

3GPP FDD incl. enhanced MS/BS tests, HSDPA, HSUPA, HSPA+ Digital Standard for R&S® Signal Generators Operating Manual



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This document describes the following software options:

- R&S®SMBV-K42/-K43/-K45/-K59
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The following abbreviations are used throughout this manual: R&S®AMU is abbreviated as R&S AMU, R&S®SMATE is abbreviated as R&S SMATE, R&S®SMBV is abbreviated as R&S SMBV, R&S®SMJ is abbreviated as R&S SMJ, R&S®SMU is abbreviated as R&S SMU, R&S®WinIQSIM2 is abbreviated as R&S WinIQSIM2, R&S®AFQ is abbreviated as R&S AFQ.

Basic Safety Instructions

Always read through and comply with the following safety instructions!

All plants and locations of the Rohde & Schwarz group of companies make every effort to keep the safety standards of our products up to date and to offer our customers the highest possible degree of safety. Our products and the auxiliary equipment they require are designed, built and tested in accordance with the safety standards that apply in each case. Compliance with these standards is continuously monitored by our quality assurance system. The product described here has been designed, built and tested in accordance with the attached EC Certificate of Conformity and has left the manufacturer's plant in a condition fully complying with safety standards. To maintain this condition and to ensure safe operation, you must observe all instructions and warnings provided in this manual. If you have any questions regarding these safety instructions, the Rohde & Schwarz group of companies will be happy to answer them.

Furthermore, it is your responsibility to use the product in an appropriate manner. This product is designed for use solely in industrial and laboratory environments or, if expressly permitted, also in the field and must not be used in any way that may cause personal injury or property damage. You are responsible if the product is used for any intention other than its designated purpose or in disregard of the manufacturer's instructions. The manufacturer shall assume no responsibility for such use of the product.

The product is used for its designated purpose if it is used in accordance with its product documentation and within its performance limits (see data sheet, documentation, the following safety instructions). Using the product requires technical skills and a basic knowledge of English. It is therefore essential that only skilled and specialized staff or thoroughly trained personnel with the required skills be allowed to use the product. If personal safety gear is required for using Rohde & Schwarz products, this will be indicated at the appropriate place in the product documentation. Keep the basic safety instructions and the product documentation in a safe place and pass them on to the subsequent users.

Observing the safety instructions will help prevent personal injury or damage of any kind caused by dangerous situations. Therefore, carefully read through and adhere to the following safety instructions before and when using the product. It is also absolutely essential to observe the additional safety instructions on personal safety, for example, that appear in relevant parts of the product documentation. In these safety instructions, the word "product" refers to all merchandise sold and distributed by the Rohde & Schwarz group of companies, including instruments, systems and all accessories.





Symbols and safety labels

							
Notice, general danger location Observe product documentation	Caution when handling heavy equipment	Danger of electric shock	Warning! Hot surface	PE terminal	Ground	Ground terminal	Be careful when handling electrostatic sensitive devices

					
ON/OFF supply voltage	Standby indication	Direct current (DC)	Alternating current (AC)	Direct/alternating current (DC/AC)	Device fully protected by double (reinforced) insulation

Tags and their meaning

The following signal words are used in the product documentation in order to warn the reader about risks and dangers.

	indicates a hazardous situation which, if not avoided, will result in death or serious injury.
	indicates a hazardous situation which, if not avoided, could result in death or serious injury.
	indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
	indicates the possibility of incorrect operation which can result in damage to the product. In the product documentation, the word ATTENTION is used synonymously.

These tags are in accordance with the standard definition for civil applications in the European Economic Area. Definitions that deviate from the standard definition may also exist in other economic areas or military applications. It is therefore essential to make sure that the tags described here are always used only in connection with the related product documentation and the related product. The use of tags in connection with unrelated products or documentation can result in misinterpretation and in personal injury or material damage.

Operating states and operating positions

The product may be operated only under the operating conditions and in the positions specified by the manufacturer, without the product's ventilation being obstructed. If the manufacturer's specifications are not observed, this can result in electric shock, fire and/or serious personal injury or death. Applicable local or national safety regulations and rules for the prevention of accidents must be observed in all work performed.

1. Unless otherwise specified, the following requirements apply to Rohde & Schwarz products: predefined operating position is always with the housing floor facing down, IP protection 2X, pollution severity 2, overvoltage category 2, use only indoors, max. operating altitude 2000 m above sea level, max. transport altitude 4500 m above sea level. A tolerance of $\pm 10\%$ shall apply to the nominal voltage and $\pm 5\%$ to the nominal frequency.
2. Do not place the product on surfaces, vehicles, cabinets or tables that for reasons of weight or stability are unsuitable for this purpose. Always follow the manufacturer's installation instructions when installing the product and fastening it to objects or structures (e.g. walls and shelves). An installation that is not carried out as described in the product documentation could result in personal injury or death.
3. Do not place the product on heat-generating devices such as radiators or fan heaters. The ambient temperature must not exceed the maximum temperature specified in the product documentation or in the data sheet. Product overheating can cause electric shock, fire and/or serious personal injury or death.

Electrical safety

If the information on electrical safety is not observed either at all to the extent necessary, electric shock, fire and/or serious personal injury or death may occur.

1. Prior to switching on the product, always ensure that the nominal voltage setting on the product matches the nominal voltage of the AC supply network. If a different voltage is to be set, the power fuse of the product may have to be changed accordingly.
2. In the case of products of safety class I with movable power cord and connector, operation is permitted only on sockets with an earthing contact and protective earth connection.
3. Intentionally breaking the protective earth connection either in the feed line or in the product itself is not permitted. Doing so can result in the danger of an electric shock from the product. If extension cords or connector strips are implemented, they must be checked on a regular basis to ensure that they are safe to use.
4. If the product does not have a power switch for disconnection from the AC supply network, the plug of the connecting cable is regarded as the disconnecting device. In such cases, always ensure that the power plug is easily reachable and accessible at all times (corresponding to the length of connecting cable, approx. 2 m). Functional or electronic switches are not suitable for providing disconnection from the AC supply network. If products without power switches are integrated into racks or systems, a disconnecting device must be provided at the system level.
5. Never use the product if the power cable is damaged. Check the power cable on a regular basis to ensure that it is in proper operating condition. By taking appropriate safety measures and carefully laying the power cable, you can ensure that the cable will not be damaged and that no one can be hurt by, for example, tripping over the cable or suffering an electric shock.
6. The product may be operated only from TN/TT supply networks fused with max. 16 A (higher fuse only after consulting with the Rohde & Schwarz group of companies).
7. Do not insert the plug into sockets that are dusty or dirty. Insert the plug firmly and all the way into the socket. Otherwise, sparks that result in fire and/or injuries may occur.
8. Do not overload any sockets, extension cords or connector strips; doing so can cause fire or electric shocks.
9. For measurements in circuits with voltages $V_{\text{rms}} > 30 \text{ V}$, suitable measures (e.g. appropriate measuring equipment, fusing, current limiting, electrical separation, insulation) should be taken to avoid any hazards.
10. Ensure that the connections with information technology equipment, e.g. PCs or other industrial computers, comply with the IEC60950-1/EN60950-1 or IEC61010-1/EN 61010-1 standards that apply in each case.
11. Unless expressly permitted, never remove the cover or any part of the housing while the product is in operation. Doing so will expose circuits and components and can lead to injuries, fire or damage to the product.
12. If a product is to be permanently installed, the connection between the PE terminal on site and the product's PE conductor must be made first before any other connection is made. The product may be installed and connected only by a licensed electrician.
13. For permanently installed equipment without built-in fuses, circuit breakers or similar protective devices, the supply circuit must be fused in such a way that anyone who has access to the product, as well as the product itself, is adequately protected from injury or damage.

Basic Safety Instructions

14. Use suitable overvoltage protection to ensure that no overvoltage (such as that caused by a bolt of lightning) can reach the product. Otherwise, the person operating the product will be exposed to the danger of an electric shock.
15. Any object that is not designed to be placed in the openings of the housing must not be used for this purpose. Doing so can cause short circuits inside the product and/or electric shocks, fire or injuries.
16. Unless specified otherwise, products are not liquid-proof (see also section "Operating states and operating positions", item 1. Therefore, the equipment must be protected against penetration by liquids. If the necessary precautions are not taken, the user may suffer electric shock or the product itself may be damaged, which can also lead to personal injury.
17. Never use the product under conditions in which condensation has formed or can form in or on the product, e.g. if the product has been moved from a cold to a warm environment. Penetration by water increases the risk of electric shock.
18. Prior to cleaning the product, disconnect it completely from the power supply (e.g. AC supply network or battery). Use a soft, non-linting cloth to clean the product. Never use chemical cleaning agents such as alcohol, acetone or diluents for cellulose lacquers.

Operation

1. Operating the products requires special training and intense concentration. Make sure that persons who use the products are physically, mentally and emotionally fit enough to do so; otherwise, injuries or material damage may occur. It is the responsibility of the employer/operator to select suitable personnel for operating the products.
2. Before you move or transport the product, read and observe the section titled "Transport".
3. As with all industrially manufactured goods, the use of substances that induce an allergic reaction (allergens) such as nickel cannot be generally excluded. If you develop an allergic reaction (such as a skin rash, frequent sneezing, red eyes or respiratory difficulties) when using a Rohde & Schwarz product, consult a physician immediately to determine the cause and to prevent health problems or stress.
4. Before you start processing the product mechanically and/or thermally, or before you take it apart, be sure to read and pay special attention to the section titled "Waste disposal", item 1.
5. Depending on the function, certain products such as RF radio equipment can produce an elevated level of electromagnetic radiation. Considering that unborn babies require increased protection, pregnant women must be protected by appropriate measures. Persons with pacemakers may also be exposed to risks from electromagnetic radiation. The employer/operator must evaluate workplaces where there is a special risk of exposure to radiation and, if necessary, take measures to avert the potential danger.
6. Should a fire occur, the product may release hazardous substances (gases, fluids, etc.) that can cause health problems. Therefore, suitable measures must be taken, e.g. protective masks and protective clothing must be worn.
7. If a laser product (e.g. a CD/DVD drive) is integrated into a Rohde & Schwarz product, absolutely no other settings or functions may be used as described in the product documentation. The objective is to prevent personal injury (e.g. due to laser beams).

Repair and service

1. The product may be opened only by authorized, specially trained personnel. Before any work is performed on the product or before the product is opened, it must be disconnected from the AC supply network. Otherwise, personnel will be exposed to the risk of an electric shock.
2. Adjustments, replacement of parts, maintenance and repair may be performed only by electrical experts authorized by Rohde & Schwarz. Only original parts may be used for replacing parts relevant to safety (e.g. power switches, power transformers, fuses). A safety test must always be performed after parts relevant to safety have been replaced (visual inspection, PE conductor test, insulation resistance measurement, leakage current measurement, functional test). This helps ensure the continued safety of the product.

Batteries and rechargeable batteries/cells

If the information regarding batteries and rechargeable batteries/cells is not observed either at all or to the extent necessary, product users may be exposed to the risk of explosions, fire and/or serious personal injury, and, in some cases, death. Batteries and rechargeable batteries with alkaline electrolytes (e.g. lithium cells) must be handled in accordance with the EN 62133 standard.

1. Cells must not be taken apart or crushed.
2. Cells or batteries must not be exposed to heat or fire. Storage in direct sunlight must be avoided. Keep cells and batteries clean and dry. Clean soiled connectors using a dry, clean cloth.
3. Cells or batteries must not be short-circuited. Cells or batteries must not be stored in a box or in a drawer where they can short-circuit each other, or where they can be short-circuited by other conductive materials. Cells and batteries must not be removed from their original packaging until they are ready to be used.
4. Keep cells and batteries out of the hands of children. If a cell or a battery has been swallowed, seek medical aid immediately.
5. Cells and batteries must not be exposed to any mechanical shocks that are stronger than permitted.
6. If a cell develops a leak, the fluid must not be allowed to come into contact with the skin or eyes. If contact occurs, wash the affected area with plenty of water and seek medical aid.
7. Improperly replacing or charging cells or batteries that contain alkaline electrolytes (e.g. lithium cells) can cause explosions. Replace cells or batteries only with the matching Rohde & Schwarz type (see parts list) in order to ensure the safety of the product.
8. Cells and batteries must be recycled and kept separate from residual waste. Rechargeable batteries and normal batteries that contain lead, mercury or cadmium are hazardous waste. Observe the national regulations regarding waste disposal and recycling.

Transport

1. The product may be very heavy. Therefore, the product must be handled with care. In some cases, the user may require a suitable means of lifting or moving the product (e.g. with a lift-truck) to avoid back or other physical injuries.

2. Handles on the products are designed exclusively to enable personnel to transport the product. It is therefore not permissible to use handles to fasten the product to or on transport equipment such as cranes, fork lifts, wagons, etc. The user is responsible for securely fastening the products to or on the means of transport or lifting. Observe the safety regulations of the manufacturer of the means of transport or lifting. Noncompliance can result in personal injury or material damage.
3. If you use the product in a vehicle, it is the sole responsibility of the driver to drive the vehicle safely and properly. The manufacturer assumes no responsibility for accidents or collisions. Never use the product in a moving vehicle if doing so could distract the driver of the vehicle. Adequately secure the product in the vehicle to prevent injuries or other damage in the event of an accident.

Waste disposal

1. If products or their components are mechanically and/or thermally processed in a manner that goes beyond their intended use, hazardous substances (heavy-metal dust such as lead, beryllium, nickel) may be released. For this reason, the product may only be disassembled by specially trained personnel. Improper disassembly may be hazardous to your health. National waste disposal regulations must be observed.
2. If handling the product releases hazardous substances or fuels that must be disposed of in a special way, e.g. coolants or engine oils that must be replenished regularly, the safety instructions of the manufacturer of the hazardous substances or fuels and the applicable regional waste disposal regulations must be observed. Also observe the relevant safety instructions in the product documentation. The improper disposal of hazardous substances or fuels can cause health problems and lead to environmental damage.

Informaciones elementales de seguridad

Es imprescindible leer y observar las siguientes instrucciones e informaciones de seguridad!

El principio del grupo de empresas Rohde & Schwarz consiste en tener nuestros productos siempre al día con los estándares de seguridad y de ofrecer a nuestros clientes el máximo grado de seguridad. Nuestros productos y todos los equipos adicionales son siempre fabricados y examinados según las normas de seguridad vigentes. Nuestro sistema de garantía de calidad controla constantemente que sean cumplidas estas normas. El presente producto ha sido fabricado y examinado según el certificado de conformidad adjunto de la UE y ha salido de nuestra planta en estado impecable según los estándares técnicos de seguridad. Para poder preservar este estado y garantizar un funcionamiento libre de peligros, el usuario deberá atenerse a todas las indicaciones, informaciones de seguridad y notas de alerta. El grupo de empresas Rohde & Schwarz está siempre a su disposición en caso de que tengan preguntas referentes a estas informaciones de seguridad.

Además queda en la responsabilidad del usuario utilizar el producto en la forma debida. Este producto está destinado exclusivamente al uso en la industria y el laboratorio o, si ha sido expresamente autorizado, para aplicaciones de campo y de ninguna manera deberá ser utilizado de modo que alguna persona/cosa pueda sufrir daño. El uso del producto fuera de sus fines definidos o sin tener en cuenta las instrucciones del fabricante queda en la responsabilidad del usuario. El fabricante no se hace en ninguna forma responsable de consecuencias a causa del mal uso del producto.

Informaciones elementales de seguridad

Se parte del uso correcto del producto para los fines definidos si el producto es utilizado conforme a las indicaciones de la correspondiente documentación del producto y dentro del margen de rendimiento definido (ver hoja de datos, documentación, informaciones de seguridad que siguen). El uso del producto hace necesarios conocimientos técnicos y ciertos conocimientos del idioma inglés. Por eso se debe tener en cuenta que el producto solo pueda ser operado por personal especializado o personas instruidas en profundidad con las capacidades correspondientes. Si fuera necesaria indumentaria de seguridad para el uso de productos de Rohde & Schwarz, encontraría la información debida en la documentación del producto en el capítulo correspondiente. Guarde bien las informaciones de seguridad elementales, así como la documentación del producto, y entréguelas a usuarios posteriores.

Tener en cuenta las informaciones de seguridad sirve para evitar en lo posible lesiones o daños por peligros de toda clase. Por eso es imprescindible leer detalladamente y comprender por completo las siguientes informaciones de seguridad antes de usar el producto, y respetarlas durante el uso del producto. Deberán tenerse en cuenta todas las demás informaciones de seguridad, como p. ej. las referentes a la protección de personas, que encontrarán en el capítulo correspondiente de la documentación del producto y que también son de obligado cumplimiento. En las presentes informaciones de seguridad se recogen todos los objetos que distribuye el grupo de empresas Rohde & Schwarz bajo la denominación de "producto", entre ellos también aparatos, instalaciones así como toda clase de accesorios.

Símbolos y definiciones de seguridad

							
Aviso: punto de peligro general Observar la documentación del producto	Atención en el manejo de dispositivos de peso elevado	Peligro de choque eléctrico	Advertencia: superficie caliente	Conexión a conductor de protección	Conexión a tierra	Conexión a masa	Aviso: Cuidado en el manejo de dispositivos sensibles a la electrostática (ESD)

					
Tensión de alimentación de PUESTA EN MARCHA / PARADA	Indicación de estado de espera (Standby)	Corriente continua (DC)	Corriente alterna (AC)	Corriente continua / Corriente alterna (DC/AC)	El aparato está protegido en su totalidad por un aislamiento doble (reforzado)

Palabras de señal y su significado

En la documentación del producto se utilizan las siguientes palabras de señal con el fin de advertir contra riesgos y peligros.



PELIGRO identifica un peligro inminente con riesgo elevado que provocará muerte o lesiones graves si no se evita.



ADVERTENCIA identifica un posible peligro con riesgo medio de provocar muerte o lesiones (graves) si no se evita.



ATENCIÓN identifica un peligro con riesgo reducido de provocar lesiones leves o moderadas si no se evita.



AVISO indica la posibilidad de utilizar mal el producto y, como consecuencia, dañarlo.

En la documentación del producto se emplea de forma sinónima el término CUIDADO.

Las palabras de señal corresponden a la definición habitual para aplicaciones civiles en el área económica europea. Pueden existir definiciones diferentes a esta definición en otras áreas económicas o en aplicaciones militares. Por eso se deberá tener en cuenta que las palabras de señal aquí descritas sean utilizadas siempre solamente en combinación con la correspondiente documentación del producto y solamente en combinación con el producto correspondiente. La utilización de las palabras de señal en combinación con productos o documentaciones que no les correspondan puede llevar a interpretaciones equivocadas y tener por consecuencia daños en personas u objetos.

Estados operativos y posiciones de funcionamiento

El producto solamente debe ser utilizado según lo indicado por el fabricante respecto a los estados operativos y posiciones de funcionamiento sin que se obstruya la ventilación. Si no se siguen las indicaciones del fabricante, pueden producirse choques eléctricos, incendios y/o lesiones graves con posible consecuencia de muerte. En todos los trabajos deberán ser tenidas en cuenta las normas nacionales y locales de seguridad del trabajo y de prevención de accidentes.

1. Si no se convino de otra manera, es para los productos Rohde & Schwarz válido lo que sigue: como posición de funcionamiento se define por principio la posición con el suelo de la caja para abajo, modo de protección IP 2X, grado de suciedad 2, categoría de sobrecarga eléctrica 2, uso solamente en estancias interiores, utilización hasta 2000 m sobre el nivel del mar, transporte hasta 4500 m sobre el nivel del mar. Se aplicará una tolerancia de $\pm 10\%$ sobre el voltaje nominal y de $\pm 5\%$ sobre la frecuencia nominal.
2. No sitúe el producto encima de superficies, vehículos, estantes o mesas, que por sus características de peso o de estabilidad no sean aptos para él. Siga siempre las instrucciones de instalación del fabricante cuando instale y asegure el producto en objetos o estructuras (p. ej. paredes y estantes). Si se realiza la instalación de modo distinto al indicado en la documentación del producto, pueden causarse lesiones o incluso la muerte.
3. No ponga el producto sobre aparatos que generen calor (p. ej. radiadores o calefactores). La temperatura ambiente no debe superar la temperatura máxima especificada en la documentación del producto o en la hoja de datos. En caso de sobrecalentamiento del producto, pueden producirse choques eléctricos, incendios y/o lesiones graves con posible consecuencia de muerte.

Seguridad eléctrica

Si no se siguen (o se siguen de modo insuficiente) las indicaciones del fabricante en cuanto a seguridad eléctrica, pueden producirse choques eléctricos, incendios y/o lesiones graves con posible consecuencia de muerte.

1. Antes de la puesta en marcha del producto se deberá comprobar siempre que la tensión preseleccionada en el producto coincida con la de la red de alimentación eléctrica. Si es necesario modificar el ajuste de tensión, también se deberán cambiar en caso dado los fusibles correspondientes del producto.
2. Los productos de la clase de protección I con alimentación móvil y enchufe individual solamente podrán enchufarse a tomas de corriente con contacto de seguridad y con conductor de protección conectado.
3. Queda prohibida la interrupción intencionada del conductor de protección, tanto en la toma de corriente como en el mismo producto. La interrupción puede tener como consecuencia el riesgo de que el producto sea fuente de choques eléctricos. Si se utilizan cables alargadores o regletas de enchufe, deberá garantizarse la realización de un examen regular de los mismos en cuanto a su estado técnico de seguridad.
4. Si el producto no está equipado con un interruptor para desconectarlo de la red, se deberá considerar el enchufe del cable de conexión como interruptor. En estos casos se deberá asegurar que el enchufe siempre sea de fácil acceso (de acuerdo con la longitud del cable de conexión, aproximadamente 2 m). Los interruptores de función o electrónicos no son aptos para el corte de la red eléctrica. Si los productos sin interruptor están integrados en bastidores o instalaciones, se deberá colocar el interruptor en el nivel de la instalación.
5. No utilice nunca el producto si está dañado el cable de conexión a red. Compruebe regularmente el correcto estado de los cables de conexión a red. Asegúrese, mediante las medidas de protección y de instalación adecuadas, de que el cable de conexión a red no pueda ser dañado o de que nadie pueda ser dañado por él, p. ej. al tropezar o por un choque eléctrico.
6. Solamente está permitido el funcionamiento en redes de alimentación TN/TT aseguradas con fusibles de 16 A como máximo (utilización de fusibles de mayor amperaje solo previa consulta con el grupo de empresas Rohde & Schwarz).
7. Nunca conecte el enchufe en tomas de corriente sucias o llenas de polvo. Introduzca el enchufe por completo y fuertemente en la toma de corriente. La no observación de estas medidas puede provocar chispas, fuego y/o lesiones.
8. No sobrecargue las tomas de corriente, los cables alargadores o las regletas de enchufe ya que esto podría causar fuego o choques eléctricos.
9. En las mediciones en circuitos de corriente con una tensión $U_{\text{eff}} > 30 \text{ V}$ se deberán tomar las medidas apropiadas para impedir cualquier peligro (p. ej. medios de medición adecuados, seguros, limitación de tensión, corte protector, aislamiento etc.).
10. Para la conexión con dispositivos informáticos como un PC o un ordenador industrial, debe comprobarse que éstos cumplan los estándares IEC60950-1/EN60950-1 o IEC61010-1/EN 61010-1 válidos en cada caso.
11. A menos que esté permitido expresamente, no retire nunca la tapa ni componentes de la carcasa mientras el producto esté en servicio. Esto pone a descubierto los cables y componentes eléctricos y puede causar lesiones, fuego o daños en el producto.

Informaciones elementales de seguridad

12. Si un producto se instala en un lugar fijo, se deberá primero conectar el conductor de protección fijo con el conductor de protección del producto antes de hacer cualquier otra conexión. La instalación y la conexión deberán ser efectuadas por un electricista especializado.
13. En el caso de dispositivos fijos que no estén provistos de fusibles, interruptor automático ni otros mecanismos de seguridad similares, el circuito de alimentación debe estar protegido de modo que todas las personas que puedan acceder al producto, así como el producto mismo, estén a salvo de posibles daños.
14. Todo producto debe estar protegido contra sobretensión (debida p. ej. a una caída del rayo) mediante los correspondientes sistemas de protección. Si no, el personal que lo utilice quedará expuesto al peligro de choque eléctrico.
15. No debe introducirse en los orificios de la caja del aparato ningún objeto que no esté destinado a ello. Esto puede producir cortocircuitos en el producto y/o puede causar choques eléctricos, fuego o lesiones.
16. Salvo indicación contraria, los productos no están impermeabilizados (ver también el capítulo "Estados operativos y posiciones de funcionamiento", punto 1). Por eso es necesario tomar las medidas necesarias para evitar la entrada de líquidos. En caso contrario, existe peligro de choque eléctrico para el usuario o de daños en el producto, que también pueden redundar en peligro para las personas.
17. No utilice el producto en condiciones en las que pueda producirse o ya se hayan producido condensaciones sobre el producto o en el interior de éste, como p. ej. al desplazarlo de un lugar frío a otro caliente. La entrada de agua aumenta el riesgo de choque eléctrico.
18. Antes de la limpieza, desconecte por completo el producto de la alimentación de tensión (p. ej. red de alimentación o batería). Realice la limpieza de los aparatos con un paño suave, que no se deshilache. No utilice bajo ningún concepto productos de limpieza químicos como alcohol, acetona o diluyentes para lacas nitrocelulósicas.

Funcionamiento

1. El uso del producto requiere instrucciones especiales y una alta concentración durante el manejo. Debe asegurarse que las personas que manejen el producto estén a la altura de los requerimientos necesarios en cuanto a aptitudes físicas, psíquicas y emocionales, ya que de otra manera no se pueden excluir lesiones o daños de objetos. El empresario u operador es responsable de seleccionar el personal usuario apto para el manejo del producto.
2. Antes de desplazar o transportar el producto, lea y tenga en cuenta el capítulo "Transporte".
3. Como con todo producto de fabricación industrial no puede quedar excluida en general la posibilidad de que se produzcan alergias provocadas por algunos materiales empleados, los llamados alérgenos (p. ej. el níquel). Si durante el manejo de productos Rohde & Schwarz se producen reacciones alérgicas, como p. ej. irritaciones cutáneas, estornudos continuos, enrojecimiento de la conjuntiva o dificultades respiratorias, debe avisarse inmediatamente a un médico para investigar las causas y evitar cualquier molestia o daño a la salud.
4. Antes de la manipulación mecánica y/o térmica o el desmontaje del producto, debe tenerse en cuenta imprescindiblemente el capítulo "Eliminación", punto 1.

5. Ciertos productos, como p. ej. las instalaciones de radiocomunicación RF, pueden a causa de su función natural, emitir una radiación electromagnética aumentada. Deben tomarse todas las medidas necesarias para la protección de las mujeres embarazadas. También las personas con marcapasos pueden correr peligro a causa de la radiación electromagnética. El empresario/operador tiene la obligación de evaluar y señalar las áreas de trabajo en las que exista un riesgo elevado de exposición a radiaciones.
6. Tenga en cuenta que en caso de incendio pueden desprenderse del producto sustancias tóxicas (gases, líquidos etc.) que pueden generar daños a la salud. Por eso, en caso de incendio deben usarse medidas adecuadas, como p. ej. máscaras antigás e indumentaria de protección.
7. En caso de que un producto Rohde & Schwarz contenga un producto láser (p. ej. un lector de CD/DVD), no debe usarse ninguna otra configuración o función aparte de las descritas en la documentación del producto, a fin de evitar lesiones (p. ej. debidas a irradiación láser).

Reparación y mantenimiento

1. El producto solamente debe ser abierto por personal especializado con autorización para ello. Antes de manipular el producto o abrirlo, es obligatorio desconectarlo de la tensión de alimentación, para evitar toda posibilidad de choque eléctrico.
2. El ajuste, el cambio de partes, el mantenimiento y la reparación deberán ser efectuadas solamente por electricistas autorizados por Rohde & Schwarz. Si se reponen partes con importancia para los aspectos de seguridad (p. ej. el enchufe, los transformadores o los fusibles), solamente podrán ser sustituidos por partes originales. Después de cada cambio de partes relevantes para la seguridad deberá realizarse un control de seguridad (control a primera vista, control del conductor de protección, medición de resistencia de aislamiento, medición de la corriente de fuga, control de funcionamiento). Con esto queda garantizada la seguridad del producto.

Baterías y acumuladores o celdas

Si no se siguen (o se siguen de modo insuficiente) las indicaciones en cuanto a las baterías y acumuladores o celdas, pueden producirse explosiones, incendios y/o lesiones graves con posible consecuencia de muerte. El manejo de baterías y acumuladores con electrolitos alcalinos (p. ej. celdas de litio) debe seguir el estándar EN 62133.

1. No deben desmontarse, abrirse ni triturarse las celdas.
2. Las celdas o baterías no deben someterse a calor ni fuego. Debe evitarse el almacenamiento a la luz directa del sol. Las celdas y baterías deben mantenerse limpias y secas. Limpiar las conexiones sucias con un paño seco y limpio.
3. Las celdas o baterías no deben cortocircuitarse. Es peligroso almacenar las celdas o baterías en estuches o cajones en cuyo interior puedan cortocircuitarse por contacto recíproco o por contacto con otros materiales conductores. No deben extraerse las celdas o baterías de sus embalajes originales hasta el momento en que vayan a utilizarse.
4. Mantener baterías y celdas fuera del alcance de los niños. En caso de ingestión de una celda o batería, avisar inmediatamente a un médico.
5. Las celdas o baterías no deben someterse a impactos mecánicos fuertes indebidos.

Informaciones elementales de seguridad

6. En caso de falta de estanqueidad de una celda, el líquido vertido no debe entrar en contacto con la piel ni los ojos. Si se produce contacto, lavar con agua abundante la zona afectada y avisar a un médico.
7. En caso de cambio o recarga inadecuados, las celdas o baterías que contienen electrolitos alcalinos (p. ej. las celdas de litio) pueden explotar. Para garantizar la seguridad del producto, las celdas o baterías solo deben ser sustituidas por el tipo Rohde & Schwarz correspondiente (ver lista de recambios).
8. Las baterías y celdas deben reciclarse y no deben tirarse a la basura doméstica. Las baterías o acumuladores que contienen plomo, mercurio o cadmio deben tratarse como residuos especiales. Respete en esta relación las normas nacionales de eliminación y reciclaje.

Transporte

1. El producto puede tener un peso elevado. Por eso es necesario desplazarlo o transportarlo con precaución y, si es necesario, usando un sistema de elevación adecuado (p. ej. una carretilla elevadora), a fin de evitar lesiones en la espalda u otros daños personales.
2. Las asas instaladas en los productos sirven solamente de ayuda para el transporte del producto por personas. Por eso no está permitido utilizar las asas para la sujeción en o sobre medios de transporte como p. ej. grúas, carretillas elevadoras de horquilla, carros etc. Es responsabilidad suya fijar los productos de manera segura a los medios de transporte o elevación. Para evitar daños personales o daños en el producto, siga las instrucciones de seguridad del fabricante del medio de transporte o elevación utilizado.
3. Si se utiliza el producto dentro de un vehículo, recae de manera exclusiva en el conductor la responsabilidad de conducir el vehículo de manera segura y adecuada. El fabricante no asumirá ninguna responsabilidad por accidentes o colisiones. No utilice nunca el producto dentro de un vehículo en movimiento si esto pudiera distraer al conductor. Asegure el producto dentro del vehículo debidamente para evitar, en caso de un accidente, lesiones u otra clase de daños.

Eliminación

1. Si se trabaja de manera mecánica y/o térmica cualquier producto o componente más allá del funcionamiento previsto, pueden liberarse sustancias peligrosas (polveros con contenido de metales pesados como p. ej. plomo, berilio o níquel). Por eso el producto solo debe ser desmontado por personal especializado con formación adecuada. Un desmontaje inadecuado puede ocasionar daños para la salud. Se deben tener en cuenta las directivas nacionales referentes a la eliminación de residuos.
2. En caso de que durante el trato del producto se formen sustancias peligrosas o combustibles que deban tratarse como residuos especiales (p. ej. refrigerantes o aceites de motor con intervalos de cambio definidos), deben tenerse en cuenta las indicaciones de seguridad del fabricante de dichas sustancias y las normas regionales de eliminación de residuos. Tenga en cuenta también en caso necesario las indicaciones de seguridad especiales contenidas en la documentación del producto. La eliminación incorrecta de sustancias peligrosas o combustibles puede causar daños a la salud o daños al medio ambiente.

Qualitätszertifikat

Certificate of quality

Certificat de qualité

Certified Quality System
ISO 9001

Certified Environmental System
ISO 14001

Sehr geehrter Kunde,

Sie haben sich für den Kauf eines Rohde&Schwarz-Produktes entschieden. Hiermit erhalten Sie ein nach modernsten Fertigungsmethoden hergestelltes Produkt. Es wurde nach den Regeln unseres Qualitätsmanagementsystems entwickelt, gefertigt und geprüft. Das Rohde&Schwarz-Qualitätsmanagementsystem ist u.a. nach ISO9001 und ISO14001 zertifiziert.

Der Umwelt verpflichtet

- ▮ Energie-effiziente, RoHS-konforme Produkte
- ▮ Kontinuierliche Weiterentwicklung nachhaltiger Umweltkonzepte
- ▮ ISO 14001-zertifiziertes Umweltmanagementsystem

Dear Customer,

You have decided to buy a Rohde&Schwarz product. You are thus assured of receiving a product that is manufactured using the most modern methods available. This product was developed, manufactured and tested in compliance with our quality management system standards. The Rohde&Schwarz quality management system is certified according to standards such as ISO9001 and ISO14001.

Environmental commitment

- ▮ Energy-efficient products
- ▮ Continuous improvement in environmental sustainability
- ▮ ISO 14001-certified environmental management system

Cher client,

Vous avez choisi d'acheter un produit Rohde&Schwarz. Vous disposez donc d'un produit fabriqué d'après les méthodes les plus avancées. Le développement, la fabrication et les tests respectent nos normes de gestion qualité. Le système de gestion qualité de Rohde&Schwarz a été homologué, entre autres, conformément aux normes ISO9001 et ISO14001.

Engagement écologique

- ▮ Produits à efficience énergétique
- ▮ Amélioration continue de la durabilité environnementale
- ▮ Système de gestion de l'environnement certifié selon ISO 14001

Customer Support

Technical support – where and when you need it

For quick, expert help with any Rohde & Schwarz equipment, contact one of our Customer Support Centers. A team of highly qualified engineers provides telephone support and will work with you to find a solution to your query on any aspect of the operation, programming or applications of Rohde & Schwarz equipment.

Up-to-date information and upgrades

To keep your instrument up-to-date and to be informed about new application notes related to your instrument, please send an e-mail to the Customer Support Center stating your instrument and your wish. We will take care that you will get the right information.

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1 Preface

1.1 Documentation Overview

The user documentation for the R&S Signal Generator consists of the following parts:

- Online Help system on the instrument,
- "Quick Start Guide" printed manual,
- Documentation CD-ROM with:
 - Online help system (*.chm) as a standalone help,
 - Operating Manuals for base unit and options,
 - Service Manual,
 - Data sheet and specifications,
 - Links to useful sites on the R&S internet.

Online Help

The Online Help is embedded in the instrument's firmware. It offers quick, context-sensitive access to the complete information needed for operation and programming. The online help contains help on operating the R&S Signal Generator and all available options.

Quick Start Guide

The Quick Start Guide is delivered with the instrument in printed form and in PDF format on the Documentation CD-ROM. It provides the information needed to set up and start working with the instrument. Basic operations and an example of setup are described. The manual includes also general information, e.g., Safety Instructions.

Operating Manuals

The Operating Manuals are a supplement to the Quick Start Guide. Operating Manuals are provided for the base unit and each additional (software) option.

These manuals are available in PDF format - in printable form - on the Documentation CD-ROM delivered with the instrument. In the Operating Manual for the base unit, all instrument functions are described in detail. Furthermore, it provides an introduction to remote control and a complete description of the remote control commands with programming examples. Information on maintenance, instrument interfaces and error messages is also given.

In the individual option manuals, the specific instrument functions of the option are described in detail. For additional information on default settings and parameters, refer to the data sheets. Basic information on operating the R&S Signal Generator is not included in the option manuals.

These manuals can also be ordered in printed form (see ordering information in the data sheet).

Service Manual

The Service Manual is available in PDF format - in printable form - on the Documentation CD-ROM delivered with the instrument. It describes how to check compliance with rated specifications, on instrument function, repair, troubleshooting and fault elimination. It contains all information required for repairing the instrument by the replacement of modules.

This manual can also be ordered in printed form (see ordering information in the data sheet).

Release Notes

The release notes describe new and modified functions, eliminated problems, and last minute changes to the documentation. The corresponding firmware version is indicated on the title page of the release notes. The current release notes are provided in the Internet.

1.2 Typographical Conventions

The following text markers are used throughout this documentation:

Convention	Description
"Graphical user interface elements"	All names of graphical user interface elements on the screen, such as dialog boxes, menus, options, buttons, and softkeys are enclosed by quotation marks.
KEYS	Key names are written in capital letters.
File names, commands, program code	File names, commands, coding samples and screen output are distinguished by their font.
<i>Input</i>	Input to be entered by the user is displayed in italics.
Links	Links that you can click are displayed in blue font.
"References"	References to other parts of the documentation are enclosed by quotation marks.

2 Introduction

The R&S Signal Generator provides you with the ability to generate signals in accordance with the WCDMA standard 3GPP FDD.

Option K43 3GPP FDD enhanced MS/BS tests incl. HSDPA extends the 3GPP FDD signal generation with simulation of high speed channels in the downlink (HS-SCCH, HS-PDSCH) and the uplink (HS-DPCCH) and with dynamic power control in real time. HSDPA (high speed downlink packet access) mode enhances the 3GPP FDD standard by data channels with high data rates especially for multi media applications.

Option K45 3GPP HSUPA extends the 3GPP FDD signal generation with full HSUPA (high speed uplink packet access) support. Option K59 3GPP FDD HSPA+ extends the HSDPA and/or HSUPA signal generation with HSPA+ features in the downlink and uplink.

WCDMA (Wideband CDMA) describes a group of mobile radio communication technologies, the details of which differ greatly. The R&S Signal Generator supports the 3GPP FDD standard developed by the 3GPP ("3rd Generation Partnership Project") standardization committee. The standard is implemented in accordance with Release 9. The signals can also be set to be compatible with previous releases, by not using the new functions of later releases (e.g. no HSDPA channels). Details can be found in the relevant releases of the standard.

The R&S Signal Generator generates the 3GPP FDD signals in a combination of realtime mode (enhanced channels) and arbitrary waveform mode. Channel coding and simulation of bit and block errors can be activated for the enhanced channels of Release 99 and for H-Sets 1-5 generated in realtime. Channel coding can also be activated for HSDPA/HSPA+ H-Sets and all HSUPA/HSPA+ FRC channels which are generated in arbitrary wave mode. Data lists can also be used for the data and TPC fields. The enhanced state of realtime channels can be switched off to generate specific test scenarios. In arbitrary waveform mode, the signal is first calculated and then output.

The R&S Signal Generator simulates 3GPP FDD at the physical channel level and also at the transport layer level for all channels for which channel coding can be activated.

The following list gives an overview of the functions provided by the R&S Signal Generator for generating a 3GPP FDD signal (Option K42):

- Configuration of up to 4 base stations and 4 user equipment.
- Combination of realtime mode (enhanced channels) and arbitrary waveform mode
- All special channels and up to 512 channels on the downlink, except HSDPA, HSUPA and HSPA+
- Various test models and pre-defined settings for the uplink and the downlink
- Modulation 16QAM and 64QAM (downlink) for configuring high-speed channels in continuous mode (test model 5&6, HSDPA)
- Clipping for reducing the crest factor
- Misuse TPC" parameter for varying the original normal transmit power over time
- Simulation of up to 128 additional user equipment

The following functions are provided specifically for the receiver test:

- Realtime generation of up to 4 code channels with the option of using data lists for the data and TPC fields
- Channel coding of the reference measurement channels, AMR and BCH in realtime
- Feeding through of bit errors (to test a BER tester) and block errors (to test a BLER tester)
- Simulation of orthogonal channel noise (OCNS in accordance with TS 25.101)
- Presettings in accordance with 3GPP specifications
- HSDPA Downlink in continuous mode (test model 5&6 for TX tests)

The following functions are provided by extension K43 Enhanced BS/MS Tests Including HSDPA:

- HSDPA uplink
- HSDPA downlink (packet mode and H-Set mode without CPC, 64QAM and MIMO)
- Dynamic Power Control
- Predefined and user-definable H-Sets
- Assistance in the setting of the appropriate sequence length for arbitrary waveform mode

The following functions are provided by extension K45 3GPP FDD HSUPA:

- HSUPA Downlink (RX measurements on 3GPP FDD UEs with correct timing)
- HSUPA Uplink (RX measurements on 3GPP FDD Node BS supporting HSUPA)
- HSUPA HARQ Feedback support

The following functions are provided by extension K59 3GPP FDD HSPA+:

- Downlink 64QAM with channel coding
- Uplink 16QAM (4PAM)
- Downlink MIMO
- Uplink ACK/PCI/CQI feedback for downlink MIMO and/or Dual Cell HSDPA
- CPC in downlink (HS-SCCH less operation, Enhanced F-DPCH) and uplink (UL-DTX, Uplink DPCCH slot format 4)
- Support for the generation of 3i OCNS and for randomly varying modulation and the number of HS-PDSCH channels in H-Set over time (type 3i enhanced performance requirements tests).

Parameter	Value
Chip rate	3.84 Mcps
Channel types	Downlink: <ul style="list-style-type: none"> • Primary Common Pilot Channel (P-CPICH) • Secondary Common Pilot Channel (S-CPICH) • Primary Sync Channel (P-SCH) • Secondary Sync Channel (S-SCH) • Primary Common Control Phys. Channel (P-CCPCH) • Secondary Common Control Phys. Channel (S-CCPCH) • Page Indication Channel (PICH) • Acquisition Indication Channel (AICH) • Access Preamble Acquisition Indication Channel (AP-AICH) • Collision Detection Acquisition Indication Channel (CD-AICH) • Phys. Downlink Shared Channel (PDSCH) • Dedicated Physical Control Channel (DL-DPCCH) • Dedicated Phys. Channel (DPCH) • High Speed Shared Control Channel (HS-SCCH) • High Speed Physical Downlink Shared Channel (HS-PDSCH), Modulation QPSK, 16 QAM or 64QAM • HSUPA channels (E-AGCH, E-RGCH, E-HICH, F-DPCH) Uplink: <ul style="list-style-type: none"> • Phys. Random Access Channel (PRACH) • Phys. Common Packet Channel (PCPCH) • Dedicated Physical Control Channel (DPCCH) • Dedicated Physical Data Channel (DPDCH) • High Speed Dedicated Physical Control Channel (HS-DPCCH) • E-DCH Dedicated Physical Control Channel (E-DPCCH) • E-DCH dedicated physical data channel (E-DPDCH)
Symbol rates	7.5ksps, 15ksps, 30ksps to 960ksps depending on the channel type (downlink) 15ksps, 30ksps, 60ksps to 1920ksps depending on the channel type (uplink)
Channel count	In downlink 4 base stations each with up to 128 DPCHs and 11 special channels. In uplink 4 user equipment either with PRACH or PCPCH or a combination of DPCCH, up to 6 DPDCH, HS-DPCCH, E-DPCCH and up to 4 E-DPDCH channels.
Frame structure	Timeslot: 0.667ms, Subframe: 3 timeslots = 2 ms Radio frame: 15 timeslots = 10ms The frame structure in symbols depends on the symbol rate.
Scrambling code	Downlink: 18 bit M sequence Uplink: 25 bit M sequence in long mode and 8 bit M sequence in short mode
Channelization code for most of the channel types	"Orthogonal Variable Spreading Factor Code (OVSF)" square matrix of dimension chip rate/symbol rate

3 Modulation System 3GPP FDD

The following block diagram shows the components of the 3GPP FDD transmission system.

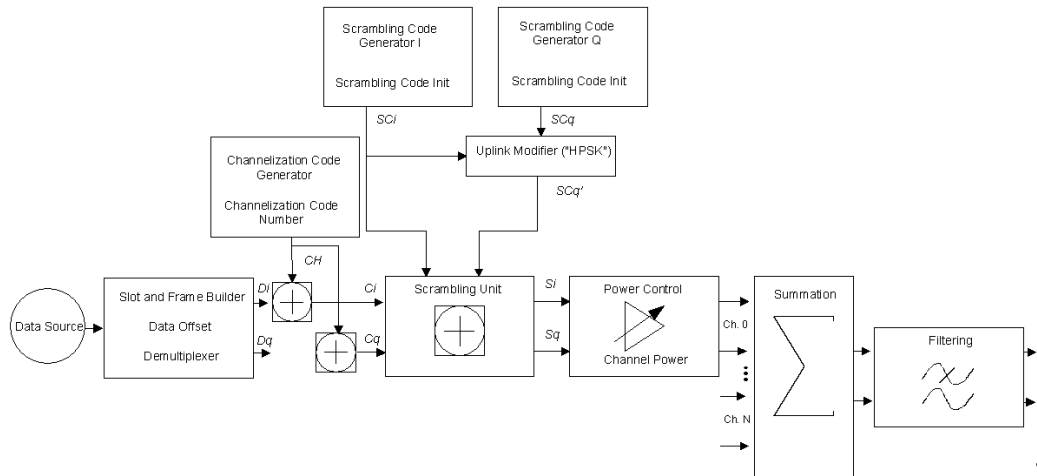


Fig. 3-1: Components of the 3GPP FDD transmission system

3.1 Scrambling Code Generator

The scrambling code generator (previously called long code generator) is used to scramble the chip sequence as a function of the transmitter.

Depending on the link direction and mode (long or short), the structure and initialization regulation of the generator are different.

3.1.1 Downlink Scrambling Code Generator

This generator consists of a pair of shift registers from which the binary sequences for inphase and orthogonal component of the scrambling code are determined. The [figure 3-2](#) shows that the I component is produced as EXOR operation of the LSB outputs, whereas the register contents are first masked and read out for the Q component and then EXORed.

Table 3-1: Generator polynomials of the downlink scrambling code generators

Shift register 1	$x^{18}+x^7+1$
Shift register 2	$x^{18}+x^{10}+x^7+x^5+1$

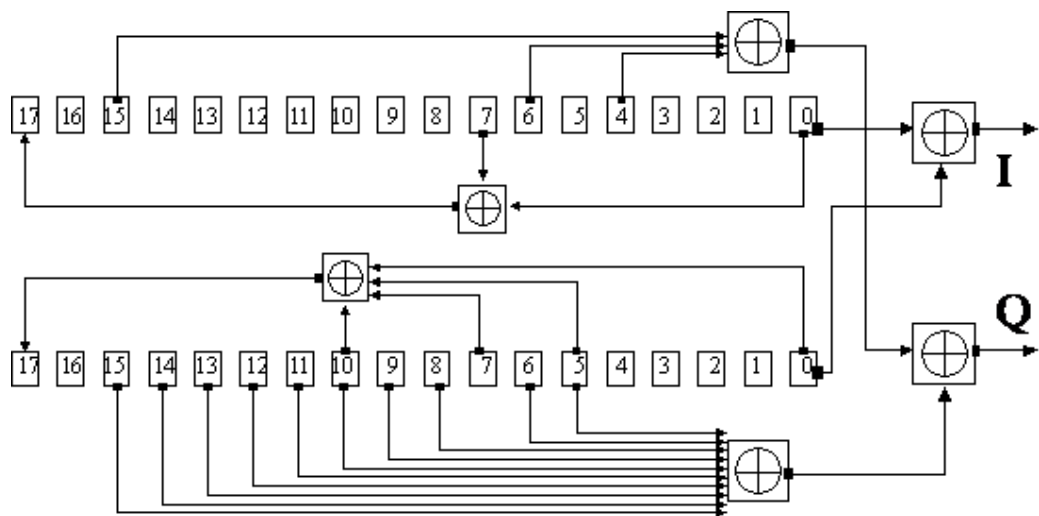


Fig. 3-2: Structure of downlink scrambling code generator

The shift registers are initialized by loading shift register 1 with "0...01" and shift register 2 completely with "1". In addition, shift register 1 is wound forward by n cycles, n being the scrambling code number or Scrambling Code (SC) for short.

After a cycle time of one radio frame the generators are reset, i.e. the above initialization is carried out again.

3.1.2 Uplink Scrambling Code Generator

In the uplink, a differentiation is made between two SC modes. The long SC, on the one hand, can be used for all types of channel. The short SC, on the other hand, can be used as an alternative to the long SC for all channels except PRACH and PCPCH.

Uplink long scrambling code

Principally, the code generator of the long SC in the uplink is of the same structure as the SC in the downlink. However, the generator polynomials of the shift registers and the type of initialization are different.

Table 3-2: Generator polynomials of the uplink long scrambling code generator

Shift register 1	$x^{25}+x^3+1$
Shift register 2	$x^{25}+x^3+x^2+x+1$

The shift registers are initialized by allocating 1 to shift register 1 bit number 24 and the binary form of the scrambling code number n to bits 23 to 0. Shift register 2 is completely loaded with "1".

The read-out positions for the Q component are defined such that they correspond to an IQ offset of 16.777.232 cycles.

After a cycle time of one radio frame the generators are reset, i.e. the above initialization is carried out again.

Uplink short scrambling code

The code generator of the short SC in the uplink consists of a total of 3 coupled shift registers.

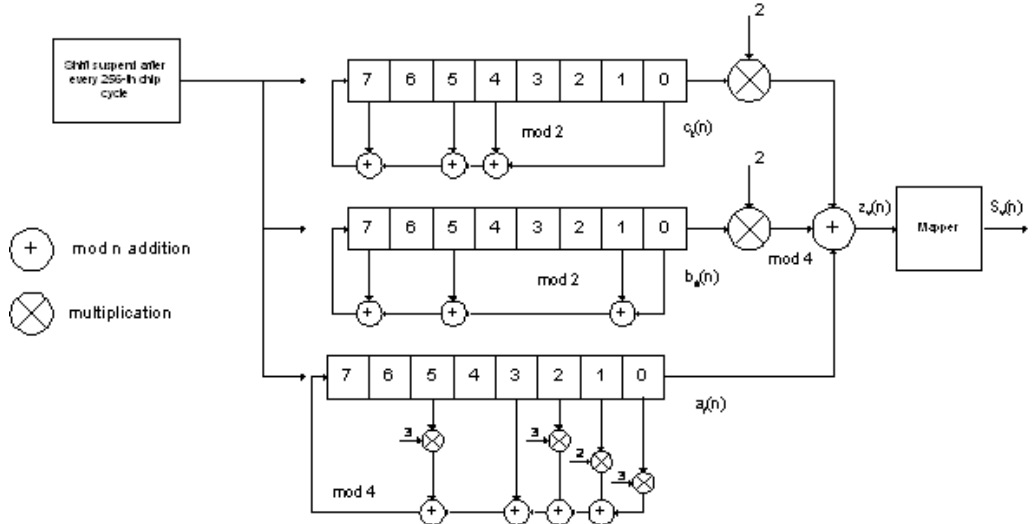


Fig. 3-3: Structure of uplink short scrambling code generator

Table 3-3: Generator polynomials of uplink short scrambling code generator

Shift register 1 (binary)	$x^8+x^7+x^5+x^4+1$
Shift register 2 (binary)	$x^8+x^7+x^5+x+1$
Shift register 3 (quaternary)	$x^8+x^5+3x^3+x^2+2x+1$

The output sequences of the two binary shift registers are weighted with factor 2 and added to the output sequence of the quaternary shift register (Modulo 4 addition). The resulting quaternary output sequence is mapped into the binary complex level by the mapper block.

For initialization of the three 8-bit shift registers (in a modified way) the binary form of the 24-bit short SC number n is used, for details see 3GPP TS 25 213, Spreading and Modulation.

Table 3-4: Mapping of the quaternary output sequence into the binary IQ level

$z_v(n)$	$S_v(n)$
0	$+1 + j1$
1	$-1 + j1$
2	$-1 - j1$
3	$+1 - j1$

Preamble scrambling code generator

When generating the preambles of the PRACH and PCPCH a special SC is used. It is based on the Long SC described under a), however only the I component is taken and subsequently a pointer ($e^{j(\pi/4 + \pi/4 * k)}$, $k=0$ to 4095) modulated upon it.

Modification of the long and short scrambling code output sequence

The scrambling code sequence of the Q component is modified as standard to reduce the crest factor of the signal. Zero-crossings can thus be avoided for every second cycle. (This method is often called "HPSK").

For details see 3GPP TS 25 213, Spreading and Modulation. R&S Signal Generator makes use of a decimation factor of 2.

3.2 Scrambling Unit

In the scrambling unit, the output of the scrambling code generator is linked with spread symbols. If the input signal and the scrambling code signal are interpreted as complex signal ($C_i, C_q, SC_i, SC_q' \in \{-1, +1\}$), the output signal is a complex multiplication of the two signals:

$$S_i + j S_q = (C_i + j C_q) * (SC_i + j SC_q')$$

and the following equations apply

$$S_i = C_i SC_i - C_q SC_q'$$

$$S_q = C_i SC_q' + C_q SC_i$$

The signal thus obtained can be interpreted as a QPSK signal with the following constellation diagram:

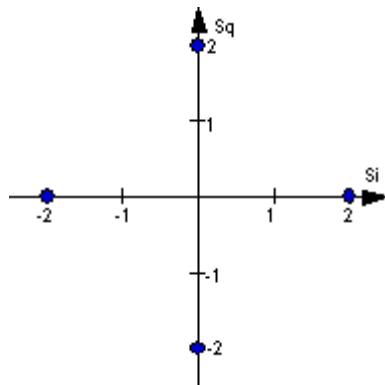


Fig. 3-4: Constellation diagram of a channel with 0 dB power



There are auxiliary conditions for some types of channels that may result in different constellation diagrams. If, for instance, symbols of the SCH are coded, a BPSK constellation is obtained without the scrambling unit.

Furthermore, with HSDPA and HSPA+, the higher order modulations 4PAM, 16QAM and 64QAM were introduced.

3.3 Channelization Code Generator

The channelization code generator cyclically outputs a channel-specific bit pattern. The length of the cycle corresponds to the period of the source symbol to be spread, i.e. the number of bits corresponds to the spread factor. The spreading sequence for the I and Q branch is identical (real value). Spreading is a simple EXOR operation.

Two different channelization code generators are used depending on the type of channel:

Channelization code generator for all channels except SCH

Due to this channelization code the channel separation takes place in the sum signal. The channelization code number is the line of an orthogonal spreading matrix which is generated according to an iterative scheme ("OVSF").

Channelization code generator SCH

This generator replaces the one described above if the synchronization code symbol of the SCH channels is spread.

The spreading matrix is replaced by a method that forms the spreading sequence from a Hadamard sequence and a statistical sequence. For details see 3GPP TS 25 213.

3.4 Data Source

The data and TPC fields of the enhanced channels (realtime channels) can be filled from data lists containing data defined by the user. This allows user information from the physical layer or from higher layers such as the transport layer to be introduced into the signal generation process.

The choice of data sources is crucially important for the signal characteristics. The constellation diagram and the crest factor in particular are modeled to a great extent by a suitable choice of data.

3.5 Slot and Frame Builder

The bits from the data source are first entered into a frame structure. The frames are made up of three hierarchical levels:

Table 3-5: Hierarchical structure of 3GPP FDD frames

Hierarchy	Length in ms	Remarks
Timeslot	0,667	
Subframe	2 ms	One subframe consists of 3 timeslots.
Radio frame	10	After a radio frame, pilot symbols are repeated. One radio frame consists of 15 timeslots. A frame is also the length of a scrambling code cycle. Frames are the basic unit in R&S Signal Generator. The sequence length is stated in radio frames.

The configuration of the timeslots depends on the channel type and symbol rate. The following components are distinguished:

- **Pilot sequence**
The pilot sequence characterizes the timeslot position within the radio frame and also depends on the symbol rate, transmit diversity and the pilot length parameter. Channel types DPCH, S-CCPCH, DL-DPCCH, DPCCH, PRACH and PCPCH have a pilot sequence.
The pilot sequence cannot be changed by the user.
- **Synchronization code symbol**
The synchronization code symbol is the only symbol of the SCH.
- **TPC symbol**
This symbol is used to control the transmit power. It is used in DPCH, DL-DPCCH and DPCCH.
A bit pattern for the sequence of TPC symbols can be indicated as a channel-specific pattern.
- **Data symbols**
These symbols carry the user information and are fed from the data source. They are used in DPCH, P-CCPCH, S-CCPCH, PDSCH, E-AGCH, E-RGCH, E-HICH, DPDCH, PRACH, PCPCH, HS-PDSCH and E-DPDCH.
- **Signature**
The signature is used in PRACH and PCPCH. 16 fixed bit patterns are defined of which the user may select one.
- **TFCI**
The "Transport Format Combination Indicator" is used in DPCH/DPCCH if the state is set to On. In this case, a code sequence with the length of 30 is defined using this value and distributed among 15 subsequent timeslots. In PRACH and PCPCH, the TFCI field is provided as standard.
- **FBI**
Feedback indication bits are only used in DPCCH and PCPCH.

3.6 Timing Offset

The symbol stream can be shifted in time relative to the other channels. For this purpose a timing offset can be entered into the channel table, stating the range of shifting in mul-

titles of 256 chips. Since the generator does not generate infinite symbol streams like a real-time system, this offset is implemented as a rotation.

Example:

DPCH 30 ksps, 1 timeslot, timing offset = 2;

2 x 256 chips = 512 chip offset;

4 data symbols shifting at a symbol rate of 30 ksps (1 symbol corresponds to 3.84 Mcps / 30 ksps = 128 chips).

previously:

11	11	11	11	00	01	10	11	00	10	01	11	11	01	00	01	10	11	01	00
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

afterwards:

10	11	01	00	11	11	11	11	00	01	10	11	00	10	01	11	11	01	00	01
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

The use of the timing offset usually causes a reduction of the crest factor of the total signal, since it is not always the same spreading chips (channelization chips) CH and scramble chips SC_i/SC_q that are applied to the pilot sequences of the channels.

3.7 Demultiplexer

In the downlink, the symbol stream is divided into two bit streams D_i and D_q prior to processing in the spreading unit. For example, if QPSK modulation is used for a channel, the symbol stream is divided by allocating bits 1, 3, 5, to 2n-1 to the in-phase bit stream D_i, and bits 2, 4, 6, 2n to the quadrature bit stream D_q.

For the above example with timing offset:

$$D_i = 1\ 1\ 0\ 0\ 1\ 1\ 1\ 1\ 0\ 0\ 1\ 1\ 0\ 1\ 0\ 1\ 1\ 0\ 0\ 0$$

$$D_q = 0\ 1\ 1\ 0\ 1\ 1\ 1\ 1\ 0\ 1\ 0\ 1\ 0\ 0\ 1\ 1\ 1\ 1\ 0\ 1$$

(left-hand bit is always the first one in the time sequence)

In the uplink, independent data are used for the two paths.

PRACH/PCPCH:	Preamble : signature parallel to I and Q
	Message part : data to I, pilot, TPC and TFCI to Q
DPCCH/E-DPCCH:	all bits to I, Q always unused
DPDCH/HS-DPCCH/E-DPDCH:	all bits are always to I or Q (dependent on channel number), the other path is unused.

3.8 Power Control

After spreading and scrambling, a channel-specific power factor p is applied to the signal. A value of -6 dB therefore results in half the level (or $1/4$ power) and the following diagram (DPCH):

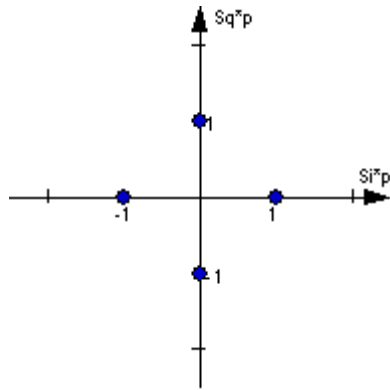


Fig. 3-5: Constellation diagram of a channel with -6 dB power

3.9 Summation and Filtering

After application of the channel power, the components of the individual channels are summed up.

The constellation diagram of the sum signal is obtained by superposition of the diagrams of the individual channels. If the signal consists of two channels with a power of -6 dB and -12 dB and each channel contains independent source data (DPCH), the following constellation diagram is obtained:

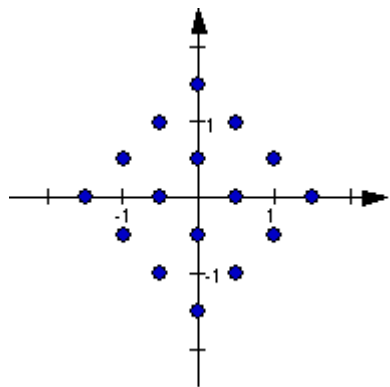


Fig. 3-6: Constellation diagram of a 3GPP W-CDMA signal with two DPCH channels

3.10 Multicode

3GPP FDD supports multicode transmission for downlink-dedicated physical channels (DPCH).

This form of transmission is used for channels intended for the same receiver, i.e. those receivers that belong to a radio link. The first channel of this group is used as a master channel.

Shared parts (pilot, TPC and TCFI) are spread for all channels using the spreading code of the master channel.



Instead of changing the spreading code within a slot several times, the master code rather than the shared parts can be sent at higher power. The other channels then have to be blanked out correspondingly.

3.11 HARQ Feedback



R&S SMBV instruments do not support HARQ Feedback.

The HARQ Feedback functionality extends the R&S Signal Generator option 3GPP FDD in order to meet the requirements defined in 3GPP TS 25.141, chapter 8.12 and 8.13.

This allows the user to dynamically control the transmission of the HSUPA fixed reference channels (FRC 1-7), the HSPA+ fixed reference channel (FPC 8) and the user defined fixed reference channels. An ACK from the base station leads to the transmission of a new packet while a NACK forces the R&S Signal Generator to retransmit the packet with a new channel coding configuration (i.e. new redundancy version RV) of the concerned HARQ process.

3.11.1 Limitations

Although an arbitrary data source can be selected, the same user data is used for all HARQ processes and for all retransmissions.

Example:

If FRC4 is configured and the data source is set to PN9, then the first 5076 bits of the PN9 are used as input for all four HARQ processes, regardless of which retransmission is performed. Note that the bitstream after channel coding of course is different for different retransmissions due to different redundancy versions.

Furthermore, "DTX-Mode" and "Bit-Error-Insertion/Block-Error-Insertion" are not available in this mode.

3.11.2 Setup

If an instrument with fading simulation is available, no more test equipment is needed in order to fulfill the test setup described in 3GPP TS 25.141, Annex B.3.4.

As the instrument has no RF input available, the HARQ feedback from the base station is expected as a TTL signal. The instrument provides two input connectors for this signal, the LEVATT connector on the external AUX I/O BNC adapter board R&S SMx-Z5 and the USER 1 connector on the instrument. Use the parameter [Connector \(HARQ\)](#) to enable the currently used one in each baseband.

A high level (TTL) is interpreted as an ACK, while a low level corresponds to a NACK. Use the parameter [ACK Definition \(HARQ\)](#) to re-define it.

3.11.3 Timing

In general, the ACK/NACK feedback from the base station should be available at the selected instrument's connector (LEVATT or the USER 1) with the same timing the E-HICH is transmitted. The instrument will read out this port at time T_{SMx} after the start of the HARQ process the feedback is related to (see [figure 3-7](#)). The user is able to adjust this time via the parameter [Additional User Delay](#) parameter. The signal should be constant on this instrument's input for 0.5 ms before and after the defined point in time.

As it probably takes some time for the base station to be synchronized to the signal transmitted from the instrument, the ACK/NACK feedback should be NACK during this period, in order to force the instrument to retransmit the packets, until the first packet is read out correctly from the base station.

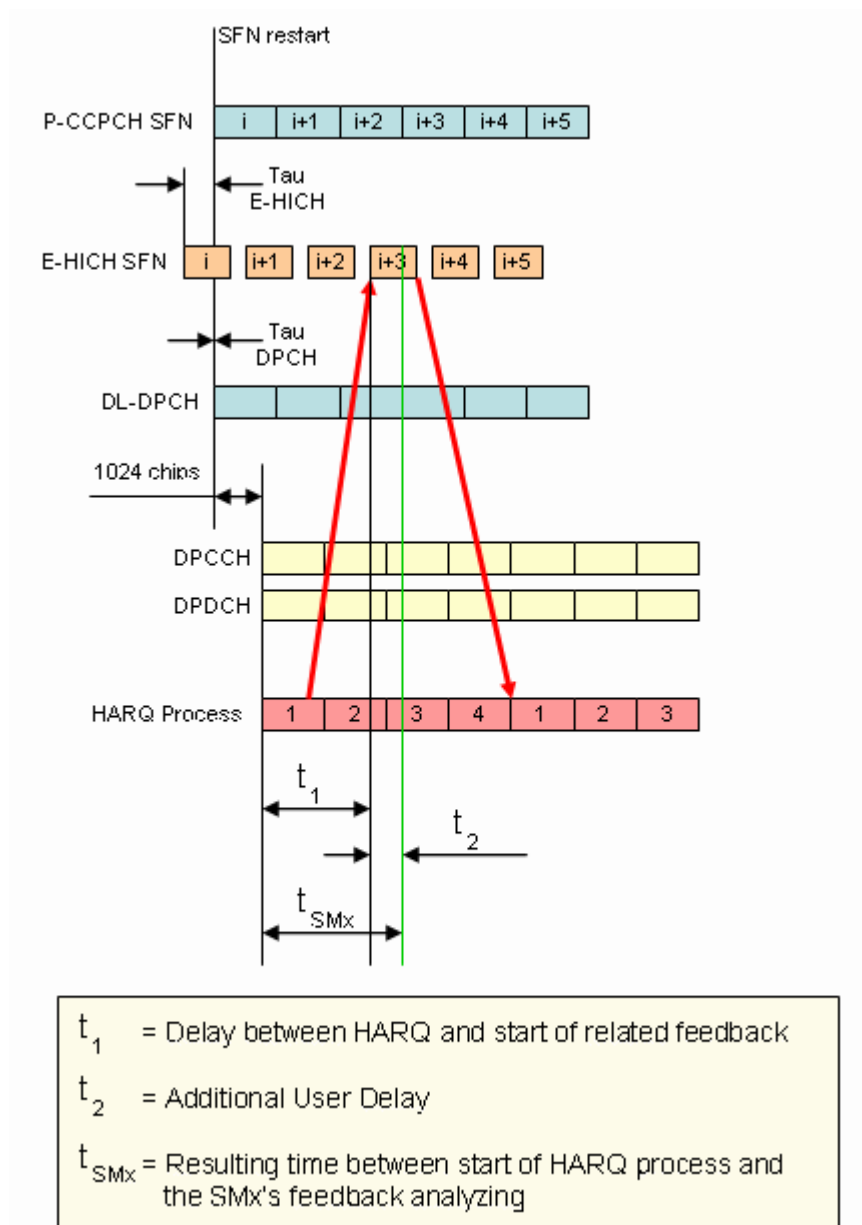


Fig. 3-7: Timing diagram for TTI 10ms, $\tau_{dpch} = 0$, $\tau_{E-HICH} = -7$ slots

3.12 HS-SCCH less operation

HS-SCCH less operation is a special HSDPA mode of operation which reduces the HS-SCCH overhead and reduces UE battery consumption. It changes the conventional structure of HSDPA data reception. In HSDPA as defined from 3GPP release 5 onwards, UE is supposed to read continuously HS-SCCH where data allocations are being signaled. The UE is being addressed via a UE specific identity (16 bit H-RNTI / HSDPA Radio Network Temporary Identifier) on HS-SCCH. As soon as the UE detects relevant

control information on HS-SCCH it switches to the associated HS-PDSCH resources and receives the data packet.

This scheme is fundamentally changed in HS-SCCH less operation and HS-SCCH less operation is optimized for services with relatively small packets, e.g. VoIP.

In HS-SCCH less operation mode, the base station can decide for each packet again whether to apply HS-SCCH less operation or not, i.e. conventional operation is always possible.

The first transmission of a data packet on HS-DSCH is done without an associated HS-SCCH. The first transmission always uses QPSK and redundancy version $X_{rv} = 0$. Only four pre-defined transport formats can be used so the UE can blindly detect the correct format. The four possible transport formats are configured by higher layers. Only pre-defined channelization codes can be used for this operation mode and are configured per UE by higher layers: the parameter HS-PDSCH code index provides the index of the first HS-PDSCH code to use. For each of the transport formats, it is configured whether one or two channelization codes are required.

In order to allow detection of the packets on HS-DSCH, the HS-DSCH CRC (Cyclic Redundancy Check) becomes UE specific based on the 16 bit HRNTI. This is called CRC attachment method 2 (CRC attachment method 1 is conventional as of 3GPP release 5).

In case of successful reception of the packet, the UE will send an ACK on HS-DPCCH. If the packet was not received correctly, the UE will send nothing.

If the packet is not received in the initial transmission, the base station may retransmit it. The number of retransmissions is limited to two in HS-SCCH less operation.

In contrast to the initial transmission, the retransmissions are using HS-SCCH signaling. However, the coding of the HS-SCCH deviates from release 5, since the bits on HS-SCCH are re-interpreted. This is called HS-SCCH type 2. The conventional HS-SCCH as of 3GPP release 5 is called HS-SCCH type 1.

3.12.1 HS-SCCH Type 2

The table below gives a comparison of the HS-SCCH Type 1 (normal operation) and HS-SCCH Type 2 (Less Operation) formats.

Table 3-6: Comparison of HS-SCCH Type 1 and Type 2

HS-SCCH Type 1 (normal operation)	HS-SCCH Type 2 (less operation)
Channelization code set information (7 bits)	Channelization code set information (7 bits)
Modulation scheme information (1 bit)	Modulation scheme information (1 bit)
Transport block size information (6 bits)	Special Information type (6 bits)
HARQ process information (3 bits)	Special Information (7 bits)
Redundancy and constellation version (3 bits)	UE identity (16 bits)
New data indicator (1 bit)	
UE identity (16 bits)	

The Special Information type on HS-SCCH type 2 must be set to 111110 to indicate HS-SCCH less operation. The 7 bits Special information then contains:

- 2 bit transport block size information (one of the four possible transport block sizes as configured by higher layers)
- 3 bit pointer to the previous transmission of the same transport block (to allow soft combining with the initial transmission)
- 1 bit indicator for the second or third transmission
- 1 bit reserved.

QPSK is also used for the retransmissions. The redundancy version X_{rv} for the second and third transmissions shall be equal to 3 and 4, respectively.

For the retransmissions, also HS-DSCH CRC attachment method 2 is used.

ACK or NACK are reported by the UE for the retransmitted packets.

3.12.2 HS-SCCH Type 2 Fixed Reference Channel: H-Set 7

In order to support HS-SCCH Type 2 (Less Operation) testing, a fixed reference channel has been introduced. H-Set 7 is specified as reference test channel for HSDPA test cases.

The H-Set 7 consists of one HS-PDSCH and its parameterization and coding chain is based on 1 code with QPSK modulation and one HARQ process.

3.13 Higher Order Modulation

3.13.1 64QAM in downlink

With the possibility to use 64QAM in downlink, HSPA+ can achieve downlink data rates of 21 Mbps. This theoretical peak data rate (physical channel bit rate) with 64QAM is calculated as follow:

$$\text{Peak data rate (64QAM)} = 15 [\text{codes}] * 2880 \text{ bits} / 2 \text{ ms} [\text{subframe}] = 21.6 \text{ MBps}$$

3.13.2 64QAM Fixed Reference Channel: H-Set 8

In order to support 64QAM testing, a fixed reference channel has been introduced. H-Set 8 is specified as reference test channel for HSPA+ test cases.

The H-Set 8 parameterization and coding chain is based on 15 codes with 64QAM modulation. Six Hybrid ARQ processes are used, and HS-DSCH is continuously transmitted.

3.13.3 16QAM in uplink

With the possibility to use 16QAM on E-DCH (Enhanced Dedicated Channel) in uplink, HSPA+ can achieve uplink peak data rates of 11.5 Mbps. A new uplink UE category 7 has been introduced which supports 16QAM in addition to BSPK.

Uplink transmission in HSPA+ is based on IQ multiplexing of E-DPDCH (Enhanced Dedicated Physical Data Channel) physical channels as in HSUPA of 3GPP release 6. In fact, the 16QAM constellation is made up of two orthogonal 4PAM (pulse amplitude modulation) constellations. In case of 4PAM modulation, a set of two consecutive binary symbols n_k, n_{k+1} is converted to a real valued sequence following the mapping described in the table below.

Table 3-7: Mapping of E-DPDCH with 4PAM modulation

n_k, n_{k+1}	00	01	10	11
Mapped real value	0.4472	1.3416	-0.4477	-1.3416

This results in the following symbol mapping:



An E-DPDCH may use BPSK or 4PAM modulation symbols.

3.13.4 16QAM Fixed Reference Channel: FRC 8

To support 16QAM (4PAM) testing in the uplink, a E-DPDCH fixed reference channel (FRC 8) has been introduced.

The FRC 8 parameterization and channel coding is based on four Physical Channel Codes (2xSF2 and 2xSF4) with overall symbol rate of $2 \times 960 + 2 \times 1920$ ksp/s, 4PAM modulation and E-DCH TTI of 2 ms. Eight Hybrid ARQ processes are used.

3.14 MIMO in HSPA+

HSPA+ uses full MIMO approach including spatial multiplexing. The approach is called D-TxAA (Double Transmit Antenna Array). It is only applicable for the High Speed Downlink Shared Channel, the HS-DSCH.

The figure below shows the basic principle of the 2x2 approach. The figure is taken from 3GPP TS 25.214.

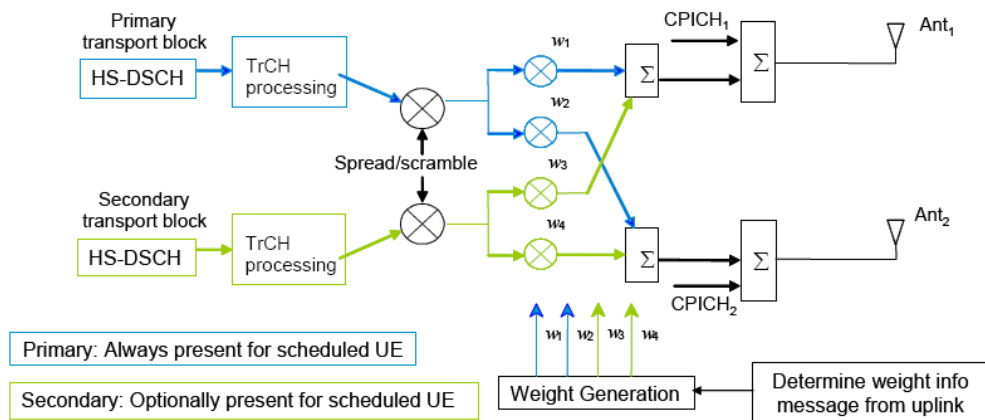


Fig. 3-8: MIMO for HSPA+

With D-TxAA, two independent data streams (transport blocks) can be transmitted simultaneously over the radio channel over the same WCDMA channelization codes. Each transport block is processed and channel coded separately. After spreading and scrambling, **precoding** based on weight factors is applied to optimize the signal for transmission over the mobile radio channel.

Four precoding weights w_1 - w_4 are available. The first stream is multiplied with w_1 and w_2 , the second stream is multiplied with w_3 and w_4 . The weights can take the following values:

$$w_3 = w_1 = 1/\sqrt{2},$$

$$w_4 = -w_2,$$

$$w_2 \in \left\{ \frac{1+j}{2}, \frac{1-j}{2}, \frac{-1+j}{2}, \frac{-1-j}{2} \right\}$$

Precoding weight w_1 is always fixed, and only w_2 can be selected by the base station. Weights w_3 and w_4 are automatically derived from w_1 and w_2 , because they have to be orthogonal.

3.14.1 D-TxAA Feedback signaling: PCI and CQI

D-TxAA requires a **feedback signaling** from the UE to assist the base station in taking the right decision in terms of modulation and coding scheme and precoding weight selection. The UE has to determine the preferred primary precoding vector for transport block 1 consisting of w_1 and w_2 . Since w_1 is fixed, the feedback message only consists of a proposed value for w_2 . This feedback is called **precoding control information (PCI)**. The UE also recommends whether one or two streams can be supported in the current channel situation. In case dual stream transmission is possible, the secondary precoding vector consisting of weights w_3 and w_4 is inferred in the base station, because it has to be orthogonal to the first precoding vector with w_1 and w_2 . Thus, the UE does not have to report it explicitly. The UE also indicates the optimum modulation and coding scheme for each stream. This report is called **channel quality indicator (CQI)**.

Based on the composite PCI/CQI reports, the base station scheduler decides whether to schedule one or two data streams to the UE and what packet sizes (transport block sizes) and modulation schemes to use for each stream.

3.14.2 MIMO downlink control channel support

In order to support MIMO operation, changes to the HSDPA downlink control channel have become necessary, i.e. the HS-SCCH.

There is a new **HS-SCCH Type 3** for MIMO operation defined. The table below gives a comparison of the HS-SCCH Type 1 and Type 3 formats.

HS-SCCH Type 1	HS-SCCH Type 3	MIMO
(normal operation)	One transport block	Two transports blocks
Channelization code set information (7 bits)	Channelization code set information (7 bits)	Channelization code set information (7 bits)
Modulation scheme information (1 bit)	Modulation scheme and number of transport blocks information (3 bits)	Modulation scheme and number of transport blocks information (3 bits)
Transport block size information (6 bits)	Precoding weight information (2 bits)	Precoding weight information for primary transport block (2 bits)
HARQ process information (3 bits)	Transport block size information (6 bits)	Transport block size information for primary transport block (6 bits)
Redundancy and constellation version (3 bits)	HARQ process information (4 bits)	Transport block size information for secondary transport block (6 bits)
New data indicator (1 bit)	Redundancy and constellation version (2 bits)	HARQ process information (4 bits)
UE identity (16 bits)	UE identity (16 bits)	Redundancy and constellation version for primary transport block (2 bits)
		Redundancy and constellation version for secondary transport block (2 bits)
		UE identity (16 bits)

The "Precoding weight info for the primary transport block" contains the information on weight factor w_2 as described above. Weight factors w_1 , w_3 , and w_4 are derived accordingly. The number of transport blocks transmitted and the modulation scheme information are jointly coded as shown in [table 3-8](#).

Table 3-8: Interpretation of "Modulation scheme and number of transport blocks info" sent on HS-SCCH

Modulation scheme + number of transport blocks info (3 bits)	Modulation for primary transport block	Modulation for secondary transport block	Number of transport blocks
111	16QAM	16QAM	2
110	16QAM	QPSK	2
101	64QAM	n/a	1
	64QAM	QPSK	2
100	16QAM	n.a.	1
011	QPSK	QPSK	2
010	64QAM	64QAM	2

Modulation scheme + number of transport blocks info (3 bits)	Modulation for primary transport block	Modulation for secondary transport block	Number of transport blocks
001	64QAM	16QAM	2
000	QPSK	n.a.	1

3.14.3 Redundancy Version

Redundancy versions for the primary transport block and for the secondary transport block are signaled. Four redundancy version values are possible (unlike HSDPA in 3GPP release 5 where eight values for the redundancy version could be signaled).

3.14.4 HARQ Processes

Also the signaling of the HARQ processes differs from HSDPA in 3GPP release 5. In 3GPP release 5, up to eight HARQ processes can be signaled. A minimum of six HARQ processes needs to be configured to achieve continuous data transmission. Similarly, in MIMO with dual stream transmission, a minimum of twelve HARQ processes would be needed to achieve continuous data transmission.

Each HARQ process has independent acknowledgements and retransmissions. In theory, HARQ processes on both streams could run completely independently from one another. This would however increase the signaling overhead quite significantly (to 8 bits), since each possible combination of HARQ processes would need to be addressed.

To save signaling overhead, a restriction is introduced: HARQ processes are only signaled for the primary transport block within 4 bits, the HARQ process for the secondary transport block is derived from that according to a fixed rule; according to 3GPP TS 25.212. Thus, there is a one-to-one mapping between the HARQ process used for the primary transport block and the HARQ process used for the secondary transport block. The relation is shown in the table below for the example of 12 HARQ processes configured.

Table 3-9: Combinations of HARQ process numbers for dual stream transmission (12 HARQ processes configured)

HARQ process number on primary stream	0	1	2	3	4	5	6	7	8	9	10	11
HARQ process number on secondary stream	6	7	8	9	10	11	0	1	2	3	4	5



Only an even number of HARQ processes is allowed to be configured with MIMO operation.

3.14.5 MIMO uplink control channel support

Also the uplink control channel for HSDPA operation is affected by MIMO, i.e. the HS-DPCCH (High Speed Dedicated Physical Control Channel). In addition to CQI reporting as already defined from 3GPP release 5 onwards, PCI reporting for precoding feedback

is introduced. Channel coding is done separately for the composite precoding control indication (PCI) / channel quality indication (CQI) and for HARQ-ACK (acknowledgement or negative acknowledgement information). The figure below shows the principle.

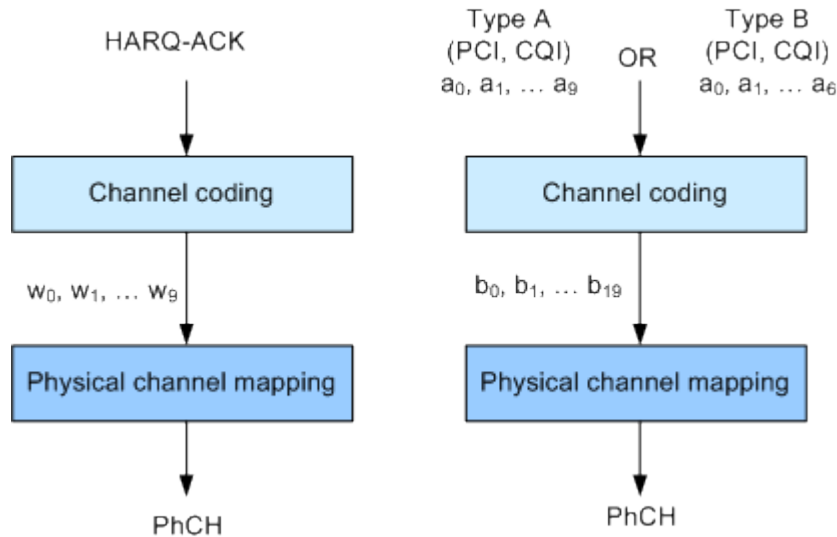


Fig. 3-9: Channel coding for HS-DPCCH (MIMO mode)

The 10 bits of the HARQ-ACK messages are interpreted according to 3GPP TS 25.212 (see table below). ACK/NACK information is provided for the primary and for the secondary transport block.

Table 3-10: Interpretation of HARQ-ACK in MIMO operation (non DC-HSDPA case)

HARQ-ACK message to be transmitted		w_0	w_1	w_2	w_3	w_4	w_5	w_6	w_7	w_8	w_9
HARQ-ACK in response to a single scheduled transport block											
ACK		1	1	1	1	1	1	1	1	1	1
NACK		0	0	0	0	0	0	0	0	0	0
HARQ-ACK in response to two scheduled transport blocks											
Response to primary transport block	Response to secondary transport block										
ACK	ACK	1	0	1	0	1	1	1	1	0	1
ACK	NACK	1	1	0	1	0	1	0	1	1	1
NACK	ACK	0	1	1	1	1	0	1	0	1	1
NACK	NACK	1	0	0	1	0	0	1	0	0	0
PRE/POST indication											
PRE		0	0	1	0	0	1	0	0	1	0
POST		0	1	0	0	1	0	0	1	0	0

3.14.6 CQI Reports: Type A and Type B

In MIMO case, two types of CQI reports shall be supported:

- **Type A CQI reports** can indicate the supported transport format(s) for the number of transport block(s) that the UE prefers. Single and dual stream transmissions are supported.
- **Type B CQI reports** are used for single stream transmission according to what has been defined from 3GPP release 5 onwards.

For type A CQI reports, the UE selects the appropriate CQI1 and CQI2 values for each transport block in dual stream transmission, or the appropriate CQIS value in single stream transmission, and then creates the CQI value to report on HS-DPCCH as follows:

$$CQI = \begin{cases} 15 * CQI_1 + CQI_2 + 31 & \text{when 2 transport blocks are preferred by the UE} \\ CQI_s & \text{when 1 transport block is preferred by the UE} \end{cases}$$

For dual stream transmission, new CQI tables are specified in 3GPP TS25.214 for correct interpretation of transport formats based on CQI1 and CQI2.

3.14.7 PCI reports

The PCI value to report in the uplink is created in the UE according to the preferred precoding weight w_2 according to the table below.

Table 3-11: Mapping of preferred precoding weight to PCI values

w_2^{pref}	$\frac{1+j}{2}$	$\frac{1-j}{2}$	$\frac{-1+j}{2}$	$\frac{-1-j}{2}$
PCI value	0	1	2	3

The PCI value shall be transmitted together with the CQI value as a composite PCI/CQI value. The figure below shows how the composite PCI/CQI report is created.

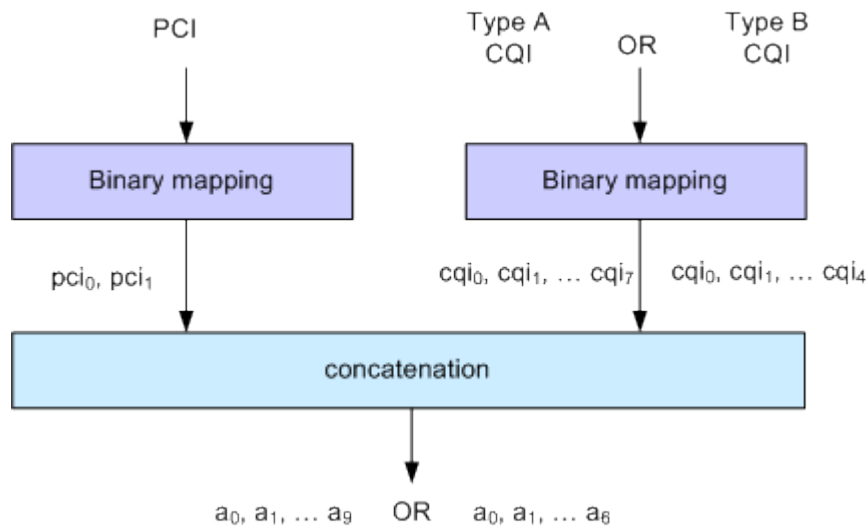


Fig. 3-10: Composite PCI/CQI information (MIMO mode)

3.14.8 MIMO Fixed Reference Channels: H-Set 9 and H-Set 11

In order to support MIMO testing, two fixed reference channels have been introduced. H-Set 9 and H-Set 11 are specified as reference test channel for HSPA+ test cases.

The H-Set 9 parameterization and coding chain is based on 15 codes with two different modulations, 16QAM and QPSK, for the primary and secondary transport blocks respectively. Six HARQ processes are used, and HS-DSCH is continuously transmitted.

The H-Set 11 parameterization and coding chain is also based on 15 codes and uses two different modulations, six HARQ processes and HS-DSCH is continuously transmitted. The modulation schemes specified for the H-Set 11 are however **64QAM** and **16QAM** for the primary and secondary transport blocks respectively.

3.15 Dual Cell HSDPA (DC-HSDPA)

Within 3GPP Release 7 the peak user throughput was significantly enhanced (MIMO, Higher Order Modulation). In order to fulfill the desire for even better and more consistent user experience across the cell the deployment of a second HSDPA carrier creates an opportunity for network resource pooling as a way to enhance the user experience, in particular when the radio conditions are such that existing techniques (e.g. MIMO) can not be used.

In DC-HSDPA operation the UE is configured with secondary serving HS-DSCH cell. With one HS-SCCH in each of the two cells scheduling flexibility to have different transport formats depending on CQI feedback on each carrier is maintained.

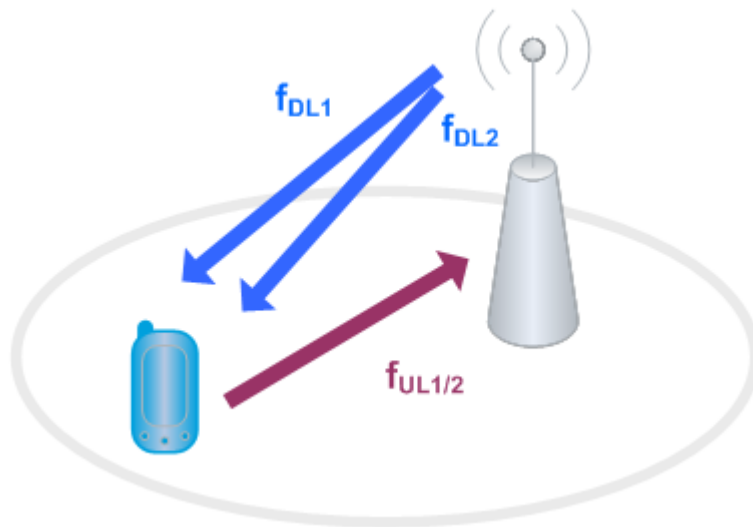


Fig. 3-11: Dual Cell HSDPA Operation

The following restrictions apply in case of DC-HSDPA operation:

- The dual cell transmission only applies to HSDPA physical channels
- The two cells belong to the same Node-B
- In Release 8 it is required that the two cells are on adjacent carriers; from Release 9 onwards the paired cells can operate on two different frequency bands.
- The two cells may use MIMO to serve UEs configured for dual cell operation

3.15.1 DC-HSDPA Data Acknowledgement (non MIMO mode)

When the UE is configured to work in DC-HSDPA non MIMO mode, the coding of the HS-DPCCH is performed according to the general coding flow, i.e. parallel coding of the HARQ-ACK and the CQI is performed. The figure below shows the principle.

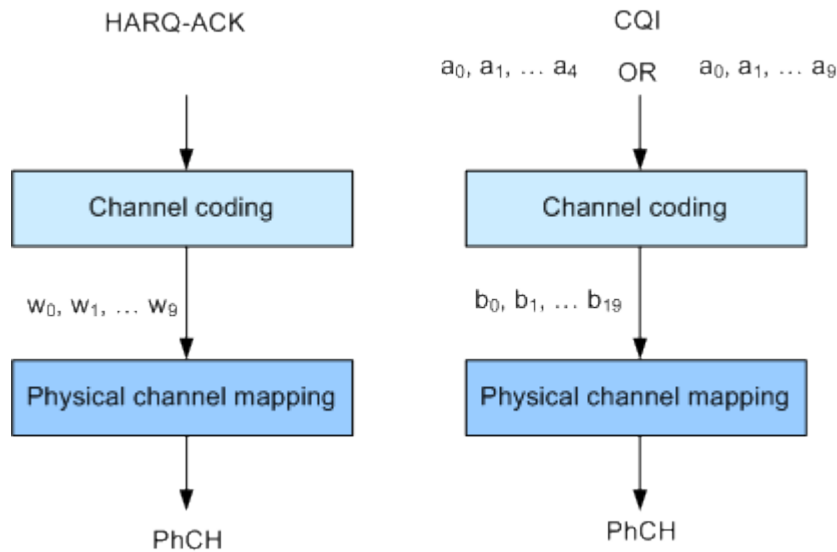


Fig. 3-12: Channel coding for HS-DPCCH (non MIMO mode)

The 10 bits of the HARQ-ACK messages are interpreted according to 3GPP TS 25.212 (see the table below). ACK/NACK information is provided for the transport block of the serving and secondary serving HS-DSCH cells.

Table 3-12: Interpretation of HARQ-ACK in DC-HSDPA non MIMO operation

HARQ-ACK message to be transmitted	w ₀	w ₁	w ₂	w ₃	w ₄	w ₅	w ₆	w ₇	w ₈	w ₉
HARQ-ACK in response to a single scheduled transport block, detected on the serving HS-DSCH cell										
ACK	1	1	1	1	1	1	1	1	1	1
NACK	0	0	0	0	0	0	0	0	0	0
HARQ-ACK in response to a single scheduled transport block, detected on the secondary serving HS-DSCH cell										
ACK	1	1	1	1	1	0	0	0	0	0
NACK	0	0	0	0	0	1	1	1	1	1
HARQ-ACK in response to a single scheduled transport block, detected on each of the serving and secondary serving HS-DSCH cells										
Response to transport block from set-ving HS-DSCH cell	Response to transport block from secondary serving HS-DSCH cell									
ACK	ACK	1	0	1	0	1	0	1	0	1
ACK	NACK	1	1	0	0	1	1	0	0	1
NACK	ACK	0	0	1	1	0	0	1	1	0
NACK	NACK	0	1	0	1	0	1	0	1	0
PRE/POST indication										

PRE		0	0	1	0	0	1	0	0	1	0
POST		0	1	0	0	1	0	0	1	0	0

3.15.1.1 CQI reports: CQI1 and CQI2

Two individual CQI reports CQI1 and CQI2 are concatenated to form the composite channel quality information. CQI1 corresponds to the serving HS-DSCH cell and CQI2 to the secondary serving cell respectively. The figure below show how the CQI report is constructed.

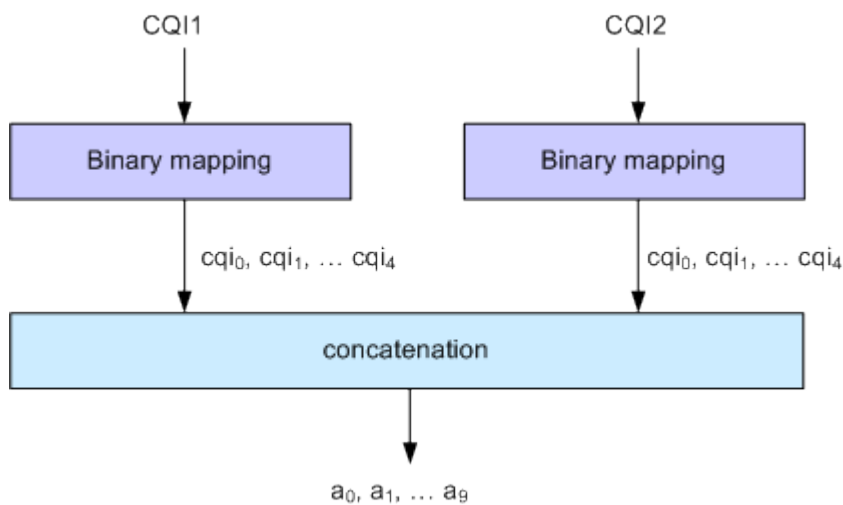


Fig. 3-13: Composite CQI information (DC-HSDPA operation, non MIMO mode)

3.15.2 DC-HSDPA + MIMO

Channel coding is done separately for the composite PCI/CQI and for HARQ-ACK information.

The principle is shown on figure [figure 3-9](#).

The composite PCI/CQI report is created as illustrated on figure [figure 3-10](#).

The HARQ-ACK message is coded to 10 bits according to 3GPP TS 25.212. The standard defines the HARQ-ACK coding for the feedback of the serving and secondary serving HS-DSCH cells for normal and dual stream transmission.

3.15.3 Dual Cell HSDPA (DC-HSDPA) Fixed Reference Channel: H-Set 12

In order to support DC-HSDPA testing, a fixed reference channel has been introduced. H-Set 12 is specified as reference test channel for HSDPA test cases.

The H-Set 12 parameterization and coding chain is based on 1 code with QPSK modulation. Six Hybrid ARQ processes are used, and HS-DSCH is continuously transmitted.

3.16 Dual Cell HSUPA (Dual Cell E-DCH)

The Dual Cell HSUPA employs carrier aggregation in the uplink. The DC-HSUPA operation is available only in combination with the DC-HSDPA. This operation uses two independent carriers, each assigned to one of the DC-HSDPA "cells".

3.17 UE Capabilities

MIMO, 64QAM and DC-HSDPA operation in downlink as well as 16QAM in uplink are UE capability, i.e. not all UEs will have to support them.

Several UE categories have been introduced to provide:

- DL MIMO support and support of 64QAM in addition to 16QAM and QPSK in downlink
- 16QAM support in uplink
- Support of dual cell operation and MIMO

R&S Signal Generator supports all UE categories.

3.17.1 MIMO and 64QAM UE Capabilities

According to 3GPP TS25.306 V8.4.0, the following release 8 HS-DSCH categories with MIMO and 64QAM support are defined:

- Categories 13 and 14:
Support of 64QAM
No support of MIMO
Maximum data rate of category 14 is 21 Mbps
- Categories 15 and 16:
Support of MIMO with modulation schemes QPSK and 16QAM
No support of 64QAM
Maximum data rate of category 16 is 27.6 Mbps
- Categories 17 and 18:
Support of MIMO with modulation schemes QPSK and 16QAM
Support of 64QAM and MIMO, but not simultaneously
Maximum data rate of category 18 is 27.6 Mbps when MIMO is used and 21 Mbps when 64QAM is used
- Categories 19 and 20:
Simultaneous support of MIMO and all modulation schemes (QPSK, 16QAM and 64QAM)
Maximum data rate of category 20 is 42.1 Mbps

3.17.2 UL 16QAM UE Capabilities

According to 3GPP TS25.306 V9.5.0, the following release 8 E-DCH categories with 16QAM uplink support are defined:

- Category 7 and 9:
Support of 16QAM in addition to BPSK

3.17.3 MIMO and DC-HSDPA Operation UE Capabilities

According to 3GPP TS25.306 V9.0.0, the following release 9 HS-DSCH categories with MIMO and dual cell operation support are defined:

- Categories 21, 22, 23 and 24:
Support of QPSK, 16QAM and for categories 23 and 24 also 64QAM
Support of dual cell operation, but without MIMO
- Categories 25, 26, 27 and 28:
Support of QPSK, 16QAM and for categories 27 and 28 also 64QAM
Simultaneous support of MIMO and dual cell operation

3.17.4 Dual Cell E-DCH Operation UE Capabilities

According to 3GPP TS25.306 V9.5.0, the following release 9 E-DCH categories with Dual Cell E-DCH support are defined:

- Category 8:
Supports only QPSK in Dual Cell E-DCH operation
- Category 9:
Supports QPSK and 16QAM in Dual Cell E-DCH operation

4 Application Sheets

Application sheets describe short application examples for selected issues and provide related background information.

4.1 Uplink Dual Cell HSDPA Test Signal Generation

The R&S Signal Generator supports the generation of feedback messages for HSDPA data acknowledgment and channel quality indication as defined in the 3GPP TS 25.212 release 8 and release 9.

This application sheet describes how to configure the R&S Signal Generator to generate an uplink test signal for basic tests on Dual Cell HSDPA (DC-HSDPA) operation.

4.1.1 Options and Equipment Required

The following equipment is required:

- Vector Signal Generator R&S SMU, R&S AMU, R&S SMJ, R&S SMATE or R&S SMBV, equipped with:
 - Firmware version 2.15.085.47 (R&S SMBV) and 2.10.111.53 (other instruments) or later. Latest firmware version recommended.
 - one of the baseband options, e.g. R&S SMx/AMU-B10
 - one of the frequency options, e.g. R&S SMx-B103
- Option R&S SMx/AMU-K42, "Digital Standard 3GPP FDD"
- Option R&S SMx/AMU-K43, "3GPP FDD enhanced MS/BS tests incl. HSDPA"
- Option R&S SMx/AMU-K59, "Digital Standard HSPA+"

4.1.2 Test Setup



Fig. 4-1: Test Setup (example with R&S SMU)

4.1.3 Generating an uplink DC-HSDPA Test Signal (Non MIMO Mode)

To generate an uplink test signal corresponding to the signal of a UE configured to work in DC-HSDPA non MIMO mode, configure the uplink HS-DPCCH as follows:

1. Preset the R&S Signal Generator to ensure a defined instrument state.
2. Open the 3GPP FDD main dialog (e.g. "Baseband Block > 3GPP FDD") and select an Uplink "Link Direction".
3. Select "UE1" and open the corresponding "User Equipment" dialog.
4. Set the "Scrambling Code" as required.
5. Navigate to the "HS-DPCCH Settings" section and expand the display of detailed settings.
 - a) Ensure that the "Compatibility Mode" is set to "Release 8 and Later".
 - b) Enable the "Secondary Cell Active" parameter to configure dual cell HSDPA mode for the selected UE.
 - c) Set the parameter "HARQ-ACK" as required to adjust the information transmitted during the HARQ-ACK slot of the corresponding TTI.
For example, an *A/N* feedback means that an ACK is sent to the serving cell and a NACK to the secondary serving cell.
 - d) To include composite CQI messages in the signal as specified in 3GPP TS 25.212, set the parameter "CQI Type" to *Composite CQI* and adjust the values of the parameters "CQI1" and "CQI2".
 - e) Adjust the power settings and configure the HS-DPCCH structure with the parameters "Inter TTI Distance" and "Number of TTIs"/"Number of Table Rows", as well as by configuring the HARQ-ACK and CQI/PCI information per TTI by means of the parameters in the table.
 - f) Press "Adjust ARB Sequence Length".
 - g) Set the "State" of the channel to On and close the dialog.

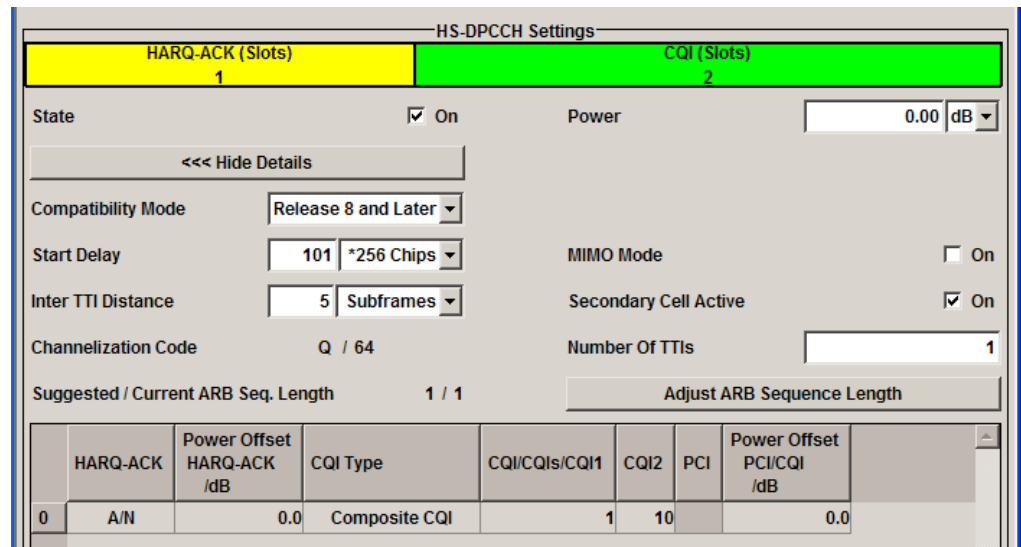


Fig. 4-2: Example: R&S SMU with firmaware version 2.10.111.53

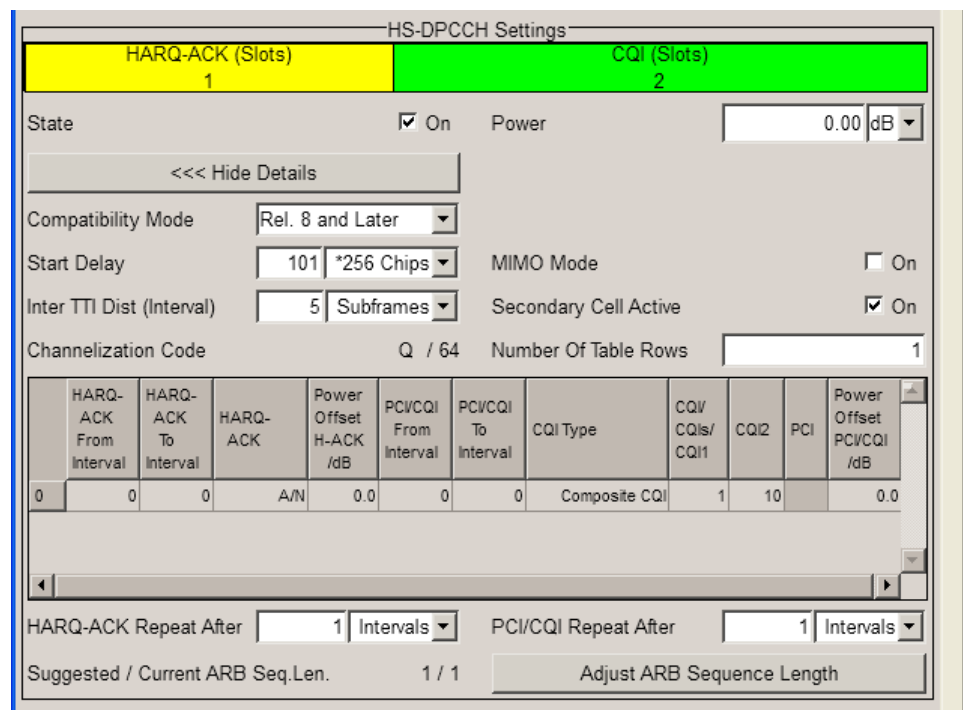


Fig. 4-3: Example: R&S SMBV with frimware version 2.20.160.xx

- In the "3GPP FDD > Trigger/Marker/Clock" dialog, adjust the settings as required. For example, to synchronize the R&S Signal Generator to the frame timing of the DUT, feed the frame marker signal of the DUT (if available) to the instrument, enable trigger mode "Armed Auto" and select an "External Source".
- In the "3GPP FDD main dialog", set the "State" to On to enable the generation of the 3GPP FDD uplink (UL) signal.

8. In the "RF > RF Frequency > Reference Frequency" dialog, adjust the settings as required.
For example, if a common reference signal is used or if the DUT provides the reference frequency, connect the reference signal source to the R&S Signal Generator, select "Source External" and adjust the "External Reference Frequency".
9. Press the FREQ key and select the desired RF frequency, e.g. 1950 MHz.
10. Adjust the output signal level as required and press the RF ON/OFF key to activate the RF output.

4.1.4 Generating an Uplink Test Signal for Simultaneous Dual Cell and MIMO Operation

- ▶ Perform the steps described above and enable the parameter "3GPP FDD > UE1 > HS-DPCCH Settings > MIMO Mode".

You are enabled to configure the HARQ-ACK feedback messages for up to four simultaneously transmitted downlink transport blocks.



For background information about the dual cell operation and processing of HARQ-ACK feedback messages, refer to [chapter 3.15, "Dual Cell HSDPA \(DC-HSDPA\)"](#), on page 37.

4.2 Downlink Dual Cell HSDPA Test Signal Generation

This application sheet describes how to configure the R&S SMU to generate a downlink signal for HSDPA performance tests for user equipment (UE) supporting Dual Cell HSDPA (DC-HSDPA) operation. A typical example is the "Demodulation of HS-DSCH" test described in clause 9.2. of the 3GPP TS 34.121 [1].



The technical specification 3GPP TS 34.121 [1] is used as guideline for this description and some of the values/methods proposed in this document may differ from the values/methods defined in the standard.

Please note that at the time of the release of this document a discussion is ongoing in the 3GPP body about whether or not there should be OCNS configured in the secondary serving cell in case of DC-HSDPA tests. In this document it is presumed that OCNS should be used in the secondary serving cell.

4.2.1 Options and Equipment Required

The following equipment is required:

- Two-path Vector Signal Generator R&S SMU equipped with:

- Firmware version 2.10.111.53 or later. Latest firmware version recommended.
- one of the baseband options per path, e.g. R&S SMU-B10
- one of the frequency options, e.g. R&S SMU-B103
- 2 x Option R&S SMU-K42, "Digital Standard 3GPP FDD"
- 2 x Option R&S SMU-K43, "3GPP FDD enhanced MS/BS tests incl. HSDPA"
- 2 x Option R&S SMU-B14/B15, "Fading Simulator/Fading Simulator Extensions"
- 1 x Option R&S SMU-K62, "Additive White Gaussian Noise (AWGN)"

4.2.2 Test Setup



Fig. 4-4: Test Setup

Path A of the R&S SMU generates the DL signal of the serving cell, and path B the signal of the secondary serving cell.

4.2.3 Assumptions

The DC-HSDPA performance requirements for HS-DSCH demodulation tests are defined as minimum performance requirements for the UEs supporting one of the HS-DSCH categories 21-24. The 3GPP TS 34.121 [1] defines tests with several H-Sets per UE category, as well as different propagation conditions and power levels.

The example in this document does not cover all possible cases but focuses on one particular example. An overview of the used settings is provided in [table 4-1](#).

Table 4-1: DC-HSDPA test parameters for testing Single Link Performance - Enhanced Performance Requirements Type 2 - QPSK FRC H-Set 6A (example)

Parameter	Value	Remark
Performance Requirements	Enhanced Performance Requirements Type 2	according to Table 9.2.3C, [1]
HS-DSCH UE Category	Category 21	according to Table 5.1a, [2]
Fixed Reference Channel	H-Set 6A	according to Table 9.2.3C, [1]
\hat{I}_{Qr}/I_{oc}	10.6 dB	according to Table 9.2.1FA.8, [1]

Downlink Dual Cell HSDPA Test Signal Generation

Parameter	Value	Remark
Modulation	QPSK	determines that test parameters for testing QPSK FRC H-Set 6A are used
I_{oc}	-60 dBm/3.84 MHz	according to Table 9.2.1FA.1, [1]
Redundancy and Constellation Version Coding Sequence	{0,2,5,6}	according to Table 9.2.1FA.1, [1]
Maximum Number of HARQ Transmissions	4	according to Table 9.2.1FA.1, [1]
Propagation Conditions	PA3	according to Table 9.2.1FA.8, [1]
HS-PDSCH E_c/I_{or}	-2.9 dB	according to Table 9.2.1FA.8, [1]
Level Set for HSDPA Measurements	Level Set 3	according to Table E.5.9, [1]
P-CPICH E_c/I_{or}	-9.9 dB	according to Table E.5.8, [1]
P-CCPCH E_c/I_{or}	-11.9 dB	according to Table E.5.8, [1]
SCH E_c/I_{or}	-11.9 dB	according to Table E.5.8, [1]
PICH E_c/I_{or}	-14.9 dB	according to Table E.5.8, [1]
HS-PDSCH E_c/I_{or}	-2.9 dB	according to Table E.5.8, [1]
HS-SCCH1 E_c/I_{or}	-8.4 dB	according to Table E.5.8, [1]
DPCH E_c/I_{or}	-8.4 dB	according to Table E.5.8, [1]
OCNS for the serving cell	off	according to Table E.5.8, [1]
OCNS for the secondary serving cell	on	
OCNS Channelization Codes	122 to 127 (SF 128)	according to Table E.6.2.1, [1]
DPCH Channelization Code	96 (SF 128)	according to Table E.6.2.1, [1]
HS-SCCH Channelization Code	2 (SF 128)	according to Table E.6.2.1, [1]
Mid Range Frequency	2140 MHz (serving cell) 2145 MHz (secondary serving cell)	according to the table for DC-HSDPA mode in chapter 5.1.1.1, [3]

4.2.4 Generating a DL DC-HSDPA Test Signal

Adjust the settings of the R&S SMU to generate a test signal suitable for the verification of the ability of the UE to receive a predefined test signal in multi-path fading conditions as follows:

General Workflow

1. Connect the test equipment, see [figure 4-4](#).
2. Preset the R&S SMU to ensure a defined instrument state.

3. Set the noise level and adjust the propagation conditions, see "[Configuring the AWGN Noise Source and the Fading Simulator](#)" on page 49.
4. Adjust the frequency of RF output A to the center of the frequencies of both cells, e.g. 2142.5 MHz and activate the RF A output.
5. Select "Baseband A/B > Frequency Offset" and set the frequency offsets to -2.5 MHz and +2.5 MHz respectively.
6. Perform the steps required to establish a connection setup.
7. Adjust the 3GPP FDD settings of the serving and the secondary serving cell, see "[Configuring the 3GPP FDD signal of the serving cell \(Baseband A\)](#)" on page 50 and "[Configuring the 3GPP FDD signal of the secondary serving cell \(Baseband B\)](#)" on page 51.
8. Enable the generation of the 3GPP FDD downlink (DL) signal:
 - a) In the path B, set the "3GPP FDD > State" to On
 - b) In the path A, set the "3GPP FDD > State" to On.
 HSDPA data is transmitted on both the serving cells.
9. Measure the information bit **Throughput** per cell to verify the receiver's ability to meet the desired performance requirements.

Configuring the AWGN Noise Source and the Fading Simulator

1. Select "Fading A > Signal Routing > A->A|B->A" to enable the routing of the signal of path B to path A.
2. Open the "Fading Settings" dialog in path A (e.g. "Fading > Fading Settings") and perform the following settings:

Table 4-2: Fading Settings (Path A and Path B)

R&S SMU Dialog	Parameter Name	Value
Fading Settings	Set to Default	
	Standard > 3GPP	3GPP PA3 (UE)
	State	On

Perform the same fading settings in path B.

3. Open the "AWGN Settings" dialog in path A (e.g. "AWGN/IMP A > AWGN") and perform the following settings:

Table 4-3: AWGN Settings

R&S SMU Dialog	Parameter Name	Value
AWGN Settings	Mode	Additive Noise
	System Bandwidth	3.84 MHz
	Minimum Noise/System Bandwidth Ratio	3.5
	Reference Mode	Noise

R&S SMU Dialog	Parameter Name	Value
	Noise Level (System Bandwidth)	-60 dBm
	Carrier/Noise Ratio	13.61 dB
	State	On

Configuring the 3GPP FDD signal of the serving cell (Baseband A)

1. Open the "3GPP FDD" main dialog in path A (e.g. "Baseband Block > 3GPP FDD") and perform the following settings:

Table 4-4: Configuration Settings for R&S SMU Path A

R&S SMU Dialog	Parameter Name	Value
3GPP FDD A Main Dialog	Link Direction	Downlink
Basestation BS1	Preset Channel Table	Reset
		HSDPA H-Set
Basestation BS1 > Channel Table > HS-SCCH Enhanced Channel Config > Enhanced HSDPA Mode	Predefined H-Set	6 (QPSK)
	HARQ Mode	Constant NACK
	Redundancy Version Sequence	0,2,5,6
	Current ARB Seq. Length	Adjust
Basestation BS1	P-CPICH Power	-9.9 dB
	P-CCPCH Power	-11.9 dB
	P-SCH Power	-14.91 dB
	S-SCH Power	-14.91 dB
	PICH Power	-14.9 dB
	DPCH Power (Channel#11)	-8.4 dB
	HS-PDSCH Power	-12.9 dB
	HS-SCCH1 Power	-8.4 dB
	P-CPICH/P-CCPCH/P-SCH/S-SCH/PICH/DPCH (Channel#11) State	On
	Domain Conflict	Resolve Domain Conflicts
	DPCH Channelization Code	96
HS-SCCH Channelization Code	2	
Basestation BS1 > Channel Table > DPCH Enhanced Channel Configuration	Channel Coding State	On

R&S SMU Dialog	Parameter Name	Value
	Enhanced State	On
Trigger/Marker/Clock	Mode	Auto

- Use the "Save/Recall" function to save the settings made for path A.

Configuring the 3GPP FDD signal of the secondary serving cell (Baseband B)

- Use the "Save/Recall" function to load the settings made for path A into path B.
- In the "Baseband B > 3GPP FDD B > Basestation BS1" dialog, disable the channels P-CCPCH, P-SCH, S-SCH, PICH and DPCH.
- In the "Baseband B > 3GPP FDD B" dialog, select the "OCNS Mode" HSDPA and set the "OCNS State" to On.
- In the "3GPP FDD B > Trigger/Marker" dialog, enable trigger mode "Armed Retrigger" and trigger source "Internal (Baseband A)".

4.2.5 Possible Extensions

The test configuration can be extended for testing DUTs with two antennas in several multi-path fading environments.

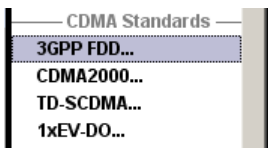
The following additional options are necessary:

- 1 x Option R&S SMU-K62, "Additive White Gaussian Noise (AWGN)"
- 1 x Option R&S SMU-K74, "MIMO Fading"
- one of the frequency options, e.g. R&S SMU-B203

4.2.6 References

- [1] 3GPP TS 34.121 "User Equipment (UE) conformance specification; Radio transmission and reception (FDD); Part 1: Conformance specification (Release 9)"
- [2] 3GPP TS 25.306 "UE Radio Access capabilities (Release 9)"
- [3] 3GPP TS 34.108 "Common test environments for User Equipment (UE); Conformance testing (Release 9)"

5 User Interface

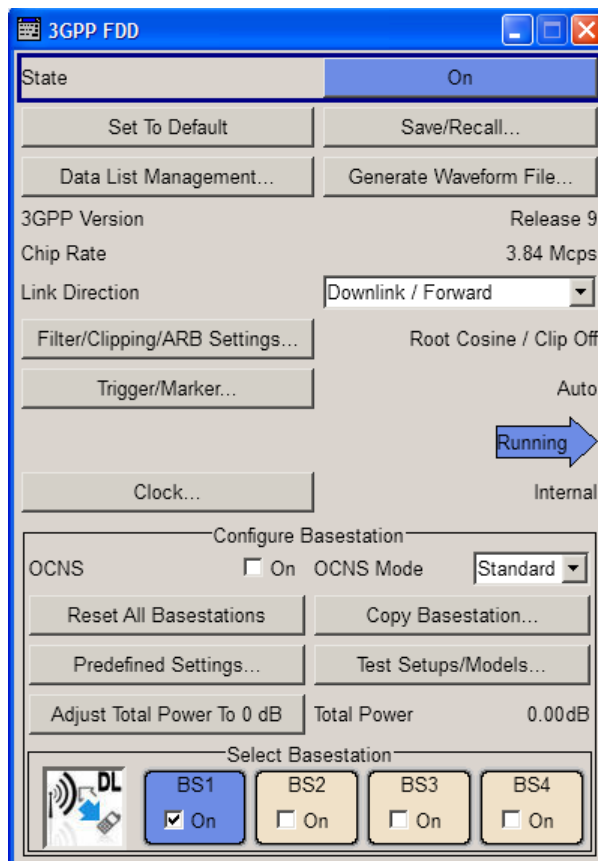


To access the dialog for setting the 3GPP FDD digital standard, select "Baseband > 3GPP FDD" or use the menu tree under "Baseband".

The dialog is split into several sections for configuring the standard. The choice of transmission direction determines which displays and parameters are made available in the lower section.

The upper section of the dialog is where the 3GPP FDD digital standard is enabled, the default settings are called and the transmission direction selected. Button "Test Case Wizard" opens a configuration menu with a selection of predefined settings according to Test Cases in TS 25.141. The valid 3GPP version and the chip rate in use are displayed. Many of the buttons lead to submenus for loading and saving the 3GPP FDD configuration and for setting the filter, trigger and clock parameters.

The lower dialog section is where either the base station signal or the user equipment signal is configured, depending on the transmission direction selected.



The dialog is extremely comprehensive, so a small list of contents is added here to make orientation easier.

The headings are always given a short form of the "dialog path" and the header also shows you your current location in the dialog.

5.1 General Settings for 3GPP FDD Signals

The upper menu section is where the 3GPP FDD digital standard is enabled and reset and where all the settings valid for the signal in both transmission directions are made.

State

Enables/disables the 3GPP FDD standard.

Enabling this standard disables all the other digital standards and digital modulation modes.

In case of two-path instruments, this affects the same path.

The 3GPP FDD signal is generated by a combination of realtime mode (enhanced channels) and arbitrary waveform mode (all the other channels).

On the downlink, P-CCPCH and up to three DPCHs of base station 1 as well as H-Sets 1 to 5 can be generated in realtime.

In the uplink, the DPCCH and one DPDCH of user equipment 1 are generated in realtime. Depending on the actual configurations, other channels of user equipment 1 may also be generated in realtime. The PRACH and PCPCH channels are not generated in realtime. The other user equipment are generated in arbitrary waveform mode and added to the realtime signal.

SCPI command:

[:SOURce<hw>] :BB:W3GPp:STATe on page 332

Set to default

Calls the default settings. Test Model 1 (64 channels) is preset.

SCPI command:

[:SOURce<hw>] :BB:W3GPp:PRESet on page 330

Save/Recall

Calls the "Save/Recall" menu.

From the "Save/Recall" menu the "File Select" windows for saving and recalling 3GPP FDD configurations and the "File Manager" can be called.



3GPP FDD configurations are stored as files with the predefined file extension *.3g. The file name and the directory they are stored in are user-definable.

The complete settings in the "3GPP FDD" dialog and all sub-dialogs are saved and recalled.

"Recall 3GPP FDD setting" Opens the "File Select" window for loading a saved 3GPP FDD configuration. The configuration of the selected (highlighted) file is loaded by pressing the "Select" button.

- "Save 3GPP FDD setting" Opens the "File Select" window for saving the current 3GPP FDD signal configuration.
The name of the file is specified in the "File name" entry field, the directory selected in the "save into" field. The file is saved by pressing the "Save" button.
The "Fast Save" function determines whether the instrument performs an absolute or a differential storing of the settings. Enable this function to accelerate the saving process by saving only the settings with values different to the default ones. "Fast Save" is not affected by the "Pre-set" function.
- "File Manager" Calls the "File Manager".
The "File Manager" is used to copy, delete and rename files and to create new directories.

SCPI command:

[:SOURce<hw>] :BB:W3GPp:SETTing:CATalog on page 330

[:SOURce<hw>] :BB:W3GPp:SETTing:LOAD on page 330

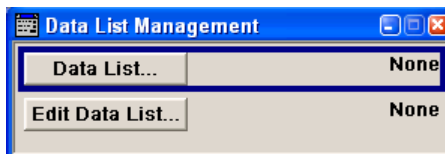
[:SOURce<hw>] :BB:W3GPp:SETTing:STORe on page 331

[:SOURce<hw>] :BB:W3GPp:SETTing:STORe:FAST on page 331

[:SOURce<hw>] :BB:W3GPp:SETTing:DELeTe on page 330

Data List Management

Calls the "Data List Management" menu. This menu is used to create and edit a data list.



All data lists are stored as files with the predefined file extension *.dm_iqd. The file name and the directory they are stored in are user-definable.

The data lists must be selected as a data source from the submenus under the individual function, e.g. in the channel table of the base stations.

Note: All data lists are generated and edited by means of the `SOURce:BB:DM` subsystem commands. Files containing data lists usually end with *.dm_iqd. The data lists are selected as a data source for a specific function in the individual subsystems of the digital standard.

Example: Creating and editing the data list

```
SOUR:BB:DM:DLIS:SEL "3gpp"
SOUR:BB:DM:DLIS:DATA 1,1,0,1,0,1,0,1,1,1,1,0,0,0
SOUR:BB:DM:DLIS:DATA:APP 1,1,0,1,0,1,0,1,1,1,1,0,0
```

SCPI command:

[\[:SOURce<hw>\]:BB:W3GPp:BSTation<st>:CHANnel<ch>:DATA on page 360](#)

[\[:SOURce<hw>\]:BB:W3GPp:BSTation<st>:CHANnel<ch>:DATA:DSElect on page 360](#)

[\[:SOURce<hw>\]:BB:W3GPp:BSTation<st>:CHANnel<ch>:DPCCh:TPC:DATA on page 363](#)

[\[:SOURce<hw>\]:BB:W3GPp:BSTation<st>:CHANnel<ch>:DPCCh:TPC:DATA:DSElect on page 364](#)

[\[:SOURce<hw>\]:BB:W3GPp:BSTation:ENHanced:CHANnel<ch0>:DPCH:TChannel<di>:DATA on page 410](#)

[\[:SOURce<hw>\]:BB:W3GPp:BSTation:ENHanced:CHANnel<ch0>:DPCH:TChannel<di>:DATA:DSElect on page 411](#)

[\[:SOURce<hw>\]:BB:W3GPp:MSTation<st>:CHANnel<ch>:DPDCh:DATA on page 455](#)

[\[:SOURce<hw>\]:BB:W3GPp:MSTation<st>:CHANnel<ch>:DPDCh:DATA:DSElect on page 455](#)

[\[:SOURce<hw>\]:BB:W3GPp:MSTation:ENHanced:DPDCh:TChannel<di>:DATA on page 506](#)

[\[:SOURce<hw>\]:BB:W3GPp:MSTation:ENHanced:DPDCh:TChannel<di>:DATA:DSElect on page 506](#)

[\[:SOURce<hw>\]:BB:W3GPp:MSTation<st>:DPCCh:TPC:DATA on page 434](#)

[\[:SOURce<hw>\]:BB:W3GPp:MSTation<st>:DPCCh:TPC:DATA:DSElect on page 434](#)

[\[:SOURce<hw>\]:BB:W3GPp:MSTation<st>:PCPCh:DATA on page 459](#)

[\[:SOURce<hw>\]:BB:W3GPp:MSTation<st>:PCPCh:DATA:DSElect on page 459](#)

[\[:SOURce<hw>\]:BB:W3GPp:MSTation<st>:PCPCh:TPC:DATA on page 465](#)

[\[:SOURce<hw>\]:BB:W3GPp:MSTation<st>:PCPCh:TPC:DATA:DSElect on page 465](#)

[\[:SOURce<hw>\]:BB:W3GPp:MSTation<st>:PRACH:DATA on page 468](#)

[\[:SOURce<hw>\]:BB:W3GPp:MSTation<st>:PRACH:DATA:DSElect on page 468](#)

Generate Waveform File

Opens the submenu for storing the current 3GPP signal as ARB signal in a waveform file. This file can be loaded in the ARB menu and processed as multi carrier or multi segment signal.

The file name is entered in the submenu. The file is stored with the predefined file extension *.wv. The file name and the directory it is stored in are user-definable.

SCPI command:

[\[:SOURce<hw>\]:BB:W3GPp:WAVEform:CREate on page 332](#)

Test Case Wizard

R&S SMU and R&S SMATE instruments only

Opens a configuration menu with a selection of predefined settings according to Test Cases in TS 25.141.

The test cases are described in [chapter 6.1, "Introduction"](#), on page 256.

SCPI command:

n.a.

3GPP Version

Displays the current version of the 3GPP FDD standard.

The default settings and parameters provided are oriented towards the specifications of the version displayed.

SCPI command:

[\[:SOURCE\]:BB:W3GPP:GPP3:VERSION](#) on page 332

Chip Rate

Displays the system chip rate. This is fixed at 3.84 Mcps.

The output chip rate can be varied in the Filter menu, Clipping, ARB Settings (see ["Filtering/Clipping/ARB Settings"](#) on page 56).

SCPI command:

[\[:SOURCE<hw>\]:BB:W3GPP:CRATE](#) on page 334

Link Direction

Selects the transmission direction.

The settings of the base station or the user equipment are provided in the following menu section in accordance with the selection.

"Downlink/Forward Link" The transmission direction selected is base station to user equipment.
The signal corresponds to that of a base station.

"Uplink/Reverse Link" The transmission direction selected is user equipment to base station.
The signal corresponds to that of user equipment.

SCPI command:

[\[:SOURCE<hw>\]:BB:W3GPP:LINK](#) on page 329

Filtering/Clipping/ARB Settings

Calls the menu for setting baseband filtering, clipping and the sequence length of the arbitrary waveform component. The current setting is displayed next to the button.

The menu is described in section [chapter 5.3, "Filtering, Clipping, ARB Settings"](#), on page 67.

SCPI command:

n.a.

Trigger/Marker

(Trigger for R&S SMx and R&S AMU instruments only)

Calls the menu for selecting the trigger source, for configuring the marker signals and for setting the time delay of an external trigger signal (see [chapter 5.4, "Trigger/Marker/Clock Settings"](#), on page 72).

The currently selected trigger source is displayed to the right of the button.

SCPI command:

n.a.

Execute Trigger

(R&S SMx and R&S AMU instruments only)

Executes trigger manually.

A manual trigger can be executed only when an internal trigger source and a trigger mode other than "Auto" have been selected.

SCPI command:

[:SOURce<hw>] :BB:W3GPp:TRIGger:EXECute on page 339

Clock

(R&S SMx and R&S AMU instruments only)

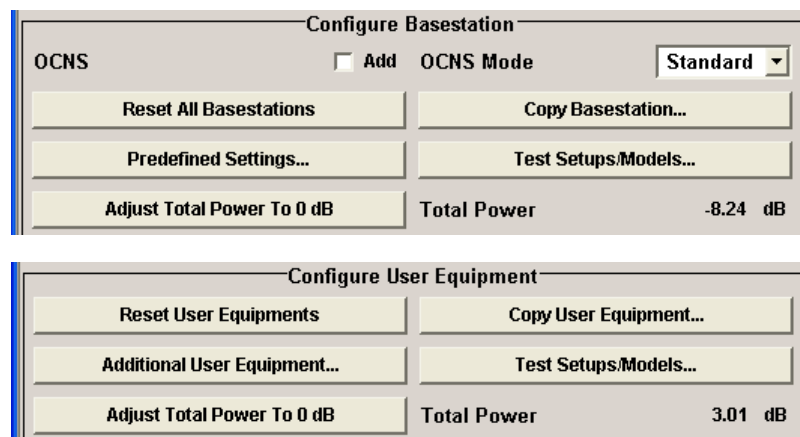
Calls the menu for selecting the clock source and for setting a delay (see [chapter 5.4.4, "Clock Settings"](#), on page 79).

SCPI command:

n.a.

5.2 Configure Base Station or UE

Depending on the transmission direction selection, the central section of the menu provides either the "Configure Base Station" section (selection "Downlink/Forward Link") or the "Configure User Equipment" section (selection "Uplink/Reverse Link").



5.2.1 Orthogonal Channel Noise (OCNS) Settings

With Orthogonal Channel Noise, a practical downlink signal is generated to test the maximum input levels of user equipment in accordance with standard specifications. This simulates the data and control signals of the other orthogonal channels in the downlink. 3GPP TS 25.101 contains a precise definition of the required appearance of the OCNS signal.

Four different OCNS scenarios are defined in the standard; one "standard" scenario, two scenarios for HSDPA test cases and one scenario for type 3i enhanced performance requirements tests according to 3GPP TS34.121-1 ("other user's channels").

When activating OCNS and depending on the selected OCNS mode, different channel groups with different presetting are assigned as in the following tables. These channels cannot be edited in the channel table.

Standard, HSDPA and HSDPA2 modes

For the "Standard", "HSDPA" and "HSDPA2" modes, the OCNS channels are all normal DPCHs. The symbol rate is set at 30 kps and the pilot length to 8 bits.

The powers of the OCNS channel outputs are relative. In the R&S Signal Generator, the power of the OCNS component is automatically set so that OCNS channels supplement the remaining channels in base station 1 to make a total power of 0 dB (linear 1).

It is not possible to adapt the OCNS power if the linear power of the remaining channels is >1, this will produce an error message. The OCNS channels are then given the maximum power (all -80 dB).

The "Total Power" display is updated after automatic calculation of the output; it is not possible to use "Adjust Total Power" to make the setting.

Table 5-1: Defined settings for the OCNS signal in base station 1 in Standard mode

Chan. code	Timing offset (x256Tchip)	Level setting (dB)	Channel type	Symbol rate	Pilot length
2	86	-1	DPCH	30 kps	8 bit
11	134	-3	DPCH	30 kps	8 bit
17	52	-3	DPCH	30 kps	8 bit
23	45	-5	DPCH	30 kps	8 bit
31	143	-2	DPCH	30 kps	8 bit
38	112	-4	DPCH	30 kps	8 bit
47	59	-8	DPCH	30 kps	8 bit
55	23	-7	DPCH	30 kps	8 bit
62	1	-4	DPCH	30 kps	8 bit
69	88	-6	DPCH	30 kps	8 bit
78	30	-5	DPCH	30 kps	8 bit
85	18	-9	DPCH	30 kps	8 bit

Chan. code	Timing offset (x256Tchip)	Level setting (dB)	Channel type	Symbol rate	Pilot length
94	30	-10	DPCH	30 ksps	8 bit
125	61	-8	DPCH	30 ksps	8 bit
113	128	-6	DPCH	30 ksps	8 bit
119	143	0	DPCH	30 ksps	8 bit

Table 5-2: Defined settings for the OCNS signal in base station 1 in HSDPA mode

Channelization code at SF=128	Relative Level setting (dB)	Channel type	Symbol rate	Pilot length
122	0	DPCH	30 ksps	8 bit
123	-2	DPCH	30 ksps	8 bit
124	-2	DPCH	30 ksps	8 bit
125	-4	DPCH	30 ksps	8 bit
126	-1	DPCH	30 ksps	8 bit
127	-3	DPCH	30 ksps	8 bit

Table 5-3: Defined settings for the OCNS signal in base station 1 in HSDPA2 mode

Channelization code at SF=128	Relative Level setting (dB)	Channel type	Symbol rate	Pilot length
4	0	DPCH	30 ksps	8 bit
5	-2	DPCH	30 ksps	8 bit
6	-4	DPCH	30 ksps	8 bit
7	-1	DPCH	30 ksps	8 bit

3i OCNS mode

(Requires options R&S SMx/AMU-K43 and -K59)

In the "3i" OCNS mode, 16 DPCH channels are inserted in the BS 1 channel according to 3GPP TS34.121-1, chapter E.5E.

According to 3GPP TS34.121-1, table E.5E.1.3, the channelization code of each of these channels changes randomly on a symbol-by-symbol basis between two possible values.

23	DPCH (OCNS)		10	30	2	-1.70	PN 9
24						108	
25	DPCH (OCNS)		10	30	3	-2.70	PN 9
26						103	
27	DPCH (OCNS)		10	30	5	-3.50	PN 9
28						109	

Fig. 5-1: Channel table (first three DPCHs only)

The power control sequence modeling according to 3GPP TS34.121-1, chapter E.5E.3 is applied to these channels; the power relationship between these channels is according

to 3GPP TS34.121-1, table E.5E.1.3 only during the very first slot, and can deviate in the subsequent slots up to a certain range, but the total power of these channels will be kept constant (by normalization).



If the "3i" OCNS mode is activated (and the "3GPP FDD > State > On"), the OCNS channels are automatically leveled in order to have a total power of 0 dB for all channels of BS 1.

Table 5-4: Defined settings for the OCNS signal in base station 1 in 3i mode

Slot format	Symbol Rate, kbps	First Ch. Code of the channel	Second Ch. Code of the channel	Relative Power, dB (prior to the 0 dB adjustment)
10	30	2	108	-1.7
10	30	3	103	-2.7
10	30	5	109	-3.5
10	30	6	118	-0.8
10	30	90	4	-6.2
10	30	94	123	-4.6
10	30	96	111	-2.3
10	30	98	106	-4.1
10	30	99	100	-3.1
10	30	101	113	-5.1
12	60	52	44	0.0
10	30	110	124	-4.6
10	30	114	115	-4.8
10	30	116	126	-4.8
12	60	60	46	-1.1
10	30	125	95	-4.1



Refer to [chapter 5.13.9, "Randomly Varying Modulation and Number of Codes"](#), on page 127 for description of the further settings required for the 3i Enhanced Performance Requirements tests according to 3GPP TS34.121-1.

OCNS On

Activates OCNS channels, as defined in the 3GPP standard, in base station 1.

Different OCNS scenarios are defined in the 3GPP standard. Set the scenario by means of the parameter [OCNS Mode](#).

SCPI command:

`[:SOURCE<hw>] :BB:W3Gpp:BSTation:OCNS:STATE` on page 356

OCNS Mode

Chooses the scenario for activating OCNS channels. For an overview of the provided scenarios and their settings, refer to [chapter 5.2.1, "Orthogonal Channel Noise \(OCNS\) Settings"](#), on page 58.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:BSTation:OCNS:MODE` on page 357

OCNS Seed

In "3i" OCNS mode, sets the seed for both the random processes, the power control simulation process and the process controlling the switch over of the channelization codes.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:BSTation:OCNS:SEED` on page 357

5.2.2 General Configuration Settings**Reset all Base Stations**

Resets all base stations to the predefined settings. The following table gives an overview of the settings. The preset value for each parameter is specified in the description of the remote-control commands.

Parameter	Value
State	Off
State (all channels)	Off
Scrambling Code	0
Slot Format DPCH	8
Symbol Rate DPCH	30 ksps
Channelization Code (all channels)	0
Data Source (all channels)	PN9
Timing Offset (all channels)	0
Multi Code State (all channels)	Off

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:BSTation:PRESet` on page 327

Reset User Equipment

Resets all user equipment to the predefined settings. The following table gives an overview of the settings. The preset value for each parameter is specified in the description of the remote-control commands.

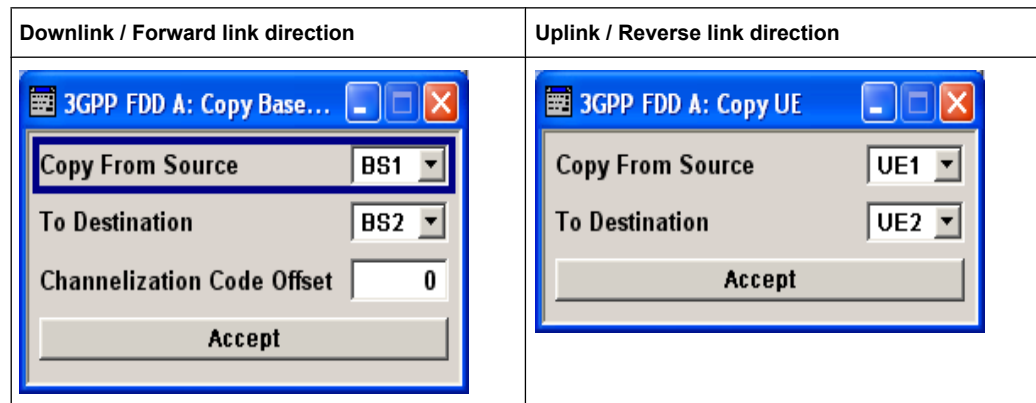
Parameter	Value
State	Off
Mode	DPCCH + DPDCH
Scrambling Code (hex)	0
DPCCH Settings	
Power	0 dB
DPDCH Settings	
DPDCH State	On
HS-DPCCH, E-DPCCH and E-DPDCH State	Off
Channel Power	0 dB
Overall Symbol Rate	60 ksps

SCPI command:

[\[:SOURce<hw>\]:BB:W3Gpp:MSTation:PRESet](#) on page 426

Copy Basestation/Copy User Equipment...

Copies the settings of a base station or user equipment to a second base or user equipment. A dialog opens for creating the destination station.



"Copy from Source" Selects the base station or user equipment whose settings are to be copied.

SCPI command:

[\[:SOURce<hw>\]:BB:W3Gpp:COPY:SOURce](#) on page 328

"To Destination" Selects the base station or user equipment whose settings are to be overwritten.

SCPI command:

[\[:SOURce<hw>\]:BB:W3Gpp:COPY:DESTination](#) on page 328

"Channelization Code Offset (Base Station only)" Enters the offset to be applied when copying the base station to the channelization codes of the destination base station. The minimum value is 0 (channelization codes are identical), the maximum value is 511.

SCPI command:

[:SOURCE<hw>] :BB:W3GPP:COPY:COFFset on page 327

"Accept" Starts the copy process.

SCPI command:

[:SOURCE<hw>] :BB:W3GPP:COPY:EXECute on page 328

Test Setups/Models

Calls the dialog for selecting one of the test models defined in the 3GPP standard and further test setups, see [chapter 5.5, "Test Setups/Models"](#), on page 81.

SCPI command:

n.a.

Predefined Settings Downlink

Calls the dialog for setting predefined configurations, see [chapter 5.6, "Predefined Settings - Downlink"](#), on page 84.

SCPI command:

n.a.

Additional UE

(Configure User Equipment only)

Calls the dialog for simulating up to 128 additional user equipments, see [chapter 5.7, "Additional User Equipment - Uplink"](#), on page 86.

SCPI command:

n.a.

Select Basestation/Configure User Equipment...

Selects the base station or user equipment by pressing the accompanying button. This opens a dialog for editing the selected basestation or user equipment (see [chapter 5.9, "Base Station Configuration"](#), on page 93 and [chapter 5.24, "User Equipment Configuration \(UE\)"](#), on page 162).

SCPI command:

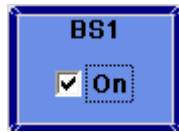
n.a.

(the base station or user equipment is selected by the keyword index

BSTation<[1] | 2 | 3 | 4> or MSTation<i>)

Base Station/UE On

Activates or deactivates the base station or user equipment.



SCPI command:

[\[:SOURCE<hw>\]:BB:W3GPP:BSTation<st>:STATE](#) on page 401

[\[:SOURCE<hw>\]:BB:W3GPP:MSTation<st>:STATE](#) on page 427

5.2.3 General Power Settings

Adjust Total Power to 0dB

(only for State = ON)

Sets the power of the enabled channels so that the total power of all the active channels is 0 dB. This will not change the power ratio among the individual channels.

SCPI command:

[\[:SOURCE<hw>\]:BB:W3GPP:POWER:ADJUST](#) on page 329

Total Power

Displays the total power of the active channels.

The total power is calculated from the power ratio of the powered up code channels with modulation on. If the value is not equal to 0 dB, the individual code channels (whilst still retaining the power ratios) are internally adapted so that the "Total Power" for achieving the set output level is 0 dB.

SCPI command:

[\[:SOURCE<hw>\]:BB:W3GPP:POWER\[:TOTAl\]](#) on page 329

Level Reference

Determines the level reference for the leveling of the output signal in uplink direction.

Parameter	Power leveling performed during	Power in "Level" display equal to	"Mode" of the first active UE
"RMS Power"	Complete signal	Output signal's mean power	<ul style="list-style-type: none"> • PRACH Standard • PRACH Preamble Only • DPCCH+DPDCH and UL-DTX Off • PCPCH Standard • PCPCH Preamble Only
"First DPCCH"	First slot in which a DPCCH is transmitted in the first active UE	Output signal's mean power during the first active DPCCH Note: if there are other UEs or channels active during the reference slot, the total power is used as a reference, not only the DPCCH power. This mode is required if the UL-DTX is enabled, due to the long signal parts of inactivity.	<ul style="list-style-type: none"> • DPCCH+DPDCH and UL-DTX On • DPCCH+DPDCH and UL-DTX Off
"PRACH Message Part"	PRACH Message Part of the first active UE	Output signal's mean power during the PRACH Message Part	PRACH Standard
"Last PRACH Preamble"	Last PRACH preamble of the first active UE	Output signal's mean power during the last PRACH preamble	<ul style="list-style-type: none"> • PRACH Standard • PRACH Preamble Only

Example:

- "RF Level" = -10 dBm (value displayed in the header of the instrument)
- DPCCH is activated
- E-DPCCH and one E-DPDCH are on in the first subframe of each frame

The [figure 5-2](#) displays the power versus time for "Level Reference = First DPCCH": the signal level in the first subframe is -10 dBm; the RMS power of the signal is -13.3 dBm.

Configure Base Station or UE

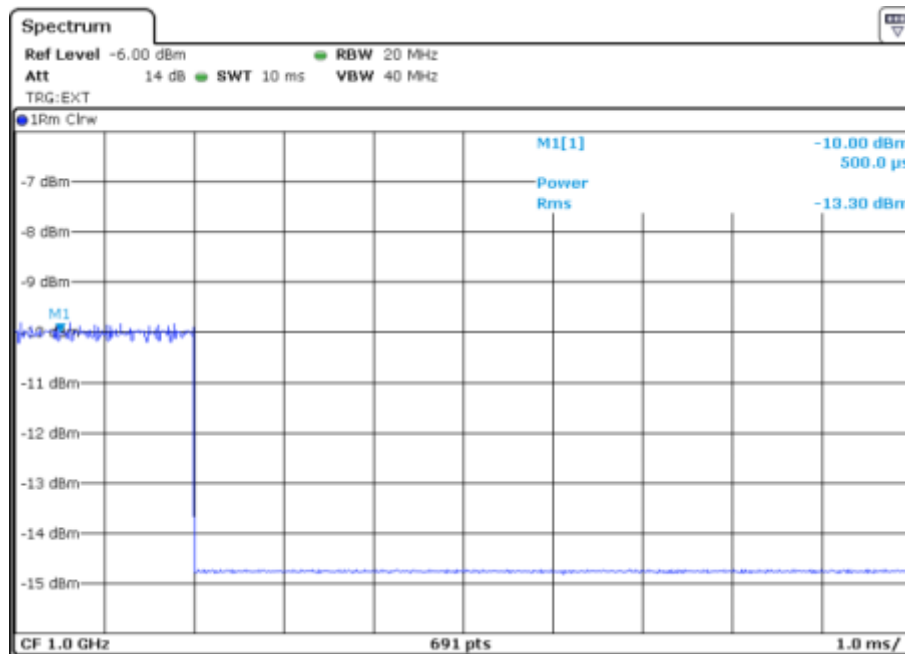


Fig. 5-2: Example: Level Reference = First DPCCH

The figure 5-3 displays the power versus time for "Level Reference = RMS": the RMS power of the signal is -10 dBm; the signal level in the first subframe is -6.7 dBm

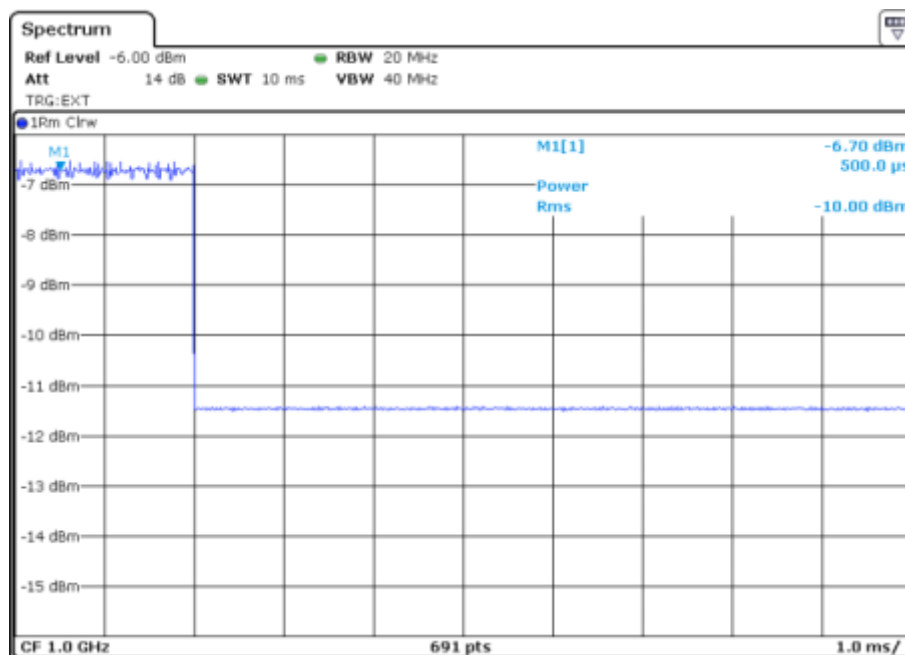


Fig. 5-3: Example: Level Reference = RMS

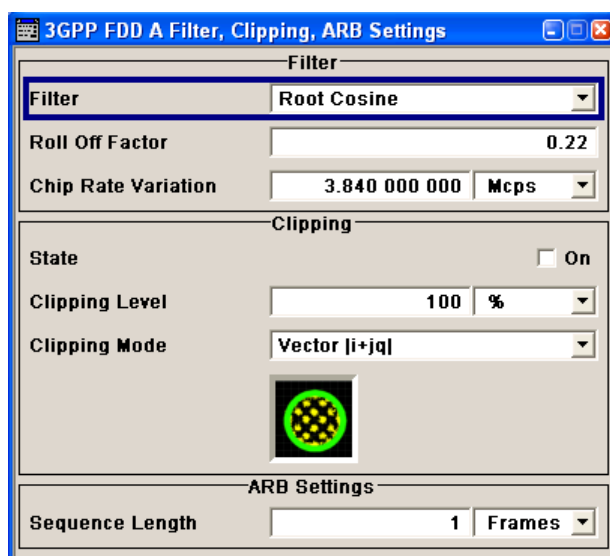
SCPI command:

[:SOURce<hw>] :BB:W3GPP:LREference on page 428

5.3 Filtering, Clipping, ARB Settings

The "Filtering, Clipping, ARB Settings" menu is reached via the 3GPP FDD main menu.

The filter parameters ("Filter" section), clipping ("Clipping" section) and the sequence length of the arbitrary waveform component ("ARB Settings" section) are defined in this menu.



5.3.1 Filter

In the "Filter" section, the settings are made for the baseband filter.

Filter

Selects baseband filter.

This opens a selection window containing all the filters available to the instrument.

SCPI command:

[\[:SOURce<hw>\]:BB:W3GPp:FILTer:TYPe](#) on page 337

Roll Off Factor or BxT

Enters the filter parameters.

The filter parameter offered (Roll Off factor or BxT) depends on the currently selected filter type. This parameter is always set to the default for each of the predefined filters.

SCPI command:

[\[:SOURce<hw>\]:BB:W3GPp:FILTer:PARAmeter:APCO25](#) on page 336

[\[:SOURce<hw>\]:BB:W3GPp:FILTer:PARAmeter:COStine](#) on page 336

[\[:SOURce<hw>\]:BB:W3GPp:FILTer:PARAmeter:GAUSs](#) on page 336

[\[:SOURce<hw>\]:BB:W3GPp:FILTer:PARAmeter:RCOSine](#) on page 337

[\[:SOURce<hw>\]:BB:W3GPp:FILTer:PARAmeter:SPHase](#) on page 337

Cut Off Frequency Factor

(This feature is available for filter parameter "Lowpass" only.)

Sets the value for the cut off frequency factor. The cut off frequency of the lowpass filter (ACP and EVM optimization) can be adjusted to reach spectrum mask requirements.

SCPI command:

[\[:SOURce<hw>\]:BB:W3GPp:FILTer:PARAmeter:LPASs](#) on page 336

[\[:SOURce<hw>\]:BB:W3GPp:FILTer:PARAmeter:LPASSEVM](#) on page 337

Chip Rate Variation

Enters the chip rate. The default settings for the chip rate is 3.84 Mcps.

The chip rate entry changes the output clock and the modulation bandwidth, as well as the synchronization signals that are output. It does not affect the calculated chip sequence.

SCPI command:

[\[:SOURce<hw>\]:BB:W3GPp:CRATe:VARiation](#) on page 334

Impulse Length

(For WinIQSIM2 only)

Displays the number of filter tabs. If the check box is activated, the most sensible parameter values are selected. The value depends on the coherence check. If the check box is deactivated, the values can be changed manually.

SCPI command:

[\[:SOURce<hw>\]:BB:W3GPp:FILTer:ILENgtH:AUTO](#) on page 335

[\[:SOURce<hw>\]:BB:W3GPp:FILTer:ILENgtH](#) on page 335

Oversampling

(For WinIQSIM2 only)

Determines the upsampling factor. If the check box is activated, the most sensible parameter values are selected. The value depends on the coherence check. If the check box is deactivated, the values can be changed manually.

SCPI command:

[\[:SOURce<hw>\]:BB:W3GPp:FILTer:OSAMpling:AUTO](#) on page 335

[\[:SOURce<hw>\]:BB:W3GPp:FILTer:OSAMpling](#) on page 335

5.3.2 Clipping

The settings for clipping are collected in the "Clipping" section.

Clipping State

Switches baseband clipping on and off.

Baseband clipping is a very simple and effective way of reducing the crest factor of the WCDMA signal.

WCDMA signals may have very high crest factors particularly with many channels and unfavorable timing offsets. High crest factors entail two basic problems:

- The nonlinearity of the power amplifier (compression) causes intermodulation which expands the spectrum (spectral regrowth).
- Since the level in the D/A converter is relative to the maximum value, the average value is converted with a relatively low resolution. This results in a high quantization noise.

Both effects increase the adjacent-channel power.

With baseband clipping, all the levels are limited to a settable value ("Clipping Level"). This level is specified as a percentage of the highest peak value. Since clipping is done prior to filtering, the procedure does not influence the spectrum. The EVM however increases.

Since clipping the signal not only changes the peak value but also the average value, the effect on the crest factor is unpredictable. The following table shows the effect of the "Clipping" on the crest factor for typical scenarios.

Table 5-5: Changing the crest factor by clipping (vector mode $|I+Q|$) for signal configurations with different output crest factors. 100% clipping levels mean that clipping does not take place.

Clipping level	Downlink: 10 DPCHs "Minimum Crest" 30 ksp	Downlink: 10 DPCHs "Worst Crest" 30 ksp	Downlink: 10 DPCHs "Average Crest" 30 ksp	Downlink: 128 DPCHs "Average Crest" 30 ksp
100%	9.89 dB	14.7 dB	10.9 dB	21.7 dB
80%	8.86 dB	12.9 dB	9.39 dB	20.2 dB
50%	7.50 dB	10.1 dB	8.29 dB	16.9 dB
20%	5.50 dB	6.47 dB	6.23 dB	12.5 dB
10%	5.34 dB	6.06 dB	5.80 dB	9.57 dB
5%	5.34 dB	6.06 dB	5.80 dB	8.17 dB

The following pictures demonstrate the effect of clipping with vector mode ($|I+Q|$), using a signal configuration with 4 DPCH as an example.

The arrows and the circle in the upper illustration show how the levels are mapped during subsequent clipping in vector mode ($|I+Q|$).

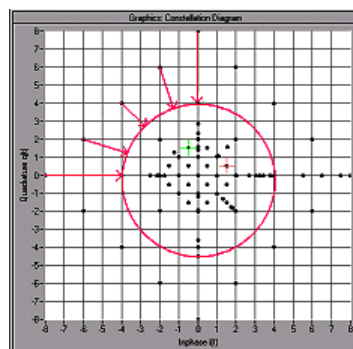


Fig. 5-4: Constellation diagram of the signal without clipping, shows the level mapping for vector mode

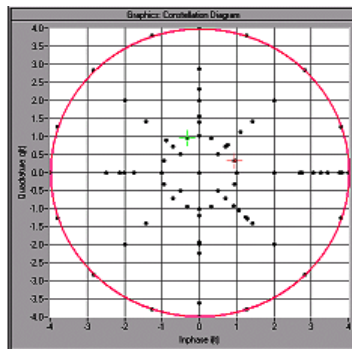


Fig. 5-5: Constellation diagram with clipping level 50 %, vector mode ($|I+q|$)

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:CLIPping:STATe` on page 334

Clipping Level

Sets the limit for clipping.

This value indicates at what point the signal is clipped. It is specified as a percentage, relative to the highest level. 100% indicates that clipping does not take place.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:CLIPping:LEVEl` on page 333

Clipping Mode

Selects the clipping method. A graphic illustration of the way in which these two methods work is given in the menu.

"Vector $|I + q|$ " The limit is related to the amplitude $|I + q|$. The I and Q components are mapped together, the angle is retained (see [Clipping State](#)).



"Scalar $|I| + |Q|$ " The limit is related to the absolute maximum of all the I and Q values $|I| + |Q|$.



The I and Q components are mapped separately, the angle changes.

Example:

In the figure below, the square and the arrows show how the levels are mapped for clipping level 50% in scalar mode ($|I| + |Q|$).

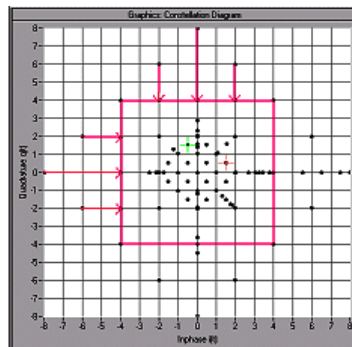


Fig. 5-6: Constellation diagram of the signal with 4 DPCH without clipping, shows the level mapping in scalar mode

SCPI command:

`[:SOURCE<hw>] :BB:W3GPP:CLIPPING:MODE` on page 333

5.3.3 ARB Settings

The ARB Settings section is where the sequence length of the arbitrary waveform component is defined.

Sequence Length ARB

Changes the sequence length of the arbitrary waveform component of the 3GPP signal in the number of frames. This component is calculated in advance and output in the arbitrary waveform generator. It is added to the realtime signal components (enhanced channels).

The maximum number of frames is calculated as follows:

Max. No. of Frames = Arbitrary waveform memory size / (3.84 Mcps x 10 ms).

Tip: In pure amplifier tests with several channels and no enhanced channels, it is possible to improve the statistical properties of the signal by increasing the sequence length.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPP:SENGth` on page 331

5.4 Trigger/Marker/Clock Settings



The trigger, clock, and marker delay functions are available for R&S SMx and R&S AMU instruments only.

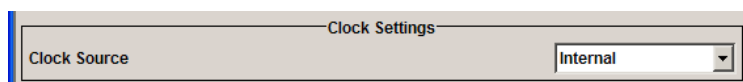
To access this dialog, select "Main Menu > Trigger/Marker".

The "Trigger In" section is where the trigger for the signal is set. Various parameters will be provided for the settings, depending on which trigger source - internal or external - is selected. The current status of signal generation ("Running" or "Stopped") is indicated for all trigger modes.

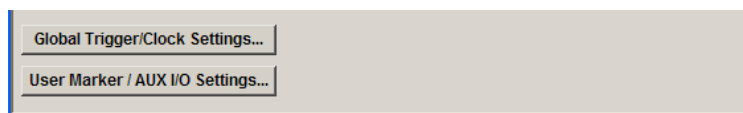
The "Marker Mode" section is where the marker signals at the MARKER output connectors are configured.

The "Marker Delay" section is where a marker signal delay can be defined, either without restriction or restricted to the dynamic section, i.e., the section in which it is possible to make settings without restarting signal and marker generation.

The "Clock Settings" section is where the clock source is selected and - in the case of an external source - the clock type.



The buttons in the last section lead to submenu for general trigger, clock and mapping settings.



5.4.1 Trigger In



The trigger functions are available for R&S SMx and R&S AMU instruments only.

The "Trigger In" section is where the trigger for the signal is set. Various parameters will be provided for the settings, depending on which trigger source - internal or external - is selected. The current status of signal generation ("Running" or "Stopped") is indicated for all trigger modes.

Trigger Mode

Selects trigger mode.

The trigger mode determines the effect of a trigger on the signal generation.

"Auto"	The signal is generated continuously.
"Retrigger"	The signal is generated continuously. A trigger event (internal or external) causes a restart.
"Armed_Auto"	The signal is generated only when a trigger event occurs. Then the signal is generated continuously. Button "Arm" stops signal generation. A subsequent trigger event (internal with "Execute Trigger" or external) causes a restart.
"Armed_Retrigger"	The signal is generated only when a trigger event occurs. Then the signal is generated continuously. Every subsequent trigger event causes a restart. Button "Arm" stops signal generation. A subsequent trigger event (internal with "Execute Trigger" or external) causes a restart.
"Single"	The signal is generated only when a trigger event occurs. Then the signal is generated once to the length specified at "Signal Duration". Every subsequent trigger event (internal with "Execute Trigger" or external) causes a restart.

SCPI command:

[\[:SOURce<hw>\]:BB:W3GPp\[:TRIGger\]:SEQUence](#) on page 343

Signal Duration Unit

Defines the unit for the entry of the length of the signal sequence to be output in the "Single" trigger mode.

SCPI command:

`[:SOURce<hw>] :BB:W3GPp:TRIGger:SLUNit` on page 341

Signal Duration

Defines the length of the signal sequence to be output in the "Single" trigger mode.

It is possible to output deliberately just part of the signal, an exact sequence of the signal, or a defined number of repetitions of the signal.

SCPI command:

`[:SOURce<hw>] :BB:W3GPp:TRIGger:SLENgth` on page 341

Running/Stopped

Displays the status of signal generation for all trigger modes. This display appears only when signal generation is enabled ("State" On).

- | | |
|-----------|--|
| "Running" | The modulation signal is generated; a trigger was (internally or externally) initiated in triggered mode.
If "Armed_Auto" and "Armed_Retrigger" have been selected, generation of signals can be stopped with the "Arm" button. A new trigger (internally with "Execute Trigger" or externally) causes a restart. |
| "Stopped" | The signal is not generated, and the instrument waits for a trigger event (internal or external). |

SCPI command:

`[:SOURce<hw>] :BB:W3GPp:TRIGger:RMODe` on page 340

Arm

Stops signal generation. This button appears only with "Running" signal generation in the "Armed_Auto" and "Armed_Retrigger" trigger modes.

Signal generation can be restarted by a new trigger (internally with "Execute Trigger" or externally).

SCPI command:

`[:SOURce<hw>] :BB:W3GPp:TRIGger:ARM:EXECute` on page 338

Execute Trigger

(R&S SMx and R&S AMU instruments only)

Executes trigger manually.

A manual trigger can be executed only when an internal trigger source and a trigger mode other than "Auto" have been selected.

SCPI command:

`[:SOURce<hw>] :BB:W3GPp:TRIGger:EXECute` on page 339

Trigger Source

Selects trigger source. This setting is effective only when a trigger mode other than "Auto" has been selected.

- | | |
|------------|---|
| "Internal" | The trigger event is executed by "Execute Trigger". |
|------------|---|

- "Internal (Baseband A / B)" (two-path instruments only)
The trigger event is executed by the trigger signal from the second path
- "External (TRIGGER 1 / 2)"
The trigger event is executed with the aid of the active edge of an external trigger signal.
The trigger signal is supplied via the TRIGGER connector.
The polarity, the trigger threshold and the input impedance of the TRIGGER input can be set in the "Global Trigger/Clock Settings" dialog.

SCPI command:

`[:SOURce<hw>] :BB:W3GPp:TRIGger:SOURce` on page 342

Sync. Output to External Trigger

(enabled for Trigger Source External)

Enables/disables output of the signal synchronous to the external trigger event.

For R&S SMBV instruments:

For two or more R&S SMBVs configured to work in a master-slave mode for synchronous signal generation, configure this parameter depending on the provided system trigger event and the properties of the output signal. See the table below for an overview of the required settings.

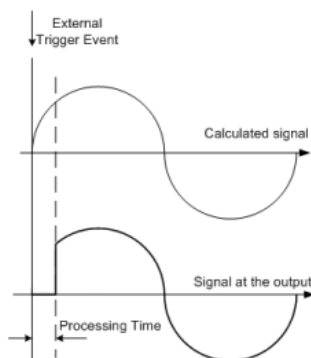
Table 5-6: Typical Applications

System Trigger	Application	"Sync. Output to External Trigger"
Common External Trigger event for the master and the slave instruments	All instruments are synchronous to the external trigger event	ON
	All instruments are synchronous among themselves but starting the signal from first symbol is more important than synchronicity with external trigger event	OFF
Internal trigger signal of the master R&S SMBV for the slave instruments	All instruments are synchronous among themselves	OFF

"On"

Corresponds to the default state of this parameter.

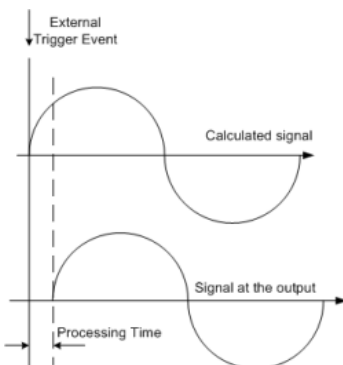
The signal calculation starts simultaneously with the external trigger event but because of the instrument's processing time the first samples are cut off and no signal is outputted. After elapsing of the internal processing time, the output signal is synchronous to the trigger event.



"Off"

The signal output begins after elapsing of the processing time and starts with sample 0, i.e. the complete signal is outputted.

This mode is recommended for triggering of short signal sequences with signal duration comparable with the processing time of the instrument.



SCPI command:

`[:SOURce<hw>] :BB:W3GPp:TRIGger:EXTernal:SYNChronize:OUTPut`
on page 339

Trigger Delay

Sets the trigger signal delay in samples on external triggering or on internal triggering via the second path.

Sets the trigger signal delay in samples on external triggering.

This enables the R&S Signal Generator to be synchronized with the device under test or other external devices.

For two-path instruments, the delay can be set separately for each of the two paths.

SCPI command:

`[:SOURce<hw>] :BB:W3GPp:TRIGger [:EXTernal<ch>] :DELay` on page 342
`[:SOURce<hw>] :BB:W3GPp:TRIGger:OBASeband:DELay` on page 340

Trigger Inhibit

Sets the duration for inhibiting a new trigger event subsequent to triggering. The input is to be expressed in samples.

In the "Retrigger" mode, every trigger signal causes signal generation to restart. This restart is inhibited for the specified number of samples.

This parameter is only available on external triggering or on internal triggering via the second path.

For two-path instruments, the trigger inhibit can be set separately for each of the two paths.

SCPI command:

[\[:SOURce<hw>\]:BB:W3GPp:TRIGger\[:EXTernal<ch>\]:INHibit](#) on page 343

[\[:SOURce<hw>\]:BB:W3GPp:TRIGger:OBASeband:INHibit](#) on page 340

5.4.2 Marker Mode

The marker output signal for synchronizing external instruments is configured in the marker settings section "Marker Mode".



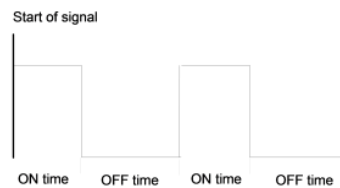
The R&S SMBV supports only two markers.

Marker Mode

Selects a marker signal for the associated MARKER output.

"Slot"	A marker signal is generated at the start of each slot (every 2560 chips or 0.667 ms).
"Radio Frame"	A marker signal is generated at the start of each frame (every 38400 chips or 10 ms).
"Chip Sequence Period (ARB)"	A marker signal is generated at the start of every arbitrary waveform sequence (depending on the setting for the arbitrary waveform sequence length). If the signal does not contain an arbitrary waveform component, a radio frame trigger is generated.
"System Frame Number (SFN) Restart"	A marker signal is generated at the start of every SFN period (every 4096 frames).

"ON/OFF Ratio" A regular marker signal that is defined by an ON/OFF ratio is generated. A period lasts one ON and OFF cycle.



The ON time and OFF time are each expressed as a number of chips and are set in an input field which opens when ON/OFF ratio is selected.

SCPI command:

`[:SOURce<hw>] :BB:W3GPp:TRIGger:OUTPut<ch>:ONTime` on page 347

`[:SOURce<hw>] :BB:W3GPp:TRIGger:OUTPut<ch>:OFFTime` on page 347

"User Period" A marker signal is generated at the beginning of every user-defined period. The period is defined in Period. This can be used, for instance, to generate a pulse at the start of each transport block (e.g. TTI 20 ms or 40 ms).

SCPI command:

`[:SOURce<hw>] :BB:W3GPp:TRIGger:OUTPut<ch>:PERiod` on page 348

"Dynamic Power Control" the parameter is not available for R&S SMBV. This marker is used internally. Marker 4 is set automatically to this value if Dynamic Power Control is enabled.

"HARQ Feed-back" the parameter is not available for R&S SMBV. This marker is used internally. Marker 4 is set automatically to this value if HARQ Feedback is enabled.
Remote-control command: n.a.

SCPI command:

`[:SOURce<hw>] :BB:W3GPp:TRIGger:OUTPut<ch>:MODE` on page 346

5.4.3 Marker Delay

The delay of the signals on the MARKER outputs is set in the "Marker Delay" section.



The marker delay functions are available for R&S SMx and R&S AMU instruments only.

The R&S SMBV supports only two markers.

Marker x Delay

Enters the delay between the marker signal at the marker outputs and the start of the frame or slot.

The input is expressed as a number of symbols/samples. If the setting "Fix marker delay to dynamic range" is enabled, the setting range is restricted to the dynamic range. In this range the delay of the marker signals can be set without restarting the marker and signal.

SCPI command:

`[:SOURce<hw>] :BB:W3GPp:TRIGger:OUTPut<ch>:DELay` on page 345

Current Range without Recalculation

Displays the dynamic range within which the delay of the marker signals can be set without restarting the marker and signal.

The delay can be defined by moving the setting mark.

SCPI command:

`[:SOURce<hw>] :BB:W3GPp:TRIGger:OUTPut<ch>:DELay:MAXimum`

on page 345

`[:SOURce<hw>] :BB:W3GPp:TRIGger:OUTPut<ch>:DELay:MINimum`

on page 346

Fix marker delay to current range

Restricts the marker delay setting range to the dynamic range. In this range the delay can be set without restarting the marker and signal.

SCPI command:

`[:SOURce<hw>] :BB:W3GPp:TRIGger:OUTPut:DELay:FIXed` on page 345

5.4.4 Clock Settings

The Clock Settings is used to set the clock source and a delay if required.



The clock functions are available for R&S SMx and R&S AMU instruments only.

Sync. Mode

(for R&S SMBV only)

Selects the synchronization mode.

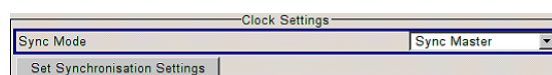
This parameter is used to enable generation of very precise synchronous signal of several connected R&S SMBVs.

Note: If several instruments are connected, the connecting cables from the master instrument to the slave one and between each two consecutive slave instruments must have the same length and type.

Avoid unnecessary cable length and branching points.

"None" The instrument is working in stand-alone mode.

"Sync. Master" The instrument provides all connected instrument with its synchronisation (including the trigger signal) and reference clock signal.



"Sync. Slave" The instrument receives the synchronisation and reference clock signal from another instrument working in a master mode.

SCPI command:

`[:SOURce<hw>] :BB:W3GPp:CLOCK:SYNChronization:MODE` on page 350

Set Synchronization Settings

(for R&S SMBV only)

Performs automatic adjustment of the instrument's settings required for the synchronization mode, selected with the parameter [Sync. Mode](#).

SCPI command:

`[:SOURce<hw>] :BB:W3GPp:CLOCK:SYNChronization:EXECute` on page 350

Clock Source

Selects the clock source.

"Internal" The internal clock reference is used to generate the chip clock.

"External" The external clock reference is fed in as the chip clock or multiple thereof via the CLOCK connector.
The chip rate must be correctly set to an accuracy of (2 % (see data sheet).
The polarity of the clock input can be changed with the aid of "Global Trigger/Clock Settings".
In the case of two-path instruments, this selection applies to path A

SCPI command:

`[:SOURce<hw>] :BB:W3GPp:CLOCK:SOURce` on page 349

Clock Mode

Enters the type of externally supplied clock.

"Chip" A chip clock is supplied via the CLOCK connector.

"Multiple Chip" A multiple of the chip clock is supplied via the CLOCK connector; the chip clock is derived internally from this.
The Multiplier window provided allows the multiplication factor to be entered.

SCPI command:

`[:SOURce<hw>] :BB:W3GPp:CLOCK:MODE` on page 348

Chip Clock Multiplier

Enters the multiplication factor for clock type Multiple.

SCPI command:

`[:SOURce<hw>] :BB:W3GPp:CLOCK:MULTiplier` on page 349

Measured External Clock

Indicates the measured frequency of the external clock signal. This enables the user to permanently monitor the frequency of the externally introduced clock.

This information is displayed only if the external clock source has been selected.

SCPI command:

`CLOC:INP:FREQ?`

5.4.5 Global Settings

The buttons in this section lead to submenu for general trigger, clock and mapping settings.

This settings are available for R&S SMx and R&S AMU instruments only.

Global Trigger/Clock Settings

Calls the "Global Trigger/Clock/Input Settings" dialog.

This dialog is used among other things for setting the trigger threshold, the input impedance and the polarity of the clock and trigger inputs.

In the case of two-path instruments, these settings are valid for both paths.

The parameters in this menu affect all digital modulations and standards, and are described in chapter "Global Trigger/Clock/Input Settings" in the Operating Manual.

User Marker / AUX I/O Settings

Calls the "User Marker AUX I/O Settings" menu, used to map the connector on the rear of the instruments.

See also "User Marker / AUX I/O Settings" in the Operating Manual.

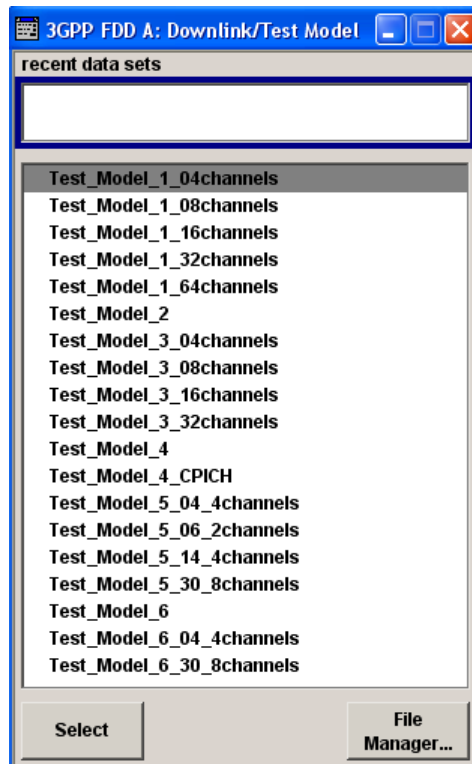
5.5 Test Setups/Models

The "Test Setups/Models" dialog can be reached via the "3GPP FFD" main menu.

The menu offers various test models, depending on which transmission direction is set. The presetting is defined in the 3GPP standard TS 25.141.

Test Models Downlink

Opens a window in which to select a test model in accordance with the 3GPP standard TS 25.141.



Selecting a test model for an active base station immediately generates the selected signal configuration.

The following table gives an overview of the test models available for selection.

Table 5-7: Test Models Downlink

Test Model	Description
"Test Model 1 (4/8 channels)"	Test models for Home BS <ul style="list-style-type: none"> • Spectrum emission mask • ACLR • Spurious emissions • Transmit intermodulation • Modulation accuracy • Peak code domain error
"Test Model 1 (16/32/64 channels)"	<ul style="list-style-type: none"> • Spectrum emission mask • ACLR • Spurious emissions • Transmit intermodulation • Modulation accuracy • Peak code domain error
"Test Model 2"	Output power dynamics
"Test Model 3 (4/8 channels)"	Peak code domain error test models for Home BS
"Test Model 3 (16/32 channels)"	Peak code domain error
"Test Model 4"	Error Vector Magnitude, optional P-CPICH is not active
"Test Model 4_CPICH"	Error Vector Magnitude, optional P-CPICH is active.

Test Model	Description
"Test Model 5 (4 HS-PDSCH + 4 DPCH)"	Error Vector Magnitude test models for Home BS at base stations that support high speed physical downlink shared channels with 16 QAM
"Test Model 5 (8 HS-PDSCH + 30 DPCH)" "Test Model 5 (4 HS-PDSCH + 14 DPCH)" "Test Model 5 (2 HS-PDSCH + 6 DPCH)"	Error Vector Magnitude at base stations that support high speed physical downlink shared channels with 16 QAM
"Test Model 6_04_4channels"	Relative Code Domain Error test models for Home BS only applicable for 64QAM modulated codes.
"Test Model 6_30_8channels"	Relative Code Domain Error only applicable for 64QAM modulated codes.

SCPI command:

[\[:SOURCE<hw>\]:BB:W3GPP:SETTING:TModel:BSTation:CATalog](#) on page 355

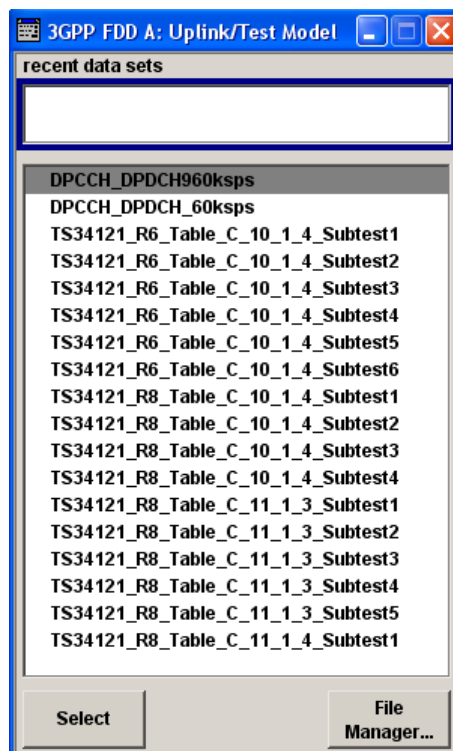
[\[:SOURCE<hw>\]:BB:W3GPP:SETTING:TModel:BSTation](#) on page 354

Test Models Uplink

Opens a window in which to select pre-defined test signals.

3GPP has not defined any test models for the Uplink transmission direction. But the R&S Signal Generator also makes pre-defined test signals available for the Uplink, so that useful test signals can be generated at the press of a button.

The Uplink test models are generated in the enhanced state of user equipment 1. An exception are the test models for the E-DPCCH and E-DPDCH, these channels are not calculated in realtime. The sequence length is not changed.



The following table lists some examples of configurations available for selection.

Table 5-8: Test Models Uplink

Test Model	Description
"DPCCH + DPDCH 60 kbps"	User equipment 1 is activated in DPCCH + DPDCH mode. 60 kbps is selected as the overall symbol rate. All the other settings correspond to the preset setting.
"DPCCH + DPDCH 960 kbps"	User equipment 1 is activated in DPCCH + DPDCH mode. 960 kbps is selected as the overall symbol rate. All the other settings correspond to the preset setting.
"TS34121_R6_Table_C_10_1_4_Subset1 .. 6"	Uplink test model according to 3GPP TS 34.121 Release 6, Table C.10.1.4.
"TS34121_R8_Table_C_10_1_4_Subset1 .. 4"	Uplink test models for transmitter characteristics tests with HS-DPCCH according to 3GPP TS 34.121 Release 8, Table C.10.1.4.
"TS34121_R8_Table_C_11_1_3_Subset1 .. 5"	Uplink test models for transmitter characteristics tests with HS-DPCCH and E-DCH according to 3GPP TS 34.121 Release 8, Table C.11.1.3.
"TS34121_R8_Table_C_11_1_4_Subset1"	Uplink test model for transmitter characteristics tests with HS-DPCCH and E-DCH with 16QAM according to 3GPP TS 34.121 Release 8, Table C.11.1.4.

SCPI command:

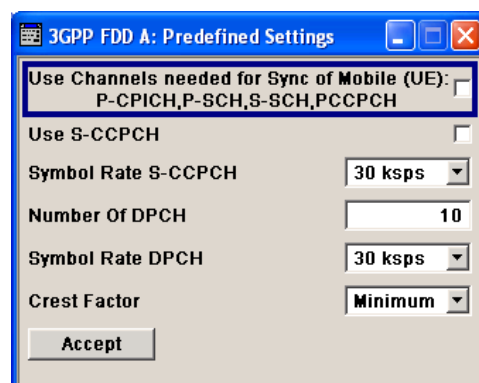
[\[:SOURCE<hw>\]:BB:W3GPP:SETTING:TMODEL:MSTation:CATalog](#) on page 356

[\[:SOURCE<hw>\]:BB:W3GPP:SETTING:TMODEL:MSTation](#) on page 355

5.6 Predefined Settings - Downlink

The "Predefined Settings" can be reached via the "3GPP FDD" main menu. It is only available when the Downlink transmission direction is selected. The channel table of base station 1 is filled (preset) with the set parameters. The sequence length of the generated signal is 1 frame.

With the "Predefined Settings" function, it is possible to create highly complex scenarios with just a few keystrokes. This function is of use if, say, just the envelope of the signal is of interest.



Use Channels

Selects if P-CPICH, P-SCH, S-SCH and PCCPCH are used in the scenario or not. These "special channels" are required by user equipment for synchronization.

SCPI command:

[:SOURCE<hw>] :BB:W3GPP:PPARAmeter:SCHannels on page 353

Use S-CCPCH

Selects if S-CCPCH is used in the scenario or not.

SCPI command:

[:SOURCE<hw>] :BB:W3GPP:PPARAmeter:SCCPch:STATe on page 353

Symbol Rate S-CCPCH

Sets the symbol rate of S-CCPCH.

SCPI command:

[:SOURCE<hw>] :BB:W3GPP:PPARAmeter:SCCPch:SRATe on page 353

Number of DPCH

Sets the number of activated DPCHs.

The maximum number is the ratio of the chip rate and the symbol rate (maximum 512 at the lowest symbol rate of 7.5 ksps).

SCPI command:

[:SOURCE<hw>] :BB:W3GPP:PPARAmeter:DPCH:COUNT on page 352

Symbol Rate DPCH

Sets the symbol rate of all DPCHs.

SCPI command:

[:SOURCE<hw>] :BB:W3GPP:PPARAmeter:DPCH:SRATe on page 352

Crest Factor

Selects desired range for the crest factor of the test scenario. The crest factor of the signal is kept in the desired range by automatically setting appropriate channelization codes and timing offsets.

"Minimum"	The crest factor is minimized. The channelization codes are distributed uniformly over the code domain. The timing offsets are increased by 3 per channel.
"Average"	An average crest factor is set. The channelization codes are distributed uniformly over the code domain. The timing offsets are all set to 0.
"Worst"	The crest factor is set to an unfavorable value (i.e. maximum). The channelization codes are assigned in ascending order. The timing offsets are all set to 0.

SCPI command:

[:SOURCE<hw>] :BB:W3GPP:PPARAmeter:CRESt on page 351

Accept

Presets the channel table of basestation 1 with the parameters defined in the Predefined Settings menu. Scrambling Code 0 is automatically selected (as defined in the 3GPP test models).

SCPI command:

`[:SOURCE<hw>] :BB:W3GPP:PPARAMeter:EXECute` on page 353

5.7 Additional User Equipment - Uplink

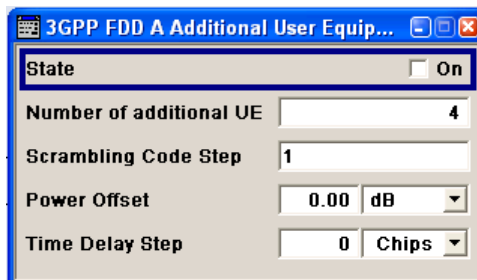
Submenu "Additional User Equipment" can be reached via the "3GPP FFD" main menu. It is only available when the Uplink transmission direction is selected.

The menu makes it possible to simulate up to 128 additional user equipment and thus to generate a signal that corresponds to the received signal for a base station with high capacity utilization.

The fourth user equipment (UE4) serves as a template for all other stations.

The following parameters are the only ones modified for the additional user equipment:

- Scrambling code (different for all stations)
- Power (different to UE4, but identical among themselves)

**State**

Activates additional user equipment. At "State Off", all the additional user equipment are switched off.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPP:MSTation:ADDITIONal:STATe` on page 425

Number of Additional UE

Sets the number of additional user equipment. As many as 128 additional user equipments can be simulated.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPP:MSTation:ADDITIONal:COUNT` on page 424

Scrambling Code Step

Enters the step width for increasing the scrambling code of the additional user equipment. The start value is the scrambling code of UE4.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPP:MSTation:ADDITIONAL:SCODE:STEP on page 425
```

Power Offset

Sets the power offset of the active channels of the additional user equipment to the power outputs of the active channels of UE4.

The resultant power must fall within the range 0 ... - 80 dB. If the value is above or below this range, it is limited automatically.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPP:MSTation:ADDITIONAL:POWER:OFFSET  
on page 424
```

Time Delay Step

Enters the step width for the time delay of the additional user equipment to one another. The start value returns the time delay of UE4. Entry is made in chips and can be a maximum of 1 frame.

The time delay allows user equipment to be simulated even if the arrival of their signals is not synchronized at the base station.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPP:MSTation:ADDITIONAL:TDELAY:STEP on page 425
```

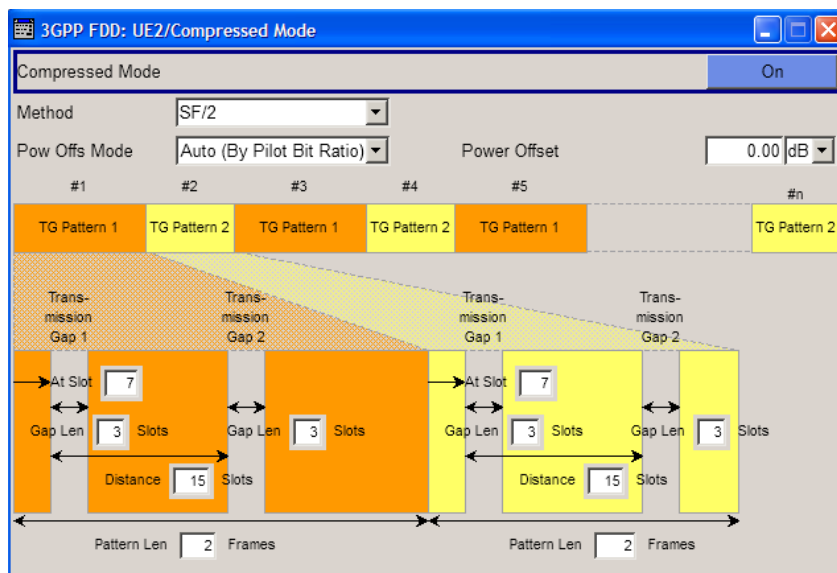
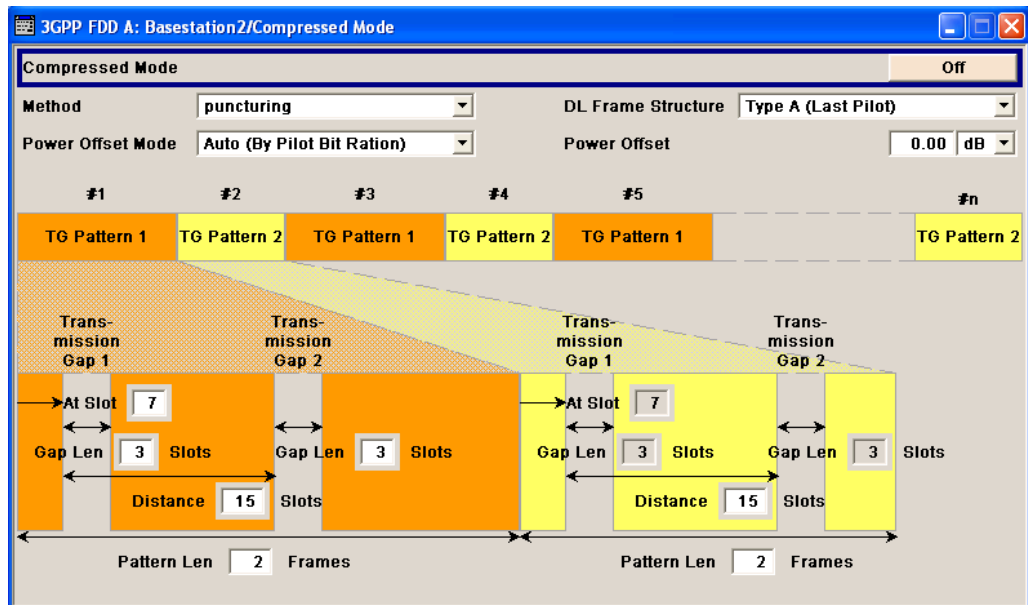
5.8 Compressed Mode

(This feature is available for BS 2...4 and UE 2...4 only.)

To enable handover of a mobile station from a 3GPP FDD base station/user equipment to another base station/user equipment, (3GPP FDD, 3GPP TDD, GSM or E-UTRA) at a different frequency, transmission and reception of the 3GPP FDD signal must be interrupted for a short time. During this time, the mobile station changes to the frequency of the new base station, for example to measure the receive level of this station or read system information.

To transmit a consistently high data volume also in the remaining (shorter) period of time, the data is compressed. This can be done by halving the spreading factor (SF/2 method) or reducing error protection (puncturing method). In both cases, transmit power in the ranges concerned is increased to maintain adequate signal quality.

Apart from these two methods, there is also the method of "higher layer scheduling". With this method, transmission of the data stream is stopped during the transmission gap. This method is suitable for packet-oriented services; it involves no power increase (power offset) in the active ranges.



5.8.1 Compressed Mode General Settings

Compressed Mode State

Activates compressed mode.

The Compressed mode is configured in the dialog called by button "Compressed Mode".

SCPI command:

`[:SOURce<hw>] :BB:W3GPp:BSTation<st>:CMODE:STATE` on page 398

`[:SOURce<hw>] :BB:W3GPp:MSTation<st>:CMODE:STATE` on page 430

Compressed Mode Method

Selects compressed mode method.

"Higher layer scheduling" The data is compressed by stopping the transmission of the data stream during the transmission gap.

"SF/2" The data is compressed by halving the spreading factor.

SCPI command:

[\[:SOURCE<hw>\]:BB:W3GPP:MSTation<st>:CMODE:METHOD](#) on page 428

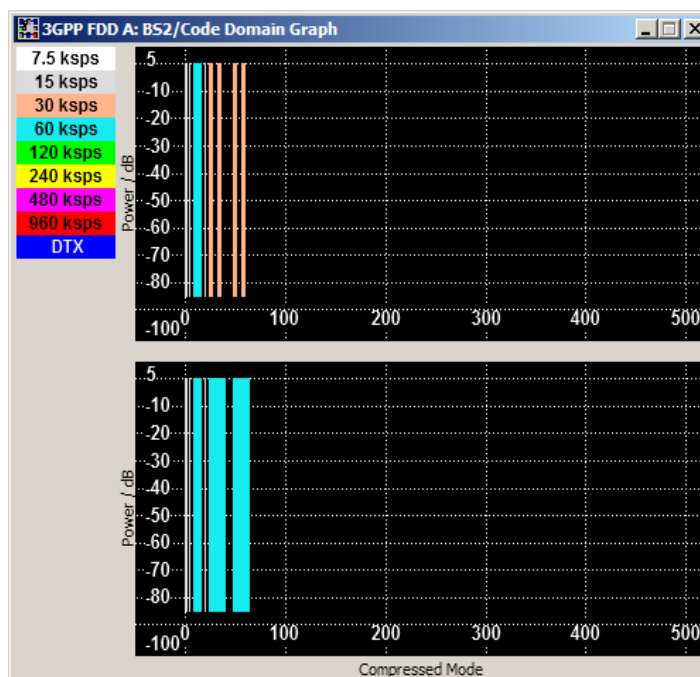
Compressed Mode Method - BS

Selects compressed mode method.

"Puncturing" The data is compressed by reducing error protection.

"Higher layer scheduling" The data is compressed by stopping the transmission of the data stream during the transmission gap.

"SF/2" The data is compressed by halving the spreading factor. This method can be demonstrated in the code domain graph. The graph is split into two windows. The upper window shows the code domain assignment with non-compressed slots, the lower window with compressed slots. It can be recognized clearly that the DPCH bars in the lower window are wider, which is due to the reduction of the spreading factor of these channels. The other channels (e.g. CPICH) have the same width in both halves.



SCPI command:

[\[:SOURCE<hw>\]:BB:W3GPP:BSTation<st>:CMODE:METHOD](#) on page 395

DL Frame Structure

Selects frame structure. The frame structure determines the transmission of TPC and pilot field in the transmission gaps.

For 3GPP FDD radio communication to operate, the mobile station receiver requires information in the pilot field for synchronization and channel estimation and in the power control field TPC for control of the mobile station transmit power.

To keep the period during which no channel estimation takes place as short as possible, the pilot is sent in the last slot of each transmission gap.



Optionally, the first TPC field of the transmission gap can be sent in addition.



"Type A (Last Pilot)" The pilot field is sent in the last slot of each transmission gap.

"Type B (First TPC, Last Pilot)" The pilot field is sent in the last slot of each transmission gap. The first TPC field of the transmission gap is sent in addition.

SCPI command:

[\[:SOURCE<hw>\]:BB:W3GPp:BSTation<st>:CMODE:DLFStructure](#) on page 394

Power Offset Mode

Selects power offset mode.

The compressed slots can be sent with a power offset, i.e. at an increased power level.

"Auto (By Pilot Bit Ratio)" The power offset is obtained as the relation between the Number of pilots bits of non-compressed slots and the Number of pilot bits by compressed slots.

"User" The power offset is defined manually. The value is input in entry field Power offset.

SCPI command:

[\[:SOURCE<hw>\]:BB:W3GPp:BSTation<st>|MSTation<st>:CMODE:POMode](#) on page 398

Power Offset

Defines power offset. The entered value is only valid for "Power Offset Mode User".

SCPI command:

[\[:SOURCE<hw>\]:BB:W3GPp:BSTation<st>|MSTation<st>:CMODE:POFFset](#) on page 397

5.8.2 Compressed Mode Configuration Graph

The remaining parameters of the compressed mode are set in the configuration graph. The graph displays the distribution of transmission gaps in a compressed mode signal.

The signal generated can be divided into three subranges.

5.8.3 Transmission Gaps

A transmission gap has a maximum length of 14 slots. Since at least eight active slots must be sent per frame, gaps comprising seven slots and more have to be distributed over two neighboring frames.

The transmitted signal consists of max. two patterns that are sent alternately. Each pattern comprises two transmission gaps.

The graph includes all parameters necessary to define the transmission gaps in the signal.



The settings in the graph are also valid for the compressed mode graph of the user equipment with the same number. For example, setting a distance of 9 slots for base station 4 also sets the distance to 9 slots for user equipment 4.

The parameters below are interrelated in many ways. For example, the transmission gap distance must be selected so that no frame contains more than one gap. In the event of an invalid entry, the next valid value is automatically set. If the entry is valid but changes the valid range for another parameter, the setting of the parameter is adapted.

At Slot:

Transmission gap slot number.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:BSTation<st>:CMODE:PATtern<ch>:TGSN
```

on page 397

```
[ :SOURCE<hw> ] :BB:W3GPp:MSTation<st>:CMODE:PATtern<ch>:TGSN
```

on page 430

Gap Len:

Transmission gap lengths.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:BSTation<st>:CMODE:PATtern<ch>:TGL<di>
```

on page 396

```
[ :SOURCE<hw> ] :BB:W3GPp:MSTation<st>:CMODE:PATtern<ch>:TGL<di>
```

on page 429

Distance

Transmission gap distance.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:BSTation<st>:CMODE:PATtern<ch>:TGD
```

on page 395

```
[ :SOURCE<hw> ] :BB:W3GPp:MSTation<st>:CMODE:PATtern<ch>:TGD
```

on page 429

Pattern Len:

Transmission gap pattern length. The input range is 1 ... 100 frames for pattern 1 and 0 ... 100 frames for pattern 2. Thus, it is possible to configure transmission gap pattern with only one pattern.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPP:BSTation<st>:CMODE:PATtern<ch>:TGPL
```

on page 396

```
[ :SOURCE<hw> ] :BB:W3GPP:MSTation<st>:CMODE:PATtern<ch>:TGPL
```

on page 429

5.8.4 Compressed Ranges

All slots of a frame that are not blanked are compressed. If the transmission gap is transmitted within one frame (single-frame method), an envelope as shown by the diagram below is obtained:

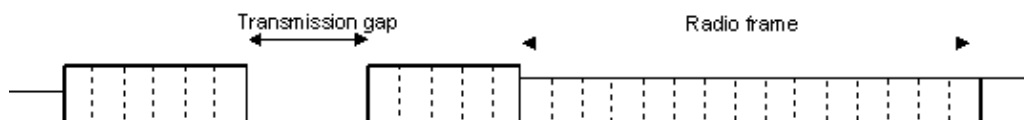


Fig. 5-7: Envelope of compressed mode signal with single-frame method

If the transmission gap is distributed over two neighboring frames, all slots of the two frames that are not blanked are compressed:



Fig. 5-8: Envelope of compressed mode signal with double-frame method

A different slot format, usually with a higher number of pilot bits, is used in the compressed ranges.

The transmit power can be increased ("Power Offset Mode") automatically or manually by defining a power offset.

5.8.5 Non-compressed ranges

Frames containing no transmission gaps are sent with the same slot format and the same power as in the non-compressed mode.

5.9 Base Station Configuration

The "Base Station Configuration" menu is called by selecting base station "BS1 ... BS4" in the "3GPP FFD" menu. Base stations can be configured independently of one another. Base station 1 (BS1) also includes enhanced channels (Enhanced Channels, Realtime).

The menu comprises the "Common Settings" section, in which the general parameters of the base station are set, a row containing the buttons "Multi Channel Assistant", "Code Domain" and "Channel Graph", which call the appropriate submenus and graphics and the most important part, the channel table with graphical display of the structure of the channel being edited.

Common Settings

State: On

2nd Search Code Group: 0

Use Scrambling Code (hex): 0000

Page Indicators/Frame: 72

Time Delay: 0 Chips

Diversity / MIMO: Antenna 2 Of 2

Use S-CPICH As Phase Reference

Open Loop Transmit Diversity:

Compressed Mode Available For BS2..BS4

Preset Channel Table:

Channel Type	Enh / HSDPA Settings	Slot Fmt	Symb Rate /ksp	Ch Code	Power /dB	Data	DList / Pattern	T Offs	DPCCH Settings	State	Dom Conf
6	PICH		15	0	0.00	PN 9		0		Off	
7	AICH		15	0	0.00				Config...	Off	
8	AP-AICH		15	0	0.00				Config...	Off	
9	PDSCH		0	15	0	0.00	PN 9			Off	
10	DL-DPCCH		0	7.5	0	0.00			Config...	Off	
11	DPCH	Config...	8	30	0	0.00	PN 9	0	Config...	Off	
12	HS-SCCH	Config...		30	5	-10.00	H-Set			On	
13	HS-PDS.QPSK			240	8	-20.00	PN 9			On	
14	HS-PDS.QPSK			240	9	-20.00	PN 9			On	
15	HS-PDS.QPSK			240	10	-20.00	PN 9			On	
16	HS-PDS.QPSK			240	11	-20.00	PN 9			On	
17	HS-PDS.QPSK			240	12	-20.00	PN 9			On	
18	DPCH		8	30	0	0.00	PN 9	0	Config...	Off	
19	DPCH		8	30	0	0.00	PN 9	0	Config...	Off	
20	DPCH		8	30	0	0.00	PN 9	0	Config...	Off	
21	DPCH		8	30	0	0.00	PN 9	0	Config...	Off	
22	DPCH		8	30	0	0.00	PN 9	0	Config...	Off	
23	DPCH (OCNS)		10	30	4	0.00	PN 9	0	Config...	On	
24	DPCH (OCNS)		10	30	5	-2.00	PN 9	0	Config...	On	
25	DPCH (OCNS)		10	30	6	-4.00	PN 9	0	Config...	On	
26	DPCH (OCNS)		10	30	7	-1.00	PN 9	0	Config...	On	

5.9.1 Common Settings

The general parameters of the base station are set in the Common Settings section.

State - BS

Activates or deactivates the selected base station. The number of the selected base station is displayed in the menu header.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:BSTation<st>:STATE` on page 401

2nd Search Code Group - BS

Displays the 2nd search code group.

This parameter is specified in the table defined by the 3GPP standard "Allocation of SSCs for secondary SCH". This table assigns a specific spreading code to the synchronization code symbol for every slot in the frame. The value is calculated from the scrambling code.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:BSTation<st>:SSCG` on page 400

Use Scrambling Code - BS

Activates or deactivates the scrambling code. The scrambling code can be deactivated for test purposes.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:BSTation<st>:SCODE:STATE` on page 400

Scrambling Code - BS

Enters the base station identification. This value is also the initial value of the scrambling code generator (see [chapter 3.1, "Scrambling Code Generator"](#), on page 18).

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:BSTation<st>:SCODE` on page 400

Page Indicators/Frame - BS

Enters the number of page indicators (PI) per frame in the page indicator channel (PICH).

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:BSTation<st>:PINDicator:COUNT` on page 399

Use S-CPICH as Phase Reference - BS

Activates or deactivates the use of S-CPICH as reference phase.

If activated the phase of S-CPICH and the phase of all DPCHs is 180 degrees offset from the phase of P-CPICH.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:BSTation<st>:SCPich:PREference [:STATE]`
on page 400

Diversity / MIMO - BS

Selects the antenna and the antenna configuration to be simulated.

The R&S Signal Generator supports two antenna configurations: a single-antenna system and a two-antenna system. Thus, an instrument equipped with two paths can simulate simultaneously the signals of both antennas of one two-antenna system. Moreover, for this two-antenna system, transmit diversity can be additionally activated or deactivated.

To simulate transmit diversity, a two-antenna system has to be selected and "Open Loop Transmit Diversity" has to be activated.

To configure HS-PDSCH MIMO channels, a two-antenna system has to be selected.

"Single Antenna" The signal of single-antenna system is calculated and applied.

"Antenna 1 of 2" Calculates and applies the output signal for antenna 1 of a two-antenna system.

"Antenna 2 of 2" Calculates and applies the output signal for antenna 2 of a two-antenna system.

SCPI command:

[\[:SOURCE<hw>\]:BB:W3GPP:BSTation<st>:TDIVersity](#) on page 401

Open Loop Transmit Diversity - BS

(Enabled for two-antenna system only)

Activates/deactivates open loop transmit diversity. The antenna whose signal is to be simulated is selected with the parameter "Diversity/MIMO".

Various forms of transmit diversity are described in the 3GPP standard. Different coding is used to divide the signal between the two antennas. As a result, the receiver can decode the traffic signal from the two input signals and is less liable to fading and other interferences.

A fixed diversity scheme is assigned to each channel type:

- TSTD (time switched transmit diversity for SCH) for P-SCH, S-SCH
- STTD (space time block coding transmit antenna diversity) for all other channels, except HS-PDSCH MIMO.

The HS-PDSCH MIMO channels are precoded as described in [chapter 3.14, "MIMO in HSPA+"](#), on page 31.

These two schemes are described in detail in TS 25.211.

SCPI command:

[\[:SOURCE<hw>\]:BB:W3GPP:BSTation<st>:TDIVersity](#) on page 401

[\[:SOURCE<hw>\]:BB:W3GPP:BSTation<st>:OLTDiversity](#) on page 399

Time Delay- BS

(This feature is available for BS 2...4 only.)

Enters the time delay of the signal of the selected base station compared to the signal of base station 1.

SCPI command:

[\[:SOURCE<hw>\]:BB:W3GPP:BSTation<st>:TDELay](#) on page 401

Compressed Mode State

Activates compressed mode.

The Compressed mode is configured in the dialog called by button "Compressed Mode".

SCPI command:

[\[:SOURCE<hw>\]:BB:W3GPP:BSTation<st>:CMODE:STATE](#) on page 398

[\[:SOURCE<hw>\]:BB:W3GPP:MSTation<st>:CMODE:STATE](#) on page 430

Compressed Mode...

Calls the menu for configuring the compressed mode.

The menu is described in [chapter 5.8, "Compressed Mode"](#), on page 87.

SCPI command:

n.a.

Reset Channel Table

Calls the default settings for the channel table.

SCPI command:

[\[:SOURCE<hw>\]:BB:W3GPp:BSTation<st>:CHANnel:PRESet](#) on page 358

Multi Channel Assistant...

Calls the menu for configuring several DPCH channels simultaneously.

The menu is described in [chapter 5.23, "Multi Channel Assistant - BS"](#), on page 158.

SCPI command:

n.a.

Code Domain...

Calls a graphical display of the assigned code domain.

The code domain graph is described in [chapter 5.10, "Code Domain Graph - BS"](#), on page 104.

SCPI command:

n.a.

Channel Graph...

Opens the channel graph display to visually check the configured signal.

The channel graph is described in [chapter 5.11, "Channel Graph - BS"](#), on page 107.

SCPI command:

n.a.

HSDPA H-Set

(This feature is available for BS 1 only.)

Calls the default settings of the channel table for the HSDPA H-Set mode.

Channels 12 to 17 are preset for HSDPA H-Set 1.

Example:

```
SOUR:BB:W3GP:BST1:CHAN:HSDP:HSET:PRES
```

```
SOUR:BB:W3GP:BST1:CHAN12:TYPE?
```

```
Response: HSSC
```

```
SOUR:BB:W3GP:BST1:CHAN12:HSDP:HSET:PRE?
```

```
Response: P1QPSK
```

SCPI command:

[\[:SOURCE<hw>\]:BB:W3GPp:BSTation<st>:CHANnel:HSDPa:HSET:PRESet](#)
on page 358

5.9.2 Channel Table

The "channel table" is located in the lower part of the menu. The channel table is where the individual channel parameters are set. The structure of the channel currently being edited is displayed graphically in the table header.

TFCI		Data										Pilot	
8		296										16	
	Channel Type	Enhanced/HSDPA Settings	Slot Fmt	Symb Rate /ksps	Ch Code	Power /dB	Data	DList / Pattern	T Offs	DPCCH Settings	State	Do Conf	
0	P-CPICH	Config...		15	0	0.00					Off		
1	S-CPICH			15	0	0.00					Off		
2	P-SCH			15		0.00					Off		
3	S-SCH			15		0.00					Off		
4	P-CCPCH	Config...		15	1	0.00	PN 9				Off		
5	S-CCPCH		13	240	0	0.00	PN 9		10	Config...	On		
6	PICH			15	16	0.00	PN 9		0		On		
7	AICH			15	0	0.00				Config...	Off		
8	AP-AICH			15	0	0.00				Config...	Off		
9	PDSCH		0	15	0	0.00	PN 9			Config...	Off		
10	DL-DPCCH		0	7.5	0	0.00				Config...	Off		
11	HS-PDS.MIMO	Config...		240	2	0.00	PN 9				On		
12	HS-SCCH	Config...		30	9	0.00	H-Set				On		
13	HS-PDS.QPSK			240	3	0.00	PN 9				On		
14	HS-PDS.QPSK			240	4	0.00	PN 9				On		
15	HS-PDS.QPSK			240	5	0.00	PN 9				On		
16	HS-PDS.QPSK			240	6	0.00	PN 9				On		
17	HS-PDS.QPSK			240	7	0.00	PN 9				On		

139 channels are available for each base station. Channels 0 to 10 are assigned to the special channels, with the allocation of channels 0 to 8 being fixed. Channels 9 and 10 can be assigned a PDSCH, a DL-DPCCH, an HS-SCCH, an E-AGCH, an E-RGCH, or an E-HICH.

Code channels 11 to 138 can either be assigned a DPCH, an HS-SCCH, an HS-PDSCH (QPSK), an HS-PDSCH (16QAM), an HS-PDSCH (64QAM), an HS-PDSCH (MIMO), an E-AGCH, an E-RGCH, an E-HICH, or an F-DPCH (see also the List of Supported Channels). This makes it possible to simulate the signal of a base station that supports high-speed channels.

Channels 4 and 11 to 13 of base station 1 can be generated in realtime (enhanced channels) and are highlighted in color. User-definable channel coding can be activated for these channels. Bit and block errors can be simulated and data can be added to the data and TPC fields from data lists either at the physical level or in the transport layer.

Table 5-9: List of supported channel types and their sequence in the 3GPP FDD channel table

Index	Shortform	Name	Function	Optional Enhanced in BS1
0	P-CPICH	Primary Common Pilot Channel	<ul style="list-style-type: none"> Specifies the scrambling code in the scrambling code group (2nd stage of scrambling code detection) Phase reference for additional down-link channels Reference for the signal strength 	no
1	S-CPICH	Secondary Common Pilot Channel		no

Index	Shortform	Name	Function	Optional Enhanced in BS1
2	P-SCH	Primary Sync Channel	Slot synchronization	no
3	S-SCH	Secondary Sync Channel	<ul style="list-style-type: none"> • Frame synchronization • Specifies the scrambling code group 	no
4	P-CCPCH	Primary Common Control Phys. Channel	<ul style="list-style-type: none"> • Transfers the system frame number (SFN) • Timing reference for additional downlink channels • Contains the BCH transport channel 	yes
5	S-CCPCH	Secondary Common Control Phys. Channel		no
6	PICH	Page Indication Channel	Transfers the paging indicator	no
7	AICH	Acquisition Indication Channel		no
8	AP-AICH	Access Preamble Acquisition Indication Channel		no
9 / 10	PDSCH	Phys. Downlink Shared Channel		no
	DL-DPCCH	Dedicated Physical Control Channel		
	HS-SCCH	High Speed Shared Control Channel		
	E-AGCH	E-DCH Absolute Grant Channel		
	E-RGCH	E-DCH Relative Grant Channel		
	E-HICH	E-DCH Hybrid ARQ Indicator Channel		
11 - 13	DPCH	Dedicated Phys. Channel	Transfers the user data and the control information	yes
	HS-SCCH	High Speed Shared Control Channel		no
	HS-PDSCH (QPSK)	High Speed Physical Downlink Shared Channel (QPSK)		no
	HS-PDSCH (16 QAM)	High Speed Physical Downlink Shared Channel (16 QAM)		no
	HS-PDSCH (64 QAM)	High Speed Physical Downlink Shared Channel (64 QAM)		no
	HS-PDSCH (MIMO)	High Speed Physical Downlink Shared Channel (MIMO)		no
	E-AGCH	E-DCH Absolute Grant Channel		no
	E-RGCH	E-DCH Relative Grant Channel		no
	E-HICH	E-DCH Hybrid ARQ Indicator Channel		no
	F-DPCH	Fractional Dedicated Phys. Channel		no

Index	Shortform	Name	Function	Optional Enhanced in BS1
14 - 138	DPCH	Dedicated Phys. Channel	Transfers the user data and the control information	no
	HS-SCCH	High Speed Shared Control Channel		
	HS-PDSCH (QPSK)	High Speed Physical Downlink Shared Channel (QPSK)		
	HS-PDSCH (16 QAM)	High Speed Physical Downlink Shared Channel (16 QAM)		
	HS-PDSCH (64 QAM)	High Speed Physical Downlink Shared Channel (64 QAM)		
	HS-PDSCH (MIMO)	High Speed Physical Downlink Shared Channel (MIMO)		
	E-AGCH	E-DCH Absolute Grant Channel		
	E-RGCH	E-DCH Relative Grant Channel		
	E-HICH	E-DCH Hybrid ARQ Indicator Channel		
	F-DPCH	Fractional Dedicated Phys. Channel		

At the physical level, a downlink DPCH consists of the DPDCH (Dedicated Physical Data Channel) and the DPCCH (Dedicated Physical Control Channel); the channel characteristics are defined by the symbol rate. The DPDCH transports the user data that is fed directly into the data field.

The DPCCH transports the control fields (TFCI = Transport Format Combination Indicator; TPC = Transmit Power Control and Pilot field). DPDCH is grouped with DPCCH using time division multiplexing in accordance with 3GPP TS 25.211, see diagram below (the formation of a downlink reference measurement channel is described in [chapter 5.16](#), "Enhanced Settings for DPCHs - BS1", on page 131).

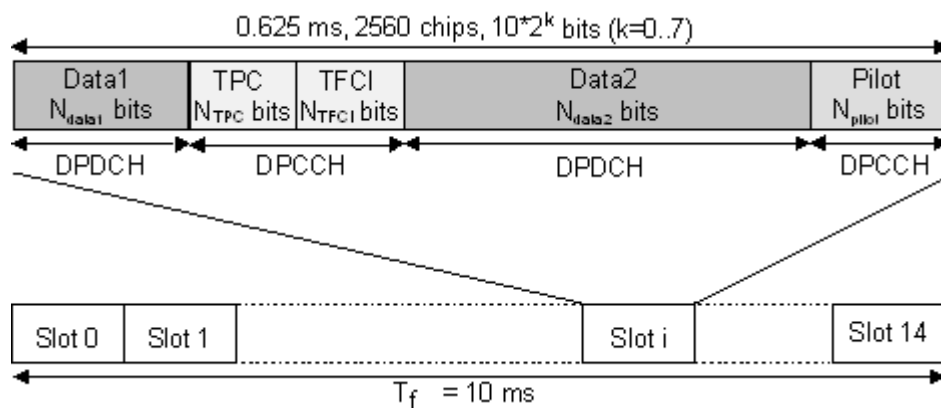


Fig. 5-9: Structure of a downlink DPCH in the time domain

Channel Number - BS

Displays the consecutive channel numbers from 0 to 138.

All the rows are always displayed, even if the channels are inactive. They are switched on and off by the "On/Off" button in the "State" column.

SCPI command:

n.a.

(selected via the suffix to the keyword :CHANnel<n>)

Channel Type - BS

Selects channel type.

The channel type is fixed for channel numbers 0...8; for the remaining channel numbers, the choice lays between the relevant standard channels and the high-speed channels.

The first 11 channels are reserved for special channels.

SCPI command:

[:SOURce<hw>] :BB:W3Gpp:BSTation<st>:CHANnel<ch>:TYPE on page 389

Enhanced Settings / HSDPA Settings - BS1

(Enhanced Settings are available for BS1 only.)

Calls the menu for configuring the enhanced channels of BS1 or the menu for configuring the high-speed channels for all base stations.

Enhanced Settings

The channel state, "Enhanced On" or Off, is displayed in different colors.

Enhanced channels are generated in realtime. Channel coding in accordance with the 'Reference Measurement Channels' definition in TS25.101, TS25.104 and TS25.141 can be activated. Any other user-defined coding can also be configured and stored.

If data lists are used as the data sources for data fields and TPC fields, it is possible to load external data, for example, user information from a higher layer, to the R&S Signal Generator. For example, this allows externally generated data with user information to be applied, or TPC lists to be used to generate longer, non-repetitive power profiles.

To test the BER/BLER testers (e.g. integrated in the base station), it is possible to feed through artificial bit errors to all the data sources (and block errors to the CRC checksum).

The enhanced settings menu is different for the P-CCPCH and the DPCHs. The menus are described in [chapter 5.16, "Enhanced Settings for DPCHs - BS1"](#), on page 131 and [chapter 5.15, "Enhanced Settings for P-CCPCH - BS1"](#), on page 128.

HSDPA Settings

The available settings and indications of the HSDPA settings menu depend on the selected high-speed channel type HS-SCCH, HS-PDSCH (QPSK), HS-PDSCH (QAM) or HS-PDSCH (MIMO).

The menu is described in [chapter 5.12, "HSDPA Settings - BS"](#), on page 108.

SCPI command:

n.a.

Slot Format - BS

Enters the slot formats for the selected channel.

The range of values depends on the channel selected. For DPCH channels, for example, the slot formats are 0 to 16.

For F-DPCH channels, the slot Formats 1 .. 9 are enabled only for instruments equipped with option R&S SMx/AMU-K59. The difference between the F-DPCH slot formats is the position of the 2 bits TPC field.

A slot format defines the complete structure of a slot made of data and control fields and includes the symbol rate.

Parameters set via the slot format can subsequently be changed individually.

The structure of the channel currently selected is displayed in a graphic above the channel table (slot structure).

SCPI command:

`[:SOURce<hw>] :BB:W3GPP:BSTation<st>:CHANnel<ch>:SFORmat`
on page 388

Symbol Rate - BS

Sets the symbol rate of the selected channel. The range of values depends on the channel selected.

A change in the symbol rate may lead to a change in the slot format and vice versa.

SCPI command:

`[:SOURce<hw>] :BB:W3GPP:BSTation<st>:CHANnel<ch>:SRATE` on page 388

Channelization Code - BS

Enters the channelization code (formerly the spreading code number).

The code channel is spread with the set channelization code (spreading code). The range of values of the channelization code depends on the symbol rate of the channel.

The standard assigns a fixed channelization code to some channels (P-CPICH, for example, always uses channelization code 0).

The range of values runs from 0 to $((\text{Chip Rate}/\text{Symbol Rate}) - 1)$, where the Chip Rate is 3.84Mcps.

SCPI command:

`[:SOURce<hw>] :BB:W3GPP:BSTation<st>:CHANnel<ch>:CCODE` on page 359

Power - BS

Sets the channel power in dB.

The power entered is relative to the powers of the other channels. If "3GPP main dialog > Adjust Total Power to 0 dB" is executed, all the power data is relative to 0 dB.

The set "Power" value is also the start power of the channel for "Misuse TPC", "Dynamic Power Control" (enhanced channels of basestation 1) and the power control sequence simulation of the OCNS mode 3i channels.

Note: The maximum channel power of 0 dB applies to non-blanked channels (duty cycle 100%), with blanked channels, the maximum value can be increased (by "Adjust Total Power") to values greater than 0 dB (to $10 \cdot \log_{10} 1/\text{duty_cycle}$).

SCPI command:

`[:SOURce<hw>] :BB:W3GPP:BSTation<st>:CHANnel<ch>:POWER` on page 387

Data - BS

Selects data source.

The data sources "PN9, PN15, PN16, PN20, PN21, PN23, ALL 0, ALL1, Pattern", and "Data List" are all available to choose from.

If the "Pattern" data type is used, you can enter the bit pattern in a bit editor that is called in the column "DList Pattern". The length is limited to 64 bits.

If the "Data List" data type is used, you can select the list from a file window that is called in the "DList Pattern" column. The selected data list is shown in the "DList Pattern" column.

SCPI command:

`[:SOURce<hw>] :BB:W3GPp:BSTation<st>:CHANnel<ch>:DATA` on page 360

`[:SOURce<hw>] :BB:W3GPp:BSTation<st>:CHANnel<ch>:DATA:PATtern`
on page 361

`[:SOURce<hw>] :BB:W3GPp:BSTation<st>:CHANnel<ch>:DATA:DSElect`
on page 360

Data Config - BS

(This feature is available for BS1 with active channel coding only.)

Calls the menu for configuring the data sources of subchannels in the transport layer.

The menu is described in [chapter 5.16, "Enhanced Settings for DPCHs - BS1"](#), on page 131.

SCPI command:

n.a.

Timing Offset - BS

Sets the timing offset.

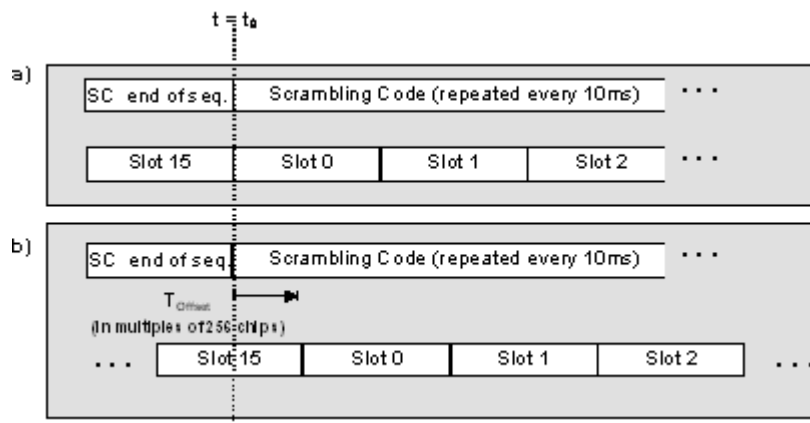
The timing offset determines the shift of the source symbols before interleaving.

The absolute starting time of the frame (slot 0) is shifted relative to the start of the scrambling code sequence by the timing offset * 256 chips. This means that whatever the symbol rate, the resolution of the timing offset is always 256 chips.

This procedure is used to reduce the crest factor. To obtain a lower crest factor, for example, a good offset from channel to channel is 1, that is to say DPCH11 - timing offset 0, DPCH12 - timing offset 1, DPCH13 - timing offset 2, etc.

The illustration below shows the effect of the timing offset parameter. For various scenarios, the scrambling code sequence is shown in time relation to the data slots and to a reference time t_0 (starting from t_0 the signal is calculated in the R&S Signal Generator).

- Timing offset is not used ($T_{\text{Offset}} = 0$). The beginning of the frame (slot 0) and the beginning of the scrambling code period are synchronous with starting point t_0 .
- Timing offset is used ($T_{\text{Offset}} > 0$). The absolute starting time of the frames (slot 0) is shifted relative to the reference time t_0 by $T_{\text{Offset}} * 256$ chips. The beginning of the scrambling code sequence is still synchronous with reference time t_0 . The beginning of the scrambling code period and the frame (slot 0) are no longer synchronous.



SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:BSTation<st>:CHANnel<ch>:TOFFset`
on page 389

DPCCH Settings - BS

Calls the menu for configuring the control fields of the selected channel.

The selected slot format predetermines the setting of the control fields. So a change is also made to the control fields by changing the slot format and vice versa.

The menu is described in [chapter 5.19, "DPCCH Settings - BS Channel Table"](#), on page 148.

SCPI command:

n.a.

Channel State - BS

Activates or deactivates the channel.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:BSTation<st>:CHANnel<ch>:STATE` on page 388

Domain Conflict - BS

Displays whether the channel has a code domain conflict with one of the channels lying above it (with a lower channel number). If there is a conflict, a red dot appears and the column is colored soft orange. If there is no conflict, the column is colored soft blue.

The R&S Signal Generator helps to resolve code domain conflicts by automatically adapting the channelization code of the channels involved. You get the button required for this purpose if you click the table field in a submenu.



To call the graphical display of code domain occupancy by all the active code channels, use the "Code Domain" button (see [chapter 5.10, "Code Domain Graph - BS"](#), on page 104).

You can recognize a domain conflict when the assigned domains of different channel rows overlap. The occupied code domain of a channel is calculated from the symbol rate of the channel, the minimum symbol rate (for 3GPP FDD 7.5 ksps), the chip rate (3.84 Mcps) and the channelization code number with

$$\text{Domain_Factor} = \frac{\text{current_symbol_rate}}{\text{min_symbol_rate}(=7.5\text{kpsps})}$$

as follows:

"Lower domain limit" = current channelization code number * domain factor

"Upper domain limit" = lower domain limit + domain_factor – 1.

Example:

Channel with symbol rate 30 ksps and channelization code 10:

Domain factor = 30/7.5 = 4,

Lower domain limit = 10 x 4 = 40,

Upper domain limit = 40 + 4 - 1 = 43.

The channel occupies the code domain 40 to 43.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:BSTation<st>:DCONflict[:STATe]` on page 399

`[:SOURCE<hw>] :BB:W3GPp:BSTation<st>:DCONflict:RESolve` on page 398

5.10 Code Domain Graph - BS

The channelization codes are taken from a code tree of hierarchical structure (see below).

The higher the spreading factor, the smaller the symbol rate and vice versa. The product of the spreading factor and symbol rate is constant and always yields the chip rate.

The outer branches of the tree (right-most position in the figure) indicate the channelization codes for the smallest symbol rate (and thus the highest spreading factor). The use of a channelization code of the level with spreading factor N blocks the use of all other channelization codes of levels with spreading factor >N available in the same branch of the code tree. Channelization codes with smaller spreading factor are contained in the codes with larger spreading factor in the same code branch. When using such competitive channelization codes at the same time, the signals of associated code channels are mixed such that they can no longer be separated in the receiver. Orthogonality will then be lost.

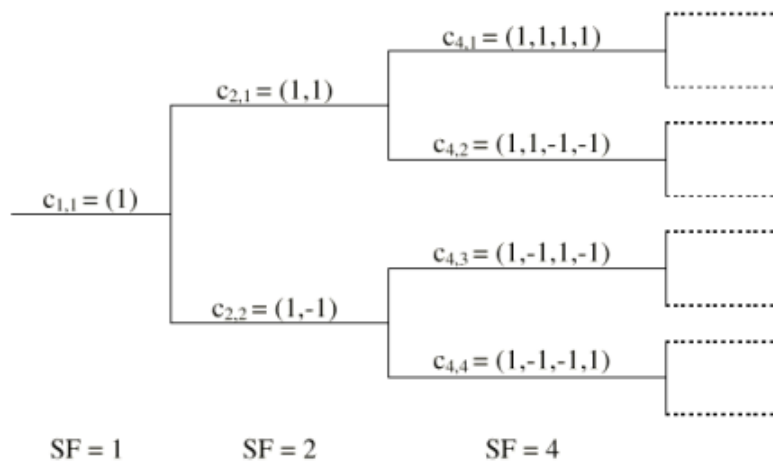


Fig. 5-10: Code tree of channelization codes

The outer branches of the tree (right-most position in the figure) indicate the channelization codes for the smallest symbol rate (and thus the highest spreading factor). The use of a channelization code of the level with spreading factor N blocks the use of all other channelization codes of levels with spreading factor >N available in the same branch of the code tree.

Example:

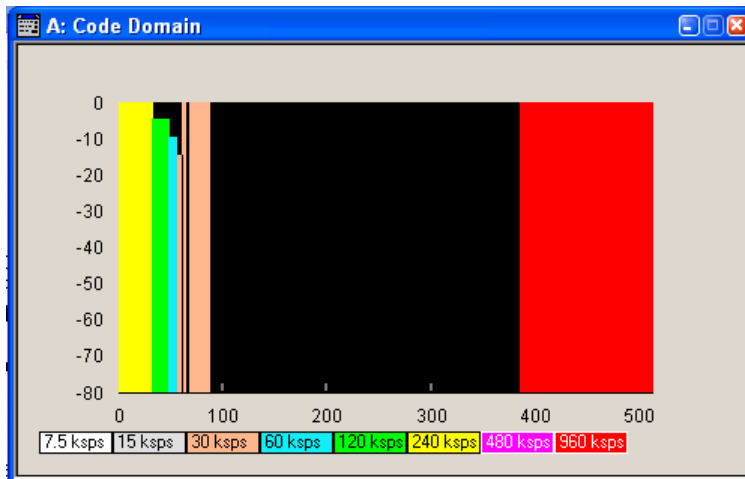
If code $c_{2,1}$ is being used, the remaining branch with $c_{4,1}$ and $c_{4,2}$ is blocked.

The domain of a certain channelization code is the outer branch range (with minimum symbol rate and max. spreading factor) which is based on the channelization code selected in the code tree. Using a spreading code means that its entire domain is used.

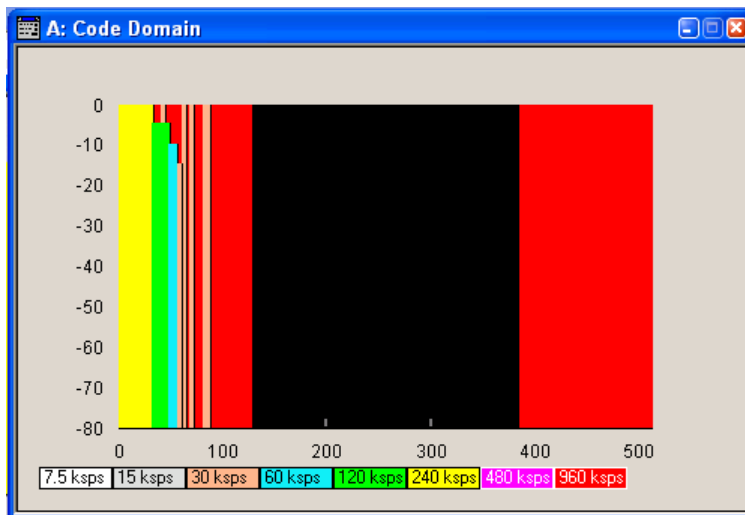
At a chip rate of 3.84 Mcps, the domain ranges from 0 to 511

$$= \frac{\text{Chip_rate}}{\text{min_Symbol_rate}} - 1 = \frac{3.84\text{Mcps}}{7.5\text{ksps}} - 1$$

The "Code Domain" display indicates the assigned code domain. The channelization code is plotted at the X-axis, the colored bars indicate coherent code channels. The colors are assigned to fixed symbol rates, the allocation is shown below the graph. The relative power can be taken from the height of the bar.



It is possible to determine from this display whether the settings made have resulted in a code domain conflict, that is to say, whether the code domains of the active channels intersect. A code domain conflict is indicated by overlapping bars:



In the channel table, a code domain conflict with an overlying channel (with a lower index) is indicated in column "Dom Conf" on the far right of the table by a red dot and the orange-colored column.

16	DPCH	No	#8	30	15	0.00	PN 9	0	Config...	On	
17	DPCH	No	#16	960	3	0.00	PN 9	0	Config...	On	
18	DPCH	No	#8	30	17	0.00	PN 9	0	Config...	On	
19	DPCH	No	#8	30	10	0.00	PN 9	0	Config...	On	
20	DPCH	No	#16	960	0	0.00	PN 9	0	Config...	On	
21	DPCH	No	#8	30	20	0.00	PN 9	0	Config...	On	
22	DPCH	No	#8	30	21	0.00	PN 9	0	Config...	On	

By pressing the red button, a submenu opens which allows automatic resolution of the existing code domain conflicts.



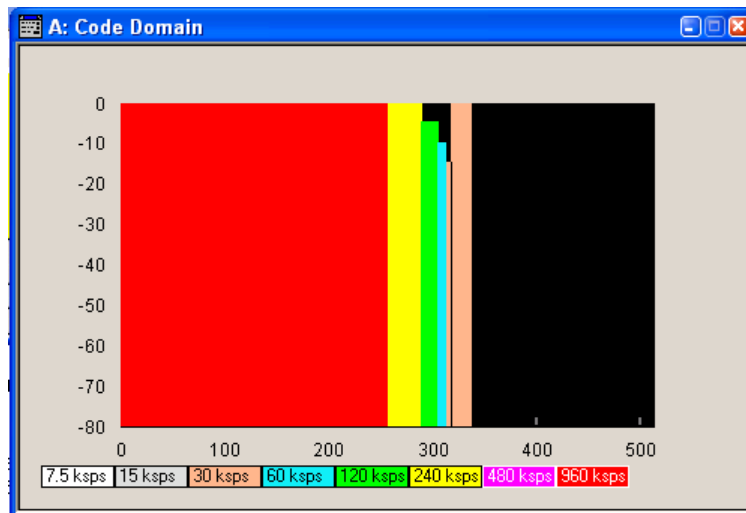
The code domain conflict is resolved by changing the channelization codes of the affected channels. The red dots in column "Dom Conf" disappear and the column is blue-colored.



The HSUPA control channels E-RGCH and E-HICH may use the same channelization code as long as they use different signature sequence hopping index that identifies the user equipment. The F-DPCH channels may also use the same channelization code as long as they use a different timing offset (TOFFs) or slot format.

16	DPCH	No	#8	30	79	0.00	PN 9	0	Config...	On
17	DPCH	No	#16	960	0	0.00	PN 9	0	Config...	On
18	DPCH	No	#8	30	80	0.00	PN 9	0	Config...	On
19	DPCH	No	#8	30	81	0.00	PN 9	0	Config...	On
20	DPCH	No	#16	960	1	0.00	PN 9	0	Config...	On
21	DPCH	No	#8	30	82	0.00	PN 9	0	Config...	On
22	DPCH	No	#8	30	83	0.00	PN 9	0	Config...	On

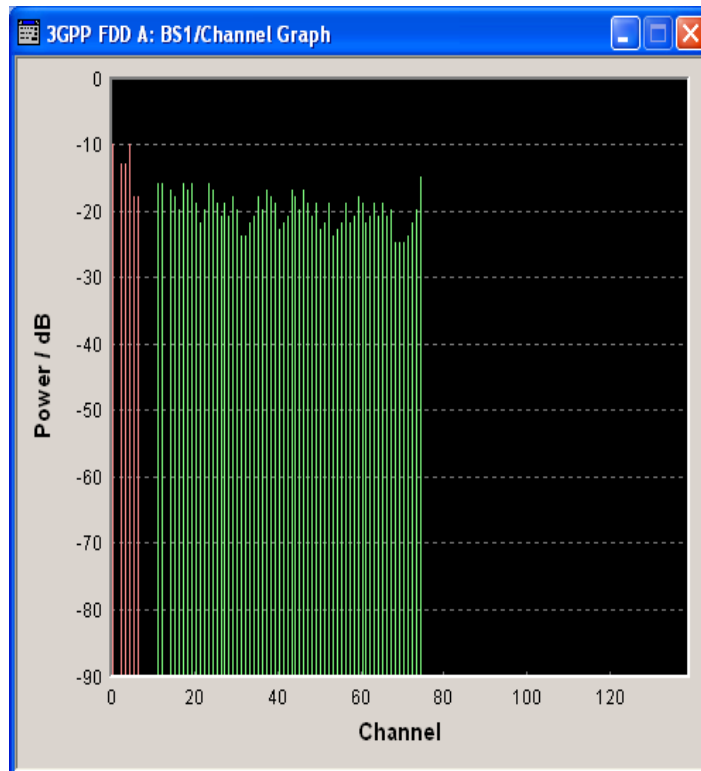
The graphs immediately display the change:



5.11 Channel Graph - BS

The channel graph display shows the active code channels. The channel number is plotted on the X-axis. The red bars represent the special channels (P-CPICH to DL-DPCCH), the green bars the other channels. The height of the bars shows the relative power of the channel.

The graph is calculated from the settings that have been made.



5.12 HSDPA Settings - BS

The "Enhanced HSDPA Mode" menu can be called in the BS channel table in column "HSDPA Settings" with button "Config". The available settings and indications of the menu depend on the selected HSDPA mode and channel type.

Section "MIMO Settings" is only available for enabled two-antenna system (see "[Diversity / MIMO - BS](#)" on page 94) and selected HS-PDSCH MIMO channel.

HSDPA-Mode	Subframe 1
Burst-Mode	<input checked="" type="checkbox"/> On
Inter TTI Distance	5
Constellation Version Parameter - b	0

MIMO Settings			
Precoding Weight Pattern (w2)	0,1,2		
Stream 2 Active Pattern	1111 1111		
Modulation And Constellation Version			
	Stream 1:	Stream 2:	
Modulation	64 QAM	QPSK	
Constellation Version Parameter - b	1		

The high speed channels can be generated either continuously as defined in test model 5, in packet mode or in H-Set mode according to TS 25.101 Annex A.7.

In packet mode, the start of the channel and the distance between the HSDPA packets can be set. The packet transmissions can start in one of the first five sub-frames (0 to 4). A sub-frame has the same length as a packet and is 3 slots long. A HS-SCCH starts at the beginning of the selected sub-frame, a HS-PDSCH starts with an offset of two slots to the selected sub-frame. The active parts of the HS-SCCH and the HS-PDSCH for a specific sub-frame setting differ by the slot offset of the HS-PDSCH.

Example:

Setting Sub-frame 1

HS-SCCH: slot 3 to 5 active

HS-PDSCH: slot 5 to 7 active.

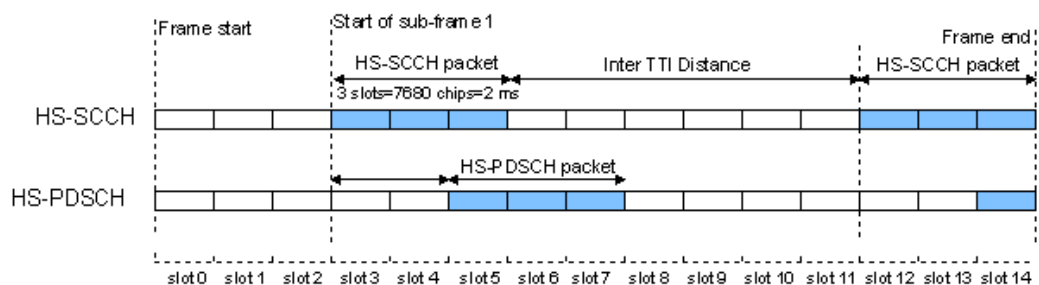


Fig. 5-11: Timing diagram for the HS-SCCH and the associated HS-PDSCH, Packet Subframe 1 mode and Inter TTI Distance = 3

In H-Set mode, the first packet is sent in the HS-SCCH subframe 0. Up to 15 HSDPA channels are coupled to be used in the fixed reference channels. The number of coupled channels depends on the selected H-Set. Channel coding is always performed over a certain number of bits. The resulting packets are distributed evenly over one subframe of all HS-PDSCH channelization codes. Therefore, the data stream is not assigned to a defined channel but to all coupled channels.

5.12.1 Enhanced HSDPA Mode Settings

HSDPA Mode - BS

Selects the HSDPA mode.

- "Continuous" The high-speed channel is generated continuously. This mode is used in test model 5 and 6.
- "Subframe 0 | 1 | 2 | 3 | 4" The high-speed channel is generated in packet mode. The start of the channel is set by selecting the subframe in which the first packet is sent. The distance between subsequent packets is set with parameter "Inter TTI Distance".
- "H-Set" (This feature is available for BS1 and HS-SCCH only.) The high-speed channel is generated in packet mode. The first packet is sent in the HS-SCCH subframe 0. The number of the coupled channel in the H-Set can be changed with the parameter "Number of HS-PDSCH Channel Codes".

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:MODE
```

on page 386

Burst Mode - BS

Activates/deactivates burst mode. The signal is bursted when on, otherwise dummy data are sent during transmission brakes.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:BMODE [ :
STATe ] on page 369
```

Inter TTI Distance (H-Set) - BS

(Available for "subframe x")

Selects the distance between two packets in HSDPA packet mode.

The distance is set in number of sub-frames (3 slots = 2 ms). An "Inter TTI Distance" of 1 means continuous generation.

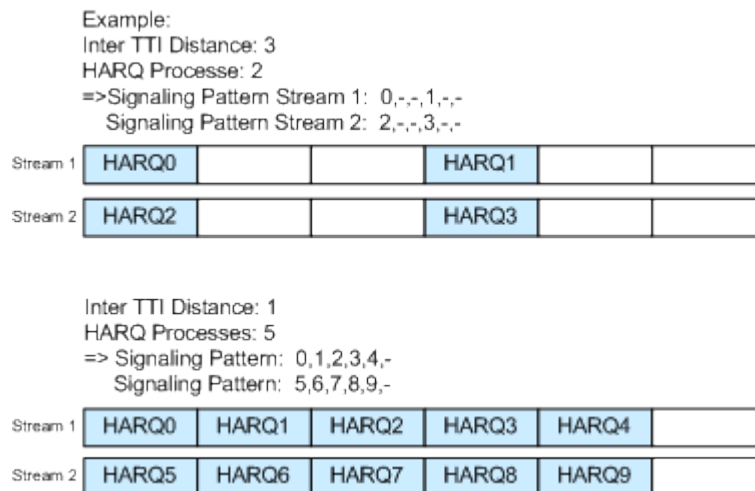


Fig. 5-12: Example: Inter TTI Distance in HSDPA H-Set Mode

SCPI command:

`[:SOURce<hw>] :BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:TTIDistance` on page 387

Constellation Version Parameter b - BS

(Available for "HS-PDSCH 16QAM" and "64QAM" only)

Switches the order of the constellation points of the 16QAM or 64QAM mapping.

The re-arrangement is done according to 3GPP TS25.212.

SCPI command:

`[:SOURce<hw>] :BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:CVPB` on page 369

5.12.2 MIMO Configuration



The parameters in this menu section are available for instruments equipped with option SMx-K59, BS1 and Channel Type HS-PDSCH (MIMO) only.

Precoding Weight Pattern (w2) - BS

Sets the precoding weight parameter w2 for MIMO precoding.

The values of the weight parameters w1, w3 and w4 are calculated based on the value for w2 (see [chapter 3.14, "MIMO in HSPA+"](#), on page 31).

SCPI command:

`[:SOURce<hw>] :BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:MIMO:PWPattern` on page 386

Stream 2 Active Pattern - BS

Enables/disables a temporal deactivation of Stream 2 per TTI in form of sending pattern.

The stream 2 sending pattern is a sequence of max 16 values of "1" (enables Stream 2 for that TTI) and "-" (disabled Stream 2 for that TTI).

SCPI command:

```
[ :SOURce<hw> ] :BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:MIMO:
STAPattern on page 386
```

Modulation Stream 1/2 (HS-PDSCH MIMO) - BS

Sets the modulation for stream 1 and respectively stream 2 to QPSK, 16QAM or 64QAM.

SCPI command:

```
[ :SOURce<hw> ] :BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:MIMO:
MODulation<di> on page 385
```

Constellation Version Parameter b Stream 1/2 - BS

Switches the order of the constellation points of the 16QAM or 64QAM mapping.

The re-arrangement is done according to 3GPP TS25.212.

SCPI command:

```
[ :SOURce<hw> ] :BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:MIMO:
CVPB<di> on page 385
```

5.13 HSDPA H-Set Mode Settings - BS



The Enhanced HSDPA H-Set Mode menu is available for BS1, HS-SCCH and HSDPA Mode set to H-Set only.

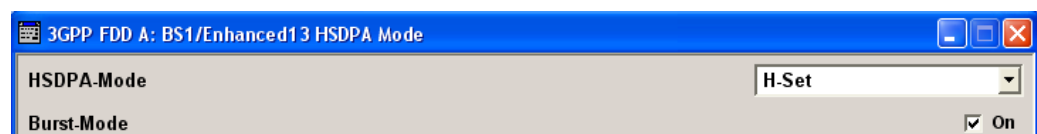
Compared to previous releases of the instrument's firmware, much more flexibility in the configuration of H-Sets is provided now. Several former fixed parameters are now configurable, e.g.:

- The channelization codes used for the physical channels are not any more fixed
- A redundancy version sequence can be selected, i.e. varying the RV is possible in case HARQ Mode Constant NACK is configured.



To let the instrument generate a signal equal to the one generated by an instrument equipped with an older firmware, set the same "Channelization Codes" as the codes used for your physical channels and set the "HARQ Mode" to "Constant ACK".

A configuration according to an H-Set defined in TS 25.101 can be easily accomplished by selecting one of the predefined H-Sets in the "Enhanced HSDPA H-Set Mode" menu.



HSDPA H-Set Mode Settings - BS

H-Set Configuration	
Predefined H-Set	9 (16QAM/QPSK)
Advanced Mode (requires ARB)	<input checked="" type="checkbox"/> On
Suggested ARB Seq. Length: 6	Current ARB Seq. Length: 12
Adjust	
Combined Nominal Average Information Bitrate /kbps	13 652
UE Category	15
HS-SCCH Type	Type 3 (MIMO)

MIMO Settings	
Precoding Weight Pattern (w2)	0
Stream 2 Active Pattern	1

Global Settings	
Data Source (HS-PDSCH)	PN 9
UEID (H-RNTI)	0
Channelization Code HS-SCCH (SF128)	5
Number Of HS-PDSCH Channelization Codes	15
Start Channelization Code HS-PDSCH (SF16)	1
Total HS-PDSCH Power	-13.24 dB

Coding Configuration		
	Stream 1:	Stream 2:
HS-PDSCH Modulation	16QAM	QPSK
Binary Channel Bits Per TTI (Physical Layer)	28 800	14 400
Transport Block Size Table	Table 1	Table 1
Transport Block Size Index	37	42
Information Bit Payload (TB-Size)	17 568	9 736
Coding Rate	0.610	0.676
Virtual IR Buffer Size (per HARQ Process)	28 800	28 800

Signal Structure	
Inter TTI Distance	2
Number Of HARQ Processes Per Stream	2
Signalling Pattern Stream 1	0,1,1,1
Signalling Pattern Stream 2	2,3,1,1

HARQ Simulation	
HARQ Mode	Constant NACK
Redundancy Version Sequence Stream 1	0,3,3
Redundancy Version Sequence Stream 2	0

Randomly Varying Modulation And Number Of Codes	
State	<input type="checkbox"/> On
Alternative HS-PDSCH Modulation	16QAM
Alternative Number Of HS-PDSCH Channelization Codes	1
Random Seed	0

Bit Error Insertion	
State	<input type="checkbox"/> On
Bit Error Rate	0.001 000 0
Insert Errors On	Physical Layer

Block Error Insertion	
State	<input type="checkbox"/> On
Block Error Rate	0.100 0

5.13.1 HSDPA H-Set General Setting

HSDPA Mode - BS

Selects the HSDPA mode.

- "Continuous" The high-speed channel is generated continuously. This mode is used in test model 5 and 6.
- "Subframe 0 | 1 | 2 | 3 | 4" The high-speed channel is generated in packet mode. The start of the channel is set by selecting the subframe in which the first packet is sent. The distance between subsequent packets is set with parameter "Inter TTI Distance".
- "H-Set" (This feature is available for BS1 and HS-SCCH only.) The high-speed channel is generated in packet mode. The first packet is sent in the HS-SCCH subframe 0. The number of the coupled channel in the H-Set can be changed with the parameter "Number of HS-PDSCH Channel Codes".

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:MODE
on page 386
```

Burst Mode - BS

Activates/deactivates burst mode. The signal is bursted when on, otherwise dummy data are sent during transmission brakes.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:BMODE [ :
STATE ] on page 369
```


5.13.2 H-Set Configuration Common Settings



The parameters in this section are available for BS1 and HSDPA H-Set Mode only.

Predefined H-Set - BS

Selects the H-Set and the modulation according to TS 25.101 Annex A.7 .

Table 5-10: Following combinations are possible:

H-Set	Modulation
1, 2, 3, 6, 10	QPSK 16QAM
4, 5, 7, 12	QPSK
8	64QAM
9	16QAM (Stream 1) QPSK (Stream 2)
11	64QAM (Stream 1) 16QAM (Stream 2)
User	-

Note: H-Sets 7 - 9 and H-Set 11 are enabled for instruments equipped with option SMU-K59 only. H-Set 9 and H-Set 11 are available only for enabled two-antenna system (see "Diversity / MIMO - BS" on page 94).

Several parameters are automatically set, depending on the selection made for the parameter "H-Set". However, it is also possible to change these parameters. In this case, the value of the parameter "H-Set" is automatically set to User.

Note: Use the predefined settings to let the instrument generate a signal equal to the one generated by an instrument equipped with an older firmware.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:HSET:PREDefined on page 376
```

Advanced Mode (requires ARB) - BS

Activates/deactivates the advanced mode in which the H-Set will be generated by the ARB. The parameter can be configured only for H-Sets 1 - 5. For H-Sets 6 - 12 and User, it is always enabled.

For an H-Set calculated in arbitrary waveform mode (enabled "Advanced Mode") it is critical to set an appropriate "Current ARB Sequence Length" in order to generate a signal without unwanted artefacts when the pre-calculated sequence is repeated cyclically. In particular, the HARQ cycles have to terminate completely before restarting the signal.

Assistance in setting an appropriate sequence length is provided by the parameter "Suggested ARB Sequence Length" and the "Adjust" button. When working in Advanced Mode, it is recommended to adjust the current ARB sequence length to the suggested one.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:HSET:AMode`
on page 370

`[:SOURCE<hw>] :BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:HSET:SLENgth`
on page 379

Suggested ARB sequence length - BS

Displays the suggested ARB sequence length.

The Suggested ARB Sequence Length is the calculated minimum length that depends on several parameters, like TTI distance, Number of HARQ Processes, HARQ cycles, HARQ Mode, RV Parameter Sequence, HS-SCCH Type, Precoding Weight Pattern and Stream 2 Active Pattern.

When working in "Advanced Mode", it is recommended to adjust the current ARB sequence length to the suggested one.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:HSET:SLENgth`
on page 379

Current ARB sequence length - BS

Displays the current ARB sequence length or the adjusted ARB sequence length, set after pressing the button "Adjust".

When working in [Advanced Mode](#), it is recommended to adjust the current ARB sequence length to the suggested one.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:SLENgth` on page 331

Adjust - BS

Sets the current ARB sequence length to the suggested value.

When working in "Advanced Mode", it is recommended to adjust the current ARB sequence length to the suggested one.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:HSET:SLENgth:ADJust`
on page 380

Nominal Average Information Bitrate - BS

Indicates the average data rate on the transport layer. In case of MIMO, the parameter indicates the Combined Nominal Average Information Bitrate.

The Nominal Average Information Bitrate is calculated for the ideal case of infinite sequence and with regard of the Stream 2 Active Pattern.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:HSET:NAIBitrate`
on page 375

UE Category - BS

Displays the UE category that is minimum required to receive the selected H-Set (see also [chapter 3.17, "UE Capabilities"](#), on page 41).

SCPI command:

```
[ :SOURce<hw> ] :BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:HSET:UECategory
```

 on page 384**HS-SCCH Type - BS**

Sets the HS-SCCH type.

"Type 1 (normal)" Normal operation mode.

"Type 2 (less operation)" (Available for instruments equipped with option SMx-K59 only)
HS-SCCH Less operation mode (see also [chapter 3.12, "HS-SCCH less operation"](#), on page 28).

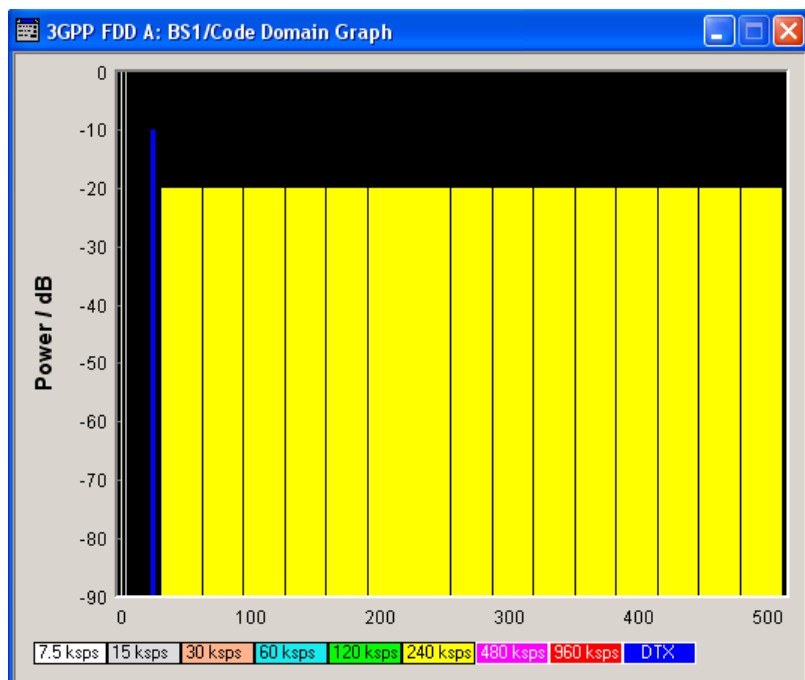
"Type 3
(MIMO)"

(Available for instruments equipped with option SMx-K59 and enabled two-antenna system only)

HS-SCCH Type 3 mode is defined for MIMO operation (see also [chapter 3.14.2, "MIMO downlink control channel support"](#), on page 33.

Enabling this operation mode, enables the parameters in section "MIMO Settings" and the Stream 2 parameters in sections "HARQ Simulation, Signal Structure" and "Coding Configuration".

While working in HS-SCCH Type 3 mode and simulating Antenna 2 of one two-antenna system without transmit diversity, no control channel is sent although the HS-SCCH channel is displayed as active in the channel table. To prove that there is no control channel transmission consult the "Code Domain Graph".



The HS-SCCH channel is displayed as DTX.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:BSStation<st>:CHANnel<ch>:HSDPa:HSET:TYPE
on page 383
```

5.13.3 MIMO Settings



The parameters in this section are available for instruments equipped with option SMx-K59, BS1, HSDPA H-Set Mode, and for HS-SCCH Type 3 (MIMO) only.

Precoding Weight Pattern (w2) - BS

Selects the sequence for the MIMO precoding weight parameter w2.

The values of the weight parameters w1, w3 and w4 are calculated based on the value for w2 (see [chapter 3.14, "MIMO in HSPA+",](#) on page 31).

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:HSET:
PWPattern on page 376
```

Stream 2 Active Pattern - BS

Enables/disables a temporal deactivation of Stream 2 per TTI in form of sending pattern.

The stream 2 sending pattern is a sequence of max 16 values of "1" (enables Stream 2 for that TTI) and "-" (disabled Stream 2 for that TTI).

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:HSET:
STAPattern on page 381
```

5.13.4 Global Settings



The parameters in this section are available for BS1 and HSDPA H-Set Mode only.

Data Source (HS-DSCH) - BS

Selects the data source for the transport channel.

New data is retrieved from the data source each time an initial transmission is performed within one TTI. An initial transmission is performed in case of "HARQ Mode" set to Constant ACK or by each new beginning of the "Redundancy Version Sequence".

The following are available for selection as data sources:

"All 0 / All 1"	0 data and 1 data are generated internally.
"PN xx"	PRBS data as per CCITT with period lengths between 2^9-1 and $2^{23}-1$ is generated internally.
"Pattern"	A user-definable bit pattern with a maximum length of 64 bits is generated internally. The bit pattern is defined in the Pattern entry field.
"Data List / Select Data List"	Internal data from a programmable data list is used. The data list can be generated by the Data Editor or generated externally. Data lists are selected in the Select Data List field.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:HSET:DATA
on page 372
```

```
[ :SOURCE<hw> ] :BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:HSET:DATA:
PATtern on page 373
```

```
[ :SOURCE<hw> ] :BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:HSET:DATA:
DSElect on page 373
```

UEID (H-RNTI) - BS

Enters the UE identity which is the HS-DSCH Radio Network Identifier (H-RNTI) defined in 3GPP TS 25.331: "Radio Resource Control (RRC); Protocol Specification".

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPP:BSTation<st>:CHANnel<ch>:HSDPa:HSET:UEID
```

on page 384

Channelization Code HS-SCCH (SF128) - BS

Sets the channelization code of the HS-SCCH.

Note: To let the instrument generate a signal equal to the one generated by an instrument equipped with an older firmware, set the same "Channelization Codes" as the codes used for your physical channels.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPP:BSTation<st>:CHANnel<ch>:HSDPa:HSET:HSCCode
```

on page 375

Number of HS-PDSCH Channelization Codes - BS

Sets the number of physical HS-PDSCH data channels assigned to the HS-SCCH.

The maximum number of channels assigned to the H-Set depends on the "HS-SCCH Type" and the channel number of the first HS-PDSCH channel in the H-Set.

For HS-SCCH Type 2 (less operation) maximum of two channels can be assigned.

For HS-SCCH Type 1 (normal operation) and Type 3 (MIMO) the maximum number of assigned channels is 15.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPP:BSTation<st>:CHANnel<ch>:HSDPa:HSET:CLENgtH
```

on page 372

Start Channelization Code HS-PDSCH (SF16) - BS

Sets the channelization code of the first HS-PDSCH channel in the H-Set.

The channelization codes of the rest of the HS-PDSCHs in this H-Set are set automatically.

Note: To let the instrument generate a signal equal to the one generated by an instrument equipped with an older firmware, set the same "Channelization Codes" as the codes used for your physical channels.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPP:BSTation<st>:CHANnel<ch>:HSDPa:HSET:SCCode
```

on page 379

Total HS-PDSCH Power

Sets the total HS-PDSCH power, i.e. sets the total power of all HS-PDSCH channels in the H-Set.

Note: In the 3GPP test specification, e.g. 3GPP TS34.121-1, the HS-PDSCH power is typically given as a total power of all HS-PDSCH channels.

Use this parameter to set the HS-PDSCH power level directly as given in the 3GPP test specification.

There are two possibilities to set the power of a H-Set:

- select "BS1 > Channel Table > HS-PDSCH Channel > Power" and set the power of the individual channels.

The total power of all HS-PDSCH channels of the H-Set depends on the [Number of HS-PDSCH Channelization Codes](#) and is calculated as follows:

$$TotalPower_{All\ HS-PDSCHs} = Power_{HS-PDSCH\ Channel} + 10 * \log_{10}(NumberOfHS-PDSCHChannelizationCodes)$$

The calculated total power is displayed with the parameter "Total HS-PDSCH Power"

- set directly the total power of the H-Set, i.e set the parameter "Total HS-PDSCH Power"

The individual power levels of the HS-PDSCHs are calculated automatically and displayed in the "BS1 > Channel Table > HS-PDSCH Channel > Power".

Example:

Select "BS1 > HSDPA H-Set".

The default H-Set with 5 Channelization Codes (BS1 > Channel table > HSDPA Settings > Config > Enhanced HSDPA Mode > Number of HS-PDSCH Channelization Codes) is configured.

The default individual power levels of the HS-PDSCH channels are -20 dB. The "Total HS-PDSCH Power" is -13.01 dB.

Set the "Total HS-PDSCH Power" to -10 dB. The individual power levels of the HS-PDSCH channels are -16.99 dB.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:BSTation<st>:CHANnel<ch0>:HSDPa:HSET:
TPower on page 381
```

5.13.5 Coding Configuration



The parameters in this section are available for BS1 and HSDPA H-Set Mode only. The parameters for stream 2 are available for instruments equipped with option SMx-K59 and for HS-SCCH Type 3 only.

HS-PDSCH Modulation Stream1/2 - BS

Sets the HS-PDSCH modulation for stream 1 and stream 2 to QPSK, 16QAM or 64QAM.

Note: The modulation 64QAM is available for instruments equipped with option SMx-K59 only.

For HS-SCCH Type 2, the available modulation scheme is QPSK only.

For HS-SCCH Type 3 (MIMO), the modulation selected for stream 1 has to be the higher order one, i.e. combination 16QAM/64QAM is not allowed.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:HSET:
MODulation<di> on page 375
```

UE Supports 64QAM - BS

(Available for BS1, "HSDPA H-Set Mode", "HS-SCCH Type 1" and "16QAM" only)

Enables/disables UE support of 64QAM.

In case this parameter is disabled, i.e. the UE does not support 64QAM, the `xccs,7` bit is used for channelization information.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:HSET:
S64Qam on page 379
```

Binary Channel Bits per TTI (Physical Layer) Stream1/2 - BS

Displays the coded binary channel bits per TTI and per stream.

The value displayed is calculated upon the values and selections for the parameters "HS-PDSCH Modulation", "Symbol Rate" and "Number of HS-PDSCH Channel Codes".

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:HSET:
BCBTti<di> on page 371
```

Transport Block Size Table Stream1/2 - BS

Selects Table 0 or Table 1 as described in 3GPP TS 25.321.

For "HS-PDSCH Modulation" set to 64QAM, only Table 1 is available.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:HSET:TBS:
TABLE<di> on page 383
```

Transport Block Size Index Stream1/2 - BS

Selects the Index `ki` for the corresponding table and stream, as described in 3GPP TS 25.321.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:HSET:TBS:
INDEX<di> on page 382
```

Transport Block Size Reference Stream1/2 - BS

(Available for BS1, HSDPA H-Set Mode and HS-SCCH Type 2 only)

While working in less operation mode, this parameter is signaled instead of the parameter Transport Block Size Index.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:HSET:TBS:
REFERence on page 383
```

Information Bit Payload (TB-Size) Stream 1/2 - BS

Displays the payload of the information bit. This value determines the number of transport layer bits sent in each TTI before coding.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:HSET:
BPAYload<di> on page 371
```


Coding Rate Stream 1/2 - BS

Displays the resulting coding rate per stream.

The coding rate is calculated as a relation between the "Information Bit Payload" and "Binary Channel Bits per TTI".

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPP:BSTation<st>:CHANnel<ch>:HSDPa:HSET:
CRATe<di> on page 372
```

Virtual IR Buffer Size (per HARQ Process) Stream1/2 - BS

Sets the size of the Virtual IR Buffer (Number of SMLs per HARQ-Process) per stream.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPP:BSTation<st>:CHANnel<ch>:HSDPa:HSET:
VIBSize<di> on page 385
```

5.13.6 Signal Structure



The parameters in this section are available for BS1 and HSDPA H-Set Mode only. The parameters for stream 2 are available for instruments equipped with option SMx-K59 and for HS-SCCH Type 3 only.

Inter TTI Distance (H-Set) - BS

(Available for "subframe x")

Selects the distance between two packets in HSDPA packet mode.

The distance is set in number of sub-frames (3 slots = 2 ms). An "Inter TTI Distance" of 1 means continuous generation.

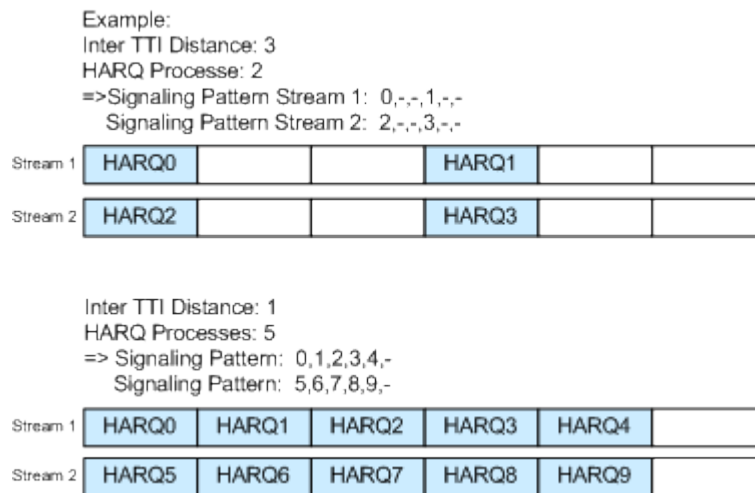


Fig. 5-13: Example: Inter TTI Distance in HSDPA H-Set Mode

SCPI command:

```
[ :SOURce<hw> ] :BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:
TTIDistance on page 387
```

Number of HARQ Processes per Stream - BS

Sets the number of HARQ processes. This value determines the distribution of the payload in the subframes and depends on the Inter "TTI Distance" (see figure).

A minimum of 6 HARQ Processes are required to achieve continuous data transmission.

SCPI command:

```
[ :SOURce<hw> ] :BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:HSET:HARQ:
LENgth on page 374
```

Signaling Pattern Stream1/2 - BS

Displays the distribution of packets over time. The Signaling Pattern displays a HARQ-Process cycle and is a sequence of HARQ-IDs and "-". A HARQ-ID indicates a packet, a "-" indicates no packet (see figure). The Signaling Pattern is cyclically repeated.

Long signaling patterns with regular repeating groups of HARQ-ID and "-" are not displayed completely. The signaling pattern is shortened and ". . ." is displayed but the scheduling is performed according to the selected "Inter TTI Distance". Long signaling patterns with irregularity in the HARQ-ID and "-" groups are displayed completely.

Depending on the selected "Burst Mode", a Dummy - TTI will be sent within the no packet subframes.

SCPI command:

```
[ :SOURce<hw> ] :BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:HSET:
SPATtern<di> on page 381
```

5.13.7 HARQ Simulation



The parameters in this section are available for BS1 and HSDPA H-Set Mode only. The parameters for stream 2 are available for instruments equipped with option SMx-K59 and for HS-SCCH Type 3 only.

Mode (HARQ Simulation) - BS

Sets the HARQ Simulation Mode.

Note: To let the instrument generate a signal equal to the one generated by an instrument equipped with an older firmware, set the "HARQ Mode" to "Constant ACK".

"Constant ACK" New data is used for each new TTI. This mode is used to simulate maximum throughput transmission.

"Constant NACK" (enabled in "Advanced Mode" only)
Enables NACK simulation, i.e. depending on the sequence selected with parameter "Redundancy Version Parameter Sequence" packets are retransmitted. This mode is used for testing with varying redundancy version.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:HSET:HARQ:MODE` on page 374

Redundancy Version Stream1/2- BS

The parameter is enabled for "HARQ Simulation Mode" set to Constant ACK.

Enters the Redundancy Version Parameter per stream. This value determines the processing of the Forward Error Correction and Constellation Arrangement (16/64QAM modulation), see TS 25.212 4.6.2.

For HS-SCCH Type 2 (less operation), the Redundancy Version Parameter is always 0.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:HSET:RVParameter<di>` on page 376

Redundancy Version Sequence Stream ½ - BS

The parameter is enabled for "HARQ Simulation Mode" set to Constant NACK.

Enters a sequence of Redundancy Version Parameters per stream. The value of the RV parameter determines the processing of the Forward Error Correction and Constellation Arrangement (16/64QAM modulation), see TS 25.212 4.6.2.

The sequence has a length of maximum 30 values. The sequence length determines the maximum number of retransmissions. New data is retrieved from the data source after reaching the end of the sequence.

For HS-SCCH Type 2 (less operation), the Redundancy Version Parameter Sequence is always "0,3,4".

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:HSET:RVSequence<di>` on page 377

5.13.8 Error Insertion



The parameters in this menu section are available for BS1, HSDPA H-Set Mode and disabled Advanced Mode only.

In the "Bit Error Insertion" and "Block Error Insertion" sections, errors can be inserted into the data source and into the CRC checksum, in order, for example, to check the bit and block error rate testers.

Bit Error State - HSDPA H-Set BS1

Activates or deactivates bit error generation.

Bit errors are inserted into the data stream of the coupled HS-PDSCHs. It is possible to select the layer in which the errors are inserted (physical or transport layer).

When the data source is read out, individual bits are deliberately inverted at random points in the data bit stream at the specified error rate in order to simulate an invalid signal.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPP:BSTation [ :ENHanced ] :CHANnel<ch> :HSDPa :
DERRor:BIT:STATe on page 422
```

Bit Error Rate - HSDPA H-Set BS1

Sets the bit error rate.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPP:BSTation [ :ENHanced ] :CHANnel<ch> :HSDPa :
DERRor:BIT:RATE on page 422
```

Insert Errors On - HSDPA H-Set BS1

Selects the layer at which bit errors are inserted.

"Transport layer" Bit errors are inserted in the transport layer.

"Physical layer" Bit errors are inserted in the physical layer.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPP:BSTation [ :ENHanced ] :CHANnel<ch> :HSDPa :
DERRor:BIT:LAYer on page 421
```

Block Error State - HSDPA H-Set BS1

Activates or deactivates block error generation.

The CRC checksum is determined and then the last bit is inverted at the specified error probability in order to simulate an invalid signal.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPP:BSTation [ :ENHanced ] :CHANnel<ch> :HSDPa :
DERRor:BLOCK:STATe on page 423
```

Block Error Rate - HSDPA H-Set BS1

Sets the block error rate.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPP:BSTation [ :ENHanced ] :CHANnel<ch> :HSDPa :
DERRor :BLOCk :RATE on page 422
```

5.13.9 Randomly Varying Modulation and Number of Codes

(Available for enabled [Advanced Mode](#), HS-SCCH Type 1 and for instruments equipped with option R&S SMx/AMU-K59)

The used modulation and number of HS-PDSCH codes in an H-Set is randomly selected every HSDPA TTI among four options with equal probability (see [table 5-11](#)).

Table 5-11: Used modulation and number of HS-PDSCH codes

Option	Modulation	Number of HS-PDSCH Codes
1	HS-PDSCH Modulation	Alternative Number of HS-PDSCH Channelization Codes
2	"Alternative HS-PDSCH Modulation" on page 128	Alternative Number of HS-PDSCH Channelization Codes
3	HS-PDSCH Modulation	Number of HS-PDSCH Channelization Codes
4	"Alternative HS-PDSCH Modulation" on page 128	Number of HS-PDSCH Channelization Codes



Although the number of active HS-PDSCH channels varies over time, the overall power of the HS-PDSCH channels in the H-Set stays constant, as the power of the individual HS-PDSCH channels is raised when the number is reduced.

The channel powers displayed in the "BS > Channel Table" are the channel powers during the TTIs in which the [Number of HS-PDSCH Channelization Codes](#) is applied.

The ARB sequence length suggestion (see [Suggested ARB sequence length - BS](#)) does not consider the statistical process of the selection among the four options, it may be necessary to further increase the ARB sequence length to achieve the desired statistical properties.



To generate a signal without unwanted artefacts, select "3GPP main dialog > Filter/Clipping/ARB Settings" and set the parameter [Sequence Length ARB](#) to a multiple of the suggested length.

The configured Transport Block Size Table and Transport Block Size Index are used in all TTIs, no matter which of the four options is used. The payload size can vary over time and can deviate from the value displayed with the parameter [Information Bit Payload \(TB-Size\) Stream 1/2 - BS](#).

State

Enables/disables the random variation of the modulation and codes.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:BSTation<st>:CHANnel<ch0>:HSDPa:HSET:RVSTate on page 378
```

Alternative HS-PDSCH Modulation

Sets the alternative modulation (see [table 5-11](#)).

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:BSTation<st>:CHANnel<ch0>:HSDPa:HSET:ALTModulation on page 370
```

Alternative Number of HS-PDSCH Channelization Codes

Sets the alternative number of HS-PDSCH channelization codes (see [table 5-11](#)).

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:BSTation<st>:CHANnel<ch0>:HSDPa:HSET:ACLength on page 370
```

Random Seed

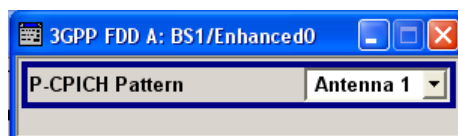
Sets the seed for the random process deciding between the four option (see [table 5-11](#)).

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:BSTation<st>:CHANnel<ch0>:HSDPa:HSET:SEED on page 378
```

5.14 Enhanced Settings for P-CPICH - BS1

The "Enhanced Settings" menu can be called in the BS channel table in column "Enhanced Settings" with button "Config".

**P-CPICH Pattern - Enhanced P-CPICH BS1**

Sets the P-CPICH pattern (channel 0).

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:BSTation<st>:ENHanced:PCPich:PATTern on page 403
```

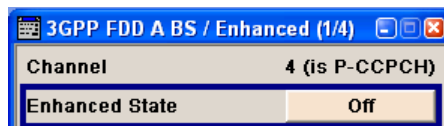
5.15 Enhanced Settings for P-CCPCH - BS1

The "Enhanced Settings" menu can be called in the BS channel table in column "Enhanced Settings" with button "Config".

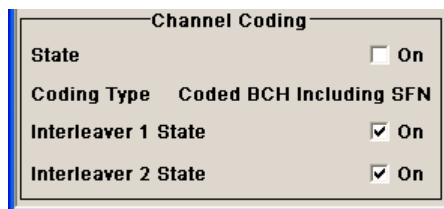
This menu is only available for base station 1.

The settings for the enhanced P-CCPCH channel and the enhanced DPCH channels are different (see [chapter 5.16, "Enhanced Settings for DPCHs - BS1"](#), on page 131). The menu for the enhanced P-CCPCH channel (channel 4) is described below.

The upper section is where the selected channel is displayed and where the enhanced state of this channel can be activated.



The "Channel Coding" section is where the channel coding settings are made. Interleaver states 1 and 2 can be activated separately.



5.15.1 Channel Number and State

Channel Number - Enhanced P-CCPCH BS1

Displays the channel number and the channel type.

SCPI command:

n.a.

State - Enhanced P-CCPCH BS1

Switches the P-CCPCH (Primary Common Control Phys. Channel) to the enhanced state. The channel signal is generated in realtime.

SCPI command:

`[:SOURCE<hw>] :BB:W3Gpp:BSTation:ENHanced:PCCPch:STATE` on page 403

5.15.2 Channel Coding - Enhanced P-CCPCH BS1

The "Channel Coding" section is where the channel coding settings are made.

The channel-coded P-CCPCH (Broadcast Channel BCH) with System Frame Number is generated according to the following principle.

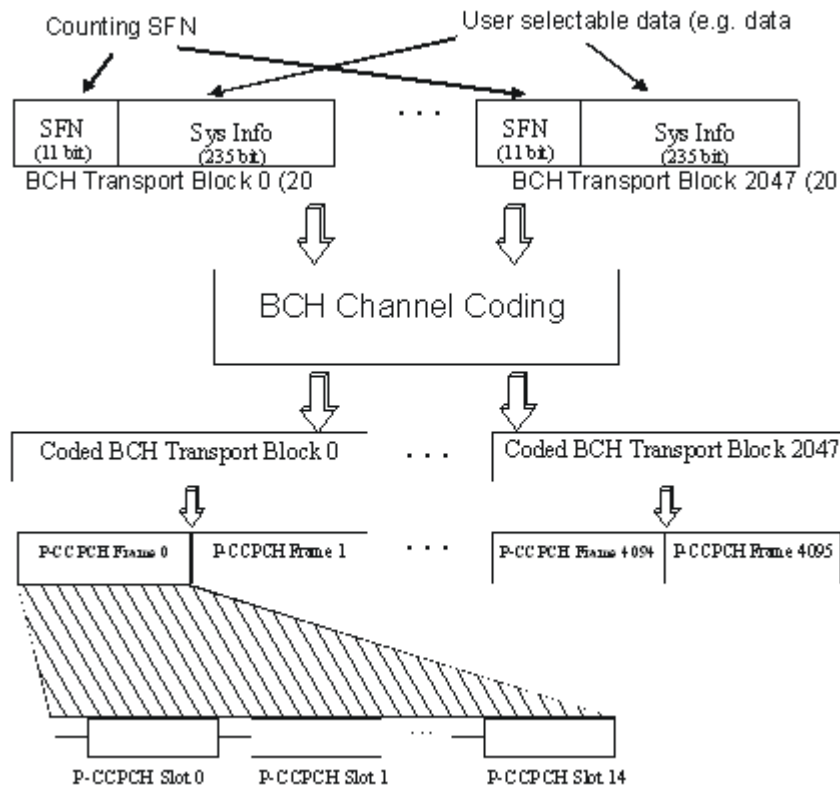


Fig. 5-14: Generation of a channel coded P-CCPCH/BCH

The data blocks of the BCH at transport-channel level comprise data determined for 20 ms of the PCCPCH (i.e. 2 frames) after channel coding. The first field of such a data block is an 11bit long field for the system frame number (SFN). The SFN is automatically incremented by 1 (as stipulated in the standard) from transport block to transport block (equivalent to a step width of 2 frames due to the transport time interval length of 20 ms). After 2048 transport blocks (equivalent to 4096 frames) the SFN is reset and starts again at 0 (SFN restart). An output trigger indicating the SFN restart can be generated (see "[Marker Mode](#)" on page 77).

The SFN format is defined in the standard; it is MSB-first coded.

The remaining system information (a 235-bit long field per block) is filled from the data source selected for the P-CCPCH.

A data list can be used to transmit further specific system information in addition to the SFN. If only the SFN is required, "ALL 0" is recommended as data source for P-CCPCH.

The BCH transport blocks are then channel-coded. A coded transport block comprises the data sequence for two P-CCPCH frames.

Channel Coding State - Enhanced P-CCPCH BS1

Activates or deactivates channel coding.

The coding scheme is displayed in the field below.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPP:BSTation:ENHanced:PCCPch:CCODing:STATE`
on page 416

Channel Coding Type - Enhanced P-CCPCH BS1

Displays the coding scheme.

The coding scheme of P-CCPCH (BCH) is specified in the standard. The channel is generated automatically with the counting system frame number (SFN). The system information after the SFN field is completed from the selected data source.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPP:BSTation:ENHanced:PCCPch:CCODing:TYPE`
on page 416

Interleaver - Enhanced P-CCPCH BS1

Activates or deactivates channel coding interleaver states 1 and 2.

Note: The interleaver states do not cause the symbol rate to change

SCPI command:

`[:SOURCE<hw>] :BB:W3GPP:BSTation:ENHanced:PCCPch:CCODing:INTerleaver<di>`
on page 415

5.16 Enhanced Settings for DPCHs - BS1

The "Enhanced Settings" menu can be called in the channel table in column "Enhanced/HSDPA Settings" with button "Config".

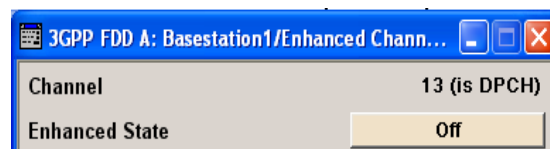
This menu is only available for base station 1.

The settings for the enhanced P-CCPCH channel (see [chapter 5.15, "Enhanced Settings for P-CCPCH - BS1"](#), on page 128) and the enhanced DPCH channels are different. The menu for the enhanced DPCH channels (channels 11...13) is described below. The channels can be set independently.



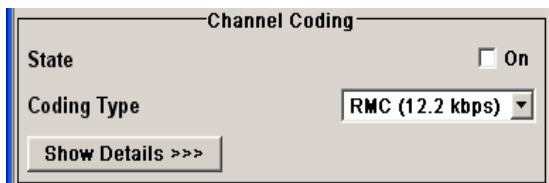
For high-speed channels, menu HSDPA Settings is called with button "Config".

The upper section is where the selected channel is displayed and where the enhanced state of this channel can be activated.



The "Channel Coding" section is where the channel coding settings are made. You can choose between a reduced display, where it is only possible to select the coding scheme,

and a display with detailed setting options. The Transport Channel section for detailed settings can be revealed with the "Show Details" button and hidden with the "Hide Details" button.



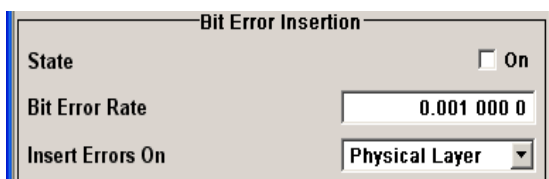
Channel Coding

State On

Coding Type RMC (12.2 kbps)

Show Details >>>

The "Bit Error Insertion" section is where the bit error simulation is configured and activated.



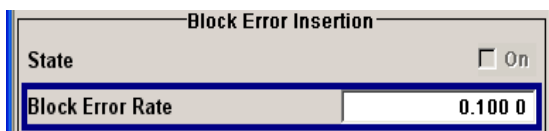
Bit Error Insertion

State On

Bit Error Rate 0.001 000 0

Insert Errors On Physical Layer

The "Block Error Insertion" section is where the block error simulation is configured and activated.

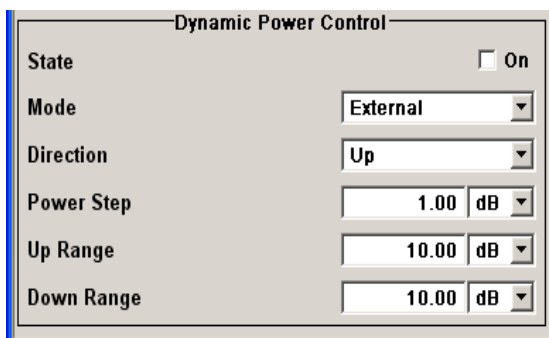


Block Error Insertion

State On

Block Error Rate 0.100 0

In the "Dynamic Power Control" section, the power of the selected Enhanced Channel can be increased or decreased within the predefined dynamic range ("Up Range + Down Range") and with the predefined step size ("Power Step").



Dynamic Power Control

State On

Mode External

Direction Up

Power Step 1.00 dB

Up Range 10.00 dB

Down Range 10.00 dB

5.16.1 Channel Number and State

Channel Number - Enhanced DPCHs BS1

Displays the number and type of the channel being configured in the enhanced state.

SCPI command:

n.a.

Enhanced State - Enhanced DPCHs BS1

Switches the DPCH channel to the enhanced state.

In the enhanced state, the modulation signal of the selected channel is generated in realtime. It is possible to activate channel coding and simulate bit and block errors or use dynamic power control. Data lists, for example with user data for the transport layer, can be used as the data source.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH:STATE
on page 403
```

5.16.2 Channel Coding - Enhanced DPCHs BS1

The "Channel Coding" section is where the channel coding settings are made. You can choose between a reduced display and the detailed setting options display. With the reduced display, it is only possible to select the coding scheme and this selection sets the associated parameters to the presetting prescribed in the standard. The "Transport Channel" section for detailed setting and for defining a user coding can be revealed with the "Show Details" button and hidden with the "Hide Details" button.

A downlink reference measurement channel according to 3GPP TS 25.101 is generated when the transport channels DTCH (Dedicated Traffic Channel) and DCCH (Dedicated Control Channel), which contain the user data, are mapped to a DPCH (Dedicated Physical Channel) with a different data rate after channel coding and multiplexing. The display below is taken from the standard (TS 25.101) and shows in diagrammatic form the generation of a 12.2 kbps reference measurement channel from the DTCH and DCCH transport channels (see standard for figures and tables of other reference measurement channels).

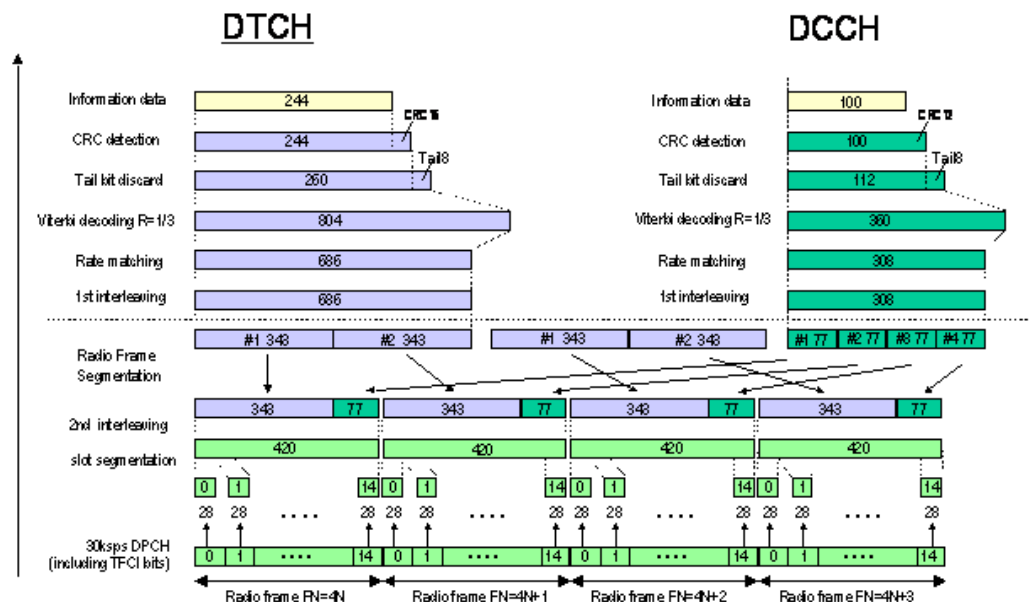


Fig. 5-15: Channel coding of the 12.2 kbps reference measurement channel (downlink)

Table 5-12: The table below shows a summary of the transport channel parameters of the 12.2 kbps reference measurement channel

Parameter	DCCH	DTCH
Data Source	All 0	All 0
Transport Block Size	100	244
Transmission Time Interval	40 ms	20 ms
Type of Error Protection	Convolution Coding	Convolution Coding
Coding Rate	1/3	1/3
Rate Matching attribute	256	256
Size of CRC	12	16
Interleaver 1/2	On	On

Channel Coding State - Enhanced DPCHs BS1

Activates or deactivates channel coding.

Channel-coded measurement channels - so-called "reference measurement channels" - are required for many test procedures specified by the standard.

When channel coding is activated, (depending on the coding type) the slot format (and thus the symbol rate, the pilot length and the TFCI state) are predetermined. The corresponding parameters in the channel table are disabled.

SCPI command:

```
[ :SOURce<hw> ] :BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH:
CCODing:STATe on page 406
```

Channel Coding Type - Enhanced DPCHs BS1

Selects channel coding.

The 3GPP specification defines 4 reference measurement channel coding types, which differ in the input data bit rate bit to be processed (12.2, 64, 144 and 384 kbps). The additional AMR CODER coding scheme generates the coding of a voice channel.

The BTFD coding types with different data rates are also defined in the 3GPP specification (TS 34.121). They are used for the receiver quality test Blind Transport Format Detection. DTX (Discontinuous Transmission) bits are included in the data stream between rate matching and interleaving 1.

User coding can be defined as required in the detailed coding settings menu section revealed with button "Show Details". They can be stored and loaded in the "User Coding" submenu. Selection User is indicated as soon as a coding parameter is modified after selecting a predefined coding type.

The input data bits are taken for channel coding from the data source specified in the "Transport Channel" dialog section. The bits are available with a higher rate at the channel coding output. The allocations between the measurement input data bit rate and the output symbol rate are fixed, that is to say, the symbol rate is adjusted automatically.

The following are available for selection:

```
"RMC 12.2      12.2 kbps measurement channel
kbps"
```

"RMC 64 kbps"	64 kbps measurement channel
"RMC 144 kbps"	144 kbps measurement channel
"RMC 384 kbps"	384 kbps measurement channel
"AMR 12.2 kbps"	Channel coding for the AMR coder
"BTFD Rate 1 12.2kspss"	Blind Transport Format Detection Rate 1 (12.2 kbps)
"BTFD Rate 2 7.95kspss"	Blind Transport Format Detection Rate 2 (7.95 kbps)
"BTFD Rate 3 1.95kspss"	Blind Transport Format Detection Rate 3 (1.95 kbps)

SCPI command:

```
[ :SOURce<hw> ] :BB:W3Gpp:BSTation:ENHanced:CHANnel<ch0>:DPCH:CCODing:TYPE on page 407
```

Show Details... - Enhanced DPCHs BS1

Reveals the detailed setting options for channel coding.

Available as well as the "Transport Channel" section are the "Bits per Frame" parameter and the "User Coding" button.

Once the details are revealed, the labeling on the button changes to "Hide Details". Use this to hide the detailed setting options display again.

<<< Hide Details

User Coding...

Slot Format

Symbol Rate 30 ksps

Bits per Frame (DPDCH) 450

Transport Channel

DTCH 1	DTCH 2	DTCH 3	DTCH 4	DTCH 5	DTCH 6	DCCH
244	100	100	100	100	100	100
PN 9	PN 9	PN 9	PN 9	PN 9	PN 9	PN 9
<input checked="" type="checkbox"/> On	<input type="checkbox"/> On	<input type="checkbox"/> On	<input type="checkbox"/> On	<input type="checkbox"/> On	<input type="checkbox"/> On	<input checked="" type="checkbox"/> On

Data Source

Transport Time Intervall

Transport Blocks

Transport Block Size

Size Of CRC

Rate Matching Attribute

DTX Indication Bits

Error Protection

Interleaver 1 State On

Interleaver 2 State On

SCPI command:

n.a.

User Coding ... - Enhanced DPCHs BS1

Calls the "User Coding" menu.

From the "User Coding" menu, the "File Select" windows for saving and recalling user-defined channel coding and the "File Manager" can be called.



User coding of BS1 are stored as files with the predefined file extension * .

3g_ccod_d1. The file name and the directory they are stored in are user-definable; the file extension is assigned automatically.

The complete channel coding settings in the menu section "Show Details" are saved and recalled.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:BSTation:ENHanced:CHANnel<ch0>:DPCH:
CCODing:USER:CATalog on page 408
```

```
[ :SOURCE<hw> ] :BB:W3GPp:BSTation:ENHanced:CHANnel<ch0>:DPCH:
CCODing:USER:STORe on page 409
```

```
[ :SOURCE<hw> ] :BB:W3GPp:BSTation:ENHanced:CHANnel<ch0>:DPCH:
CCODing:USER:LOAD on page 409
```

Slot Format (DPDCH) - Enhanced DPCHs BS1

Enters the slot format. The slot format (and thus the symbol rate, the pilot length and the TFCI state) depends on the coding type selected. The User Coding selection appears as soon as the slot format is changed.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH:
CCODing:SFORmat on page 405
```

Symbol Rate (DPDCH) - Enhanced DPCHs BS1

Displays the symbol rate.

The symbol rate is determined by the slot format set.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH:
CCODing:SRATe on page 406
```

Bits per Frame (DPDCH) - Enhanced DPCHs BS1

Displays the data bits in the DPDCH component of the DPCH frame at physical level. The value depends on the slot format.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH:
CCODing:BPFRame on page 405
```

5.16.3 Transport Channel - Enhanced DPCHs BS1

In the "Transport Channel" section, up to 7 transport channels (TCHs) can be configured. The first one is always a DCCH; the other six are DTCHs (DTCH1 to 6). The most important parameters of the TCH are displayed (data source and transport block size). The associated parameters shown in the section below depend on which TCH is currently selected.

A wide arrow beneath the block indicates which TCH is currently selected.

Transport Channel						
DTCH 1	DTCH 2	DTCH 3	DTCH 4	DTCH 5	DTCH 6	DCCH
244	100	100	100	100	100	100
PN 9	PN 9	PN 9	PN 9	PN 9	PN 9	PN 9
<input checked="" type="checkbox"/> On	<input type="checkbox"/> On	<input type="checkbox"/> On	<input type="checkbox"/> On	<input type="checkbox"/> On	<input type="checkbox"/> On	<input checked="" type="checkbox"/> On
Data Source					PN 9	
Transport Time Intervall					20 ms	
Transport Blocks					1	
Transport Block Size					244	
Size Of CRC					16	
Rate Matching Attribute					256	
DTX Indication Bits					0	
Error Protection					Conv 1/3	
Interleaver 1 State					<input checked="" type="checkbox"/> On	
Interleaver 2 State					<input checked="" type="checkbox"/> On	

Transport Channel State - Enhanced DPCHs BS1

Activates or deactivates the transport channel.

Note: In case of remote control, DCCH corresponds to :TCHannel0, DTCH1 to :TCHannel1, etc.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:BSTation:ENHanced:CHANnel<ch0>:DPCH:TCHannel<di>:STATE` on page 414

Data Source - Enhanced DPCHs BS1

Selects the data source for the transport channel.

The following are available for selection as data sources:

- "All 0, All 1" 0 data and 1 data are generated internally.
- "PN xx" PRBS data as per CCITT with period lengths between 2^9-1 and $2^{23}-1$ is generated internally.
- "Pattern" A user-definable bit pattern with a maximum length of 64 bits is generated internally.
The bit pattern is defined in the Pattern entry field.
- "Data List,
Select Data
List" Internal data from a programmable data list is used. The data list can be generated by the Data Editor or generated externally.
Data lists are selected in the "Select Data List" field.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:BSTation:ENHanced:CHANnel<ch0>:DPCH:TCHannel<di>:DATA` on page 410

`[:SOURCE<hw>] :BB:W3GPp:BSTation:ENHanced:CHANnel<ch0>:DPCH:TCHannel<di>:DATA:PATTern` on page 412

`[:SOURCE<hw>] :BB:W3GPp:BSTation:ENHanced:CHANnel<ch0>:DPCH:TCHannel<di>:DATA:DSElect` on page 411

Transport Time Interval - Enhanced DPCHs BS1

Sets the number of frames into which a TCH is divided. This setting also defines the interleaver depth.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH:
TCHannel<di>:TTINterval on page 415
```

Transport Block - Enhanced DPCHs BS1

Sets the number of transport blocks for the TCH.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH:
TCHannel<di>:TBCount on page 414
```

Transport Block Size - Enhanced DPCHs BS1

Sets the size of the transport block at the channel coding input.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH:
TCHannel<di>:TBSize on page 415
```

Size of CRC - Enhanced DPCHs BS1

Defines the type (length) of the CRC. Checksum determination can also be deactivated (setting None).

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH:
TCHannel<di>:CRCSize on page 410
```

Rate Matching Attribute - Enhanced DPCHs BS1

Sets data rate matching (Rate Matching).

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH:
TCHannel<di>:RMATtribute on page 414
```

DTX Indication Bits - Enhanced DPCHs BS1

Sets the number of DTX (Discontinuous Transmission) bits. These bits are entered in the data stream between rate matching and interleaver 1. Channel coding of BTFD reference measurement channels Rate 2 and Rate 3 includes DTX267 and DTX644, respectively (see 3GPP TS 34.121).

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH:
TCHannel<di>:DTX on page 412
```

Error Protection - Enhanced DPCHs BS1

Selects error protection.

"None" No error protection

"Turbo 1/3" Turbo Coder of rate 1/3 in accordance with the 3GPP specifications.

"Conv 1/2 | 1/3" Convolution Coder of rate 1/2 or 1/3 with generator polynomials defined by 3GPP.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:BSTation:ENHanced:CHANnel<ch0>:DPCH:
TCHannel<di>:EPRotecti on page 413
```

Interleaver 1 State - Enhanced DPCHs BS1

Activates or deactivates channel coding interleaver state 1 of the transport channel. Interleaver state 1 can be set independently in each TCH. Activation does not change the symbol rate.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:BSTation:ENHanced:CHANnel<ch0>:DPCH:
TCHannel<di>:INTerleaver on page 413
```

Interleaver 2 State - Enhanced DPCHs BS1

Activates or deactivates channel coding interleaver state 2 of all the transport channels. Interleaver state 2 can only be set for all the TCHs together. Activation does not change the symbol rate.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:BSTation:ENHanced:CHANnel<ch0>:DPCH:
INTerleaver2 on page 410
```

5.16.4 Error Insertion - Enhanced DPCHs BS1

In the "Bit Error Insertion" and "Block Error Insertion" sections, errors can be inserted into the data source and into the CRC checksum, in order, for example, to check the bit and block error rate testers.

Bit Error State - Enhanced DPCHs BS1

Activates or deactivates bit error generation.

Bit errors are inserted into the data fields of the enhanced channels. When channel coding is active, it is possible to select the layer in which the errors are inserted (physical or transport layer).

When the data source is read out, individual bits are deliberately inverted at random points in the data bit stream at the specified error rate in order to simulate an invalid signal.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:BSTation:ENHanced:CHANnel<ch0>:DPCH:
DERRor:BIT:STATe on page 420
```

Bit Error Rate - Enhanced DPCHs BS1

Sets the bit error rate.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:BSTation:ENHanced:CHANnel<ch0>:DPCH:
DERRor:BIT:RATE on page 420
```

Insert Errors On - Enhanced DPCHs BS1

Selects the layer in the coding process at which bit errors are inserted.

"Transport layer" Bit errors are inserted in the transport layer.
This selection is only available when channel coding is active.

"Physical layer" Bit errors are inserted in the physical layer.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH:
DERRor:BIT:LAYer on page 420
```

Block Error State - Enhanced DPCHs BS1

Activates or deactivates block error generation.

The CRC checksum is determined and then the last bit is inverted at the specified error probability in order to simulate an invalid signal.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH:
DERRor:BLOCK:STATe on page 421
```

Block Error Rate - Enhanced DPCHs BS1

Sets block error rate.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH:
DERRor:BLOCK:RATE on page 421
```

5.16.5 Dynamic Power Control - Enhanced DPCHs BS1

The R&S WinIQSIM2 does not support Dynamic Power Control.

In the "Dynamic Power Control" section of dialog "Enhanced Settings", the power of the selected enhanced channel can be increased or decreased within the predefined dynamic range ("Up Range + Down Range") and with the predefined step size ("Power Step") with a control signal.

The control signal can be provided either externally (LEVATT), internally (TPC pattern) or manually (see [Mode - Enhanced DPCHs BS1](#)).



The R&S SMBV does not support externally provided control signals.

With "Dynamic Power Control" the test of Closed (Inner) Loop Power Control can be performed in two test constellations:

1. Test whether the DUT (receiver) correctly performs the SIR (Signal to Interference Ratio) measurement and inserts the corresponding bits into the TPC field of its trans-

mitting signal. The TPC control information is provided by an external "Dynamic Power Control" signal.

2. Test whether the DUT (transmitter) responds with the correct output power to received TPC bits. This can be carried out by using a data list adapted to the test condition as TPC data source. The TPC pattern can be defined in the channel table.

The power change of the channels is performed by a switchover of the mapping table, controlled by the "Dynamic Power Control" signal which is queried at the beginning of the pilot field. Since the number of mappings is limited, the maximum dynamic range is restricted to 30 dB and the step width to min. 0.5 dB. The output power of each channel is thus limited to the dynamic range around the channel-specific start power.



To obtain optimum signal quality, the "Power Up Range" should not be set higher than necessary since the mapping of the I/Q level in this range must be maintained as a level margin.

Example:

Power Up Range = Power Down Range

Mode Up for channel 11 and 13

Mode Down for channel 12

The following figure shows the change of channel power of the 3 enhanced channels. The external control signal LEV ATT is used.

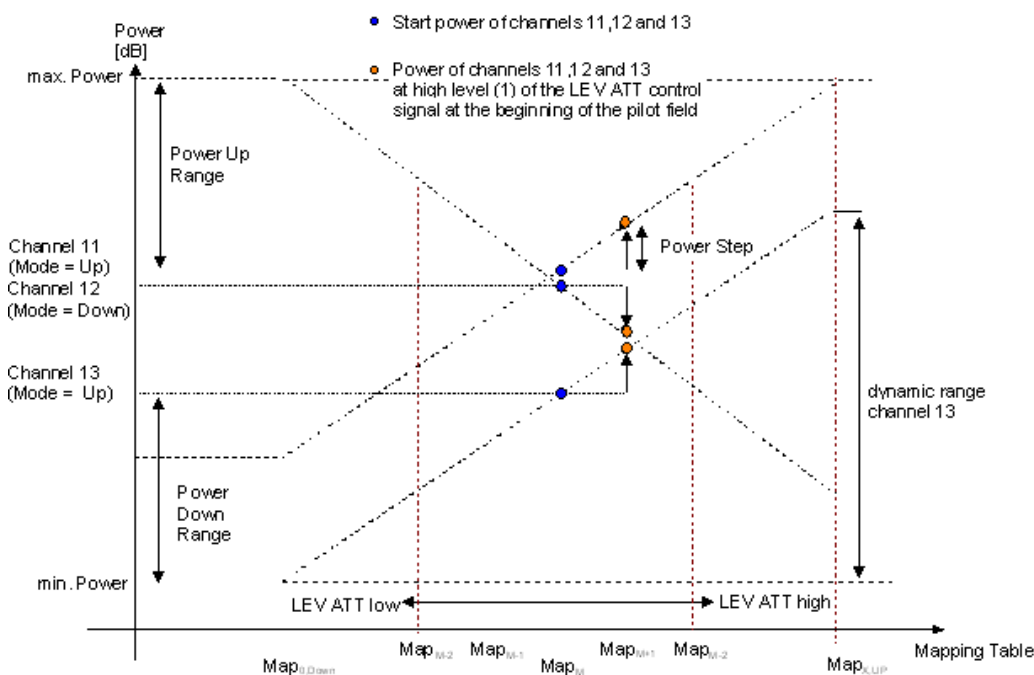


Fig. 5-16: Dynamic Power Control - Down Link

Available mappings are shown on the X-axis with MAP_M being the starting point. In this point, all channels have the start power which was set in the channel table.

At the beginning of the pilot field the LEVATT line is queried in each timeslot. If this line is set to logical "1" switchover is made to the right mapping MAP_{M+1} . This means an increase of the output power by "Power Step" for all channels with "Power Control Mode Up". The power of channel 12 is decreased by the same value (see figure 5-16).

If the LEVATT line is set to logical "0" switchover is made to the left mapping MAP_{M-1} . This means a reduction of the output power by "Power Step" for all channels with "Power Control Mode Down". The power of channel 12 is increased by the same value.

The "Dynamic Power Control" settings are performed in the "Enhanced Settings" menu of the channel table.

Dynamic Power Control State - Enhanced DPCHs BS1

Activates or deactivates the "Dynamic Power Control" for the selected enhanced channel.

With activated Dynamic Power Control, the power of the enhanced channel can be increased or decreased within the predefined dynamic range ("Up Range" + "Down Range") and with the predefined step size ("Power Step") with an external control signal. The external control signal has to be supplied via the LEVATT input of the AUX I/O connector.

The "Mode" settings determine if the channel power is increased or decreased by a high level of the control signal.

SCPI command:

```
[ :SOURce<hw> ] :BB:W3GPp:BSTation:ENHanced:CHANnel<ch0>:DPCH:
DPControl:STATe on page 418
```

Mode - Enhanced DPCHs BS1

Selects the control signal for Dynamic Power Control.

- | | |
|------------|--|
| "External" | (the parameter is not available for R&S SMBV)
An external control signal is used for "Dynamic Power Control". The external control signal is supplied via the LEV ATT input of the AUX I/O connector. |
| "TPC" | The TPC pattern is used for Dynamic Power Control. This selection corresponds to selection (Mis) Use TPC for not enhanced DPCHs. |
| "Manual" | The control signal is manually produced by pushing one of the buttons 0 or 1. Button 1 corresponds to a positive control signal, button 0 to a negative control signal.
The channel power is increased or decreased depending on the "Direction" setting by the set power step. |

SCPI command:

```
[ :SOURce<hw> ] :BB:W3GPp:BSTation:ENHanced:CHANnel<ch0>:DPCH:
DPControl:MODE on page 417
```

```
[ :SOURce<hw> ] :BB:W3GPp:BSTation:ENHanced:CHANnel<ch0>:DPCH:
DPControl:STEP:MANual on page 418
```

Direction - Enhanced DPCHs BS1

Selects the Dynamic Power Control direction. The Direction setting defines whether the channel power is increased or decreased by a high level of the control signal (see [figure 5-16](#)).

"Up" A high level of the control signal leads to an increase of channel power.

"Down" A high level of the control signal leads to a decrease of channel power.

SCPI command:

```
[ :SOURce<hw> ] :BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH:
DPControl:DIRection on page 417
```

Power Step - Enhanced DPCHs BS1

Sets step width by which – with "Dynamic Power Control" being switched on - the channel power of the selected enhanced channel in the timeslot grid (= 0,667 ms) is increased or decreased within the set dynamic range ("Up Range + Down Range").

The start power of the channel is set in the "Power" column of the channel table.

SCPI command:

```
[ :SOURce<hw> ] :BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH:
DPControl:STEP [ :EXTernal ] on page 419
```

Up Range/Down Range

Sets dynamic range by which – with "Dynamic Power Control" switched on – the channel powers of the enhanced channels can be increased. The resulting "Dynamic Power Control" dynamic range ("Up Range" + "Down Range") depends on the selected "Power Step" and is as follow:

- For "Power Step" < 1 dB, the dynamic range ("Up Range" + "Down Range") <= 30 dB
- For "Power Step" => 1 dB, the dynamic range ("Up Range" + "Down Range") <= 60 dB

SCPI command:

```
[ :SOURce<hw> ] :BB:W3GPP:BSTation<st>:ENHanced:CHANnel<ch0>:DPCH:
DPControl:RANGE:UP on page 418
[ :SOURce<hw> ] :BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH:
DPControl:RANGE:DOWN on page 418
```

Power Control Graph - Enhanced DPCHs BS1

Indicates the deviation of the channel power (delta POW) from the set power start value of the corresponding enhanced channels.

The graph is automatically displayed with "Dynamic Power Control" switched on.

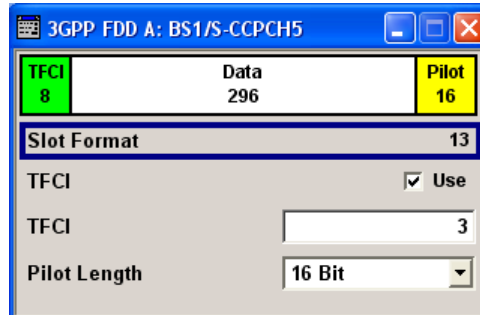
Note: Since a realtime update of the window in the timeslot (= 0.667 ms) is not possible for reasons of speed, an update can be performed in a more coarse time interval. Fast channel power changes are not displayed but the settled state of the control loop can be recognized very easily.

SCPI command:

```
[ :SOURce<hw> ] :BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH:
DPControl [ :POWER ] on page 419
```

5.17 S-CCPCH Settings - BS Channel Table

The "Config S-CCPCH" menu for configuring the fields of the secondary common control physical channel can be called in the channel table in column "DPCCH Settings" with the "Config..." button.



The selected slot format predetermines the setting of the parameters provided in the menu. Whenever the TFCI State and Pilot Length settings are changed, the slot format is adjusted accordingly. Pilot Length and TFCI State can be selected for the S-CCPCH channel.

Slot Structure (S-CCPCH) - BS

Displays the slot structure.

TFCI	Data	Pilot
8	296	16

The structure of the slot depends on the slot format selected (see also 3GPP TS 25.211, Table 18: Secondary CCPCH fields)

Slot Format (S-CCPCH) - BS

Displays the slot format.

The slot format displayed changes when a change is made to the TFCI and Pilot control field settings.

SCPI command:

n.a.

Use TFCI - BS

Activates TFCI field usage.

Note: The remote-control command is not valid for multi channel mode.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPP:BSTation<st>:CHANnel<ch>:DPCCh:TFCI:STATE`
on page 363

TFCI Value - BS

Enters the value of the TFCI field (Transport Format Combination Indicator) . This value is used to select a combination of 30 bits, which is divided into two groups of 15 successive slots.

Note: The remote-control command is not valid for multi channel mode.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:BSTation<st>:CHANnel<ch>:DPCCh:TFCI`
on page 363

Pilot Length - BS

Sets the length of the pilot fields.

The range of values for this parameter depends on the channel type and the symbol rate.

To achieve a constant slot length, the data fields are lengthened or shortened depending on the pilot length, as defined in the standard.

Note: The pilot fields of all active power-controlled DPCHs must be of the same length if [Dynamic Power Control State - Enhanced DPCHs BS1](#) with external control signal is active.

The remote-control command is not valid for multi channel mode.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:BSTation<st>:CHANnel<ch>:DPCCh:PLENgtH`
on page 361

5.18 Config AICH/AP-AICH - BS Channel Table

The "Config AICH" or "Config AP-AICH" menu for configuring the fields of the dedicated physical control channel can be called in the channel table in column "DPCCH Sett" with the "Config" button.

Signature ACK/NACK Pattern - BS

Enters the 16 bit pattern for the ACK/NACK field.

This field is used by the base station to acknowledge, refuse or ignore requests of up to 16 user equipments.

Note: Pattern + is entered using the numeric key 1. Pattern - is entered via the numeric key +/-.

""+" = ACK" The ACK is sent. Transmission was successful and correct.

""-" = NACK" The NACK is not sent. Transmission was not correct.

""0" = DTX" Nothing is sent. Transmission is interrupted (Discontinuous Transmission (DTX)).

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:BSTation<st>:CHANnel<ch>:AICH:SAPattern`
on page 358

`[:SOURCE<hw>] :BB:W3GPp:BSTation<st>:CHANnel<ch>:APAIch:SAPattern`
on page 359

Access Slot - BS

Selects the slot in which the burst is transmitted.

SCPI command:

```
[ :SOURce<hw> ] :BB:W3GPp:BSTation<st>:CHANnel<ch>:AICH:ASLOt
```

on page 358

```
[ :SOURce<hw> ] :BB:W3GPp:BSTation<st>:CHANnel<ch>:APAIch:ASLOt
```

on page 359

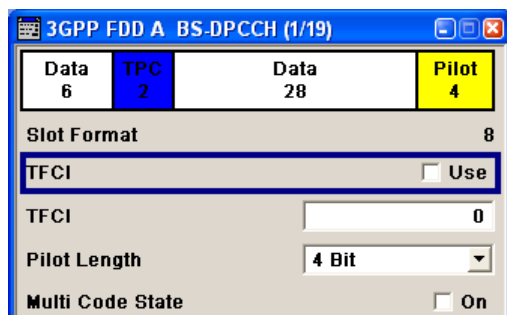
5.19 DPCCH Settings - BS Channel Table

The "Config DPCCH" menu for configuring the fields of the dedicated physical control channel can be called in the channel table in column "DPCCH Settings" with the "Config" button.

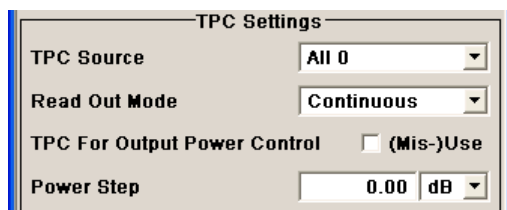
This menu is only available for selected channel types.

The selected slot format predetermines the setting of the parameters provided in the menu. Whenever the TFCI State and Pilot Length settings are changed, the slot format is adjusted accordingly.

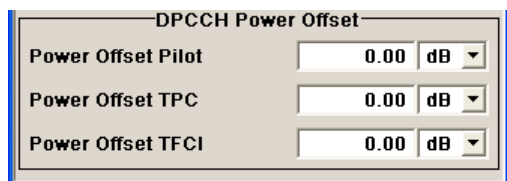
The upper section of the menu is where the slot structure is displayed and the TFCI and Pilot control fields are set.



The "TPC Settings" section is where the TPC field is set.



The "DPCCH Power Offset" section is where the power offset of the control fields to the set channel power is set.



5.19.1 Slot Structure (DPCCH) - BS

Data 6	TPC 2	Data 28	Pilot 4
-----------	----------	------------	------------

Displays the slot structure.

The structure of the slot depends on the slot format selected (see also 3GPP TS 25.211, Table 11: DPDCH and DPCCH fields)

Slot Format (DPCCH) - BS

Displays the slot format.

The slot format displayed changes when a change is made to the TFCI and Pilot control field settings.

SCPI command:

n.a.

Use TFCI - BS

Activates TFCI field usage.

Note: The remote-control command is not valid for multi channel mode.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPP:BSTation<st>:CHANnel<ch>:DPCCh:TFCI:STATE`
on page 363

TFCI Value - BS

Enters the value of the TFCI field (Transport Format Combination Indicator) . This value is used to select a combination of 30 bits, which is divided into two groups of 15 successive slots.

Note: The remote-control command is not valid for multi channel mode.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPP:BSTation<st>:CHANnel<ch>:DPCCh:TFCI`
on page 363

Pilot Length - BS

Sets the length of the pilot fields.

The range of values for this parameter depends on the channel type and the symbol rate.

To achieve a constant slot length, the data fields are lengthened or shortened depending on the pilot length, as defined in the standard.

Note: The pilot fields of all active power-controlled DPCHs must be of the same length if [Dynamic Power Control State - Enhanced DPCHs BS1](#) with external control signal is active.

The remote-control command is not valid for multi channel mode.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPP:BSTation<st>:CHANnel<ch>:DPCCh:PLENght`
on page 361

Multicode State (DPCCH) - BS

Activates multicode transmission.

Multicode transmission can be activated for a group of channels destined for the same receiver that is to say, belonging to a radio link. The first channel of this group is used as the master channel.

With multicode transmission, the common components (Pilot, TPC and TCFI) for all the channels are spread using the spreading code of the master channel.

This parameter is only available for the DPCHs.

Note: The remote-control command is not valid for multi channel mode.

SCPI command:

`[:SOURce<hw>] :BB:W3GPp:BSTation<st>:CHANnel<ch>:DPCCh:MCODE`
on page 361

TPC Data Source (DPCCH) - BS

The "TPC Settings" section is where the settings for the TPC field (Transmit Power Control) are made. This field is used to control the transmit power.

When "Pattern" is selected, an entry field appears for the bit pattern. The maximum bit pattern length is 64 bits.

The screenshot shows a control panel with two fields. The top field is labeled "TPC Pattern" and contains the value "0". The bottom field is labeled "Read Out Mod" and is currently empty.

When "Data List" is selected, a button appears for calling the "File Select" window.

The screenshot shows a button labeled "Select TPC List..." and a dropdown menu currently set to "None".

Note: The remote-control command is not valid for multi channel mode.

SCPI command:

`[:SOURce<hw>] :BB:W3GPp:BSTation<st>:CHANnel<ch>:DPCCh:TPC:DATA`
on page 363

`[:SOURce<hw>] :BB:W3GPp:BSTation<st>:CHANnel<ch>:DPCCh:TPC:DATA:`
`PATtern` on page 364

`[:SOURce<hw>] :BB:W3GPp:BSTation<st>:CHANnel<ch>:DPCCh:TPC:DATA:`
`DSElect` on page 364

TPC Read Out Mode (DPCCH) - BS

Defines TPC data usage.

With 3GPP, the TPC bits are used to signal the increase or reduction in transmit power to the called station. With all read out modes, one bit is taken from the data stream for the TPC field for each slot and entered into the bit stream several times (depending on the symbol rate). The difference between the modes lies in the usage of the TPC bits.

These different modes can be used, for example, to deliberately set a base station to a specific output power (e.g. with the pattern 11111) and then let it oscillate around this power (with Single + alt. 01 and Single + alt. 10). This then allows power measurements to be carried out at the base station (at a quasi-constant power). Together with the option (Mis-) Use TPC for output power control (see below), TPC Read Out Mode can also be used to generate various output power profiles.

Note: The remote-control commands are not valid for multi channel mode.

"Continuous:"	The TPC bits are used cyclically.
"Single + All 0"	The TPC bits are used once, and then the TPC sequence is continued with 0 bits.
"Single + All 1"	The TPC bits are used once, and then the TPC sequence is continued with 1 bit.
"Single + alt. 01"	The TPC bits are used once and then the TPC sequence is continued with 0 and 1 bits alternately (in multiples, depending on by the symbol rate, for example, 00001111).
"Single + alt. 10"	The TPC bits are used once and then the TPC sequence is continued with 1 and 0 bits alternately (in multiples, depending on by the symbol rate, for example, 11110000).

SCPI command:

```
[ :SOURce<hw> ] :BB:W3GPp:BSTation<st>:CHANnel<ch>:DPCCh:TPC:READ
```

on page 365

Misuse TPC for Output Power Control (DPCCH) - BS

Defines "mis-" use of the TPC data.

With 3GPP, the TPC bits are used to signal the increase or reduction in transmit power to the called station. If ("Mis-) use TPC for output power control" is activated, the specified pattern is misused; in order to vary the intrinsic transmit power over time. A bit of this pattern is removed for each slot in order to increase (bit = "1") or reduce (bit = "0") the channel power by the specified power step ("Power Step"). The upper limit for this is 0 dB and the lower limit -60 dB. The following envelope is produced at a channel power of 0 dB, power step 1.0 dB and pattern "001110100000011" and TPC Pattern ReadOut Mode "Continuous".

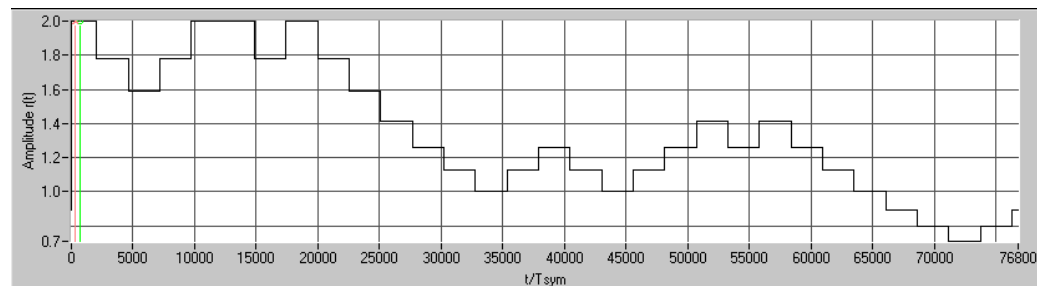


Fig. 5-17: Dynamic change of channel power (continuous)

Note: The change in power is always carried out (as stipulated in the standard) at the start of the slot pilot field. Misuse TPC for Output Power Control is not available for enhanced DPCHs. Power Control via TPC pattern for enhanced channels can be selected for active Dynamic Power Control (see [chapter 5.16.5, "Dynamic Power Control - Enhanced DPCHs BS1"](#), on page 141).

The remote-control command is not valid for multi channel mode.

SCPI command:

```
[ :SOURce<hw> ] :BB:W3GPp:BSTation<st>:CHANnel<ch>:DPCCh:TPC:MISuse
```

on page 365

TPC Power Step (DPCCH) - BS

Sets the step width of the power change in dB for (Mis-) use TPC for output power control.

Note: Misuse TPC for Output Power Control is not available for enhanced DPCHs. Power Control via TPC pattern for enhanced channels can be selected for active Dynamic Power Control (see [chapter 5.16.5, "Dynamic Power Control - Enhanced DPCHs BS1"](#), on page 141).

The remote-control command is not valid for multi channel mode.

SCPI command:

```
[ :SOURce<hw> ] :BB:W3GPp:BSTation<st>:CHANnel<ch>:DPCCh:TPC:PSTep
on page 365
```

5.19.2 DPCCH Power Offset section

The DPCCH Power Offset section is where the power offset of the control fields to the set channel power is set.

Power Offset Pilot (DPCCH) - BS

Sets the power offset of the pilot field to the channel power in dB.

Note: The remote-control command is not valid for multi channel mode.

SCPI command:

```
[ :SOURce<hw> ] :BB:W3GPp:BSTation<st>:CHANnel<ch>:DPCCh:POFFset:
PILot on page 362
```

Power Offset TPC (DPCCH) - BS

Sets the power offset of the TPC field to the channel power in dB.

Note: The remote-control command is not valid for multi channel mode.

SCPI command:

```
[ :SOURce<hw> ] :BB:W3GPp:BSTation<st>:CHANnel<ch>:DPCCh:POFFset:
TPC on page 362
```

Power Offset TFCI (DPCCH) - BS

Sets the power offset of the TFCI field to the channel power in dB.

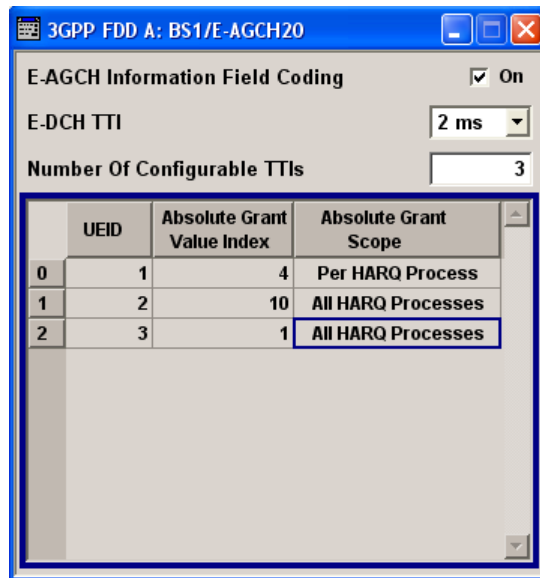
Note: The remote-control command is not valid for multi channel mode.

SCPI command:

```
[ :SOURce<hw> ] :BB:W3GPp:BSTation<st>:CHANnel<ch>:DPCCh:POFFset:
TFCI on page 362
```

5.20 Config E-AGCH - BS Channel Table

The "Config E-AGCH" menu for configuring the fields of the HSUPA control channels can be called in the channel table in column "DPCCH Settings" with the "Config" button.



E-AGCH Information Field Coding – HSUPA BS

Enables/disables the information coding. Disabling this parameter corresponds to a standard operation, i.e. no coding is performed and the data is sent uncoded. Enabling this parameter allows you to configure the way the data is coded.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:BSTation<st>:CHANnel<ch> [ :HSUPa ] :EAGCh:
IFCoding on page 389
```

E-DCH TTI – HSUPA BS

Switches between 2 ms and 10 ms. The processing duration also influences the number of used slots.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:BSTation<st>:CHANnel<ch> [ :HSUPa ] :EAGCh:
TTIEdch on page 391
```

Number of entries (TTIs) – HSUPA BS

Sets the number of configurable TTIs.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:BSTation<st>:CHANnel<ch> [ :HSUPa ] :EAGCh:
TTICount on page 391
```

UEID (A-GCH) – HSUPA BS

Sets the UE Id for the selected TTI.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:BSTation<st>:CHANnel<ch> [ :HSUPa ] :EAGCh:
TTI<di0>:UEID on page 391
```

Absolute Grant Value Index – HSUPA BS

Sets the Index for the selected TTI. According to the TS 25.212 (4.10.1 A.1), there is a cross-reference between the grant index and the grant value. The TTI configuration of the table is used cyclically. Depending on the selection made for the parameter "E-DCH TTI", each table row corresponds to a 2ms TTI or to a 10ms TTI.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:BSTation<st>:CHANnel<ch> [ :HSUPa ] :EAGCh:
TTI<di0>:AGVIndex on page 390
```

Absolute Grant Scope – HSUPA BS

Sets the scope of the selected grant. According to the TS 25.321, the impact of each grant on the UE depends on this parameter.

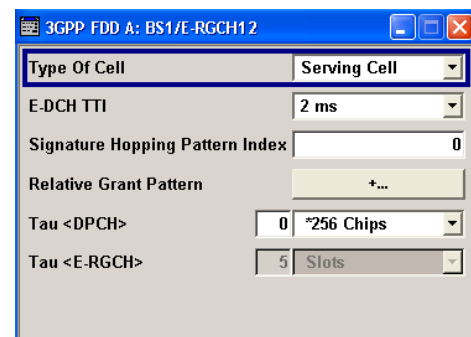
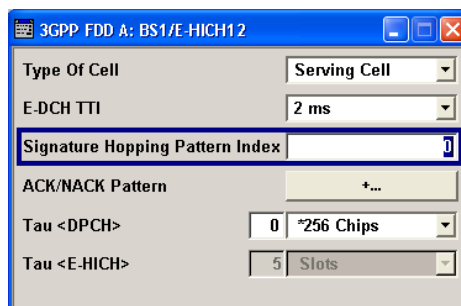
For E-DCH TTI = 10ms, the "Absolute Grant Scope" is always All HARQ Processes.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:BSTation<st>:CHANnel<ch> [ :HSUPa ] :EAGCh:
TTI<di0>:AGScope on page 390
```

5.21 Config E-RGCH/E-HICH - BS Channel Table

The "Config E-RGCH" or "Config E-HICH" menu for configuring the fields of the HSUPA control channels can be called in the channel table in column "DPCCH Settings" with the "Config" button.

**Type of Cell – HSUPA BS**

Switches between Serving Cell and Non Serving Cell. The cell type determines the number of used slots.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:BSTation<st>:CHANnel<ch> [ :HSUPa ] :ERGCh:
CTYPe on page 393
```

```
[ :SOURCE<hw> ] :BB:W3GPp:BSTation<st>:CHANnel<ch> [ :HSUPa ] :EHICH:
CTYPe on page 391
```


E-DCH TTI – HSUPA BS

Switches between 2 ms and 10 ms. The processing duration also influences the number of used slots.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:BSTation<st>:CHANnel<ch> [:HSUPa] :ERGCh:TTIEdch` on page 394

`[:SOURCE<hw>] :BB:W3GPp:BSTation<st>:CHANnel<ch> [:HSUPa] :EHICH:TTIEdch` on page 393

Signature Hopping Pattern Index – HSUPA BS

Enters a value that identifies the user equipment. The values are defined in TS 25.211.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:BSTation<st>:CHANnel<ch> [:HSUPa] :ERGCh:SSINdex` on page 394

`[:SOURCE<hw>] :BB:W3GPp:BSTation<st>:CHANnel<ch> [:HSUPa] :EHICH:SSINdex` on page 392

Relative Grant Pattern – HSUPA BS

(This feature is available for E-RGCH only.)

Enters a pattern: 0 = Hold, + = Up, - = Down.

Note: Pattern + is entered using the numeric key 1. Pattern - is entered via the numeric key +/-.

For Non Serving Cell "1" is not allowed.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:BSTation<st>:CHANnel<ch> [:HSUPa] :ERGCh:RGPAtern` on page 394

ACK/NACK Pattern - BS

(This feature is available for E-HICH only.)

Enters the pattern for the ACK/NACK field.

For Non Serving Cell only "+" (ACK) and "0" (no signal) is allowed. For Serving Cells only "+" (ACK) and "-" (NACK) is allowed.

Note: Pattern + is entered using the numeric key 1. Pattern - is entered via the numeric key +/-.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:BSTation<st>:CHANnel<ch> [:HSUPa] :EHICH:RGPAtern` on page 392

Tau DPCH - BS

Enters the offset of the downlink dedicated offset channels.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:BSTation<st>:CHANnel<ch> [:HSUPa] :EHICH:DTAU` on page 392

`[:SOURCE<hw>] :BB:W3GPp:BSTation<st>:CHANnel<ch> [:HSUPa] :ERGCh:DTAU` on page 393

Tau E-RGCH/E-HICH - BS

Displays the offset of the P-CCPCH frame boundary.

SCPI command:

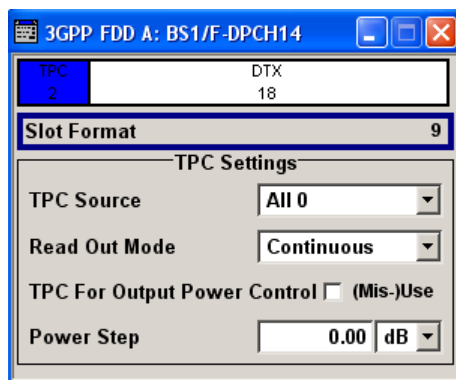
`[:SOURCE<hw>] :BB:W3GPP:BSTation<st>:CHANnel<ch> [:HSUPa] :EHICH:ETAU` on page 392

`[:SOURCE<hw>] :BB:W3GPP:BSTation<st>:CHANnel<ch> [:HSUPa] :ERGCh:ETAU` on page 393

5.22 Config F-DPCH - BS Channel Table

The "Config F-DPCCH" menu for configuring the fields of the fractional dedicated physical control channel can be called in the channel table in column "DPCCH Settings" with the "Config" button.

This menu is only available for selected channel types.



Slot Format (F-DPCH) - BS

Displays the slot format as selected with the parameter "Slot Format" in the Channel Table.

The corresponding slot structure is displayed above the parameter.

DTX	TPC	DTX
2	2	16

Slot Formats 1 .. 9 are enabled only for instruments equipped with option R&S SMx/AMU-K59.

The difference between the F-DPCH slot formats is the position of the 2 bits TPC field.

SCPI command:

n.a.

TPC Source – F-DPCH

Selects the data source for the F-DPCH channel.

The following data sources are available for selection

"All 0, All 1" 0 data and 1 data are generated internally.

"Pattern"	A user-definable bit pattern with a maximum length of 64 bits is generated internally. The bit pattern is defined in the Data Pattern entry field.
"Data List"	Internal data from a programmable data list generated with the Data Editor or externally, is used. Data lists are selected in the "File Select" window, which is called by means of the "Select Data List" button. The "File Manager" is used to transmit external data lists to the R&S Signal Generator, and can be called within every "File Select" window by means of the "File Manager" button.

SCPI command:

[\[:SOURCE<hw>\]:BB:W3GPp:BSTation<st>:CHANnel<ch>:FDPCh:DPCh:TPC:DATA](#) on page 366

[\[:SOURCE<hw>\]:BB:W3GPp:BSTation<st>:CHANnel<ch>:FDPCh:DPCh:TPC:DATA:DSElect](#) on page 367

[\[:SOURCE<hw>\]:BB:W3GPp:BSTation<st>:CHANnel<ch>:FDPCh:DPCh:TPC:DATA:PATtern](#) on page 367

TPC Read Out Mode (F-DPCH) - BS

Defines TPC data usage.

With 3GPP, the TPC bits are used to signal the increase or reduction in transmit power to the called station. With all read out modes, one bit is taken from the data stream for the TPC field for each slot and entered into the bit stream several times (depending on the symbol rate). The difference between the modes lies in the usage of the TPC bits.

These different modes can be used, for example, to deliberately set a base station to a specific output power (e.g. with the pattern 11111) and then let it oscillate around this power (with Single + alt. 01 and Single + alt. 10). This then allows power measurements to be carried out at the base station (at a quasi-constant power). Together with the option (Mis-) Use TPC for output power control TPC Read Out Mode can also be used to generate various output power profiles.

"Continuous:"	The TPC bits are used cyclically. Note that, the remote-control commands are not valid for multi channel mode.
"Single + All 0"	The TPC bits are used once, and then the TPC sequence is continued with 0 bits.
"Single + All 1"	The TPC bits are used once, and then the TPC sequence is continued with 1 bit.
"Single + alt. 01"	The TPC bits are used once and then the TPC sequence is continued with 0 and 1 bits alternately (in multiples, depending on by the symbol rate, for example, 00001111).
"Single + alt. 10"	The TPC bits are used once and then the TPC sequence is continued with 1 and 0 bits alternately (in multiples, depending on by the symbol rate, for example, 11110000).

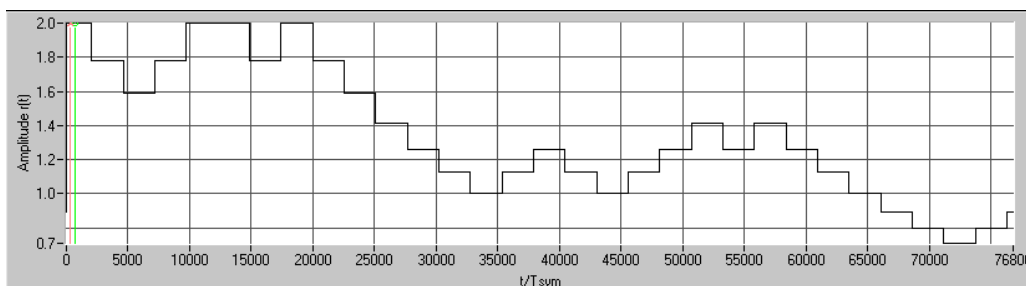
SCPI command:

[\[:SOURCE<hw>\]:BB:W3GPp:BSTation<st>:CHANnel<ch>:FDPCh:DPCh:TPC:READ](#) on page 368

TPC For Output Power Control (Mis-) Use (F-DPCH) - BS

Defines "mis-" use of the TPC data.

With 3GPP, the TPC bits are used to signal the increase or reduction in transmit power to the called station. If "(Mis-) use TPC for output power control" is activated, the specified pattern is misused; in order to vary the intrinsic transmit power over time. A bit of this pattern is removed for each slot in order to increase (bit = "1") or reduce (bit = "0") the channel power by the specified power step ("Power Step"). The upper limit for this is 0 dB and the lower limit -60 dB. The following envelope is produced at a channel power of 0 dB, power step 1.0 dB and pattern "001110100000011" and TPC Pattern ReadOut Mode "Continuous":



SCPI command:

```
[ :SOURce<hw> ] :BB:W3GPp:BSTation<st>:CHANnel<ch>:FDPCh:DPCh:TPC:
MISuse on page 368
```

TPC Power Step (F-DPCH) - BS

Sets the step width of the power change in dB for "(Mis-) use TPC for output power control".

SCPI command:

```
[ :SOURce<hw> ] :BB:W3GPp:BSTation<st>:CHANnel<ch>:FDPCh:DPCh:TPC:
PSTep on page 368
```

5.23 Multi Channel Assistant - BS

The "Multi Channel Assistant" menu is called with the button of the same name above the channel table. It allows several channels to be set simultaneously and is only available for the channel types DPCH, HS-SCCH, HS QPSK, HS 16QAM and HS 64QAM.

Enhanced state is automatically deactivated. The channel table is only filled with new values when the "Accept" button is pressed.

The screenshot shows a software dialog box titled "3GPP FDD A Basestation 1 Multi Channel Assistant". It contains several configuration fields:

- Start Channel Number (DPCH): 11
- Stop Channel Number (DPCH): 21
- Channel Type: DPCH
- Slot Format #: 8
- Symbol Rate: 30 ksps
- Channelization Code: 0
- Channelization Code Step: 0
- Power: -30.00 dB
- Power Step: 0.00 dB
- Data Source (DPDCH): PN 9
- Pattern: 0...
- Timing Offset: 0
- Timing Offset Step: 0
- Channel State: On

A button labeled "DPCCH Settings..." is highlighted with a red box. At the bottom, there is an "Accept" button.

Start Channel Number - Multichannel Base Station

Enters the index for the start channel of the channel range that is set jointly.

SCPI command:

n.a.

Stop Channel Number - Multichannel Base Station

Enters the index for the stop channel of the channel range that is set jointly.

SCPI command:

n.a.

Channel Type - Multichannel Base Station

Enters the channel type for the channel range that is set jointly. Available for selection are DPCH, HS-SCCH, HS QPSK, HS 16QAM, or HS 64QAM.

SCPI command:

n.a.

Slot Format - Multichannel Base Station

Enters the slot format.

For DPCH channels, the slot formats are 0 to 16.

A slot format defines the structure of a slot made of data and control fields and includes the symbol rate.

The individual parameters of a slot can later be changed, with the slot format being adjusted, if necessary.

This parameter is not available for high-speed channels.

Note: For the "DPCCH Settings", this value is read-only.

SCPI command:

n.a.

Symbol Rate - Multichannel Base Station

Sets the symbol rate. The range of values depends on the channel selected.

The symbol rate is determined by the slot format set. A change in the symbol rate leads automatically to an adjustment of the slot format.

SCPI command:

n.a.

Channelization Code - Multichannel Base Station

Sets the channelization code for the start channel.

The channel is spread with the specified channelization code (spreading code).

The range of values of the channelization code depends on the symbol rate of the channel.

The range of values runs from 0 to $(\text{chip_rate}/\text{symbol_rate}) - 1$

SCPI command:

n.a.

Channelization Code Step- Multichannel Base Station

Sets the step width for the channelization code from channel to channel.

The valid range of values for the channelization code of an individual channel must not be exceeded. If the range of values is exceeded, the channelization code is limited automatically.

SCPI command:

n.a.

Power - Multichannel Base Station

Sets the channel power of the start channel in dB.

The power entered is relative to the powers of the other channels and does not initially relate to the LEVEL power display. If [Adjust Total Power to 0dB](#) is executed (top level of the 3GPP dialog), all the power data is relative to 0 dB.

Note: The maximum channel power of 0 dB applies to non-blanked channels (duty cycle 100%), with blanked channels, the maximum value can be increased (by "Adjust Total Power") to values greater than 0 dB (to $10 \cdot \log_{10}(1/\text{duty_cycle})$). The Power value is also the starting power of the channel for Misuse TPC and Dynamic Power Control

.

SCPI command:

n.a.

Power Step - Multichannel Base Station

Enters the step width for the change of channel power from channel to channel.

The valid range of values must not be exceeded. If the range of values is exceeded, the power is automatically limited to the permissible of -80 dB to 0 dB.

SCPI command:

n.a.

Data Source - Multichannel Base Station

Selects data source.

The following are available for selection as data sources:

"All 0, All1"	0 data and 1 data are generated internally.
"PRBSxx"	PRBS data as per CCITT with period lengths between 2^9-1 and $2^{23}-1$ is generated internally.
"Pattern"	A user-definable bit pattern with a maximum length of 64 bits is generated internally. The bit pattern is defined in the Pattern entry field.
"Data List, Select Data List"	Internal data from a programmable data list generated with the Data Editor or externally, is used. The data list selection is called with the "Select Data List" button.

SCPI command:

n.a.

DPCCH Settings - Multichannel Base Station

Calls the menu for configuring DPCCH channels.

The parameters of the menu are described in [chapter 5.19, "DPCCH Settings - BS Channel Table"](#), on page 148. In contrary to setting a single channel, the remote control commands are not available.

SCPI command:

n.a.

Timing Offset - Multichannel Base Station

Sets the timing offset for the start channel.

The timing offset determines the shift of the source symbols before interleaving.

The absolute starting time of the frame (slot 0) is shifted relative to the start of the scrambling code sequence by the timing offset * 256 chips. This means that whatever the symbol rate, the resolution of the timing offset is always 256 chips.

This procedure is used to reduce the crest factor. A good way to obtain a lower crest factor is to use an offset of 1 from channel to channel, for example.

SCPI command:

n.a.

Timing Offset Step- Multichannel Base Station

Sets the step width for the timing offset from channel to channel.

The valid range of values must not be exceeded. If the range of values is exceeded, the timing offset is automatically limited to the permissible range.

SCPI command:

n.a.

Channel State- Multichannel Base Station

Activates or deactivates all the channels in the set channel range.

SCPI command:

n.a.

Accept- Multichannel Base Station

Executes automatic completion of the channel table in accordance with the parameters set.

SCPI command:

n.a.

5.24 User Equipment Configuration (UE)

To access the "User Equipment Configuration" dialog, select "3GPP FFD > UE1 ... UE4".



In the standard, the term "Mobile Station" has been replaced by the term "User Equipment", to take into account the fact that there is a great variety of mobile terminal equipment available to users, with functionality that is constantly being enhanced.

A user equipment has a maximum of 6 DPDCHs, with parameters largely prescribed by the standard (TS 25.211). To simplify operation, a distinction is made between three modes ("PRACH only", "PCPCH only" and "DPCCH + DPDCH").

- With the DPCCH + DPDCH mode, the HSDPA channel HS-DPCCH and the HSUPA channels E-DPCCH and E-DPDCH can be activated.
- With the PRACH only and PCPCH only modes, there is also a choice between "Standard" (all parameters can be set) and "Preamble only" (only the preamble can be set). The dialog of each particular mode only displays the parameters that are relevant.

The DPCCH and one DPDCH of user equipment 1 are generated in realtime (enhanced mode). Depending on the actual configurations, other channels of user equipment 1 may also be generated in realtime. The PRACH and PCPCH channels are not generated in realtime.

The menu comprises an upper section "Common Settings", with central sections depending on the set mode, e.g. "PRACH Settings" or "DPCCH Settings". When "DPCCH + DPDCH" modes are selected, only the channel structure, the state and the channel power are indicated. The "E-DCH Scheduling" section also appears below. The section for detailed setting and the channel tables (for DPDCH and E-DPDCH channels) can be revealed with the "Show Details" button and hidden with the "Hide Details" button.

In the menu for user equipment 1, under "DPDCH settings", there is a button for accessing the dialog for setting the enhanced channel parameters. When "PRACH Standard" or "PCPCH Standard" mode is selected, the "Channel Coding" section also appears below.

In the menus for user equipment 2, 3 and 4, the compressed mode can be activated and configured ("Compressed Mode").

User Equipment Configuration (UE)

3GPP FDD A: User Equipment1

Common Settings

State: On Mode:

Scrambling Code (hex): Scrambling Mode:

Time Delay: Chips

DPCCH Settings

Pilot 6 **TFCI** 2 **TPC** 2

<<< Hide Details

DL-UL Timing Offset: Chips Channelization Code:

Slot Format #: Use TFCI:

FBI Mode: FBI Pattern (bin):

TPC Mode: Read Out Mode:

TPC Data Source: TPC For Output Power Control: (Mis-)Use Power Step TPC: dB

DPDCH Settings

Data:

State: On Channel Power: dB

<<< Hide Details

Overall Symbol Rate: ksp/s Force Channelization Code To I / 0: On

	1	2	3	4	5	6
Channel Type	DPDCH	DPDCH	DPDCH	DPDCH	DPDCH	DPDCH
Symbol Rate / State	60	Off	Off	Off	Off	Off
Channelization Code	I / 16					
DPDCH Data Source	PN 9					
DPDCH Pattern	0					
DPDCH Data List	None					
DCCH Data Source		Channel	Coding	Off		
DCCH Pattern						
DCCH Data List						

User Equipment Configuration (UE)

HS-DPCCH Settings

HARQ-ACK (Slots) 1	PCI / CQI (Slots) 2
------------------------------	-------------------------------

State On Power dB

<<< Hide Details

Compatibility Mode

Start Delay *256 Chips MIMO Mode On

Inter TTI Distance (Interval) Subframes Secondary Cell Active On

Channelization Code Number Of Table Rows

	HARQ-ACK From Interval	HARQ-ACK To Interval	HARQ-ACK	Pow Offs HARQ-ACK /dB	PCI/CQI From Interval	PCI/CQI To Interval	CQI Type	CQI/ CQIs/ CQI1	CQI2	PCI	Pow Offs PCI/CQI /dB
0	0	1	AA/D	0.0	0	0	DTX				
1	3	3	NN/NN	0.0	1	1	Type A Dual TB	2	0	1	0.0

HARQ-ACK Repeat After Intervals PCI/CQI Repeat After Intervals

Suggested / Current ARB Seq. Length

E-DPCCH Settings

Happy Bit 1	Retrans Sequence Number 2	E-TFCI Information 7
-----------------------	-------------------------------------	--------------------------------

State On Power dB

<<< Hide Details

Retransmission Sequence Number Channelization Code

E-TFCI Information Happy Bit On

E-DPDCH Settings

Data
1280

State On

<<< Hide Details

Overall Symbol Rate Force Channelization Code To I/O On

Modulation

	1	2	3	4
Channel Type	E-DPDCH	E-DPDCH	E-DPDCH	E-DPDCH
Symbol Rate / State	480	Off	Off	Off
Channelization Code	I / 2			
Channel Power /dB	0.00			
E-DPDCH Data Source	PN 9			
E-DPDCH Pattern	0			
E-DPDCH Data List	None			

E-DCH Scheduling

E-DCH TTI

Number Of Table Rows

Schedule Repeats After TTIs

E-DCH From TTI	E-DCH To TTI
<input type="text" value="0"/>	<input type="text" value="0"/>

Scheduling List...

5.24.1 Common Settings - UE

The "Common Settings" section is where the general settings for the selected user equipment are made.

State - UE

Activates or deactivates the selected user equipment. The number of the selected user equipment is specified in the menu header.

SCPI command:

`[:SOURce<hw>] :BB:W3GPp:MSTation<st>:STATe` on page 427

Mode - UE

Selects the mode in which the user equipment is to work. The lower part of the menu will change in accordance with the mode. The following modes are available:

- "PRACH only - Standard" In this mode, the instrument generates a single physical random access channel (PRACH). This channel is needed to set up the connection between the user equipment and the base station. All the PRACH parameters can be set in the PRACH Settings section (see [chapter 5.28, "PRACH Settings - UE"](#), on page 179).
- "PRACH only - Preamble only" In this mode, the instrument only generates the preamble of a physical random access channel (PRACH). Only the PRACH preamble parameters can be set in the PRACH Settings section. This mode is needed for Test Case 8.8 TS 25.141.
- "PCPCH only - Standard" In this mode the instrument generates a single physical common packet channel (PCPCH). This channel is used to transmit packet-oriented services (e.g. SMS). The specific PCPCH parameters can be set in the PCPCH Settings section (see [chapter 5.29, "PCPCH Settings - UE"](#), on page 187).
- "PCPCH only - Preamble only" In this mode, the instrument only generates the preamble of a physical common packet channel (PCPCH). Only the PRACH preamble parameters can be set in the PCPCH Settings section. This mode is needed for Test Case 8.9 TS 25.141.

"DPCCH + DPDCH" In this mode the instrument generates a control channel (DPCCH) and up to 6 data channels (DPDCH). This mode corresponds to the standard mode of user equipment during voice and data transmission. In addition, the HS-DPCCH, E-DPCCH and E-DPDCH channels can be activated. Channel-specific parameters can be set in the section of the individual channels. The DPCCH and one DPDCH of user equipment 1 are generated in realtime (enhanced mode). Depending on the actual configurations, other channels of user equipment 1 may also be generated in realtime.

SCPI command:

`[:SOURce<hw>] :BB:W3GPp:MSTation<st>:MODE` on page 426

Scrambling Code - UE

Sets the scrambling code.

The scrambling code is used to distinguish the transmitter (UE) by transmitter-dependent scrambling. Hexadecimal values are entered. Long or short scrambling codes can be generated (see also [chapter 3.1, "Scrambling Code Generator"](#), on page 18).

SCPI command:

`[:SOURce<hw>] :BB:W3GPp:MSTation<st>:SCODE` on page 427

Scrambling Mode - UE

Sets the type of scrambling code.

With scrambling code, a distinction is made between Long and Short Scrambling Code (see also Section [Scrambling Code Generator](#)).

"Off" Disables scrambling code for test purposes.

"Long Scrambling Code" Sets the long scrambling code.

"Short Scrambling Code" (only modes "DPCCH + DPDCH" and "PCPCH only") Sets short scrambling code. The short scrambling code is only standardized for DPCCH and DPDCH channels. But it can also be generated for the PCPCH channel for test purposes.

SCPI command:

`[:SOURce<hw>] :BB:W3GPp:MSTation<st>:SCODE:MODE` on page 427

Time Delay - UE

Enters the time delay of the signal of the selected user equipment compared to the signal of user equipment 1.

SCPI command:

`[:SOURce<hw>] :BB:W3GPp:MSTation<st>:TDElay` on page 427

Compressed Mode - UE

(This feature is available for UE 2...4 and "DPCCH+DPDCH" Mode only.)

Opens the "Compressed Mode" dialog, see [chapter 5.8, "Compressed Mode"](#), on page 87.

SCPI command:
n.a.

UL-DTX - UE

(for instruments equipped with option R&S SMx/AMU-K45 and -K59, UE 1 and DPCCH+DPDCH Mode only)

Opens the dialog for configuring the uplink discontinuous transmission (UL-DTX) settings.

The menu is described in [chapter 5.27, "UL-DTX - UE"](#), on page 173.

SCPI command:
n.a.

Dynamic Power Control - UE

(for UE 1 and DPCCH+DPDCH Mode only)

(not for R&S WinIQSIM2)

Opens the dialog for configuring the Dynamic Power Control settings.

The dialog is described in [chapter 5.26, "Dynamic Power Control - UE"](#), on page 168.

SCPI command:
n.a.

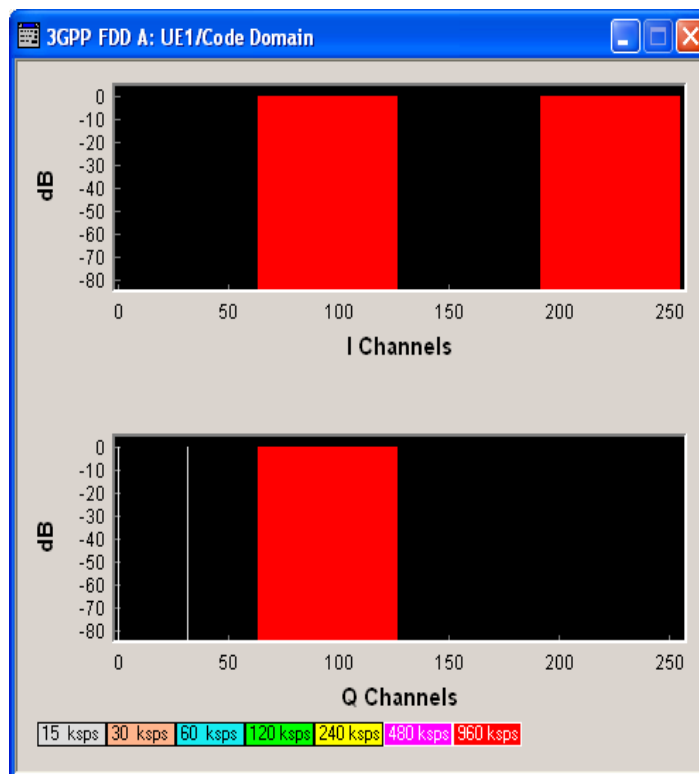
5.25 Code Domain Graph - UE

The button "Code Domain" above the channel table calls a graphical display of the assigned code domain.

Code Domain ... - UE

Opens the code domain display to visually check the signal.

The "Code Domain" display indicates the assigned code domain. The channelization code is plotted at the X axis; the colored bars indicate coherent code channels. The colors are assigned to fixed symbol rates; the allocation is shown below the graph. The relative power can be taken from the height of the bar. The symbols on so-called I- and Q-branches are spread independently. The channelization codes are fixed for the channels.



It is possible to determine from this display whether the settings made have resulted in a code domain conflict, that is to say, whether the code domains of the active channels intersect. A code domain conflict is indicated by overlapping bars. It may occur only when switch "Force Channelization Code to I/Q" is activated.

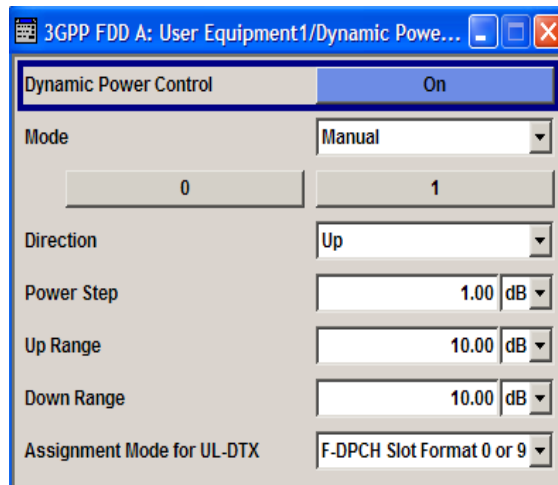
SCPI command:

n.a.

5.26 Dynamic Power Control - UE

This dialog is not available for R&S WinIQSIM2.

In the "Dynamic Power Control" dialog, the power of the enhanced channels can be increased or decreased within the predefined dynamic range ("Up Range" + "Down Range") and with the predefined step size ("Power Step") with an external, internal or manual control signal.



Dynamic Power Control State

Activates or deactivates the "Dynamic Power Control".

With activated "Dynamic Power Control" the power of the enhanced channels can be increased or decreased within the predefined dynamic range ("Up Range" + "Down Range") and with the predefined step size ("Power Step") with an external control signal. The external control signal has to be supplied via the LEVATT input of the AUX I/O connector.

Note: The R&S SMBV does not support externally provided control signals.

SCPI command:

```
[ :SOURce<hw> ] :BB:W3GPp:MSTation [:ENHanced:DPDCh] :DPControl:STATE
on page 497
```

Mode (Dynamic Power Control)

Selects the control signal for "Dynamic Power Control".

- | | |
|------------------|---|
| "External" | (the parameter is not available for R&S SMBV)
An external control signal is used for Dynamic Power Control. The external control signal is supplied via the LEVATT input of the AUX I/O. |
| "By TPC Pattern" | The TPC pattern is used for Dynamic Power Control. This selection corresponds to selection (Mis)Use TPC for not enhanced channels. |
| "Manual" | The control signal is manually produced by pushing one of the buttons 0 or 1.
The channel power is increased or decreased depending on the Direction setting by the set power step. |

SCPI command:

```
[ :SOURce<hw> ] :BB:W3GPp:MSTation [:ENHanced:DPDCh] :DPControl:MODE
on page 496
[ :SOURce<hw> ] :BB:W3GPp:MSTation [:ENHanced:DPDCh] :DPControl:STEP:
MANual on page 497
```

Direction (Dynamic Power Control)

Selects the Dynamic Power Control mode.

"Up" A high level of the control signal leads to an increase of channel power.

"Down" A high level of the control signal leads to a decrease of channel power.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPP:MSTation [ :ENHanced:DPDCh ] :DPControl:
DIRection on page 496
```

Power Step (Dynamic Power Control)

Sets step width by which – with the "Dynamic Power Control" being switched on - the channel powers of the enhanced channels in the timeslot grid are increased or decreased within the set dynamic range ("Up Range" + "Down Range").

The start power of the channel is set in the "Channel Power" entry field of the menu.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPP:MSTation [ :ENHanced:DPDCh ] :DPControl:
STEP [ :EXTernal ] on page 497
```

Up Range/Down Range

Sets dynamic range by which – with "Dynamic Power Control" switched on – the channel powers of the enhanced channels can be increased. The resulting "Dynamic Power Control" dynamic range ("Up Range" + "Down Range") depends on the selected "Power Step" and is as follow:

- For "Power Step" < 1 dB, the dynamic range ("Up Range" + "Down Range") <= 30 dB
- For "Power Step" => 1 dB, the dynamic range ("Up Range" + "Down Range") <= 60 dB

SCPI command:

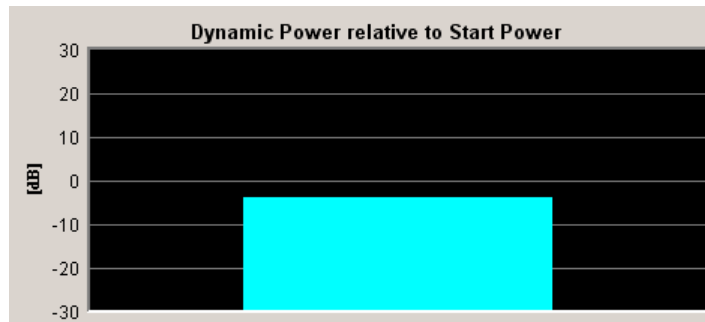
```
[ :SOURCE<hw> ] :BB:W3GPP:MSTation [ :ENHanced:DPDCh ] :DPControl:
RANGE:UP on page 496
[ :SOURCE<hw> ] :BB:W3GPP:MSTation [ :ENHanced:DPDCh ] :DPControl:
RANGE:DOWN on page 496
```

Power Control Graph

Indicates the deviation of the channel power (delta POW) from the set power start value of the enhanced channels.

The graph is automatically displayed with "Dynamic Power Control" switched on.

Note: Since a realtime update of the window in the timeslot (= 0.667 ms) is not possible for reasons of speed, an update can be performed in a more coarse time interval. Fast channel power changes are not displayed but the settled state of the control loop can be recognized very easily.



SCPI command:

```
[ :SOURCE<hw> ] :BB:W3Gpp:MStation:ENHanced:DPDCh:DPControl[:POWER]  
on page 496
```

Assignment Mode for UL-DTX

The parameter is enabled only for activated [UL-DTX State](#).

The power control recognizes the UL-DPCCH gaps according to 3GPP TS 25.214. Some of the TPC commands sent to the instrument over the external line (LEVATT connector) or by the TPC pattern are ignored, whereas others are summed up and applied later. The processing of the TPC commands depends only on whether the BS sends the TPC bits on the F-DPCH with slot format 0/ slot format 9 (i.e. during the first 512 chips of the downlink slot) or not. It is not necessary to distinguish between the cases „DL-DPCH“ and „F-DPCH Slot Format different than 9 and 0“, as in both of these cases the downlink TPC commands would be sent (to a real UE via the air interface) later than in the first 512 chips of the downlink slot, and thus the treatment of the TPC commands by the UE is identical.

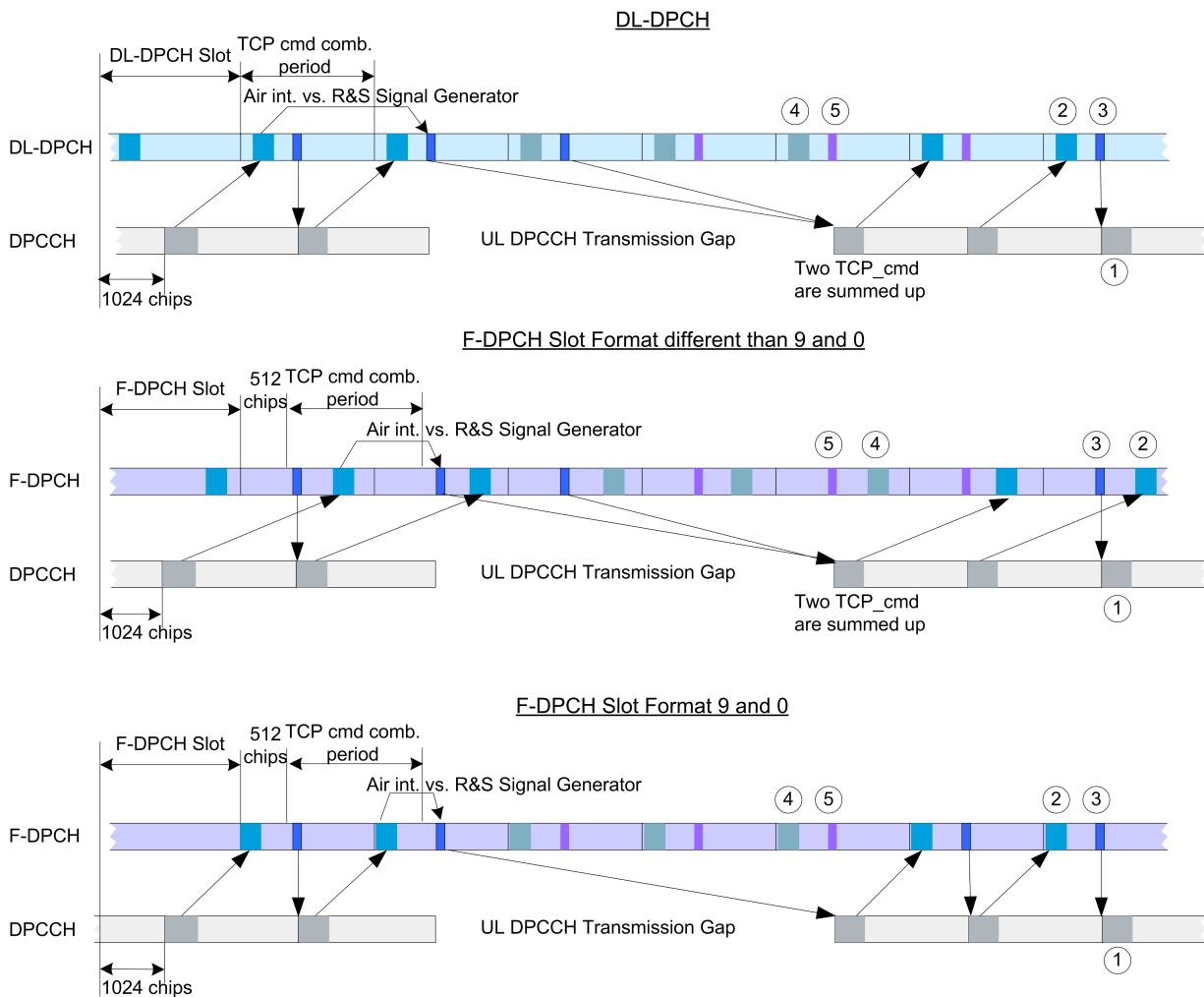


Fig. 5-18: Timing Diagram - Power Control with UL-DTX

- 1 = Uplink Pilot
- 2 = TPC bits via air interface
- 3 = TPC command via binary feedback
- 4 = No need to send TPC bits via air interface; UE ignores any TPC bits
- 5 = No need to send TPC commands via binary feedback line; R&S Signal Generator ignores any TPC commands

The feedback sent to the R&S Signal Generator corresponds to the parameter „TCP_cmd“ defined in the 3GPP standard. It represents the TPC information of the last (already completed) „TPC command combining period“, even if the TPC information of the ongoing „TPC command combining period“ is already known by the BS prior to the feedback transmission over the binary feedback line (see figure).

The binary feedback at the LEVATT connector has to be stable at least between 0.1 ms before and after the UL DPCCH slot boundary.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3Gpp:MStation [ :ENHanced:DPDCh ] :DPControl:
ASSignment on page 495
```

5.27 UL-DTX - UE



UL-DTX settings are available only for instruments equipped with option R&S SMx/AMU-K45 and -K59.

Uplink discontinuous transmission (UL DTX) is one of the features of the Continuous Packet Connectivity (CPC) provided to reduce the uplink control channel overhead. UL DTX allows the UE to stop transmission of uplink DPCCH in case there is no transmission activity on E-DCH or HS-DPCCH. This is sometimes also called uplink DPCCH gating.

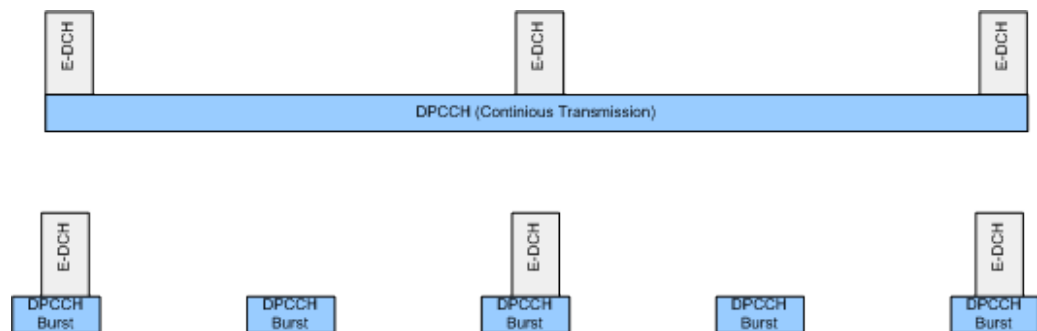


Fig. 5-19: Principle of UL-DTX

Uplink DPCCH is not transmitted continuously any more, but it is transmitted from time to time according to a known activity pattern (UE-DTX cycle). This regular activity is needed in order to maintain synchronization and power control loop. Gating is only active if there is no uplink data transmission on E-DCH or HS-DPCCH transmission ongoing. In case E-DCH or HS-DPCCH is used, the uplink DPCCH is transmitted in parallel.

The 3GPP specifications defines two patterns that can be applied to adapt the DTX cycle to the traffic conditions, the UE-DTX cycle 1 and the UE-DTX cycle 2 (see [example "Configuring the instrument to generate an UL DPCCH DTX signal"](#) on page 175). The UE-DTX cycle 1 is applied depending on the duration of E-DCH inactivity; the UE-DTX cycle 2 has less frequent DPCCH transmission instants and is applied whenever there is no uplink data transmission. The switching from UE-DTX cycle 1 to UE-DTX cycle 2 is determined by a configurable period of inactivity.

The transmission of control signaling on the HS-DPCCH is not affected by the UL-DTX pattern. With enabled UL-DTX, the HARQ-ACK messages and the CQI reporting remains unchanged and the UE transmits acknowledgment according to the HARQ-ACK pattern, regardless of the UL-DTX cycle. Transmission of control signals does not cause switching from UE-DTX cycle 2 to UE-DTX cycle 1.

A preamble and postamble are added to the DPCCH burst for synchronisation reasons. The length of the uplink DPCCH preamble and postamble depend whether the DPCCH burst transmission is caused by user-data transmission on the E-DCH or control signaling on the HS-DPCCH.

- for the E-DCH transmission

During the UE-DTX cycle 1, the DPCCH transmission starts two slots prior to the start of E-DPDCH and terminates one slot after it. For the UE-DTX cycle 2, an extended preamble of up to 15 slots is applied.

- for the HS-DPCCH transmission
The preamble length depends whether an HARQ-ACK or CQI report is transmitted. Two slots are applied for the HARQ-ACK case (unless an HARQ preamble PRE is transmitted) and three in case of CQI reporting. For the latter case, an extended preamble may be applied too.
The DPCCH transmission terminates at the end of the first full DPCCH slot after the end of the HARQ-ACK/CQI field.



Use the [Scheduling List](#) to display the UL-DTX burst pattern and transmissions of E-DCH and HS-DPCCH, as well as the impact on the UL-DPCCH transmissions.

User Interface

The "UE1 > UL-DTX" dialog is available for UE1 and DPCCH+DPDCH mode and is used to adjust the UL-DTX settings.

The provided UL-DTX functionality is fully compliant with 3GPP TS 25.214. All dependencies from E-DCH transmissions, HARQ-ACK transmissions or CQI transmissions on the DPCCH are respected.

The dialog provides the settings necessary to configure the start offset, the threshold time for switching to UE-DTX cycle 2 and the DPCCH activity patterns for both UE-DTX cycle 1 and 2. It is possible to determine the frequentness of the DPCCH bursts, the DPCCH

bursts length (without pre- and postamble) and to configure the length of the longer preamble for the UE-DTX cycle 2.



In the R&S Signal Generator, the signal generation starts with UE-DTX cycle 2. To trigger a switching to a UE-DTX cycle 1, activate the channel(s) E-DPCCH/E-DPDCH and configure the "E-DCH Scheduling" parameters.

Example: Configuring the instrument to generate an UL DPCCH DTX signal

- Select "UE1 > UL-DTX" and configure the settings as follow:

Table 5-13: UL-DTX Settings

Parameter	Value
E-DCH TTI	2 ms
Offset - UL-DTX	2 Subframes
Inactivity Threshold for Cycle 2	8 TTIs
Long Preamble Length	4 Slots
DTX Cycle 1 / DTX Cycle 2	4 Subframes and 8 Subframes respectively
DPCCH Burst Length 1 / DPCCH Burst Length 2	1 Subframes (3 Slots)
UL-DTX State	On

- The figure below shows the generated UL DPCCH DTX bursts pattern. In this implementation the signal generation starts with UE-DTX cycle 2. The UL DPCCH DTX burst pattern is offset with 2 subframes, the burst are 6 slots long (2 slots Preamble + 3 slots DPCCH Burst Length 2 + 1 slot postamble) and are generated every 8 subframe.

- Use the [Scheduling List](#) to display the configured bust pattern.

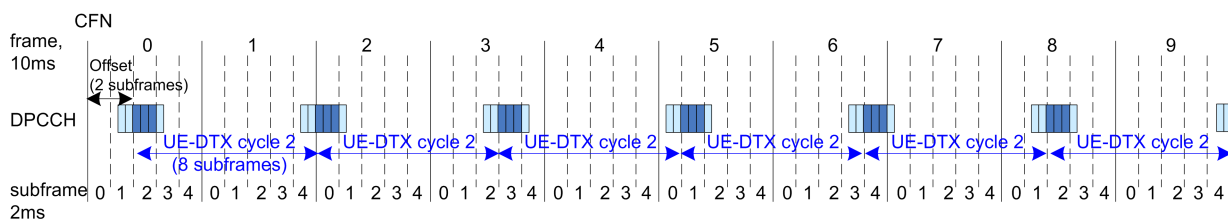


Fig. 5-20: Example for UL DPCCH DTX burst pattern as generated by the R&S Signal Generator (E-DCH TTI=2ms, beginning at CFN0, UE_DTX_DRX_Offset=2, DTX Cycle 2=8 subframes)

- Configure the "UE1 > E-DCH Scheduling Settings" as follow:

Parameter	Value
Number of Table Rows	1
E-DCH Schedule Repeats After	24 TTIs

Parameter	Value
E-DCH TTI From	10
E-DCH TTI To	10

- Select "UE1 > E-DPDCH Settings > State" to On to enable the generation of E-DPDCH.
The "UE1 > Scheduling List" shows the updated UL DPCCH DTX bursts pattern (see also figure below).

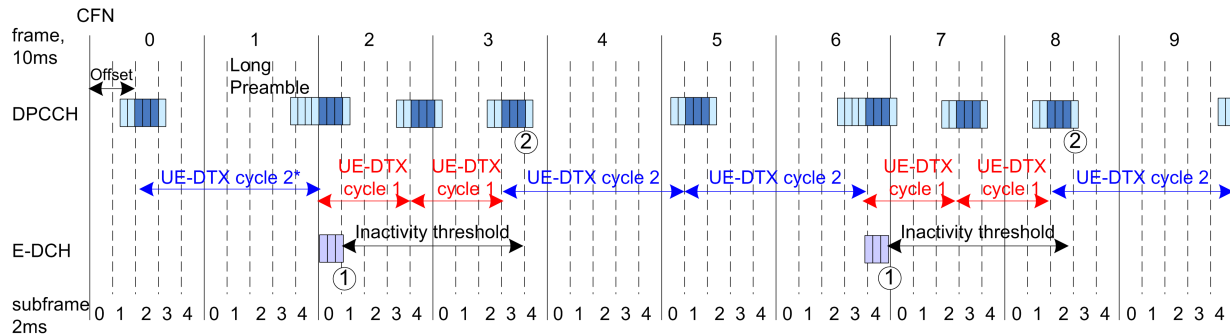


Fig. 5-21: Example for UL DPCCH DTX burst pattern in case of E-DCH transmission

- 1 = Cycle 2 to Cycle 1 switch after E-DCH transmission
- 2 = Cycle 1 to Cycle 2 switch when the inactivity timer expires
- *) = In the R&S Signal Generator, the signal generation starts with UE-DTX cycle 2.

- Configure the "UE1 > HS-DPCCH Settings" as follow:

Table 5-14: HS-DPCCH Settings

Parameter	Value
Compatibility Mode (HS-DPCCH)	Release 8 and Later RT
Inter TTI Distance (Interval)	1 subframe
HARQ-ACK From Interval/ HARQ-ACK To Interval	20 / 20
HARQ-ACK (HS-DPCCH)	A
PCI-CQI From Interval/ PCI-CQI To Interval	2 / 2
CQI Type	CQI
HARQ-ACK Repeat After	40 intervals
PCI/CQI Repeat After	40 intervals

- Select "UE1 > HS-DPCCH Settings > State" to On to enable the transmission of control signaling.
The figure below shows the generated UL DPCCH DTX bursts pattern.

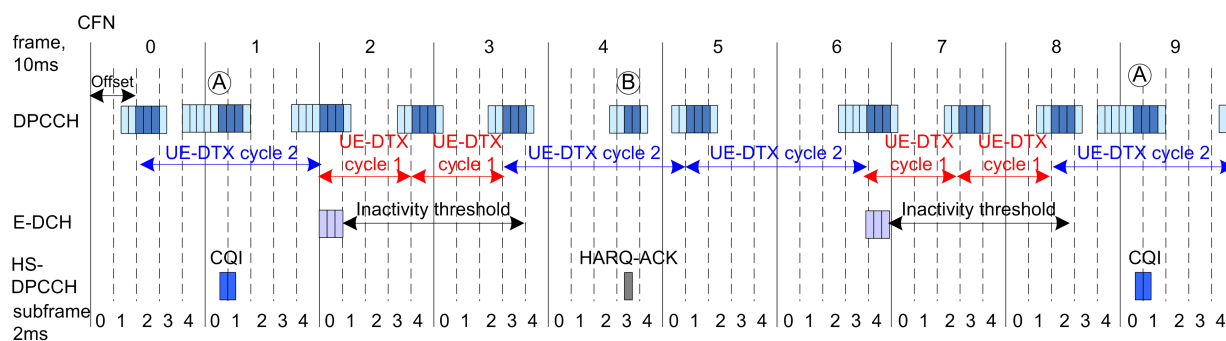


Fig. 5-22: Example for UL DPCCH DTX burst pattern in case of E-DCH and HS-DPCCH transmissions

A = DPCCH burst caused by the transmission of a CQI report

B = DPCCH burst caused by the transmission of a HARQ-ACK message

Although there is an HS-DPCCH transmission, the UE does not switch from UE-DTX cycle 2 to UE-DTX cycle 1.

UL-DTX State

Enables/disables uplink discontinuous transmission (UL-DTX), i.e. uplink DPCCH gating. Enabling the UL-DTX deactivates the DPDCH and the HSUPA FRC.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:MSTation:UDTX:STATE` on page 492

Scheduling

This section comprise the common settings for both UE-DTX cycles.

E-DCH TTI ← Scheduling

Sets the duration of a E-DCH TTI.

By enabled UL-DTX, the value configured with this parameter sets the value for the parameter "E-DCH TTI" in the "UE1 > E-DCH Scheduling" dialog.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:MSTation:UDTX:TTIEdch` on page 492

Offset - UL-DTX ← Scheduling

Sets the parameter `UE_DTX_DRX_Offset` and determines the start offset in subframes of the first uplink DPCCH burst (after the preamble). The offset is applied only for bursts belonging to the DPCCH burst pattern; HS-DPCCH or E-DCH transmissions are not affected.

The parameter `UE_DTX_DRX_Offset` is used to calculate the first subframe in each UL DPCCH burst pattern.

- for DTX Cycle 1:
 $(5 * CFN - UE_DTX_DRX_Offset + Subframe\#) \text{ MOD } UE_DTX_Cycle_1 = 0$
- for DTX Cycle 2:
 $(5 * CFN - UE_DTX_DRX_Offset + Subframe\#) \text{ MOD } UE_DTX_Cycle_2 = 0$

The offset is used to shift the DPCCH burst pattern of the different UEs so that they have the DPCCH transmission phase in their DTX cycles at different times.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:MSTation:UDTX:OFFSet` on page 492

Inactivity Threshold for Cycle 2 ← Scheduling

Defines the number of consecutive E-DCH TTIs without an E-DCH transmission, after which the UE shall immediately move from UE-DTX cycle 1 to using UE-DTX cycle 2 (see [figure 5-21](#)).

Note: In the R&S Signal Generator, the signal generation starts with UE-DTX cycle 2. To trigger a switching to a UE-DTX cycle 1, activate the channel(s) E-DPCCH/E-DPDCH and configure the "[E-DCH Scheduling](#)" parameters.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:MSTation:UDTX:ITHReshold` on page 492

Long Preamble Length ← Scheduling

Determines the length in slots of the preamble associated with the UE-DTX cycle 2.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:MSTation:UDTX:LPLength` on page 493

Cycle 1 / Cycle 2 Configuration

Comprises the settings for configuring the frequentness of the DPCCH bursts and the DPCCH bursts length (without pre- and postamble).

DTX Cycle 1 / DTX Cycle 2 ← Cycle 1 / Cycle 2 Configuration

Sets the offset in subframe between two consecutive DPCCH bursts within the corresponding UE-DTX cycle, i.e. determines how often the DPCCH bursts are transmitted (see [figure 5-21](#)).

The UE-DTX cycle 2 is an integer multiple of the UE-DTX cycle 1, i.e. has less frequent DPCCH transmission instants.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:MSTation:UDTX:CYCLE<ch>` on page 493

DPCCH Burst Length 1 / DPCCH Burst Length 2 ← Cycle 1 / Cycle 2 Configuration

Determines the uplink DPCCH burst length in subframes without the preamble and postamble, when the corresponding UE-DTX cycle is applied.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:MSTation:UDTX:BURSt<ch>` on page 493

Preamble Length 1 / Preamble Length 2 ← Cycle 1 / Cycle 2 Configuration

Displays the preamble length in slots, when the corresponding UE-DTX cycle is applied.

The preamble length is fixed to 2 slots.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:MSTation:UDTX:PREamble<ch>` on page 494

Postamble Length 1 / Postamble Length 2 ← Cycle 1 / Cycle 2 Configuration

Displays the postamble length in slots, when the corresponding UE-DTX cycle is applied.

The postamble length is fixed to 1 slot.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPP:MSTation:UDTX:POSTamble<ch>` on page 494

5.28 PRACH Settings - UE

The "PRACH Settings" section is where the settings are made for the PRACH channel. This section is only available when "PRACH only" mode is activated.

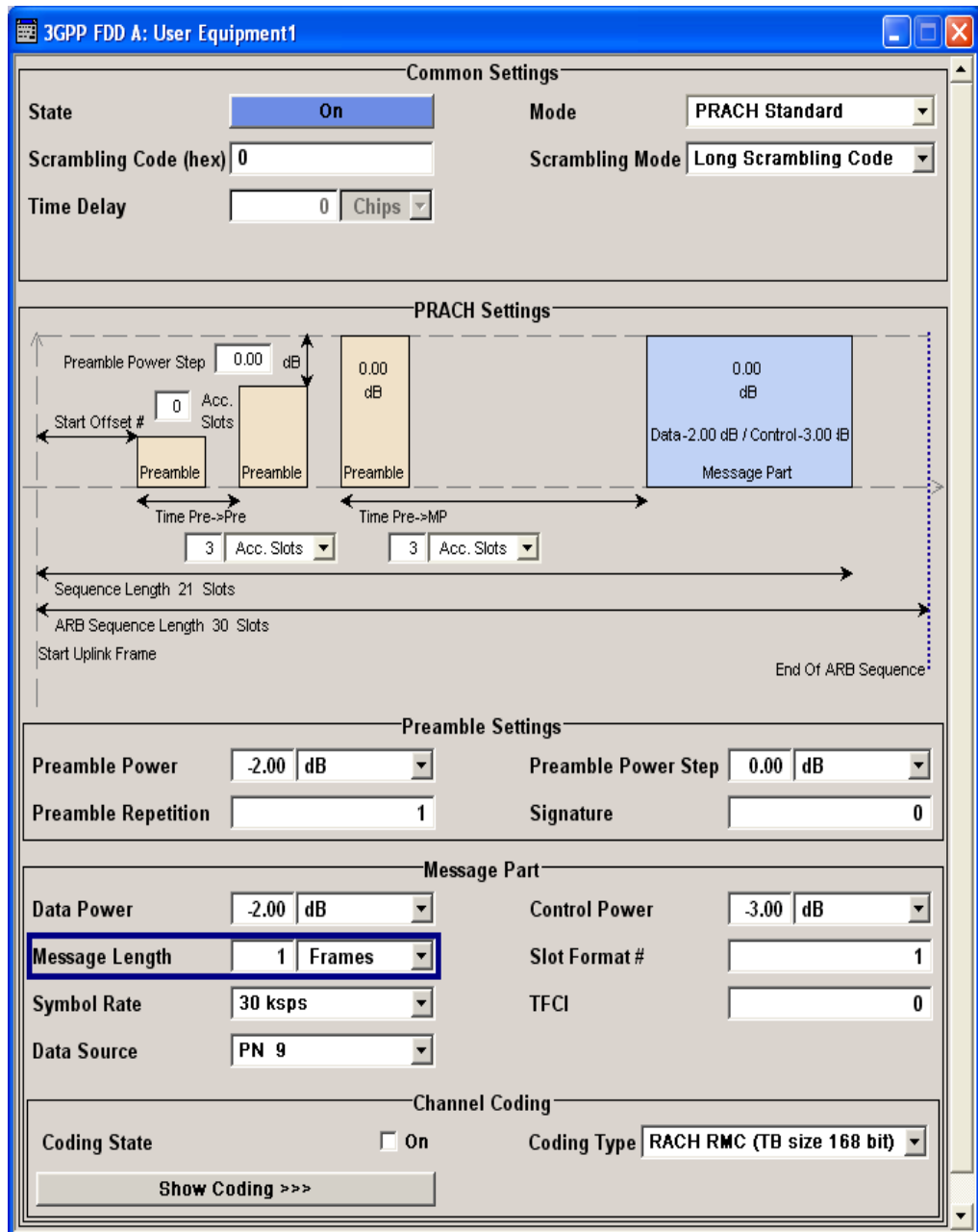
In "Standard" mode, the instrument generates a single physical random access channel (PRACH). This channel is needed to set up the connection between the user equipment and the base station.

In "Preamble only" mode, the instrument only generates the preamble of a physical random access channel (PRACH). This mode is needed for Test Case 8.8 TS 25.141.

When the selection is "PRACH only" - "Standard", all the parameters described below are available, when the selection is "PRACH only" - "Preamble only", only the preamble parameters are available.

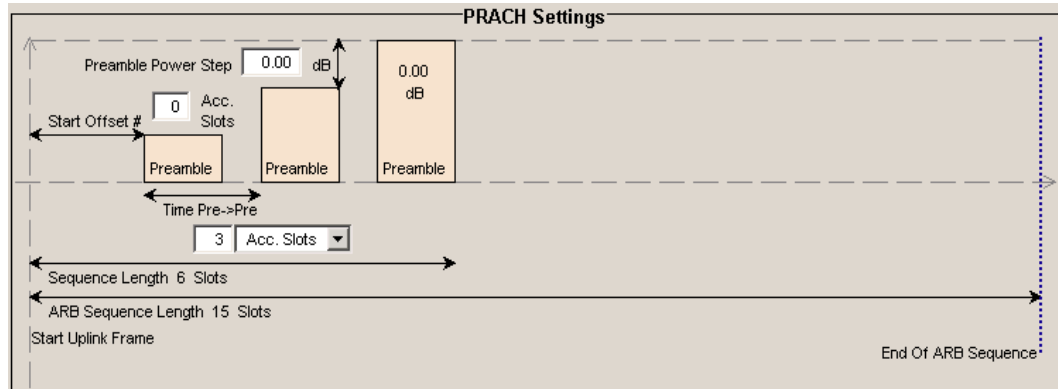
The menu section is subdivided into the graphical display of the PRACH including the timing parameters and the "Preamble Settings" and "Message Part" sections, in which the settings are made for the preamble and for the data part of the channel. Some settings are made directly in the input fields of the graphical display.

In the "Channel Coding" section channel coding can be activated.

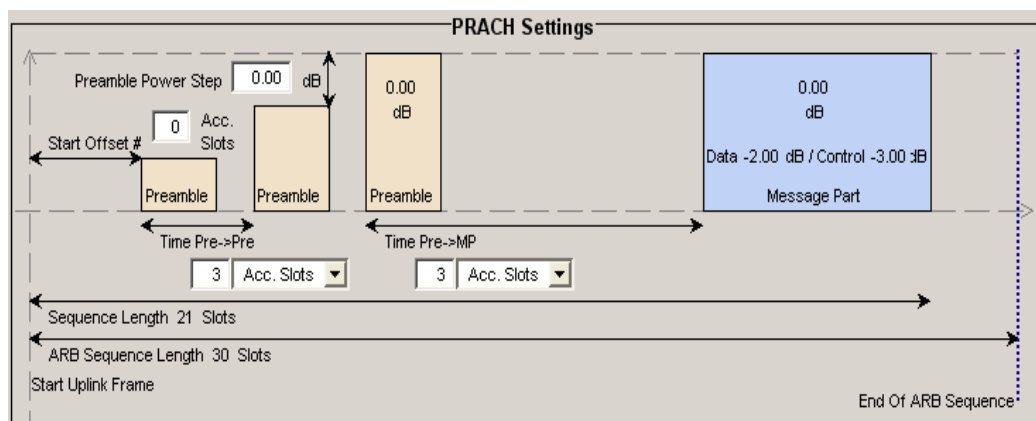


The graphical display shows either the complete PRACH including the message part or only the preamble depending on the selected mode.

Display for PRACH - Preamble-only mode



Display for PRACH - Standard mode



Some of the parameter values can be input directly in the input fields of the graphical display. However, the display of some parameters do not correspond to their real settings (e.g. the number of preambles). They are shown as an example to explain the parameter function. An exception are the indicated sequence period and the power correction values, they match the real settings. This allows the user to check if the sequence period fits into the set ARB sequence length. The power correction values can be used to calculate the correct settings for the desired RF level.

The graphic indicates the correction value for the last preamble before the message part (indication in the preamble block and the correction values for the message part overall and separately for data and control part (indications in the message part block). The power of the other preambles can be calculated by subtracting the set "Preamble Power Step".

For one active UE, the RF power of the message part is calculated by adding the set RF level to the correction value, if the "Level Reference" is set to "RMS Power".

Example:

Level = 5 dBm

Δ PowMP = 2,3 dB

The message part power is 7,3 dBm

5.28.1 Graphical Display**Delta Power - Preamble - PRACH UE**

Indication of the level correction value for the last preamble before the message part.

The level of the other preambles can be calculated by subtracting the set "Preamble Power Step".

SCPI command:

[\[:SOURCE<hw>\]:BB:W3GPp:MSTation<st>:PRACH:TIMing:DPOWer:PREamble](#)
on page 472

Delta Power - Message Part - PRACH UE

Indication of the level correction value for the message part.

In addition to the total value of the message part power, the power offsets of the data and control part are indicated separately. The indication of the total value is important for measurements where just the envelope of the signal is of interest whereas the separate indication is useful for receiver tests.

In case of one UE active, the power of the message part can be calculated by adding the set RF level, if the "Level Reference" is set to "RMS Power".

Example:

"Level" = 5 dBm + " Δ PowMP" = 2,3 dB = 7,3 dBm.

SCPI command:

[\[:SOURCE<hw>\]:BB:W3GPp:MSTation<st>:PRACH:TIMing:DPOWer:MPART](#)
on page 471

[\[:SOURCE<hw>\]:BB:W3GPp:MSTation<st>:PRACH:TIMing:DPOWer:MPART:](#)
[DATA](#) on page 472

[\[:SOURCE<hw>\]:BB:W3GPp:MSTation<st>:PRACH:TIMing:DPOWer:MPART:](#)
[CONTrol](#) on page 472

Start Offset - PRACH UE

Enters the start offset of the PRACH in access slots or slots.

The starting time delay in timeslots is calculated according to:

2 x Start Offset #

SCPI command:

[\[:SOURCE<hw>\]:BB:W3GPp:MSTation<st>:PRACH:TIMing:SOFFset](#)
on page 473

Time Pre->Pre - PRACH UE

Enters the time difference between two successive preambles in access slots.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPP:MSTation<st>:PRACH:TIMing:TIME:PREPre
```

on page 473

Time Pre->MP - PRACH UE

Enters the time difference between the last preamble and the message part in access slots.

Two modes are defined in the standard. In mode 0, the preamble to message part difference is 3 access slots, in mode 1 it is 4 access slots.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPP:MSTation<st>:PRACH:TIMing:TIME:PREMp
```

on page 473

Sequence Length - PRACH UE

Indication of the sequence length.

This indication allows the user to check if the sequence period fits into the set ARB sequence length.

- In "PRACH only - Preamble" mode, the sequence period is defined by settings Start Offset, Time Pre - Pre and Preamble Repetition:
Sequence Length = Start Offset (Slots) + Preamble Repetition x Time Pre->Pre

Example:

Start Offset = 2 Access Slots = 4 Slots

Preamble Repetition = 3

Time Pre->Pre = 3 Access Slots = 6 Slots

Sequence Length = 4 Slots + 3 x 6 Slots = 22 Slots

- In "PRACH only - Standard" mode, the sequence period is defined by settings "Start Offset", "Time Pre->Pre", "Message Part Length" and "Preamble Repetition":
Sequence Length = Start Offset (Slots) + (Preamble Repetition -) x Time Pre->Pre + Time Pre->MP + 15 x Message Part Length (Frames)

Example:

Start Offset = 2 Access Slots = 4 Slots

Preamble Repetition = 3

Time Pre->Pre = Time Pre->MP = 3 Access Slots = 6 Slots

Message Part Length = 2 Frames

Sequence Length = 4 Slots + 2 x 6 Slots + 6 Slots + 15 x 2 = 52 Slots

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPP:MSTation<st>:PRACH:TIMing:SPERiod
```

on page 473

ARB Sequence Length - PRACH UE

Indication of the ARB sequence length.

This indication allows the user to check if the sequence period fits into the set ARB sequence length.

SCPI command:

[\[:SOURCE<hw>\]:BB:W3GPp:SLENgth](#) on page 331

5.28.2 Preamble Settings**Preamble Power - PRACH UE**

Sets the power of the preamble component of the PRACH channel.

SCPI command:

[\[:SOURCE<hw>\]:BB:W3GPp:MSTation<st>:PRACH:PPOWer](#) on page 469

Preamble Power Step - PRACH UE

Sets the power by which the preamble is increased from repetition to repetition. The power set under Preamble Power is the "target power", used during the last repetition of the preamble.

Example:

"Preamble Power" = 0 dB

"Preamble Repetition" =3

"Preamble Power Step" = 3 dB

Generated power sequence:

Preamble 1 -6 dB	→ + 3 dB	Preamble 2 -3 dB	→ + 3 dB	Preamble 3 0 dB
---------------------	----------	---------------------	----------	--------------------

SCPI command:

[\[:SOURCE<hw>\]:BB:W3GPp:MSTation<st>:PRACH:PPOWer:STEP](#) on page 470

Preamble Repetition - PRACH UE

Sets the preamble count.

SCPI command:

[\[:SOURCE<hw>\]:BB:W3GPp:MSTation<st>:PRACH:PREPetition](#) on page 470

Signature - PRACH UE

Selects the signature to be used for the PRACH channel.

The signature defines the code domain for the channelization code being used. 16 fixed bit patterns are defined.

SCPI command:

[\[:SOURCE<hw>\]:BB:W3GPp:MSTation<st>:PRACH:SIGNature](#) on page 470

5.28.3 Message Part

The "Message Part" section is where the settings for the data part of the PRACH are available. This section is only available when "PRACH only - Standard" is selected.

Data Power - PRACH UE

Sets the power of the data component of the PRACH channel.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPP:MSTation<st>:PRACH:DPOWER` on page 469

Control Power - PRACH UE

Sets the power of the control component of the PRACH channel.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPP:MSTation<st>:PRACH:CPOWER` on page 467

Message Length - PRACH UE

Sets the length of the message component of the PRACH channel in frames.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPP:MSTation<st>:PRACH:MLENGTH` on page 469

Slot Format - PRACH UE

Selects the slot format.

Slot formats 0 to 3 are available for the PRACH channel. The slot format defines the symbol rate of the message component.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPP:MSTation<st>:PRACH:SFORMAT` on page 470

Symbol Rate - PRACH UE

Sets the symbol rate of the PRACH channel.

The symbol rate is determined by the slot format set. A change in the symbol rate leads automatically to an adjustment of the slot format.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPP:MSTation<st>:PRACH:SRATE` on page 471

TFCI - PRACH UE

Enters the value of the TFCI field (Transport Format Combination Indicator) in the control component of the PRACH channel.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPP:MSTation<st>:PRACH:TFCI` on page 471

Data Source - PRACH UE

Selects the data source for the data component of the PRACH channel.

The following data sources are available for selection

- | | |
|---------------|--|
| "All 0, All1" | 0 data and 1 data is generated internally. |
| "PN xx" | PRBS data as per CCITT with period lengths between 2^9-1 and $2^{23}-1$ is generated internally. |

"Pattern"	A user-definable bit pattern with a maximum length of 64 bits is generated internally. The bit pattern is defined in the "Data Pattern" entry field.
"Data List, Select Data List"	Internal data from a programmable data list generated with the Data Editor or externally, is used. Data lists are selected in the "File Select" window, which is called by means of the "Select Data List" button. The "File Manager" is used to transmit external data lists to the R&S Signal Generator, and can be called within every File Select window by means of the "File Manager" button.

SCPI command:

[\[:SOURCE<hw>\]:BB:W3GPp:MSTation<st>:PRACH:DATA](#) on page 468

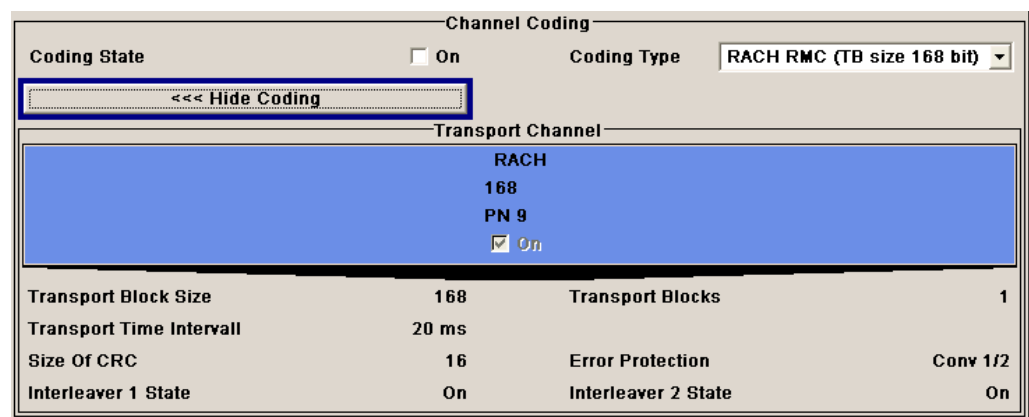
[\[:SOURCE<hw>\]:BB:W3GPp:MSTation<st>:PRACH:DATA:PATtern](#) on page 468

[\[:SOURCE<hw>\]:BB:W3GPp:MSTation<st>:PRACH:DATA:DSElect](#) on page 468

5.28.4 Channel Coding State

The "Channel Coding" section is where the channel coding for the PRACH channel is activated and deactivated and the coding type is defined. Use "Show Coding" to display the fixed settings for the channel coding parameters.

Channel coding of PRACH is possible for all UEs.



Channel Coding			
Coding State	<input type="checkbox"/> On	Coding Type	RACH RMC (TB size 168 bit)
<<< Hide Coding			
Transport Channel			
RACH			
168			
PN 9			
<input checked="" type="checkbox"/> On			
Transport Block Size	168	Transport Blocks	1
Transport Time Interval	20 ms		
Size Of CRC	16	Error Protection	Conv 1/2
Interleaver 1 State	On	Interleaver 2 State	On

Channel Coding State - PRACH UE

Activates or deactivates channel coding for the PRACH channel.

When On, the "Message Part Length" automatically is set to 2. It cannot be changed.

SCPI command:

[\[:SOURCE<hw>\]:BB:W3GPp:MSTation<st>:ENHanced:PRACH:CCODing:STATe](#) on page 509

Channel Coding Type - PRACH UE

Selects the predefined reference measurement channel coding types for the PRACH channel.

"RACH RMC (TB size 168 bit)" Reference Measurements Channel Coding with transport block size of 168 bit.

"RACH RMC (TB size 360 bit)" Reference Measurements Channel Coding with transport block size of 360 bit.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPP:MSTation<st>:ENHanced:PRACH:CCODing:TYPE`
on page 509

Show Coding - PRACH UE

Calls the menu for displaying the channel coding settings. The reference measurement channel parameters are set to fixed values.

Remote-control command: n.a.

The following parameters are displayed:

"Data Source" The data source is displayed in the transport channel graphical display.

"Transport Block Size" Size of the transport block at the channel coding input.

"Transport Block" Transport block count.

"Transport Time Interval" Number of frames into which a TCH is divided.

"Size of CRC" CRC type (length).

"Error Protection" Error protection.

"Interleaver 1 / 2 State" Channel coding interleaver state

SCPI command:
n.a.

5.29 PCPCH Settings - UE

The "PCPCH Settings" section is where the settings are made for the PCPCH channel. This section is only available when "PCPCH only" mode is activated.

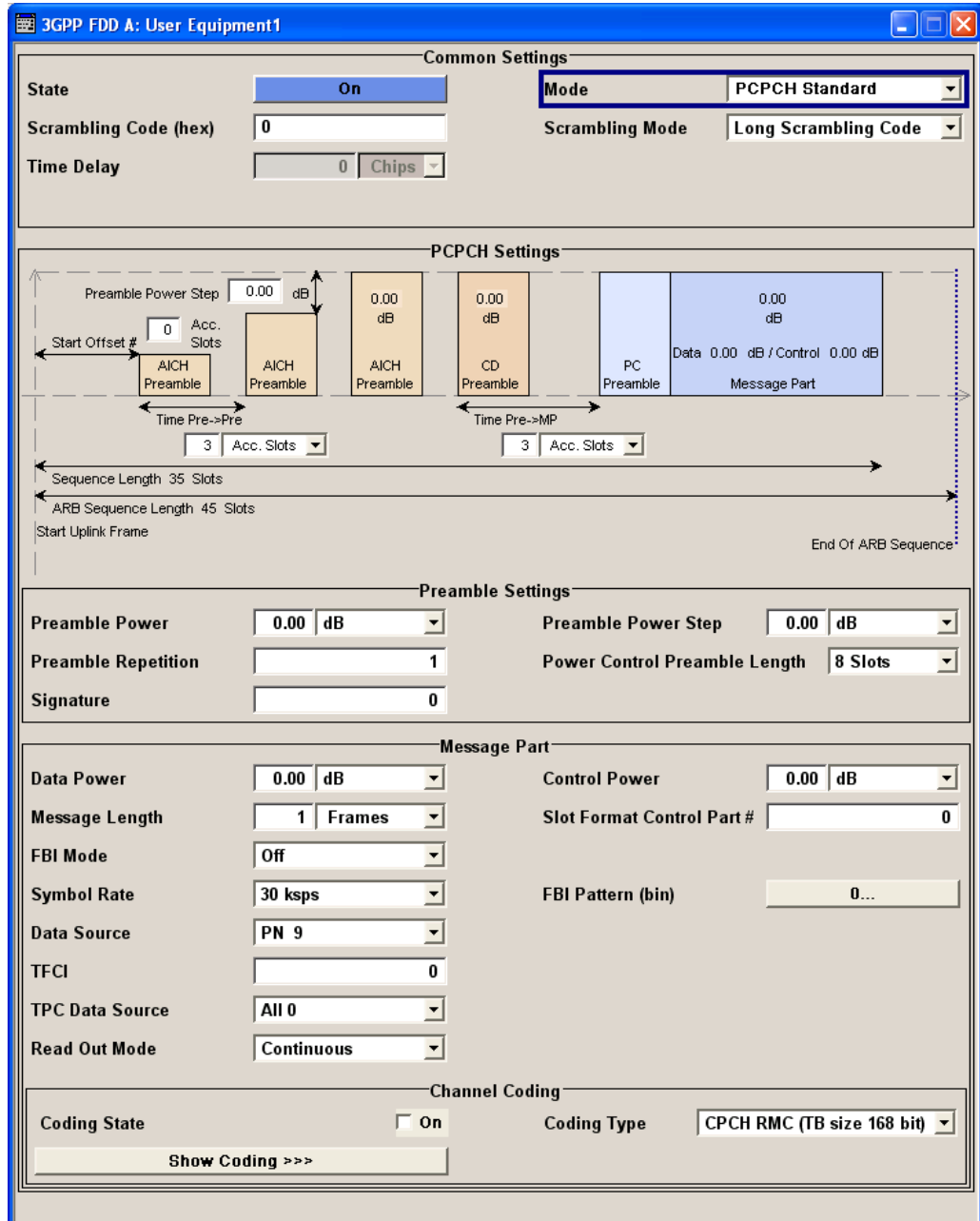
In "Standard" mode, the instrument generates a single physical common packet channel (PCPCH). This channel is used to transmit packet-oriented services (e.g. SMS).

In "Preamble only" mode, the instrument only generates the preamble of a physical common packet channel (PCPCH). This mode is needed for Test Case 8.9 TS 25.141.

When the selection is "PCPCH only - Standard", all the parameters described below are available, when the selection is "PCPCH only - Preamble only", only the preamble parameters are available.

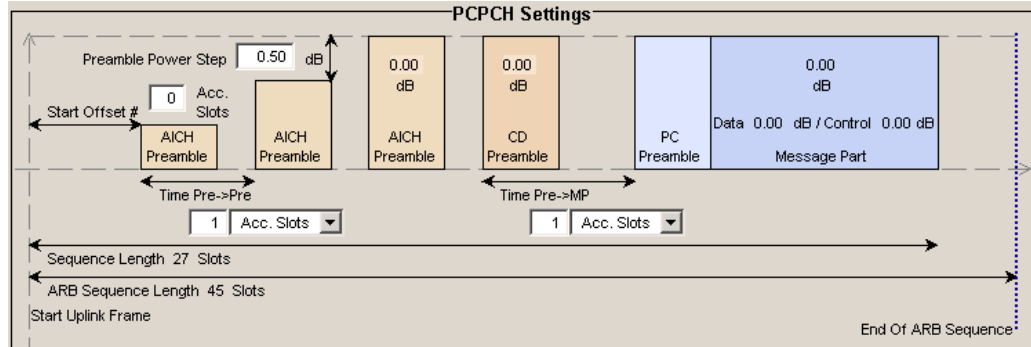
The menu section is subdivided into the graphical display of the PCPCH including the timing parameters and the "Preamble Settings" and "Message Part" sections, in which the settings are made for the preamble and for the data part of the channel. Some settings are made directly in the input fields of the graphical display.

The "Channel Coding" section for activating channel coding is available for UE1.

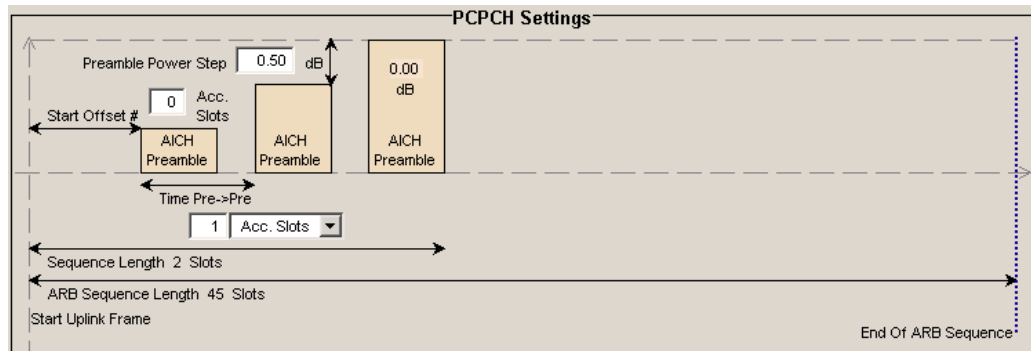


The graphical display shows either the complete PCPCH including the message part or only the preamble depending on the selected mode.

Display for PCPCH - Standard mode



Display for PCPCH - Preamble-only mode



Some of the parameter values can be input directly in the input fields of the graphical display. However, the display of some parameters do not correspond to their real settings (e.g. the number of preambles). They are shown as an example to explain the parameter function. An exception are the indicated sequence lengths and the power correction values, they match the real settings. This allows the user to check if the sequence period fits into the set ARB sequence length. The power correction values can be used to calculate the correct settings for the desired RF level.

The graphic indicates the correction value for the last AICH preamble before the message part and the CD Preamble (indication in the AICH and CD Preamble block. These two values are identical. The power of the other preambles can be calculated by subtracting the set "Preamble Power Step". It also indicates the power correction value of the message part (indication in the message part block).

For one active UE, the RF power of the message part is calculated by adding the set RF level to the correction value. Note that the "Level Reference" is always "RMS Power" for PCPCH.

Example:

"Level" = 5 dBm

" Δ PowMP" = 2,3 dB

The message part power is 7,3 dBm

5.29.1 Graphical Display

Delta Power - Preamble - PCPCH UE

Indication of the level correction value for the last AICH preamble before the message part. This value is identical to the correction value for the CD preamble.

The level of the other preambles can be calculated by subtracting the set Preamble Power Step.

SCPI command:

`[:SOURce<hw>] :BB:W3GPp:MSTation<st>:PCPCh:TIMing:DPOWer:PREamble`
on page 463

Delta Power - Message Part - PCPCH UE

Indication of the level correction value for the message part.

In case of one UE active, the power of the message part can be calculated by adding the set RF level.

Example:

Level = 5 dBm + Δ PowMP = 2,3 dB = 7,3 dBm.

SCPI command:

`[:SOURce<hw>] :BB:W3GPp:MSTation<st>:PCPCh:TIMing:DPOWer:MPART`
on page 463

Start Offset - PCPCH UE

Enters the start offset of the PCPCH in access slots.

Note: The PCPCH only transmitted once, at the start of the sequence.

The starting time delay in timeslots is calculated according to:

$2 \times \text{Start Offset \#}$

TS 25 211, Chapter 7.3 PCPCH/AICH timing relation

SCPI command:

`[:SOURce<hw>] :BB:W3GPp:MSTation<st>:PCPCh:TIMing:SOFFset`
on page 464

Transmission Timing - Preamble

Enters the time difference between two successive preambles in access slots.

SCPI command:

`[:SOURce<hw>] :BB:W3GPp:MSTation<st>:PCPCh:TIMing:TIME:PREPre`
on page 465

Transmission Timing - Message Part

Enters the time difference between the last preamble and the message part in access slots.

Two modes are defined in the standard. In mode AICH transmission timing 0, the preamble to message part difference is 3 access slots, in mode AICH transmission timing 1 it is 4 access slots.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPP:MSTation<st>:PCPCh:TIMing:TIME:PREMp`
on page 464

Sequence Length - PCPCH UE

Indication of the sequence length.

This indication allows the user to check if the sequence period fits into the set ARB sequence length.

- In "PCPCH only - Preamble" mode, the sequence period is defined by settings "Start Offset", "Time Pre->Pre" and "Preamble Repetition":
Sequence Length = Start Offset (Slots) + Preamble Repetition x Time Pre->Pre

Example:

Start Offset = 2 access slots = 4 slots

Preamble Repetition = 3

Time Pre->Pre = 3 access slots = 6 slots

Sequence length = 4 slots + 3 x 6 slots = 22 slots

- In "PCPCH only - Standard" mode, the sequence period is defined by settings Start Offset, Time Pre->Pre, Time Pre->MP, Message Part Length and Preamble Repetition:
Sequence length = Start Offset (slots) + Preamble Repetition x Time Pre->Pre + Time Pre->MP + 15 x Message Part Length (frames)

Example:

Start Offset = 2 access slots = 4 slots

Preamble Repetition = 3

Time Pre - Pre = Time Pre - MP = 3 access slots = 6 slots

Power Control Preamble Length = 8 slots

Message Part Length = 2 frames

Sequence length = 4 slots + 3 x 6 slots + 6 slots + 8 + 15 x 2 = 66 slots

Note: In PCPCH mode the CD preamble has to be taken into account. Therefore, Preamble Repetition instead of (Preamble Repetition - 1) is used.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPP:MSTation<st>:PCPCh:TIMing:SPERiod`
on page 464

ARB Sequence Length - PCPCH UE

Indication of the ARB sequence length.

This indication allows the user to check if the sequence period fits into the set ARB sequence length.

SCPI command:

[\[:SOURCE<hw>\]:BB:W3GPp:SLENgth](#) on page 331

5.29.2 Preamble Settings

Preamble Power - PCPCH UE

Sets the power of the preamble component of the PCPCH channel.

SCPI command:

[\[:SOURCE<hw>\]:BB:W3GPp:MSTation<st>:PCPCh:PPOwer](#) on page 461

Preamble Repetition - PCPCH UE

Sets the preamble count.

SCPI command:

[\[:SOURCE<hw>\]:BB:W3GPp:MSTation<st>:PCPCh:PREPetition](#) on page 462

Preamble Power Step - PCPCH UE

Sets the power by which the preamble is increased from repetition to repetition. The power set under Preamble Power is the "target power", used during the last repetition of the preamble.

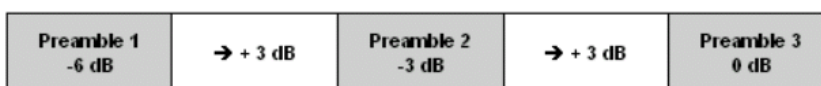
Example:

"Preamble Power" = 0 dB

"Preamble Repetition" = 3

"Preamble Power Step" = 3 dB

Generated power sequence:



SCPI command:

[\[:SOURCE<hw>\]:BB:W3GPp:MSTation<st>:PCPCh:PPOwer:STEP](#) on page 462

Power Control Preamble Length - PCPCH UE

Sets the length of the power control preamble in slots.

SCPI command:

[\[:SOURCE<hw>\]:BB:W3GPp:MSTation<st>:PCPCh:PLENgth](#) on page 461

Signature - PCPCH UE

Selects the signature to be used for the PCPCH channel. The signature defines the code domain for the channelization code being used.

SCPI command:

[\[:SOURCE<hw>\]:BB:W3GPp:MSTation<st>:PCPCh:SIGNature](#) on page 462

5.29.3 Message Part

The "Message Part" section is where the settings for the data part of the PCPCH are available. This section is only available when "PCPCH only - Standard" is selected.

Data Power - PCPCH UE

Sets the power of the data component of the PCPCH channel.

SCPI command:

[\[:SOURCE<hw>\]:BB:W3GPP:MSTation<st>:PCPCh:DPOWer](#) on page 460

Control Power - PCPCH UE

Sets the power of the control component of the PCPCH channel.

SCPI command:

[\[:SOURCE<hw>\]:BB:W3GPP:MSTation<st>:PCPCh:CPOWer](#) on page 458

Message Length - PCPCH UE

Sets the length of the message component of the PCPCH channel in frames.

SCPI command:

[\[:SOURCE<hw>\]:BB:W3GPP:MSTation<st>:PCPCh:MLENgtH](#) on page 461

Slot Format - PCPCH UE

Selects the slot format of the control component of the PCPCH channel.

Slot formats 0 to 2 are available for the PCPCH channel. The slot format defines the structure of the control component, the FBI mode.

When channel coding is active, the FBI mode and the slot format are prescribed.

"Slot format 0" no FBI field

"Slot format 1" 1 FBI field

"Slot format 2" 2 FBI fields

SCPI command:

[\[:SOURCE<hw>\]:BB:W3GPP:MSTation<st>:PCPCh:CPSFormat](#) on page 458

FBI Mode - PCPCH UE

Selects the FBI (Feed Back Information) mode.

The FBI mode is determined by the slot format set. A change in the FBI mode leads automatically to an adjustment of the slot format.

"FBI Off" The FBI field is not in use.

"FBI On 1 Bit" The FBI field is used with a length of 1 bit.

"FBI On 2 Bits" The FBI field is used with a length of 2 bits.

SCPI command:

[\[:SOURCE<hw>\]:BB:W3GPP:MSTation<st>:PCPCh:FBI:MODE](#) on page 460

FBI Pattern - PCPCH UE

Enters the bit pattern for the FBI field in the control part (of the message part) of the PCPCH.

The FBI field is filled cyclically with a pattern of up to 32 bits in length.

SCPI command:

[\[:SOURCE<hw>\]:BB:W3GPp:MSTation<st>:PCPCh:FBI:PATtern](#) on page 461

Symbol Rate - PCPCH UE

Sets the symbol rate of the PCPCH channel.

The symbol rate is determined by the slot format set. A change in the symbol rate leads automatically to an adjustment of the slot format.

When channel coding is active, the symbol rate is prescribed.

SCPI command:

[\[:SOURCE<hw>\]:BB:W3GPp:MSTation<st>:PCPCh:SRATE](#) on page 463

Data Source - PCPCH UE

Selects the data source for the data component of the PCPCH channel.

The following data sources are available for selection:

"All 0, All1"	0 data and 1 data are generated internally.
"PN xx"	PRBS data as per CCITT with period lengths between 2^9-1 and $2^{23}-1$ is generated internally.
"Pattern"	A user-definable bit pattern with a maximum length of 64 bits is generated internally. The bit pattern is defined in the "Pattern" entry field.
"Data List, Select Data List"	Internal data from a programmable data list generated with the Data Editor or externally, is used. Data lists are selected in the "File Select" window, which is called by means of the "Select Data List" button. The File Manager is used to transmit external data lists to the R&S Signal Generator, and can be called within every File Select window by means of the "File Manager" button.

SCPI command:

[\[:SOURCE<hw>\]:BB:W3GPp:MSTation<st>:PCPCh:DATA](#) on page 459

[\[:SOURCE<hw>\]:BB:W3GPp:MSTation<st>:PCPCh:DATA:PATtern](#) on page 460

[\[:SOURCE<hw>\]:BB:W3GPp:MSTation<st>:PCPCh:DATA:DSElect](#) on page 459

TFCI - PCPCH UE

Enters the value of the TFCI field (Transport Format Combination Indicator) in the control component of the PCPCH channel.

SCPI command:

[\[:SOURCE<hw>\]:BB:W3GPp:MSTation<st>:PCPCh:TFCI](#) on page 463

TPC Data Source - PCPCH UE

Defines the data source for the TPC field of the PCPCH channel.

During data list selection the "Select TPC Data List" button appears for selecting a data list.

During pattern selection, the "TPC Pattern" entry window is displayed.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPP:MSTation<st>:PCPCh:TPC:DATA` on page 465

`[:SOURCE<hw>] :BB:W3GPP:MSTation<st>:PCPCh:TPC:DATA:DSElect`
on page 465

`[:SOURCE<hw>] :BB:W3GPP:MSTation<st>:PCPCh:TPC:DATA:PATtern`
on page 466

TPC Read Out Mode - PCPCH UE

Defines the TPC data usage.

With 3GPP, the TPC bits are used to signal the increase or reduction in transmit power to the called station. With all read out modes, one bit is taken from the data stream for the TPC field for each slot and entered into the bit stream several times (depending on the symbol rate). The difference between the modes lies in the usage of the TPC bits.

"Continuous:" The TPC bits are used cyclically.

"Single + All 0" The TPC bits are used once, and then the TPC sequence is continued with 0 bits.

"Single + All 1" The TPC bits are used once, and then the TPC sequence is continued with 1 bits.

"Single + alt. 01" The TPC bits are used once and then the TPC sequence is continued with 0 and 1 bits alternately (in multiples, depending on by the symbol rate, for example, 00001111).

"Single + alt. 10" The TPC bits are used once and then the TPC sequence is continued with 1 and 0 bits alternately (in multiples, depending on by the symbol rate, for example, 11110000).

SCPI command:

`[:SOURCE<hw>] :BB:W3GPP:MSTation<st>:PCPCh:TPC:READ` on page 466

5.29.4 Channel Coding

The "Channel Coding" section is where the channel coding for the PCPCH channel is activated and deactivated and the coding type is defined. Use "Show Coding" to display the fixed settings for the channel coding parameters.

Channel coding of PCPCH is only possible for UE1.

Channel Coding			
Coding State	<input type="checkbox"/> On	Coding Type	CPCH RMC (TB size 168 bit)
<<< Hide Coding			
Transport Channel			
CPCH			
168			
PN 9			
<input checked="" type="checkbox"/> On			
Transport Block Size	168	Transport Blocks	1
Transport Time Intervall	20 ms		
Size Of CRC	16	Error Protection	Conv 1/2
Interleaver 1 State	On	Interleaver 2 State	On

Channel Coding State - PCPCH UE1

Activates or deactivates channel coding for the PCPCH channel.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPP:MSTation:ENHanced:PCPCh:CCODing:STATe
```

on page 508

Channel Coding Type - PCPCH UE1

Selects the predefined reference measurement channel coding types for the PCPCH channel.

"CPCH RMC (TB size 168 bit)" Reference Measurements Channel Coding with transport block size of 168 bit.

"CPCH RMC (TB size 360 bit)" Reference Measurements Channel Coding with transport block size of 360 bit.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPP:MSTation:ENHanced:PCPCh:CCODing:TYPE
```

on page 508

Show Coding - PCPCH UE1

Calls the menu for displaying channel coding. The reference measurement channel parameters are set to fixed values.

The following parameters are displayed:

"Data Source" The data source is displayed in the transport channel graphical display.

"Transport Block Size" Size of the transport block at the channel coding input.

"Transport Block" Transport blocks count.

"Transport Time Interval" Number of frames into which a TCH is divided.

"Size of CRC" CRC type (length).

"Error Protection" Error protection.

"Interleaver 1 / Channel coding interleaver state
2 State"

SCPI command:
n.a.

5.30 DPCCH Settings - UE

The DPCCH Settings section is where the settings are made for the DPCCH channel. This section is only available if DPCCH + DPDCH mode is activated (see also [chapter 5.33, "DPDCH Settings - UE"](#), on page 221).

In UE1, the DPCCH is generated in realtime (enhanced).

At the physical level, an uplink DPCH consists of the DPDCH (Dedicated Physical Data Channel) and the DPCCH (Dedicated Physical Control Channel); the channel characteristics are defined by the symbol rate.

The DPDCH transports the user data that is fed directly into the data field. The DPCCH carries the control fields (Pilot field; TPC = Transmit Power Control, FBI (Feedback Information) and TFCI = Transport Format Combination Indicator). DPDCH is grouped with DPCCH I/Q code multiplexing in accordance with 3GPP TS 25.211, see diagram below. The generation of an uplink reference measurement channel is described in [chapter 5.38, "Global Enhanced Channel Settings - UE1"](#), on page 247.

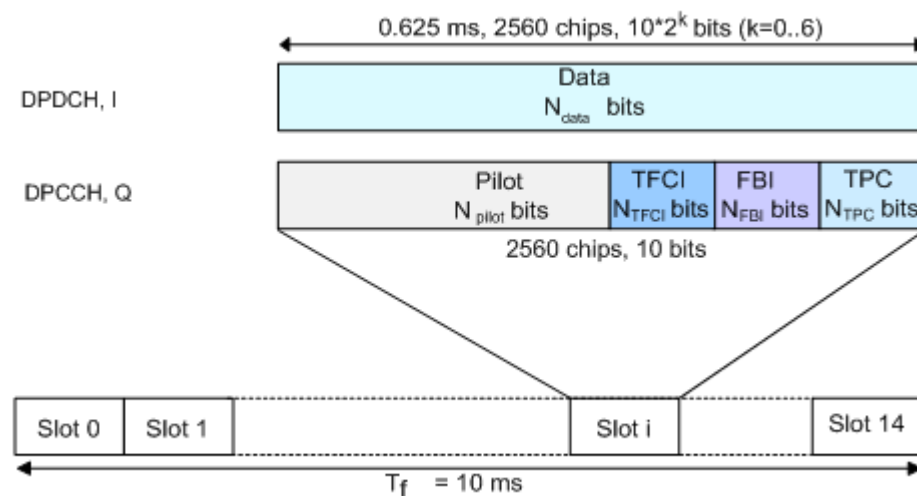


Fig. 5-23: Structure of an uplink DPCH in the time domain

In the upper section, the settings of the DPCCH parameters are made. The channel structure is displayed.

Channelization Code - DPCCH UE

Displays the channelization code and the modulation branch (I or Q) of the DPCCH. The code channel is spread with the set channelization code (spreading code). The standard assigns a fixed channelization code to the DPCCH.

SCPI command:

[\[:SOURCE<hw>\]:BB:W3Gpp:MSTation<st>:DPCCh:HS:CCODE](#) on page 438

Power - DPCCH UE

Sets the power of the DPCCH channel.

Test cases defined in the 3GPP standard often use notation "Signaling values for β_c and β_d ". The quantization of the gain parameters is shown in the following table which is taken from 3GPP Spec 25.213 (left columns) and supplemented by the instrument-specific values (right column).

Signaling values for β_c and β_d	Quantized amplitude ratios β_c and β_d	Power to be set for R&S Signal Generator / dB
15	1.0	0.0
14	14/15	-0.60
13	13/15	-1.24
12	12/15	-1.94
11	11/15	-2.69
10	10/15	-3.52
9	9/15	-4.44
8	8/15	-5.46
7	7/15	-6.62
6	6/15	-7.96
5	5/15	-9.54
4	4/15	-11.48
3	3/15	-13.99
2	2/15	-17.52

Signaling values for β_c and β_d	Quantized amplitude ratios β_c and β_d	Power to be set for R&S Signal Generator / dB
1	1/15	-23.52
0	Switch off	Switch channel off or -80 dB

SCPI command:

`[:SOURCE<hw>] :BB:W3GPP:MSTation<st>:DPCCh:POWer` on page 432

DL-UL Timing Offset - DPCCH UE

Sets the timing offset between the downlink and the uplink.

The timing offset determines the time delay in chips between the downlink signal timing and transmission of the uplink signal.

Note: The signals of all UEs have the same uplink slot timing. The parameters "DL-UL Timing Offset" are coupled and by changing this parameter for one of the UEs, the values for the other UEs are automatically adjusted.

"1024 Chips" The standard specifies this value at 1024 chips and this is taken into account automatically when generating the uplink signal. The signal is calculated synchronously to the downlink reference timing, that is to say, the first uplink frame starts at chip position 1024 of the simulated signal.

"0 Chips" No timing offset is applied, i.e. there is no timing delay between receipt of the downlink signal and transmission of the uplink signal.

Example:

This mode is useful if a generation of continuous uplink signal composed of multiple separately generated uplink frames is required.

- Adjust the uplink settings as required and set the "DL-UL Timing Offset" to 0 Chips.
- Enable generation of the 3GPP FDD signal.
- Use the [Generate Waveform File](#) function to save the current signal as an ARB signal in a waveform file.
- Re-configure the uplink settings and save the signal as an ARB file.
- Use the "Baseband > ARB > Multi Segment" function to assemble a common signal from the several uplink signals.
If required, re-adjust the "Marker" settings. A sequence list can be additionally applied to configure the order the waveforms are processed and how many times each of them is repeated.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPP:MSTation<st>:DPCCh:TOFFset` on page 433

Slot Format # - DPCCH UE

Selects the slot format.

The slot format defines the structure of the DPCCH slots and the control fields. Depending on the selected slot format, the slot structure is displayed.

Slot formats 0 to 4 are available for the DPCCH channel as defined in the 3GPP Release 7 specification TS 25.211.

Note: The former slot formats 4 and 5 according to 3GPP Release 4 specification TS 25.211 are not supported any more.

The slot format selection adjusts the DPCCH slot structure according to the 3GPP specification. However, it is also possible to adjust this structure by configuration of each of the control fields separately.

The table below gives an overview of the cross-reference between the slot format and the structure of the DPCCH slot.

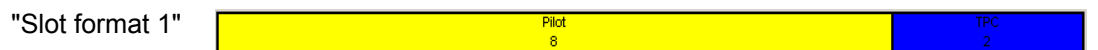
Slot Format #	NPilot, bits	NTPC, bits (TPC Mode)	NTFCI, bits (Use TFCI)	NFBI, bits (FBI Mode)
0	6	2	2	0
1	8	2	0	0
2	5	2	2	1
3	7	2	0	1
4	6	4	0	0



"FBI Mode" = Off, i.e. no FBI field

"TFCI Mode" = 2 bits

"Use TFCI" = On, i.e. TFCI field = 2 bits



"FBI Mode" = Off, i.e. no FBI field

"TFCI Mode" = 2 bits

"Use TFCI" = Off, i.e. no TFCI field



"FBI Mode" = 1 bit

"TFCI Mode" = 2 bits

"Use TFCI" = On, i.e. TFCI field = 2 bits



"FBI Mode" = 1 bit

"TFCI Mode" = 2 bits

"Use TFCI" = Off, i.e. no TFCI field



(enabled only for instruments equipped with R&S SMx/AMU-K59)

"FBI Mode" = Off, i.e. no FBI field

"TFCI Mode" = 4 bits

"Use TFCI" = Off, i.e. no TFCI field

SCPI command:

[\[:SOURCE<hw>\]:BB:W3GPp:MSTation<st>:DPCCh:SFORmat](#) on page 432

Use TFCI - DPCCH UE

Activates the TFCI (Transport Format Combination Indicator) field.

The status of the TFCI field is determined by the "Slot Format" set. A change leads automatically to an adjustment of the slot format.

SCPI command:

[\[:SOURCE<hw>\]:BB:W3GPp:MSTation<st>:DPCCh:TFCI:STATe](#) on page 433

TFCI - DPCCH UE

Enters the value of the TFCI field (Transport Format Combination Indicator) of the DPCCH channel.

SCPI command:

[\[:SOURCE<hw>\]:BB:W3GPp:MSTation<st>:DPCCh:TFCI](#) on page 433

FBI Mode - DPCCH UE

Selects the FBI (Feed Back Information) mode.

The FBI mode is determined by the "Slot Format" set. A change in the FBI mode leads automatically to an adjustment of the slot format.

Note: The former 2-bits long FBI Mode according to 3GPP Release 4 specification TS 25.211 is not supported any more.

"Off" The FBI field is not in use.

"1 Bit" The FBI field with a length of 1 bit is used.

SCPI command:

[\[:SOURCE<hw>\]:BB:W3GPp:MSTation<st>:DPCCh:FBI:MODE](#) on page 431

FBI Pattern - DPCCH UE

Enters the bit pattern for the FBI field.

The FBI field is filled cyclically with a pattern of up to 32 bits in length.

SCPI command:

[\[:SOURCE<hw>\]:BB:W3GPp:MSTation<st>:DPCCh:FBI:PATTern](#) on page 432

TPC Mode - DPCCH UE

Selects the TPC (Transmit Power Control) mode.

The TPC mode is determined by the "Slot Format" set. A change in the TPC mode leads automatically to an adjustment of the slot format.

"2 Bits" A TPC field with a length of 2 bits is used.

"4 Bits" (enabled only for instruments equipped with R&S SMx/AMU-K59)
 A TPC field with a length of 4 bits is used.
 A 4 bits long TPC field can be selected, only for Slot Format 4 and disabled FBI and TFCI fields.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:MSTation<st>:DPCCh:TPC:MODE` on page 435

TPC Data Source - DPCCH UE

Defines the data source for the TPC field of the DPCCH channel.

When "Pattern" is selected, an entry field appears for the bit pattern. The maximum bit pattern length is 64 bits.

When "Data List" is selected, a button appears for calling the "File Select" window for selection of a data list.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:MSTation<st>:DPCCh:TPC:DATA` on page 434

`[:SOURCE<hw>] :BB:W3GPp:MSTation<st>:DPCCh:TPC:DATA:PATtern`
 on page 434

`[:SOURCE<hw>] :BB:W3GPp:MSTation<st>:DPCCh:TPC:DATA:DSElect`
 on page 434

TPC Read Out Mode - DPCCH UE

Defines the TPC data usage.

With 3GPP, the TPC bits are used to signal the increase or reduction in transmit power to the called station. With all read out modes, one bit is taken from the data stream for the TPC field for each slot and entered into the bit stream several times (depending on the symbol rate). The difference between the modes lies in the usage of the TPC bits.

These different modes can be used, for example, to deliberately set a DPCH of a base station to a specific output power (e.g. with the pattern 11111) and then let it oscillate around this power (with Single + alt. 01 and Single + alt. 10). This then allows power measurements to be carried out at the base station (at a quasi-constant power). Together with the option (Mis-)Use TPC for output power control (see below), TPC Read Out Mode can also be used to generate various output power profiles.

"Continuous:" The TPC bits are used cyclically.

"Single + All 0" The TPC bits are used once, and then the TPC sequence is continued with 0 bits.

"Single + All 1" The TPC bits are used once, and then the TPC sequence is continued with 1 bits.

"Single + alt. 01" The TPC bits are used once and then the TPC sequence is continued with 0 and 1 bits alternately (in multiples, depending on by the symbol rate, for example, 00001111).

"Single + alt. 10" The TPC bits are used once and then the TPC sequence is continued with 1 and 0 bits alternately (in multiples, depending on by the symbol rate, for example, 11110000).

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:MSTation<st>:DPCCh:TPC:READ` on page 436

Misuse TPC for Output Power Control - DPCCH UE

(available for UE2, UE3 and UE4 only)

Defines "mis-" use of the TPC data.

With 3GPP, the TPC bits are used to signal the increase or reduction in transmit power to the called station. If "(Mis-) use TPC for output power control" is activated, the specified pattern is misused, in order to vary the intrinsic transmit power over time. A bit of this pattern is removed for each slot in order to increase (bit = "1") or reduce (bit = "0") the channel power by the specified power step ("Power Step"). The upper limit for this is 0 dB and the lower limit -60 dB. The following envelope is produced at a channel power of 0 dB, power step 1.0 dB and pattern "001110100000011" and TPC Pattern Read Out Mode Continuous:

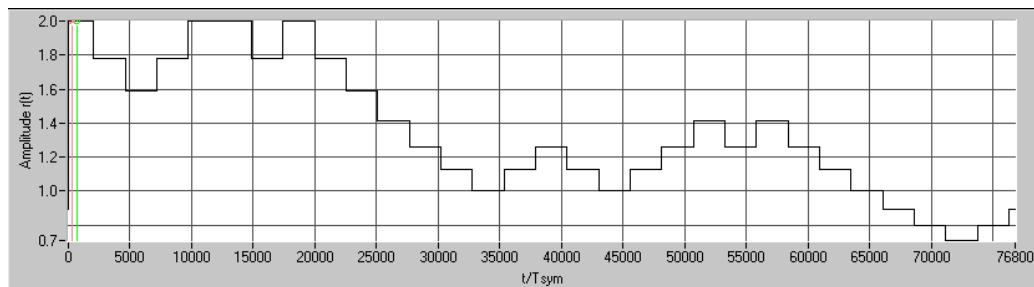


Fig. 5-24: Dynamic change of channel power (continuous)

Note: Power control works both on the DPCCH and all the active DPDCHs. The change in power is always carried out (as stipulated in the standard) at the start of the slot pilot field

SCPI command:

[\[:SOURCE<hw>\]:BB:W3GPP:MSTation<st>:DPCCh:TPC:MISuse](#) on page 435

TPC Power Step - DPCCH UE

(available for UE2, UE3 and UE4 only)

Sets the step width of the power change in dB for "(Mis-) use TPC for output power control".

SCPI command:

[\[:SOURCE<hw>\]:BB:W3GPP:MSTation<st>:DPCCh:TPC:PSTep](#) on page 436

5.31 E-DPCCH Settings - UE

The "E-DPCCH Settings" section is where the settings are made for the E-DPCCH channel. This section is only available if "DPCCH + DPDCH" mode is activated (see [chapter 5.33, "DPDCH Settings - UE"](#), on page 221).

State - E-DPCCH UE

Activates or deactivates the E-DPCCH channel.

If an FRC is set for the channel, this field is activated automatically.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:MSTation<st> [ :HSUPa ] :DPCCh:E:STATE
on page 488
```

Power - E-DPCCH UE

Sets the power of the E-DPCCH channel.

The value range is -80 dB to 0 dB.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:MSTation<st> [ :HSUPa ] :DPCCh:E:POWER
on page 488
```

Retransmission Sequence Number - E-DPCCH UE

Sets the retransmission sequence number.

The value range is 0 to 3.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:MSTation<st> [ :HSUPa ] :DPCCh:E:RSNumber
on page 488
```

Channelization Code - E-DPCCH UE

Displays the channelization code and the modulation branch (always I) of the E-DPCCH. The code channel is spread with the set channelization code (spreading code). The standard assigns a fixed channelization code to the E-DPCCH.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:MSTation<st> :DPCCh:HS:CCODE on page 438
```

E-TFCI Information - E-DPCCH UE

Sets the value for the TFCI (Transport Format Combination Indicator) field.

The value range is 0 to 127.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:MSTation<st> [ :HSUPa ] :DPCCh:E:TFCI
on page 488
```

Happy Bit - E-DPCCH UE

Activating the happy bit. This bit is indicating whether the UE could use more resources (Not Happy/deactivated) or not (Happy/activated).

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPP:MSTation<st>[:HSUPa]:DPCCh:E:HBIT
```

on page 488

HSUPA FRC... - E-DPCCH UE

(This button is available for UE1 only).

Calls the menu for configuring the FRC (Fixed Reference Channel), see [chapter 5.37, "HSUPA FRC Settings - UE"](#), on page 238.

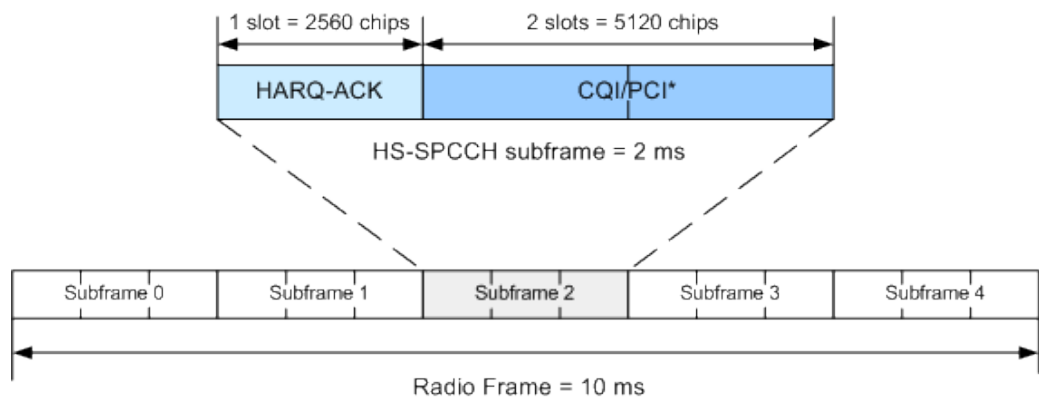
SCPI command:

n.a.

5.32 HS-DPCCH Settings - UE

The "HS-DPCCH Settings" section is where the settings are made for the HS-DPCCH. This section is only available if "DPCCH + DPDCH" mode is activated (see also [chapter 5.30, "DPCCH Settings - UE"](#), on page 197 and [chapter 5.33, "DPDCH Settings - UE"](#), on page 221).

When user equipment 1 (UE1) is selected, the signal is generated in real-time if the "Compatibility Mode" is set to "Release 7" or "Release 8 RT".

HS-DPCCH Structure

*) PCI for UE configured in MIMO mode only

Fig. 5-25: Structure of an uplink HS-DPCCH in the time domain

The HS-DPCCH carries uplink feedback signaling related to the accuracy and quality of downlink HS-DSCH transmission. Hybrid-ARQ Acknowledgment (HARQ-ACK) is transmitted in the first subframe slot, Channel-Quality Indication (CQI) and in case of UE configured in MIMO mode also Precoding Control Indication (PCI) are transmitted in the second and third subframe slot. Only one HS-DPCCH may be transmitted on each radio link. The HS-DPCCH can only exist together with an uplink DPCCH.

The HS-DPCCH subframe starts $256 \times m$ chips after the start of an uplink DPCCH slot with m selected such that the subframe transmission starts within the first 0-255 chips after 7.5 slots following the end of the received HS-PDSCH sub-frame.

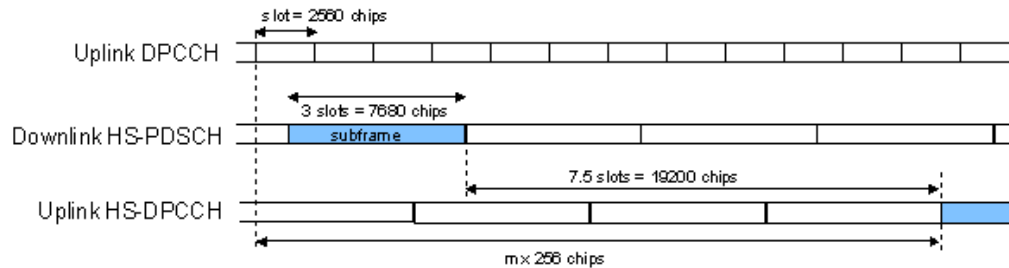


Fig. 5-26: Timing offset between the uplink DPCCH, the HS-PDSCH and the HS-DPCCH at the UE

HS-DPCCH Power

According to 3GPP TS 25.214, the uplink HS-DPCCH power shall be estimated for each HS-DPCCH slot.

In the R&S Signal Generator, the channel power can be set individually for each case of feedback signaling and UE mode as a combination of the CQI Power (parameter "Power") and the corresponding "Power Offset" (see the tables below). Since the feedback signaling can be configured per slot of TTI that carries HS-DPCCH, the channel power is also calculated on a slot basis.

Table 5-15: Calculating of the HARQ-ACK power

Mode	HARQ-ACK	Offset Parameter	Resulting Power
Compatibility Mode = Up to Release 7			
Normal	ACK/NACK Pattern	Power Offset ACK	Power + Power Offset ACK
		Power Offset NACK	Power + Power Offset NACK
	Single ACK	Power Offset ACK	Power + Power Offset ACK
	Single NACK	Power Offset NACK	Power + Power Offset NACK
MIMO	TB1: ACK, TB2: ACK	Power Offset ACK/ACK	Power + Power Offset ACK/ACK
	TB1: ACK, TB2: NACK	Power Offset ACK/NACK	Power + Power Offset ACK/NACK
	TB1: NACK, TB2: ACK	Power Offset NACK/ACK	Power + Power Offset NACK/ACK
	TB1: NACK, TB2: NACK	Power Offset NACK/NACK	Power + Power Offset NACK/ NACK
Compatibility Mode = Release 8 and Later (RT)			
all	HARQ-ACK	Power Offset HARQ-ACK	Power + Power Offset HARQ-ACK

Table 5-16: Calculating the PCI/CQI power

Mode	CQI	Type	CQI Parameter	Offset Parameter	Resulting Power
Compatib. Mode= Up to Release 7					
Normal	-		CQI	-	Power
MIMO	CQI Type A	Single TB	CQIs	Power Offset CQI Type A	Power + Power Offset CQI Type A
		Double TB	CQI1 and CQI2		
Compatib. Mode= Rel. 8 and Later (RT)					
Normal	CQI		CQI	Power Offset PCI/CQI	Power + Power Offset PCI/CQI
DC-HSDPA non MIMO	Comp. CQI		CQI1 and CQI2		
MIMO	CQI Type A	Single TB	CQIs		
		Double TB	CQI1 and CQI2		

5.32.1 HS-DPCCH Common Settings

The displayed channel structure depends on whether the UE is working in MIMO mode or not.

The screenshot shows the 'HS-DPCCH Settings' window. At the top, there are two colored bars: a yellow bar for 'HARQ-ACK (Slots) 1' and a green bar for 'PCI / CQI (Slots) 2'. Below these, the 'State' is set to 'On' with a power of '0.00 dB'. The 'Compatibility Mode' is set to 'Release 8 and Later'. Other settings include 'Start Delay' (101 *256 Chips), 'Inter TTI Distance (Interval)' (5 Subframes), 'MIMO Mode' (On), and 'Secondary Cell Active' (On). A table with 11 columns (HARQ-ACK From Interval, HARQ-ACK To Interval, HARQ-ACK, Pow Offs HARQ-ACK /dB, PCI/CQI From Interval, PCI/CQI To Interval, CQI Type, CQI/ CQIs/ CQI1, CQI2, PCI, Pow Offs PCI/CQI /dB) shows two rows of data. The first row is for DTX (HARQ-ACK: AA/D, Pow Offs: 0.0, PCI/CQI: 0/0). The second row is for Type A Dual TB (HARQ-ACK: NN/NN, Pow Offs: 0.0, PCI/CQI: 1/1, CQI Type: Type A Dual TB, CQI/ CQIs/ CQI1: 2, CQI2: 0, PCI: 1, Pow Offs PCI/CQI /dB: 0.0). At the bottom, 'HARQ-ACK Repeat After' is set to 4 intervals and 'PCI/CQI Repeat After' is set to 3 intervals. The suggested current ARB Seq. Length is 12 / 12.

State (HS-DPCCH)

Activates or deactivates the HS-DPCCH channel.

SCPI command:

[:SOURce<hw>] :BB:W3Gpp:MSTation<st>:DPCCh:HS:STATe on page 437

Power (HS-DPCCH)

Sets the power in dB.

- In case of "Compatibility Mode release 8 and later"/"Compatibility Mode release 8 and later RT", this parameter represents the reference power, relative to that the power used during the HARQ-ACK slot and the power used during the PCI/CQI slots are calculated.
- While working in a "Compatibility Mode Up to Release 7", this parameter represents the CQI Power of a UE configured in a normal mode or of a UE configured in MIMO mode and sending CQI Type B report. The CQI Power is the reference power, relative to that the power used during the HARQ-ACK slot and the power used during the PCI/CQI slots of a UE configured in MIMO mode and sending CQI Type A reports are calculated.

The power entered is relative to the powers of the other channels and does not initially relate to the "Level" power display. If [Adjust Total Power to 0dB](#) is executed (top level of the 3GPP FDD menu), all the power data is relative to the "Level" display.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPP:MSTation<st>:DPCCh:HS:POWer` on page 438

Compatibility Mode (HS-DPCCH)

Switches between the following modes:

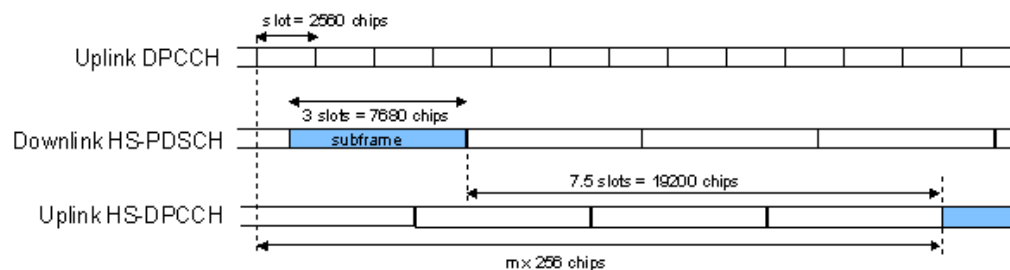
- | | |
|--------------------------|---|
| "Up to Release 7" | Switches to the display of the HS-DPCCH settings provided for backwards compatibility. |
| "Release 8 and Later" | The concept of the graphical user interface for the configuration of HS-DPCCH has been adapted to support simultaneous DC-HSDPA and MIMO operation, as required in 3GPP Release 9 onwards. This mode is disabled, if Dynamic Power Control State is On. |
| "Release 8 and Later RT" | not for R&S WinIQSIM2
Enables generation of the HS-DPCCH in real-time even for Release 8/9 content. Real-time signals are useful for complex HS-DPCCH scheduling and are required while using dynamic power control with the HS-DPCCH. |

SCPI command:

`[:SOURCE<hw>] :BB:W3GPP:MSTation<st>:DPCCh:HS:COMPatibility` on page 438

Start Delay

Sets the delay between the uplink HS-DPCCH and the frame of uplink DPCH.



Thus, the channel can be synchronized with the associated downlink HS-PDSCH.

The delay is entered as a multiple m of 256 chips according to TS 25.211 7.7:

$$m = (T_{TX_diff} / 256) + 101$$

where T_{TX_diff} is the difference in chips ($T_{TX_diff} = 0, 256, \dots, 38144$).

The value range of m is 0 to 250 (2 frames + 1024 chips)

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:MSTation<st>:DPCCh:HS:SDElay` on page 438

Inter TTI Distance (Interval)

Selects the distance between two HSDPA packets. The distance is set in number of subframes (3 slots = 2 ms). An "Inter TTI Distance" of 1 means continuous generation.

Regarding the HS-DPCCH uplink transmission, this parameter determines where HS-DPCCH transmissions are possible in principle. In order to have actual HS-DPCCH transmissions, HARQ-ACK and/or PCI/CQI transmissions have to be scheduled as described in 5.32.2, 5.32.3 and 5.32.4

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:MSTation<st>:DPCCh:HS:TTIDistance`

on page 439

Channelization Code (HS-DPCCH)

Displays the channelization code and the modulation branch (I or Q) of the HS-DPCCH.

The code channel is spread with the set channelization code (spreading code). The channelization code of the high speed channel depends on the number of activated DPDCCHs, i.e. on the overall symbol rate.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:MSTation<st>:DPCCh:HS:CCODE` on page 438

5.32.2 HS-DPCCH Scheduling Table (Release 8 and Later/Release 8 and Later RT)



This settings are available for "Compatibility Mode" set to "Release 8 and Later" or "Release 8 and Later RT".

MIMO settings and DC-HSDPA settings are available for configuration only for instruments equipped with option R&S SMx/AMU-K59.

The settings available in this dialog allow you to adjust the HS-DPCCH signal of a UE configured for normal operation, DC-HSDPA operation, MIMO mode or for a simultaneous dual cell + MIMO operation.

The HS-DPCCH structure can be configured with the parameters "Inter TTI Distance", "Number of Table Rows", "From/To" and "Repeat After", as well as by configuring the HARQ-ACK and CQI/PCI information by means of the parameters of the HS-DPCCH scheduling table. The scheduling for the HARQ-ACK and PCI/CQI reports can be performed independently; different repetition cycles can be specified.

Example: HS-DPCCH Scheduling

Parameter	Value
Start Delay	101 * 256 Chips
Compatibility Mode (HS-DPCCH)	Release 8 and Later RT
Inter TTI Distance (Interval)	5 Subframes
Number of Table Rows	2
HARQ-ACK Repeat After	4 Intervals
PCI/CQI Repeat After	3 Intervals
Row#0	
HARQ-ACK From Interval/ HARQ-ACK To Interval	from HARQ-ACK Interval 0 to 1
HARQ-ACK (HS-DPCCH)	A
PCI-CQI From Interval/ PCI-CQI To Interval	from PCI/CQI Interval 0 to 0
CQI Type	DTX
Row#1	
HARQ-ACK From Interval/ HARQ-ACK To Interval	from HARQ-ACK Interval 3 to 3
HARQ-ACK (HS-DPCCH)	N
PCI-CQI From Interval/ PCI-CQI To Interval	from PCI/CQI Interval 1 to 1
CQI Type	CQI



Use the [Scheduling List](#) to display the configured scheduling.

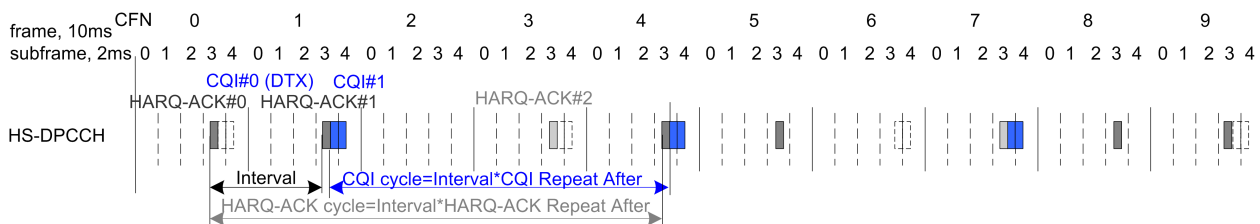


Fig. 5-27: Example of HS-DPCCH Scheduling

"Inter TTI Distance (Interval)" = 5 subframes
 "HARQ-ACK Cycle" = "Inter TTI Distance (Interval)"**"HARQ-ACK Repeat After" = 5*4=20 Intervals"
 "CQI Cycle" = "Inter TTI Distance (Interval)"**"CQI Repeat After" = 5*3=15 Intervals"

MIMO Mode

Enables/disables working in MIMO mode for the selected UE.

SCPI command:

[:SOURce<hw>] :BB:W3GPP:MSTation<st>:DPCCh:HS:MMODE on page 447

Secondary Cell Active

Enables/disables working in dual cell HSDPA mode for the selected UE.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:MSTation<st>:DPCCh:HS:SCActive` on page 448

Number of Table Rows

This parameter determines the number of the rows in the HS-DPCCH scheduling table.

Each row represents one TTI interval, as configured with the parameter [Inter TTI Distance \(Interval\)](#). The parameters set in the table are read out cyclically.

See also [figure 5-27](#).

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:MSTation<st>:DPCCh:HS:ROWCount` on page 448

HARQ-ACK From Interval/ HARQ-ACK To Interval

Defines the beginning/ end of the HARQ-ACK transmissions inside the HARQ-ACK cycle (specified by [HARQ-ACK Repeat After](#)). The range is specified in multiples of intervals, determined by [Inter TTI Distance \(Interval\)](#).

See also [figure 5-27](#).

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:MSTation<st>:DPCCh:HS:ROW<ch0>:HACK:FROM`
on page 448

`[:SOURCE<hw>] :BB:W3GPp:MSTation<st>:DPCCh:HS:ROW<ch0>:HACK:TO`
on page 448

HARQ-ACK (HS-DPCCH)

Sets the information transmitted during the HARQ-ACK slots of the TTIs during the corresponding specified "HARQ-ACK From/To" range.

The processing of HS-DPCCH is defined for four different cases (see [table 5-17](#)).

Table 5-17: HS-DPCCH processing

Mode	MIMO Mode	Secondary Cell Active	Comment
Normal operation	Off	Off	-
MIMO only	On	Off	see chapter 3.14.5, "MIMO uplink control channel support" , on page 34
DC-HSDPA only	Off	On	see chapter 3.15.1, "DC-HSDPA Data Acknowledgement (non MIMO mode)" , on page 38
DC-HSDPA +MIMO	On	On	see chapter 3.15.2, "DC-HSDPA + MIMO" , on page 40

"DTX" No HARQ-ACK feedback information is sent.

"A, N" Selects an ACK or NACK response to a single scheduled transport block.

"AA, AN, NA, NN" (MIMO Mode On, Secondary Cell Active Off)

Selects the response to two scheduled transport blocks, i.e. feedback on the primary and secondary stream in a dual stream transmission.

"A/D, N/A, ... (different combinations possible)" (MIMO Mode Off, Secondary Cell Active On)
Selects the response to a single scheduled transport block on each of the serving and secondary serving HS-DSCH cells.

Note: The feedback related to the serving HS-DSCH cell is given before the divider sign.

D means no transmission (DTX), i.e. no transport block was sent for the corresponding HS-DSCH downlink transmission.

"AN/NN, D/AA, ... (different combinations possible)" (MIMO Mode On, Secondary Cell Active On)
Selects the response to two scheduled transport blocks on each of the serving and secondary serving HS-DSCH cells.

D means no transmission (DTX), i.e. no transport block was sent for the corresponding HS-DSCH downlink transmission.

"PRE, POST" PRE or POST is sent in the HARQ-ACK slots of the corresponding TTI.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:MSTation<st>:DPCCh:HS:ROW<ch0>:HACK
```

on page 449

Power Offset HARQ-ACK

Sets the power offset of a HARQ-ACK response relative to the "Power".

The power used during all HARQ-ACK slots during the corresponding specified HARQ-ACK From/To range is calculated as:

$$P_{\text{HARQ-ACK}} = \text{Power} + P_{\text{off_HARQ-ACK}}$$

The value range is -10 dB to 10 dB.

The parameter is enabled for HARQ-ACK different than DTX.

While generating the HS-DPCCH signal in real-time, the HARQ-ACK power offsets of all configured HARQ-ACK responses are set to the same value.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:MSTation<st>:DPCCh:HS:ROW<ch0>:POHACK
```

on page 451

PCI-CQI From Interval/ PCI-CQI To Interval

Defines the beginning/ end of the PCI/CQI transmissions inside the PCI/CQI cycle (specified by [PCI/CQI Repeat After](#)). The range is specified in multiples of intervals, defined by [Inter TTI Distance \(Interval\)](#).

See also [figure 5-27](#).

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:MSTation<st>:DPCCh:HS:ROW<ch0>:PCQI:FROM
```

on page 451

```
[ :SOURCE<hw> ] :BB:W3GPp:MSTation<st>:DPCCh:HS:ROW<ch0>:PCQI:TO
```

on page 451

CQI Type

Selects the type of the CQI report (see [CQI Reports: Type A and Type B](#) and [CQI reports: CQI1 and CQI2](#)).

The available values depend on the state of the parameters "MIMO Mode" and "Secondary Cell Active".

"DTX"	No PCI/CQI feedback information is sent.
"CQI"	(MIMO Mode Off, Secondary Cell Active Off) Selects CQI report for the normal operation.
"Type A Single TB"	(MIMO Mode On) Selects CQI Type A report with information that 1 transport block is preferred.
"Type A Double TB"	(MIMO Mode On) Selects CQI Type A report with information that 2 transport blocks are preferred.
"Type B"	(MIMO Mode On) Selects CQI Type B report.
"Composite CQI"	(MIMO Mode Off, Secondary Cell Active On) Selects a Composite CQI, constructed from the two individual reports CQI1 and CQI2 of the serving and secondary serving HS-DSCH cell.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPP:MSTation<st>:DPCCh:HS:ROW<ch0>:CQIType`
on page 451

CQI/CQI_s/CQI₁/CQI₂

Sets the CQI report transmitted during the PCI/CQI slots of the TTIs during the corresponding specified PCI/CQI From/To range (see [chapter 3.14.6, "CQI Reports: Type A and Type B"](#), on page 36 and [chapter 3.15.1.1, "CQI reports: CQI1 and CQI2"](#), on page 40).

"CQI"	Sets the CQI value for CQI Type B report and the CQI in normal operation.
"CQI _s "	Sets the CQI value in case a CQI Type A report when one transport block is preferred.
"CQI ₁ "	Sets the CQI ₁ value of CQI Type A report when 2 transport blocks are preferred or the CQI ₁ value of a composite CQI report of a dual cell only operation.
"CQI ₂ "	Sets the CQI ₂ value of CQI Type A report when 2 transport blocks are preferred or the CQI ₂ value of a composite CQI report of a dual cell only operation.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPP:MSTation<st>:DPCCh:HS:ROW<ch0>:CQI<di>`
on page 452

PCI

Selects the PCI value transmitted during the PCI/CQI slots of the TTIs during the corresponding specified PCI/CQI From/To range (see [PCI reports](#)).

SCPI command:

`[:SOURCE<hw>] :BB:W3GPP:MSTation<st>:DPCCh:HS:ROW<ch0>:PCI`
on page 452

Power Offset PCI/CQI

Sets the power offset $P_{\text{off_PCI/CQI}}$ of all PCI/CQI slots during the corresponding specified PCI/CQI From/To range relative to the [Power](#).

The power $P_{\text{PCI/CQI}}$ used during the PCI/CQI slots is calculated as:

$$P_{\text{PCI/CQI}} = \text{Power} + P_{\text{off_PCI/CQI}}$$

The value range is -10 dB to 10 dB.

While generating the HS-DPCCH signal in real-time, the PCI/CQI power offsets of all configured PCI/CQI slots are set to the same value.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:MSStation<st>:DPCCh:HS:ROW<ch0>:POPCqi`
on page 453

HARQ-ACK Repeat After

Defines the cycle length after that the information in the HS-DPCCH scheduling table is read out again from the beginning.

The parameter together with the parameter [Inter TTI Distance \(Interval\)](#) defines the repetition cycle of the HARQ-ACK pattern:

$$\text{HARQ-ACK cycle} = \text{Inter TTI Distance (Interval)} * \text{HARQ-ACK Repeat After}$$

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:MSStation<st>:DPCCh:HS:HACK:REPeat`
on page 453

PCI/CQI Repeat After

Defines the cycle length after that the information in the HS-DPCCH scheduling table is read out again from the beginning.

The parameter together with the parameter [Inter TTI Distance \(Interval\)](#) defines the repetition cycle of the PCI/CQI pattern:

$$\text{PCI/CQI cycle} = \text{Inter TTI Distance (Interval)} * \text{PCI/CQI Repeat After}$$

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:MSStation<st>:DPCCh:HS:PCQI:REPeat`
on page 453

Suggested / Current ARB Seq. Length (HS-DPCCH)

Displays the suggested and current ARB sequence length, in case the signal is not generated in real-time.

The "Suggested ARB Sequence Length" is the calculated minimum length that depends on the [Inter TTI Distance \(Interval\)](#), the [Number of Table Rows](#), the [HARQ-ACK Repeat After](#) and the [PCI/CQI Repeat After](#). The current ARB sequence length is adjusted by pressing the button "Adjust ARB Sequence Length".

Example: Effect of the ARB Sequence Length

- Preset the instruments and adjust the settings as described in [example "HS-DPCCH Scheduling"](#) on page 210. Use the [Scheduling List](#) to show the HS-DPCCH scheduling (see also [figure 5-27](#)).
- Change the [Compatibility Mode \(HS-DPCCH\)](#) to "Release 8 and Later" and compare the displayed HS-DPCCH scheduling in the "Scheduling List".

Real-time signal generation	ARB signal generation with "Current ARB Seq. Length" < "Suggested ARB Seq. Length"
<pre> 3GPP FDD A: ME1/Scheduling List Frame Start: 0 Number Of Frames: 10 : The channel is inactive in the slot. X: The channel is active in the slot. -: The channel is inactive in the symbol. H: HARQ-ACK information is transmitted in the symbol. C: PCI/CQI information is transmitted in the symbol. Frame: Slot: DPCCH DPDCH HS-DPCCH Slots: Slots: Symbols: 0 0 X X ----- 1 1 X X ----- 2 2 X X ----- 3 3 X X ----- 4 4 X X ----- 5 5 X X ----- 6 6 X X ----- 7 7 X X ----- 8 8 X X ----- 9 9 X X ----- 10 10 X X ----- 11 11 X X H----- 12 12 X X ----- 13 13 X X ----- 14 14 X X ----- 1 0 X X ----- 1 1 X X ----- 2 2 X X ----- 3 3 X X ----- 4 4 X X ----- 5 5 X X ----- 6 6 X X ----- 7 7 X X ----- 8 8 X X ----- 9 9 X X ----- 10 10 X X ----- 11 11 X X C----- 12 12 X X C----- 13 13 X X ----- 14 14 X X ----- 2 0 X X ----- 1 1 X X ----- 2 2 X X ----- 3 3 X X ----- </pre>	<pre> 3GPP FDD A: ME1/Scheduling List Frame Start: 0 Number Of Frames: 10 : The channel is inactive in the slot. X: The channel is active in the slot. -: The channel is inactive in the symbol. H: HARQ-ACK information is transmitted in the symbol. C: PCI/CQI information is transmitted in the symbol. _: The channel restarts because of the ARB sequence length. Frame: Slot: DPCCH DPDCH HS-DPCCH Slots: Slots: Symbols: 0 0 X X ----- 1 1 X X ----- 2 2 X X ----- 3 3 X X ----- 4 4 X X ----- 5 5 X X ----- 6 6 X X ----- 7 7 X X ----- 8 8 X X ----- 9 9 X X ----- 10 10 X X ----- 11 11 X X H----- 12 12 X X ----- 13 13 X X ----- 14 14 X X ----- 1 0 X X ----- 1 1 X X ----- 2 2 X X ----- 3 3 X X ----- 4 4 X X ----- 5 5 X X ----- 6 6 X X ----- 7 7 X X ----- 8 8 X X ----- 9 9 X X ----- 10 10 X X ----- 11 11 X X H----- 12 12 X X ----- 13 13 X X ----- 14 14 X X ----- 2 0 X X ----- </pre> <p>The channel restarts after 1 frame ("Current ARB Seq. Length"=1 frame)</p>

- The "Suggested / Current ARB Sequence Length" is 12 / 1. Press the [Adjust ARB Sequence Length \(HS-DPCCH\)](#). The "Current ARB Seq. Length" is adjusted, the channel restarts after 12 frames and the "Scheduling List" shows the HS-DPCCH scheduling in all frames as in the real-time mode.

Tip: To ensure a long enough ARB sequence, select "3GPP FDD > Filter/Clipping/ARB Settings" and adjust the [Sequence Length ARB](#) so that the ARB sequence length is multiple or equal the scheduling repetition.

SCPI command:

[\[:SOURce<hw>\]:BB:W3GPp:MSTation<st>:DPCCh:HS:SLENgth](#) on page 454

Adjust ARB Sequence Length (HS-DPCCH)

Sets the current ARB sequence length to the suggested value (see also [example "Effect of the ARB Sequence Length"](#) on page 215).

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:MSTation<st>:DPCCh:HS:SLENgth:ADJust`
on page 454

5.32.3 HS-DPCCH Settings for Normal Operation (Up to Release 7)

This section lists the settings enabled for backwards compatibility.

Power Offset ACK - HS-DPCCH - UE

Sets the power offset $P_{\text{off_ACK}}$ of an ACK response to a single scheduled transport block relative to the CQI Power P_{CQI} .

The power P_{ACK} used during the HARQ-ACK slot is calculated as:

$$P_{\text{ACK}} = P_{\text{CQI}} + P_{\text{off_ACK}}$$

The value range is -10 dB to 10 dB.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:MSTation<st>:DPCCh:HS:POACK` on page 439

Power Offset NACK - HS-DPCCH - UE

Sets the power offset $P_{\text{off_NACK}}$ of a NACK response to a single scheduled transport block relative to the CQI Power P_{CQI} .

The power P_{NACK} used during the HARQ-ACK slot is calculated as:

$$P_{\text{NACK}} = P_{\text{CQI}} + P_{\text{off_NACK}}$$

The value range is -10 dB to 10 dB.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPP:MSTation<st>:DPCCh:HS:PONAck` on page 440

ACK/NACK Pattern - HS-DPCCH - UE

(available for "MIMO Mode" set to Off only)

Enters the pattern for the HARQ-ACK field (Hybrid-ARQ Acknowledgment).

After receiving a transmission packet, the user equipment returns feedback information in the HARQ-ACK field that is related to the accuracy of downlink HS-DSCH transmission.

One bit is used per HS-DPCCH packet. The maximum length of the pattern is 32 bits.

- ""1" = ACK" The HARQ ACK is sent. Transmission was successful and correct.
- ""0" = NACK" The NACK is sent. Transmission was not correct. With an NACK, the UE requests retransmission of the incorrect data.
- ""-" = DTX" Nothing is sent. Transmission is interrupted (Discontinuous Transmission (DTX)).

SCPI command:

`[:SOURCE<hw>] :BB:W3GPP:MSTation<st>:DPCCh:HS:HAPattern` on page 440

CQI Pattern Length - HS-DPCCH - UE

(available for "MIMO Mode" set to Off only)

Sets the length of the CQI sequence. The values of the CQI sequence are entered in input fields "CQI Values". The pattern is generated cyclically.

With the CQI (Channel Quality Indicator), the user equipment informs the base station about the receive quality of the downlink HS-PDSCH.

Thus, the base station can adapt the modulation and coding scheme to improve the signal quality. The R&S Signal Generator supports the control of the base station HS-PDSCH by CQI sequences with a length of 1 to 10 values.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPP:MSTation<st>:DPCCh:HS:CQI:PLENgtH`
on page 441

CQI Values - HS-DPCCH - UE

(available for MIMO Mode set to Off only)

Enters the values of the CQI sequence. Value -1 means that no CQI is sent (DTX).

The length of the CQI sequence is set at input field CQI Length. The pattern is generated cyclically.

With the CQI (Channel Quality Indicator), the user equipment informs the base station about the receive quality of the downlink HS-PDSCH. Thus, the base station can adapt the modulation and coding scheme to improve the signal quality. The R&S Signal Generator supports the control of the base station HS-PDSCH by CQI sequences with a length of 1 to 10 values.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPP:MSTation<st>:DPCCh:HS:CQI<ch> [:VALues]`
on page 441

MIMO Mode (Up to Release 7) - HS-DPCCH - UE

(enabled for configuration for instruments equipped with option SMx-K59 only)

Enables/disables working in MIMO mode for the selected UE.

When MIMO mode is enabled, the parameters ACK/NACK Pattern, CQI Pattern Length and CQI Values are not available. Several MIMO specific parameters are enabled for configuration (see [chapter 5.32.4, "MIMO Settings HS-DPCCH \(Up to Release 7\)"](#), on page 218s).

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:MSTation<st>:DPCCh:HS:MIMO[:MODE]
```

on page 441

5.32.4 MIMO Settings HS-DPCCH (Up to Release 7)

MIMO settings are available for configuration only for instruments equipped with option R&S SMx/AMU-K59 and enabled parameter "MIMO Mode".

The MIMO settings available in this dialog allow you to adjust the HS-DPCCH settings for UE configured in MIMO mode.

	HARQ-ACK	PCI	CQI Type	CQI/CQIs/CQI1	CQI2
0	TB1: ACK, TB2: ACK	3	Type A Dual TB	2	5
1	Single TB: NACK	1	Type B	9	
2	Single TB: ACK	0	Type A Single TB	1	

The HS-DPCCH structure can be configured with the parameters [Inter TTI Distance](#) and [Number of TTIs](#), as well as by configuring the HARQ-ACK and CQI/PCI information per TTI by means of the parameters of the HS-DPCCH scheduling table. Any combination of single or dual transport block [HARQ-ACK](#), [PCI value](#), [CQI Type](#) and corresponding [CQI value\(s\)](#), as well as channel power can be configured.

Power Offset ACK/ACK - HS-DPCCH - UE

Sets the power offset $P_{\text{off_ACK/ACK}}$ of an ACK/ACK response to two scheduled transport blocks relative to the CQI Power P_{CQI} .

The power $P_{\text{ACK/ACK}}$ used during the HARQ-ACK slots is calculated as:

$$P_{\text{ACK/ACK}} = P_{\text{CQI}} + P_{\text{off_ACK/ACK}}$$

The value range is -10 dB to 10 dB.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPP:MSTation<st>:DPCCh:HS:MIMO:POAAck`
on page 442

Power Offset ACK/NACK - HS-DPCCH - UE

Sets the power offset $P_{\text{off_ACK/NACK}}$ of an ACK/NACK response to two scheduled transport blocks relative to the CQI Power P_{CQI} .

The power $P_{\text{ACK/NACK}}$ used during the HARQ-ACK slots is calculated as:

$$P_{\text{ACK/NACK}} = P_{\text{CQI}} + P_{\text{off_ACK/NACK}}$$

The value range is -10 dB to 10 dB.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPP:MSTation<st>:DPCCh:HS:MIMO:POANack`
on page 442

Power Offset NACK/ACK - HS-DPCCH - UE

Sets the power offset $P_{\text{off_NACK/ACK}}$ of an NACK/ACK response to two scheduled transport blocks relative to the CQI Power P_{CQI} .

The power $P_{\text{NACK/ACK}}$ used during the HARQ-ACK slots is calculated as:

$$P_{\text{NACK/ACK}} = P_{\text{CQI}} + P_{\text{off_NACK/ACK}}$$

The value range is -10 dB to 10 dB.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPP:MSTation<st>:DPCCh:HS:MIMO:PONack`
on page 443

Power Offset NACK/NACK - HS-DPCCH - UE

Sets the power offset $P_{\text{off_NACK/NACK}}$ of an NACK/NACK response to two scheduled transport blocks relative to the CQI Power P_{CQI} .

The power $P_{\text{NACK/NACK}}$ used during the HARQ-ACK slots is calculated as:

$$P_{\text{NACK/NACK}} = P_{\text{CQI}} + P_{\text{off_NACK/NACK}}$$

The value range is -10 dB to 10 dB.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPP:MSTation<st>:DPCCh:HS:MIMO:PONNack`
on page 443

Power Offset CQI Type A - HS-DPCCH - UE

Sets the power offset $P_{\text{off_CQI Type A}}$ of the PCI/CQI slots in case a CQI Type A report is sent relative to the CQI Power P_{CQI} .

The power $P_{\text{CQI Type A}}$ used during the PCI/CQI slots is calculated as:

$$P_{\text{CQI Type A}} = P_{\text{CQI}} + P_{\text{off_CQI Type A}}$$

Since the CQI Type B reports are used in a single stream transmission (see [chapter 3.14.6, "CQI Reports: Type A and Type B"](#), on page 36), the power $P_{\text{CQI Type B}} = P_{\text{CQI}}$.

The value range is -10 dB to 10 dB.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:MSTation<st>:DPCCh:HS:MIMO:POCA` on page 444

Number of TTIs (Up to Release 7) - HS-DPCCH - UE

Selects the number of configurable TTIs.

This parameter determines the number of the rows in the HS-DPCCH scheduling table. Each row represents one TTI. The parameters set in the table are read out cyclically.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:MSTation<st>:DPCCh:HS:MIMO:TTICount`
on page 444

HARQ-ACK (Up to Release 7) - HS-DPCCH - UE

Selects the information transmitted during the HARQ-ACK slot of the corresponding TTI (see [chapter 3.14.5, "MIMO uplink control channel support"](#), on page 34).

"DTX" Selects Discontinuous Transmission (DTX) for the corresponding TTI. During that TTI no feedback information is sent, i.e. all other parameters in the feedback signaling table are disabled.

"Single TB: ACK/Single TB: NACK" Selects an ACK or NACK response to a single scheduled transport block.

"TB1:ACK,TB2:ACK / TB1:ACK,TB2:NACK / TB1:NACK,TB2:ACK / TB1:NACK,TB2:NACK" Selects the response to two scheduled transport blocks.

:ACK /
TB1:ACK,TB2:
NACK /
TB1:NACK,TB
2:ACK /
TB1:NACK,TB
2:NACK"

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:MSTation<st>:DPCCh:HS:MIMO:TTI<ch0>:HACK`
on page 445

PCI (Up to Release 7) - HS-DPCCH - UE

Selects the PCI value transmitted during the PCI/CQI slots of the corresponding TTI (see [chapter 3.14.7, "PCI reports"](#), on page 36).

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:MSTation<st>:DPCCh:HS:MIMO:TTI<ch0>:PCI
on page 445
```

CQI Type (Up to Release 7) - HS-DPCCH - UE

Selects the type of the CQI report (see [chapter 3.14.6, "CQI Reports: Type A and Type B"](#), on page 36).

"Type A Single TB" Selects CQI Type A report with information that 1 transport block is preferred.

"Type A Double TB" Selects CQI Type A report with information that 2 transport blocks are preferred.

"Type B" Selects CQI Type B report.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:MSTation<st>:DPCCh:HS:MIMO:TTI<ch0>:
CQIType on page 446
```

CQI/CQI_s/CQI₁/CQI₂ (Up to Release 7) - HS-DPCCH - UE

Selects the CQI report transmitted during the PCI/CQI slots of the corresponding TTI (see [chapter 3.14.6, "CQI Reports: Type A and Type B"](#), on page 36).

"CQI" Sets the CQI value for CQI Type B report.

"CQI_s" Sets the CQI value in case a CQI Type A report when 1 transport block is preferred.

"CQI₁" Sets the CQI₁ value of CQI Type A report when 2 transport blocks are preferred.

"CQI₂" Sets the CQI₂ value of CQI Type A report when 2 transport blocks are preferred.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:MSTation<st>:DPCCh:HS:MIMO:TTI<ch0>:
CQI<di> on page 446
```

5.33 DPDCH Settings - UE

The "DPDCH Settings" section is where the settings are made for the DPDCH channels. This section is only available if "DPCCH + DPDCH" mode is activated (see also [chapter 5.30, "DPCCH Settings - UE"](#), on page 197).

The "Channel Table" section is where the channel table for the DPDCH channels is displayed. The number of active channels depends on the overall symbol rate set. The data sources for the data part of the individual channels can be selected in the channel table. The remaining parameters are only displayed and their value depends on the overall symbol rate set.

In UE1, the DPDCH is generated in realtime (enhanced), if only one DPDCH is selected by the overall symbol rate setting.

The "Global Enhanced Channels" button leads to a sub-menu for configuring the enhanced parameters.

	1	2	3	4	5	6
Channel Type	DPDCH	DPDCH	DPDCH	DPDCH	DPDCH	DPDCH
Symbol Rate / State	60	Off	Off	Off	Off	Off
Channelization Code	1 / 16					
DPDCH Data Source	PN 9					
DPDCH Pattern	0					
DPDCH Data List	None					
DCCH Data Source		Channel	Coding	Off		
DCCH Pattern						
DCCH Data List						

5.33.1 DPDCH Settings

State - DPDCH UE

Activates or deactivates all the DPDCH channels.

SCPI command:

[\[:SOURce<hw>\]:BB:W3GPP:MSTation<st>:DPDCh:STATe](#) on page 457

Channel Power - DPDCH UE

Sets the channel power in dB.

The power entered is relative to the powers of the other channels and does not initially relate to the "Level" power display. If [Adjust Total Power to 0dB](#) is executed, all the power data is relative to "Level".

Note: The uplink channels are not blanked in this mode (duty cycle 100%).

Test cases defined in the 3GPP standard often use notation "Signaling values for β_c and β_d ". The quantization of the gain parameters is shown in the following table which is taken from 3GPP Spec 25.213 (left columns) and supplemented by the instrument-specific values (right column).

Signaling values for β_c and β_d	Quantized amplitude ratios β_c and β_d	Power to be set for R&S Signal Generator / dB
15	1.0	0.0
14	14/15	-0.60
13	13/15	-1.24

Signaling values for β_c and β_d	Quantized amplitude ratios β_c and β_d	Power to be set for R&S Signal Generator / dB
12	12/15	-1.94
11	11/15	-2.69
10	10/15	-3.52
9	9/15	-4.44
8	8/15	-5.46
7	7/15	-6.62
6	6/15	-7.96
5	5/15	-9.54
4	4/15	-11.48
3	3/15	-13.99
2	2/15	-17.52
1	1/15	-23.52
0	Switch off	Switch channel off or -80 dB

SCPI command:

`[:SOURCE<hw>] :BB:W3Gpp:MSTation<st>:DPDCh:POWer` on page 457

Force Channelization Code To I/Q- DPDCH UE

Sets the channelization code to I/Q.

This mode can only be activated if the overall symbol rate is < 2 x 960 kbps.

It is provided for test purposes. Using an oscilloscope, the data bits of the DPDCH are visible on the I/Q signal if:

- Force Channelization Code to I/Q is On
- Scrambling Code Mode is set to Off.
- DPCCH power is - 80 dB

SCPI command:

`[:SOURCE<hw>] :BB:W3Gpp:MSTation<st>:DPDCh:FCIO` on page 456

Overall Symbol Rate - DPDCH UE

Sets the overall symbol rate of all the DPDCH channels.

The structure of the DPDCH channel table depends on this parameter. The overall symbol rate determines which DPDCHs are active, which symbol rate they have and which channelization codes they use (see [table 5-18](#)).

DPDCHs that are not active by virtue of the overall rate are also disabled for operation.

Note: Up to an overall rate of 960 ksps, only DPDCH 1 is active, its symbol rate is the same as the overall symbol rate and the channelization code is the same as spreading

factor/4 (spreading factor = chip rate / symbol rate). With an overall symbol rate greater than 960 ksps, all the active DPDCH channels have the symbol rate 960 ksps.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPP:MSTation<st>:DPDCh:ORATe` on page 457

5.33.2 Structure of the DPDCH Channel Table

Table 5-18: Structure of the DPDCH channel table in conjunction with the overall symbol rate

Overall Symbol Rate	DPDCH 1	DPDCH 2	DPDCH 3	DPDCH 4	DPDCH 5	DPDCH 6
I or Q branch	I	Q	I	Q	I	Q
15 ksps	State: ON S-Rate: 15k Ch. Code: 64	State: OFF	State: OFF	State: OFF	State: OFF	State: OFF
30 ksps	State: ON S-Rate: 30k Ch. Code: 32	State: OFF	State: OFF	State: OFF	State: OFF	State: OFF
60 ksps	State: ON S-Rate: 60k Ch. Code: 16	State: OFF	State: OFF	State: OFF	State: OFF	State: OFF
120 ksps	State: ON S-Rate: 120k Ch. Code: 8	State: OFF	State: OFF	State: OFF	State: OFF	State: OFF
240 ksps	State: ON S-Rate: 240k Ch. Code: 4	State: OFF	State: OFF	State: OFF	State: OFF	State: OFF
480 ksps	State: ON S-Rate: 480k Ch. Code: 2	State: OFF	State: OFF	State: OFF	State: OFF	State: OFF
960 ksps	State: ON S-Rate: 960k Ch. Code: 1	State: OFF	State: OFF	State: OFF	State: OFF	State: OFF
2 x 960 ksps	State: ON S-Rate: 960k Ch. Code: 1	State: ON S-Rate: 960k Ch. Code: 1	State: OFF	State: OFF	State: OFF	State: OFF
3 x 960 ksps	State: ON S-Rate: 960k Ch. Code: 1	State: ON S-Rate: 960k Ch. Code: 1	State: ON S-Rate: 960k Ch. Code: 3	State: OFF	State: OFF	State: OFF
4 x 960 ksps	State: ON S-Rate: 960k Ch. Code: 1	State: ON S-Rate: 960k Ch. Code: 1	State: ON S-Rate: 960k Ch. Code: 3	State: ON S-Rate: 960k Ch. Code: 3	State: OFF	State: OFF

Overall Symbol Rate	DPDCH 1	DPDCH 2	DPDCH 3	DPDCH 4	DPDCH 5	DPDCH 6
5 x 960 ksps	State: ON S-Rate: 960k Ch. Code: 1	State: ON S-Rate: 960k Ch. Code: 1	State: ON S-Rate: 960k Ch. Code: 3	State: ON S-Rate: 960k Ch. Code: 3	State: ON S-Rate: 960k Ch. Code: 2	State: OFF
6 x 960 ksps	State: ON S-Rate: 960k Ch. Code: 1	State: ON S-Rate: 960k Ch. Code: 1	State: ON S-Rate: 960k Ch. Code: 3	State: ON S-Rate: 960k Ch. Code: 3	State: ON S-Rate: 960k Ch. Code: 2	State: ON S-Rate: 960k Ch. Code: 2

Global Enhanced Channels... - DPDCH UE

Calls the menu for configuring all the enhanced channel settings of user equipment UE1.

The menu is described in [chapter 5.38, "Global Enhanced Channel Settings - UE1"](#), on page 247.

SCPI command:

n.a.

5.33.3 Channel Table

The "Channel Table" section is where the channel table for the DPDCH channels is displayed. The number of active channels depends on the overall symbol rate set. The data sources for the data part of the individual channels can be selected in the channel table. The remaining parameters are only displayed and their value depends on the overall symbol rate set.

Channel Type - DPDCH Channel UE

Displays the channel type.

SCPI command:

n.a.

Channel Number - DPDCH Channel UE

Displays the channel number.

SCPI command:

n.a.

(the channel is selected by the suffix at keyword CHANnel<n>)

Symbol Rate - DPDCH Channel UE

Displays the symbol rate and the state of the DCDCH channel.

The symbol rate and the state of channel 2 to 6 are dependent on the overall symbol rate set and cannot be modified.

SCPI command:

[:SOURce<hw>] :BB:W3GPp:MSTation<st>:CHANnel<ch>:DPDCh:SRATe

on page 456

Channelization Code - DPDCH Channel UE

Displays the channelization code and the modulation branch (I or Q) of the DPDCH channel.

The channelization code is dependent on the overall symbol rate set and cannot be modified.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:MSTation<st>:CHANnel<ch>:DPDCh:CCODE`
on page 454

DPDCH - DTCH Data - DPDCH Channel UE

(UE2..UE4; UE1 without channel coding)

DPDCH / DTCH

(UE1 with channel coding)

Selects the data source for the DPDCH channel.

When the selection is UE2 ... UE4, the data source for the DPDCH is always entered here.

The data source for the DPDCH is also entered here for the enhanced channels of UE1 without channel coding.

When channel coding is active, the data source for the DTCH1 component in the transport layer is selected here. In this situation, the display reads "DTCH data Source" and the "DCCH Data" entry field is enabled for selecting the data source of the DCCH channel. The data sources of the other DTCH channels can be set in the Global "Enhanced Channel Settings in the Transport Channel section" sub-menu, see [chapter 5.38, "Global Enhanced Channel Settings - UE1"](#), on page 247.

The following are available for selection as data sources:

"All 0, All1"	0 data and 1 data are generated internally.
"PN xx"	PRBS data as per CCITT with period lengths between 2^9-1 and $2^{23}-1$ is generated internally.
"Pattern"	A user-definable bit pattern with a maximum length of 64 bits is generated internally. The bit pattern is defined in the "Pattern" entry field.
"Data List"	Internal data from a programmable data list generated with the Data Editor or externally, is used. Data lists are selected in the "File Select" window, which is called by means of the Select Data List button. The "File Manager" is used to transmit external data lists to the R&S Signal Generator, and can be called within every File Select window by means of the "File Manager" button.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:MSTation<st>:CHANnel<ch>:DPDCh:DATA`
on page 455

`[:SOURCE<hw>] :BB:W3GPp:MSTation<st>:CHANnel<ch>:DPDCh:DATA:`
`PATtern` on page 456

`[:SOURCE<hw>] :BB:W3GPp:MSTation<st>[:HSUPa]:CHANnel<ch>:DPDCh:E:`
`DATA:DSElect` on page 476

5.34 E-DPDCH Settings - UE

This section is only available if DPCCH + DPDCH mode is activated (see also [chapter 5.30, "DPCCH Settings - UE"](#), on page 197).

The "Channel Table" section is where the channel table for the E-DPDCH channels is displayed. The number of active channels depends on the overall symbol rate set. The data sources for the data part of the individual channels can be selected in the channel table. The remaining parameters are only displayed and their value depends on the overall symbol rate set.

	1	2	3	4
Channel Type	E-DPDCH	E-DPDCH	E-DPDCH	E-DPDCH
Symbol Rate / State	480	Off	Off	Off
Channelization Code	1 / 2			
Channel Power /dB	0.00			
E-DPDCH Data Source	PN 9			
E-DPDCH Pattern	0			
E-DPDCH Data List	None			

5.34.1 E-DPDCH Settings

State - E-DPDCH UE

Activates or deactivates all the E-DPDCH channels.

If an FRC is set for the channel, this field is activated automatically.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:MSTation<st> [ :HSUPa ] :DPDCh:E:STATE
```

on page 490

Force Channelization Code To I/O - E-DPDCH UE

Sets the channelization code to I/O.

This mode can only be activated if the overall symbol rate is less than 2 x 960 kbps.

It is provided for test purposes. Using an oscilloscope, the data bits of the E-DPDCH are visible on the I/Q signal if:

- Force Channelization Code to I/O is On
- Scrambling Code Mode is set to Off.
- DPDCH power is - 80 dB

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:MSTation<st> [ :HSUPa ] :DPDCh:E:FCIO
```

on page 489

Overall Symbol Rate - E-DPDCH UE

Sets the overall symbol rate of all the E-DPDCH channels.

The structure of the E-DPDCH channel table depends on this parameter. The overall symbol rate determines which E-DPDCHs are active, which symbol rate they have and which channelization codes they use (see [chapter 5.34.2, "Structure of the E-DPDCH Channel Table"](#), on page 229).

E-DPDCHs that are not active by virtue of the overall rate are also disabled for operation.

If an FRC is set for the channel, this field is read-only.

Note: If the [Dynamic Power Control State](#) is enabled and/or the UL-DTX state is enabled, the E-DPDCH is generated in realtime. Then only the overall symbol rates with one E-DPDCH channel or those that restrict the E-DPDCHs to the I or Q branch are enabled for configuration.

This does not apply for R&S WinIQSIM2.

To send simultaneously multiple physical E-DPDCH, set the Overall Rate to one of the predefined two-channel configurations. For some special applications it might be necessary to split up the generation of this channels to two baseband blocks. The R&S Signal Generator provides additionally special non-standard overall symbol rates, that enable the instrument to generate only the E-DPDCH channels of the I branch or of the Q branch per baseband block.

SCPI command:

```
[ :SOURce<hw> ] :BB:W3GPp:MSTation<st> [ :HSUPa ] :DPDCh:E:ORATe
```

on page 489

Modulation - E-DPDCH UE

Sets the modulation of the E-DPDCH.

There are two possible modulation schemes specified for this channel, BPSK and 4PAM (4 Pulse-Amplitude Modulation). The latter one is available only for [Overall Symbol Rates](#) using two channels, e.g 2x960 ksp/s and/or 2x1920 ksp/s.

Note: Modulation scheme 4PAM is available only for instruments equipped with the HSPA+ option SMx-K59.

SCPI command:

```
[ :SOURce<hw> ] :BB:W3GPp:MSTation<st> [ :HSUPa ] :DPDCh:E:MODulation
```

on page 489

5.34.2 Structure of the E-DPDCH Channel Table

Table 5-19: Structure of the E-DPDCH channel table in conjunction with the overall symbol rate and no DPDCH active

Overall Symbol Rate	E-DPDCH 1	E-DPDCH 2	E-DPDCH 3	E-DPDCH 4
I or Q branch	I	Q	I	Q
15 Ksps	State: ON S-Rate: 15 k Ch. Code: 64	State: OFF	State: OFF	State: OFF
30 ksps	State: ON S-Rate: 30 k Ch. Code: 32	State: OFF	State: OFF	State: OFF
60 ksps	State: ON S-Rate: 60 k Ch. Code: 16	State: OFF	State: OFF	State: OFF
120 ksps	State: ON S-Rate: 120 k Ch. Code: 8	State: OFF	State: OFF	State: OFF
240 ksps	State: ON S-Rate: 240 k Ch. Code: 4	State: OFF	State: OFF	State: OFF
480 ksps	State: ON S-Rate: 480 k Ch. Code: 2	State: OFF	State: OFF	State: OFF
960 ksps	State: ON S-Rate: 960 k Ch. Code: 1	State: OFF	State: OFF	State: OFF
2 x 960 ksps	State: ON S-Rate: 960 k Ch. Code: 1	State: ON S-Rate: 960 k Ch. Code: 1	State: OFF	State: OFF
2 x 1920 ksps	State: ON S-Rate: 1920 k Ch. Code: 1	State: ON S-Rate: 1920 k Ch. Code: 1	State: OFF	State: OFF
2 x 960 ksps + 2 x 1920 ksps	State: ON S-Rate: 1920 k Ch. Code: 1	State: ON S-Rate: 1920 k Ch. Code: 1	State: ON S-Rate: 960 k Ch. Code: 1	State: ON S-Rate: 960 k Ch. Code: 1
2 x 960 ksps, I only	State: ON S-Rate: 960 k Ch. Code: 1	State: OFF	State: OFF	State: OFF

Overall Symbol Rate	E-DPDCH 1	E-DPDCH 2	E-DPDCH 3	E-DPDCH 4
I or Q branch	I	Q	I	Q
2 x 960 ksps, Q only	State: OFF	State: ON S-Rate: 960 k Ch. Code: 1	State: OFF	State: OFF
2 x 1920 ksps, I only	State: ON S-Rate: 1920 k Ch. Code: 1	State: OFF	State: OFF	State: OFF
2 x 1920 ksps, Q only	State: OFF	State: ON S-Rate: 1920 k Ch. Code: 1	State: OFF	State: OFF
2 x 960 ksps + 2 x 1920 ksps, I only	State: ON S-Rate: 1920 k Ch. Code: 1	State: OFF	State: ON S-Rate: 960 k Ch. Code: 1	State: OFF
2 x 960 ksps + 2 x 1920 ksps, Q only	State: OFF	State: ON S-Rate: 1920 k Ch. Code: 1	State: OFF	State: ON S-Rate: 960 k Ch. Code: 1

Table 5-20: Structure of the E-DPDCH channel table in conjunction with the overall symbol rate and one DPDCH active

Overall Symbol Rate	E-DPDCH 1	E-DPDCH 2	E-DPDCH 3	E-DPDCH 4
Active HS-DPCCH? I or Q branch	No Q	No I	Yes I	Yes Q
15 ksps	State: ON S-Rate: 15 k Ch. Code: 128	State: OFF	State: ON S-Rate: 15 k Ch. Code: 128	State: OFF
30 ksps	State: ON S-Rate: 30 k Ch. Code: 64	State: OFF	State: ON S-Rate: 30 k Ch. Code: 64	State: OFF
60 ksps	State: ON S-Rate: 60 k Ch. Code: 32	State: OFF	State: ON S-Rate: 60 k Ch. Code: 32	State: OFF
120 ksps	State: ON S-Rate: 120 k Ch. Code: 16	State: OFF	State: ON S-Rate: 120 k Ch. Code: 16	State: OFF
240 ksps	State: ON S-Rate: 240 k Ch. Code: 8	State: OFF	State: ON S-Rate: 240 k Ch. Code: 8	State: OFF

Overall Symbol Rate	E-DPDCH 1	E-DPDCH 2	E-DPDCH 3	E-DPDCH 4
Active HS-DPCCH? I or Q branch	No Q	No I	Yes I	Yes Q
480 ksps	State: ON S-Rate: 480 k Ch. Code: 4	State: OFF	State: ON S-Rate: 480 k Ch. Code: 4	State: OFF
960 ksps	State: ON S-Rate: 960 k Ch. Code: 2	State: OFF	State: ON S-Rate: 960 k Ch. Code: 2	State: OFF
2 x 960 ksps	State: ON S-Rate: 960 k Ch. Code: 2	State: ON S-Rate: 960 k Ch. Code: 2	State: ON S-Rate: 960 k Ch. Code: 2	State: ON S-Rate: 960 k Ch. Code: 2
2 x 1920 ksps	State: ON S-Rate: 1920 k Ch. Code: 1	State: ON S-Rate: 1920 k Ch. Code: 1	State: ON S-Rate: 1920 k Ch. Code: 1	State: ON S-Rate: 1920 k Ch. Code: 1
2 x 960 ksps, I only	State: OFF	State: ON S-Rate: 960 k Ch. Code: 2	State: ON S-Rate: 960 k Ch. Code: 2	State: OFF
2 x 960 ksps, Q only	State: ON S-Rate: 960 k Ch. Code: 2	State: OFF	State: OFF	State: ON S-Rate: 960 k Ch. Code: 2
2 x 1920 ksps, I only	State: OFF	State: ON S-Rate: 1920 k Ch. Code: 1	State: ON S-Rate: 1920 k Ch. Code: 1	State: OFF
2 x 1920 ksps, Q only	State: ON S-Rate: 1920 k Ch. Code: 1	State: OFF	State: OFF	State: ON S-Rate: 1920 k Ch. Code: 1

5.34.3 Channel Table

The "Channel Table" section is where the channel table for the E-DPDCH channels is displayed. The number of active channels depends on the overall symbol rate set. The data sources for the data part of the individual channels can be selected in the channel table. The remaining parameters are only displayed and their value depends on the overall symbol rate set.

Channel Type - E-DPDCH Channel UE

Displays the channel type.

SCPI command:

n.a.

Channel Number - E-DPDCH Channel UE

Displays the channel number.

SCPI command:

n.a.

(the channel is selected by the suffix at keyword `CHANnel<n>`)

Symbol Rate - E-DPDCH Channel UE

Displays the symbol rate and the state of the E-DPDCH channel.

The symbol rate and the state of the channels are dependent on the overall symbol rate set and cannot be modified.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:MSTation<st> [:HSUPa] :CHANnel<ch> :DPDCh:E:SRATe` on page 477

Channelization Code - E-DPDCH Channel UE

Displays the channelization code and the modulation branch (I or Q) of the DPDCH channel.

The channelization code is dependent on the overall symbol rate set and cannot be modified.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:MSTation<st> [:HSUPa] :CHANnel<ch> :DPDCh:E:CCODE` on page 475

Channel Power - E-DPDCH UE

Sets the power of the selected E-DPDCH channel.

The power entered is relative to the powers of the other channels and does not initially relate to the LEVEL power display. If "[Adjust Total Power to 0dB](#)" on page 64 is executed (top level of the 3GPP FDD menu), all the power data is relative to LEVEL.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:MSTation<st> [:HSUPa] :CHANnel<ch> :DPDCh:E:POWER` on page 477

E-DPDCH Data Source - E-DPDCH Channel UE

Selects the data source for the E-DPDCH channel.

The data source for the DPDCH is also entered here for the enhanced channels of UE1 without channel coding.

The following are available for selection as data sources:

- | | |
|---------------|--|
| "All 0, All1" | 0 data and 1 data are generated internally. |
| "PN xx" | PRBS data as per CCITT with period lengths between 2^9-1 and $2^{23}-1$ is generated internally. |
| "Pattern" | A user-definable bit pattern with a maximum length of 64 bits is generated internally.
The bit pattern is defined in the "Pattern" entry field. |

"Data List" Internal data from a programmable data list generated with the Data Editor or externally, is used.
Data lists are selected in the File Select window, which is called by means of the "Select Data List" button.
The "File Manager" is used to transmit external data lists to the R&S Signal Generator, and can be called within every File Select window by means of the "File Manager" button.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPP:MSTation<st> [:HSUPa] :CHANnel<ch> :DPDCh:E:DATA` on page 476

`[:SOURCE<hw>] :BB:W3GPP:MSTation<st> [:HSUPa] :CHANnel<ch> :DPDCh:E:DATA:PATtern` on page 477

`[:SOURCE<hw>] :BB:W3GPP:MSTation<st> [:HSUPa] :CHANnel<ch> :DPDCh:E:DATA:DSElect` on page 476

5.35 E-DCH Scheduling - UE

(requires option R&S SMx/AMU-K45)

The "E-DCH Scheduling" dialog comprises the settings necessary to configure the common time schedule of the E-DPDCH and E-DPCCH. The user is enabled to configure single E-DCH packets or "bursts" of variable length consisting of several successive E-DCH packets and to decide upon the E-DCH packets distribution.

The configured uplink scheduling for every UE can be displayed by means of the [Scheduling List](#).

E-DCH Scheduling	
E-DCH TTI	2 ms
Number Of Table Rows	1
Schedule Repeats After	1 TTIs
E-DCH From TTI	E-DCH To TTI
0	0



Real-time vs. ARB signal generation

The E-DCH channels are generated in real-time or as an ARB signal.

- If the E-DCH channels are generated as ARB signal, the ARB sequence length has to be long enough and a multiple or equal the scheduling repetition.
- The instrument generate the channels in real-time if [UL-DTX](#) and/or [Dynamic Power Control](#) is activated.
 - During generation of E-DCH channels in real-time, channel coding (i.e. activation of FRCs) is disabled. Use pre-channel-coded data list as "Data Source" if channel coded data on the E-DCH is required.
 - The E-DPDCH can be generated in realtime only for overall symbol rates with one E-DPDCH channel or those that restrict the E-DPDCHs to the I or Q branch.

Example: E-DCH Scheduling

To configure an E-DCH transmission in TTIs 3-6, 128-156, 1003-1006, 1128-1156, etc. perform the settings listed in [table 5-21](#).

Table 5-21: E-DCH scheduling example

Parameter	Value	Comment
Select "3GPP FDD > Filter/Clipping/ARB Settings" and adjust the Sequence Length ARB	200 frames	If the E-DCH channels are generated as ARB signal, the ARB sequence length has to be long enough and a multiple or equal the scheduling repetition.
E-DCH TTI	2 ms	
Number of Table Rows	2	two scheduled E-DCH bursts
E-DCH Schedule Repeats After	1000 TTIs	each E-DCH burst is repeated every 1000 TTIs
Row#0		E-DCH burst (4 E-DCH packets)
"E-DCH TTI From"	3	
"E-DCH TTI To"	6	
Row#1		E-DCH burst (29 E-DCH packets)
"E-DCH TTI From"	128	
"E-DCH TTI To"	156	
E-DPCCH State	On	Enables E-DPCCH
E-DPDCH State	On	Enables E-DPDCH

Open the [Scheduling List](#) to display the E-DCH scheduling.

Frame	Slot	E-DCH TTI	DPCCH Slots	E-DPCCH Slots	E-DPDCH Slots
0	0	0	X		
	1		X		
	2		X		
	3	1	X		
	4		X		
	5		X		
	6	2	X		
	7		X		
	8		X		
	9	3	X	X	X
	10		X	X	X
	11		X	X	X
	12	4	X	X	X
	13		X	X	X
	14		X	X	X
1	0	5	X	X	X
	1		X	X	X
	2		X	X	X
	3	6	X	X	X
	4		X	X	X
	5		X	X	X
	6	7	X		
	7		X		
	8		X		
	9	8	X		
	10		X		
	11		X		
	12	9	X		
	13		X		
	14		X		

E-DCH TTI - E-DCH Scheduling

Sets the size for the TTI (Transmission Time Interval).

If an [FRC](#) is set for the E-DPCCH or [UL-DTX State](#) is enabled, this field is read-only.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3Gpp:MSTation<st> [ :HSUPa ] :EDCH:TTIEdch
on page 490
```

Number of Table Rows

Sets the number of the rows in the scheduling table, i.e. determines the number of the E-DCH "bursts" enabled for configuration. An E-DCH "burst" is build of several successive E-DCH packets.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3Gpp:MSTation<st> [ :HSUPa ] :EDCH:ROWCount
on page 491
```

E-DCH Schedule Repeats After

Determine the number of TTIs after that the E-DCH scheduling is repeated.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPP:MSTation<st> [ :HSUPa ] :EDCH:REPEAT
```

on page 490

E-DCH Scheduling Table

Enables the user to flexible configure single E-DCH packets or E-DCH "bursts" of variable length consisting of several successive E-DCH packets

E-DCH TTI From ← E-DCH Scheduling Table

Determines the start TTI of the corresponding E-DCH burst.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPP:MSTation<st> [ :HSUPa ] :EDCH:ROW<ch0>:FROM
```

on page 491

E-DCH TTI To ← E-DCH Scheduling Table

Determines the end TTI of the corresponding E-DCH burst.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPP:MSTation<st> [ :HSUPa ] :EDCH:ROW<ch0>:TO
```

on page 491

5.36 Scheduling List

Opens a display of the current uplink scheduling per UE.

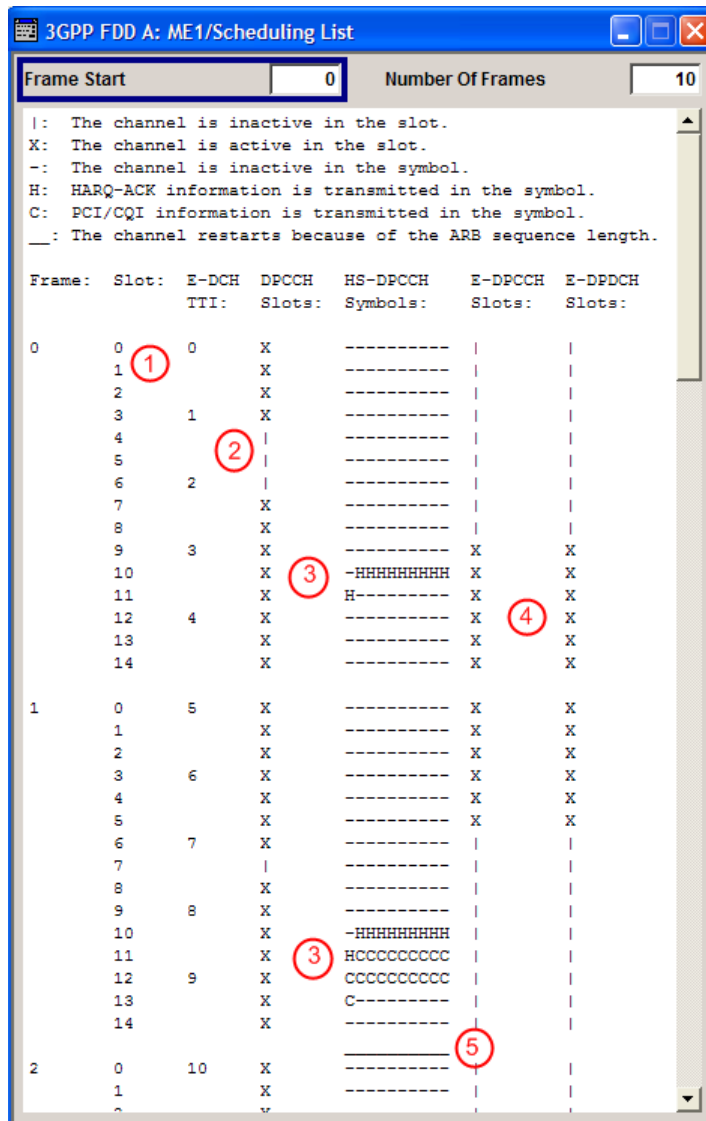


Fig. 5-28: Example of Scheduling List (UE1)

- 1 = E-DCH TTI is three slots long, i.e. E-DCH TTI = 2ms
- 2 = DPCCH shows busts pattern, i.e. UL-DTX is activated
- 3 = HS-DPCCH is active and the scheduled HARQ-ACK and PCI/CQI messages have different patterns
- 4 = E-DPCCH and E-DPDCH are active; both channels have the same E-DCH scheduling
- 5 = ARB Sequence Length = 2 frames

Frame Start

Defines the start frame of the displayed UL scheduling.

Number of Frames

Defines number of frames for that the UL scheduling is displayed.

5.37 HSUPA FRC Settings - UE

The HSUPA FRC Settings menu is where the settings for the fixed reference channel (FRC) and the settings for the HARQ simulation are made.

For more information, see also [chapter 3.11, "HARQ Feedback"](#), on page 26 and [chapter 3.13.4, "16QAM Fixed Reference Channel: FRC 8"](#), on page 31.

State	On
Fixed Reference Channel (FRC)	8
Maximum Information Bitrate /kbps	11 498.0
UE Category	7

Coding And Physical Channels	
Data Source (E-DCH)	PN 9
Overall Symbol Rate	2x960 + 2x1920 ksp/s
Modulation	4PAM
E-DCH TTI	2 ms
Number Of HARQ Processes	8
Binary Channel Bits / TTI (Nbin)	23 040
Transport Block Size Table	Table 3 (2ms)
Transport Block Size Index	124
Information Bit Payload (Ninf)	22 996
Coding Rate (Nint/Nbin)	0.998

DTX Mode	
State	<input checked="" type="checkbox"/>
User Data (DTX Pattern)	111...

HARQ Simulation	
State	<input type="checkbox"/>
Mode	Virtual HARQ
Virtual HARQ Mode	
Always Use Redundancy Version 0	<input checked="" type="checkbox"/>
HARQ1: ACK/NACK	1...
HARQ2: ACK/NACK	1...
HARQ3: ACK/NACK	1...
HARQ4: ACK/NACK	1...
HARQ5: ACK/NACK	1...
HARQ6: ACK/NACK	1...
HARQ7: ACK/NACK	1...
HARQ8: ACK/NACK	1...

HARQ Simulation	
State	<input checked="" type="checkbox"/>
Mode	HARQ Feedback
HARQ Feedback	
Always Use Redundancy Version 0	<input checked="" type="checkbox"/>
Maximum Number Of Retransmissions	4
ACK Definition	High
Delay Between HARQ And Feedback	138 *256 Chips
Additional User Delay	0 *256 Chips
Bit Error Insertion	
State	<input type="checkbox"/>
Bit Error Rate	0.001 000 0
Insert Errors On	Physical Layer
Block Error Insertion	
State	<input type="checkbox"/>
Block Error Rate	0.100 0

5.37.1 FRC General Settings

State – HSUPA FRC

Activates or deactivates the FRC state for the E-DCH channels.

If FRC is activated, the channels E-DPCCH and E-DPDCH are automatically activated.

The following parameters of these channels are set automatically, depending on the configured FRC:

- for E-DPCCH:
 - "Retransmission Sequence Number" is set to 0
 - "E-TFCI"
- For E-DPDCH:
 - Overall Symbol Rate is set according to the correspondent parameter of FRC.
 - The "Modulation" is set according to the "Modulation" used for the selected FRC.
 - The E-DPDCH Data Source is set according to the Data Source (E-DCH) used for the selected FRC.
- For E-DCH Scheduling:
 - E-DCH TTI is set according to the E-DCH TTI of the selected FRC

If the "HARQ Simulation" is disabled and the state in the DTX mode section is activated, the "E-DCH Scheduling Table" is configured according to the "DTX Pattern" specified.

By enabled "HARQ Simulation", the settings in the "E-DCH Scheduling Table" are configured to ensure a continuous E-DCH transmission.

Note: HSUPA FRCs are disabled, if "UL-DTX" or [Dynamic Power Control State](#) are activated.

SCPI command:

```
[ :SOURce<hw> ] :BB:W3GPp:MSTation<st> [ :HSUPa ] :DPCCh:E:FRC:STATe
on page 485
```

Fixed Reference Channel (FRC) - HSUPA FRC

Selects the FRC according to TS 25.141 Annex A.10.

Additionally, user defined FRC can be configured.

FRC8 is available only for instruments equipped with R&S SMx/AMU-K59.

SCPI command:

```
[ :SOURce<hw> ] :BB:W3GPp:MSTation<st> [ :HSUPa ] :DPCCh:E:FRC:CHANnel
on page 477
```

Maximum Information Bitrate/kbps – HSUPA FRC

Displays the maximum information bit rate.

SCPI command:

```
[ :SOURce<hw> ] :BB:W3GPp:MSTation<st> [ :HSUPa ] :DPCCh:E:FRC:MIBRate
on page 484
```

UE Category - HSUPA FRC

Displays the UE category that is minimum required for the selected FRC (see also [chapter 3.17.2, "UL 16QAM UE Capabilities"](#), on page 42).

SCPI command:

```
[ :SOURce<hw> ] :BB:W3GPp:MSTation<st> [ :HSUPa ] :DPCCh:E:FRC:
UECategory on page 487
```

5.37.2 Coding And Physical Channels

Data Source (E-DCH) – HSUPA FRC

Selects the data source for the E-DCH channels, i.e. this parameter affects the corresponding parameter of the E-DPDCH.

The following are available for selection as data sources:

- | | |
|---------------|--|
| "All 0, All1" | 0 data and 1 data are generated internally. |
| "PN xx" | PRBS data as per CCITT with period lengths between 2^9-1 and $2^{23}-1$ is generated internally. |
| "Pattern" | A user-definable bit pattern with a maximum length of 64 bits is generated internally.
The bit pattern is defined in the Pattern entry field. |

"Data List" Internal data from a programmable data list generated with the Data Editor or externally, is used.
Data lists are selected in the File Select window, which is called by means of the "Select Data List" button.
The File Manager is used to transmit external data lists to the R&S Signal Generator, and can be called within every File Select window by means of the File Manager button.

SCPI command:

`[:SOURce<hw>] :BB:W3GPp:MSTation<st> [:HSUPa] :DPCCh:E:FRC:DATA`
on page 478

`[:SOURce<hw>] :BB:W3GPp:MSTation<st> [:HSUPa] :DPCCh:E:FRC:DATA: PATTern` on page 479

`[:SOURce<hw>] :BB:W3GPp:MSTation<st> [:HSUPa] :DPCCh:E:FRC:DATA: DSElect` on page 479

Overall Symbol Rate - HSUPA FRC

Sets the overall symbol rate for the E-DCH channels, i.e. this parameter affects the corresponding parameter of the E-DPDCH.

SCPI command:

`[:SOURce<hw>] :BB:W3GPp:MSTation<st> [:HSUPa] :DPCCh:E:FRC:ORATe`
on page 485

Modulation - HSUPA FRC

Sets the modulation of the FRC, i.e. this parameter affects the corresponding parameter of the E-DPDCH.

There are two possible modulation schemes specified, BPSK and 4PAM (4 Pulse-Amplitude Modulation). The latter one is available only for the following [Overall Symbol Rates](#):

- 2x960 ksp/s
- 2x1920 ksp/s
- 2x960 + 2x1920 ksp/s.

Note: Modulation scheme 4PAM is available only for instruments equipped with the HSPA+ option R&S SMx/AMU-K59.

SCPI command:

`[:SOURce<hw>] :BB:W3GPp:MSTation<st> [:HSUPa] :DPCCh:E:FRC: MODulation` on page 485

E-DCH TTI - HSUPA FRC

Sets the size of the TTI (Transmission Time Interval) for the E-DCH channels, i.e. this parameter affects the corresponding parameter of the E-DCH scheduling configuration.

SCPI command:

`[:SOURce<hw>] :BB:W3GPp:MSTation<st> [:HSUPa] :DPCCh:E:FRC:TTIEdch`
on page 487

Number Of HARQ Processes - HSUPA FRC

Displays the number of HARQ (Hybrid-ARQ Acknowledgement) processes. This value determines the distribution of the payload in the subframes.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPP:MSTation<st> [:HSUPa] :DPCCh:E:FRC:HPROcesses` on page 484

Binary Channel Bits/TTI(NBin) - HSUPA FRC

Displays the number of binary bits per TTI.

Transport Block Size Table - HSUPA FRC

Selects the Transport Block Size Table from 3GPP TS 25.321, Annex B according to that the transport block size is configured.

The transport block size is determined also by the parameter "Transport Block Size Index".

The allowed values of this parameter depend on the selected "E-DCH TTI" and "Modulation" scheme.

E-DCH TTI	Modulation	Transport Block Size Table	Transport Block Size Index (E-TFCI)
2 ms	BPSK	Table 0	0 .. 127
		Table 1	0 .. 125
	4PAM	Table 2	0 .. 127
		Table 3	0 .. 124
10 ms	-	Table 0	0 .. 127
		Table 1	0 .. 120

SCPI command:

`[:SOURCE<hw>] :BB:W3GPP:MSTation<st> [:HSUPa] :DPCCh:E:FRC:TBS:TABLE` on page 486

Transport Block Size Index - HSUPA FRC

Selects the Transport Block Size Index (E-TFCI) for the corresponding table, as described in in 3GPP TS 25.321, Annex B.

The value range of this parameter depends on the selected "Transport Block Size Table".

SCPI command:

`[:SOURCE<hw>] :BB:W3GPP:MSTation<st> [:HSUPa] :DPCCh:E:FRC:TBS:INDEX` on page 486

Information Bit Payload (Ninf) - HSUPA FRC

Displays the payload of the information bit. This value determines the number of transport layer bits sent in each HARQ process.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPP:MSTation<st> [:HSUPa] :DPCCh:E:FRC:PAYBits`
on page 485

Coding Rate (Ninf/Nbin) - HSUPA FRC

Displays the relation between the information bits to binary channel bits.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPP:MSTation<st> [:HSUPa] :DPCCh:E:FRC:CRATe`
on page 478

5.37.3 DTX Mode**State (DTX) - HSUPA FRC**

Activates or deactivates the DTX (Discontinuous Transmission) mode.

Note: If activated, the "E-DCH Scheduling Table" in the "E-DPCCH Settings" dialog is configured according to the "DTX Pattern" specified.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPP:MSTation<st> [:HSUPa] :DPCCh:E:FRC:DTX:STATe`
on page 481

User Data (DTX Pattern) - HSUPA FRC

Sets the user-definable the bit pattern for the DTX. The maximum length is 64 bits.

The following values are allowed:

- 1: Data transmission
- -: DTX

Note: If activated, this setting will overwrite the "E-DCH Scheduling Table" in the "E-DPCCH Settings" dialog.

Example:

"User Data (DTX Pattern)" = "1-11-" sets the E-DCH Scheduling settings as follow:

E-DCH Scheduling				
E-DCH TTI	10 ms	E-DCH From TTI	E-DCH To TTI	
Number Of Table Rows	3	0	0	0
Schedule Repeats After	5 TTIs	1	2	2
		2	3	3

SCPI command:

`[:SOURCE<hw>] :BB:W3GPP:MSTation<st> [:HSUPa] :DPCCh:E:FRC:DTX:PATtern`
on page 481

5.37.4 HARQ Simulation

This section describes the HARQ settings.

For background information, refer to [chapter 3.11, "HARQ Feedback"](#), on page 26.



R&S SMBV instruments and the R&S WinIQSIM2 do not support HARQ Mode HARQ Feedback.

State (HARQ)

Activates or deactivates the HARQ simulation mode.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:MSTation<st> [ :HSUPa ] :DPCCh:E:FRC:HARQ:
SIMulation[:STATe] on page 484
```

Mode (HARQ)

Selects the HARQ simulation mode.

"Virtual HARQ" This mode simulates basestation feedback. For every HARQ process (either 4 or 8), a bit pattern can be defined to simulate ACKs and NACKs.

"HARQ Feed-back" (not for R&S SMBV instruments and R&S WinIQSIM2)
This mode allows the user to dynamically control the transmission of the HSUPA fixed reference channels. An "ACK" from the base station leads to the transmission of a new packet while a "NACK" forces the instrument to retransmit the packet with a new channel coding configuration (i.e. new "redundancy version") of the concerned HARQ process.

For further information, see [chapter 3.11, "HARQ Feed-back"](#), on page 26.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:MSTation<st> [ :HSUPa ] :DPCCh:E:FRC:HARQ:
SIMulation:MODE on page 482
```

Always Use Redundancy Version 0 (HARQ)

If activated, the same redundancy version is sent, that is, the redundancy version is not adjusted for the next retransmission in case of a received NACK.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:MSTation<st> [ :HSUPa ] :DPCCh:E:FRC:HARQ:
SIMulation:RVZero on page 483
```

Maximum Number Of Retransmissions (HARQ)

("HARQ mode HARQ Feedback" only)

Sets the maximum number of retransmissions. After the expiration of this value, the next packet is sent, regardless of the received feedback.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:MSTation<st> [ :HSUPa ] :DPCCh:E:FRC:HARQ:
SIMulation:MRETransmissions on page 483
```

ACK Definition (HARQ)

("HARQ mode HARQ Feedback" only)

Selects whether a high level (TTL) is interpreted as an ACK or a low level.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:MSTation<st> [ :HSUPa ] :DPCCh:E:FRC:HARQ:
SIMulation:ADEFinition on page 481
```

Connector (HARQ)

("HARQ mode HARQ Feedback" only)

Selects the connector used by the HARQ Feedback line.

Tip: Assign different connectors to the two baseboards to enable two HARQ feedback lines with different configuration.

"LEVATT" Requires an additional equipment. Connect the feedback line to the LEVATT connector on the external AUX I/O BNC adapter board R&S SMx-Z5.

"USER 1" No additional equipment is required. Connect the feedback line direct to the USER 1 connector of the instrument.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:MSTation<st> [ :HSUPa ] :DPCCh:E:FRC:HARQ:
SIMulation:CONNector on page 481
```

Delay Between HARQ And Feedback (HARQ)

(HARQ mode HARQ Feedback only)

Displays the time between the start of the HARQ process and the start of the related feedback.

For further information, see [chapter 3.11, "HARQ Feedback"](#), on page 26.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:MSTation<st> [ :HSUPa ] :DPCCh:E:FRC:HARQ:
SIMulation:DELAy:FEEDback on page 482
```

Additional User Delay

("HARQ mode HARQ Feedback "only)

Sets an additional delay to adjust the delay between the HARQ and the feedback.

For further information, see [chapter 3.11, "HARQ Feedback"](#), on page 26.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:MSTation<st> [ :HSUPa ] :DPCCh:E:FRC:HARQ:
SIMulation:DELAy:AUSer on page 482
```

HARQ1..8: ACK/NACK

(HARQ mode Virtual HARQ only)

Enters the pattern for the HARQ (Hybrid-ARQ Acknowledgement).

The maximum length of the pattern is 32 bits.

""1" = ACK" New data is transmitted and the RSN (Retransmission Sequences Number) is set to 0.

""0" = NACK" The data is retransmitted and the RSN is increased with 1.
The maximum value of RSN is 3, i.e. even if more than 3 retransmissions are configured, the RSN remains 3.

SCPI command:

[\[:SOURCE<hw>\]:BB:W3GPP:MSTation<st>\[:HSUPa\]:DPCCh:E:FRC:HARQ\[:SIMulation\]:PATTERN<ch>](#) on page 484

5.37.5 Bit and Block Error Insertion**Bit Error State - HSUPA FRC**

Activates or deactivates bit error generation.

Bit errors are inserted into the data fields of the enhanced channels. It is possible to select the layer in which the errors are inserted (physical or transport layer).

When the data source is read out, individual bits are deliberately inverted at random points in the data bit stream at the specified error rate in order to simulate an invalid signal.

SCPI command:

[\[:SOURCE<hw>\]:BB:W3GPP:MSTation<st>\[:HSUPa\]:DPCCh:E:FRC:DError:BIT:STATE](#) on page 480

Bit Error Rate - HSUPA FRC

Sets the bit error rate. The value range is 10E-1 to 10E-7.

SCPI command:

[\[:SOURCE<hw>\]:BB:W3GPP:MSTation<st>\[:HSUPa\]:DPCCh:E:FRC:DError:BIT:RATE](#) on page 480

Insert Errors On - HSUPA FRC

Selects the layer in the coding process at which bit errors are inserted.

"Transport layer" Bit errors are inserted in the transport layer.

"Physical layer" Bit errors are inserted in the physical layer.

SCPI command:

[\[:SOURCE<hw>\]:BB:W3GPP:MSTation<st>\[:HSUPa\]:DPCCh:E:FRC:DError:BIT:LAYer](#) on page 479

Block Error State - HSUPA FRC

Activates or deactivates block error generation.

The CRC checksum is determined and then the last bit is inverted at the specified error probability in order to simulate an invalid signal.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:MSTation<st> [:HSUPa] :DPCCh:E:FRC:DERRor:
BLOCk:STATe on page 480
```

Block Error Rate - HSUPA FRC

Sets block error rate.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPp:MSTation<st> [:HSUPa] :DPCCh:E:FRC:DERRor:
BLOCk:RATE on page 480
```

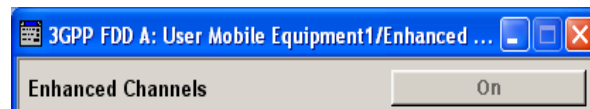
5.38 Global Enhanced Channel Settings - UE1

To access this dialog, select "UE1 > User Equipment Configuration > DPDCH Settings > Global Enhanced Settings".

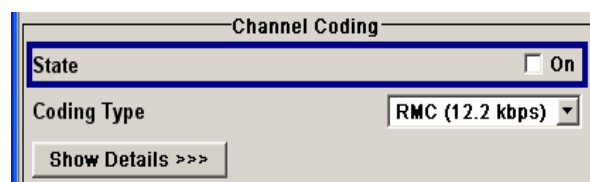


This dialog is only available for user equipment 1 (UE1).

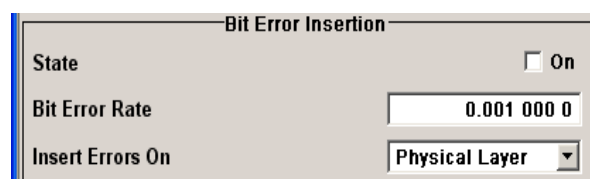
The upper section is where the enhanced state of all the UE1 channels is displayed.



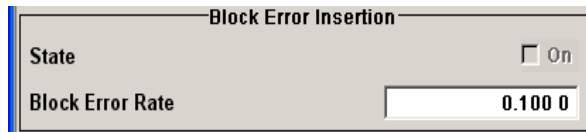
The "Channel Coding" section is where the channel coding settings are made. You can choose between a reduced display, where it is only possible to select the coding scheme, and a display with detailed setting options. The "Transport Channel" section for detailed settings can be revealed with the "Show Details" button and hidden with the "Hide Details" button.



The "Bit Error Insertion" section is where the bit error simulation is configured and activated.



The "Block Error Insertion" section is where the block error simulation is configured and activated.



5.38.1 Enhanced Channels State

Enhanced Channels State - UE 1

Displays the enhanced state of the station. As at least the DPCCH of UE1 is always calculated in realtime, the enhanced state is always on for UE1.

The DPCCH and one DPDCH of user equipment 1 are generated in realtime. Depending on the actual configurations, other channels of user equipment 1 may also be generated in realtime.

It is possible to activate channel coding and simulate bit and block errors. Data lists, for example with user data for the transport layer, can be used as the data source.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPp:MSTation:ENHanced:DPDCh:STATe` on page 504

5.38.2 Channel Coding - DPDCH Enhanced UE 1

The "Channel Coding" section is where the channel coding settings are made. You can choose between a reduced display and the detailed setting options display. With the reduced display, it is only possible to select the coding scheme and this selection sets the associated parameters to the presetting prescribed in the standard. The "Transport Channel" section for detailed setting and for defining a user coding can be revealed with the "Show Details" button and hidden with the "Hide Details" button.

An uplink reference measurement channel according to 3GPP TS 25.141 is generated when the transport channels DTCH (Dedicated Traffic Channel) and DCCH (Dedicated Control Channel), which contain the user data, are mapped to a DPDCH (Dedicated Physical Data Channel) with a different data rate after channel coding and multiplexing. The display below is taken from the standard (TS 25.141) and shows in diagrammatic form the generation of a 12.2 kbps reference measurement channel from the DTCH and DCCH transport channels.

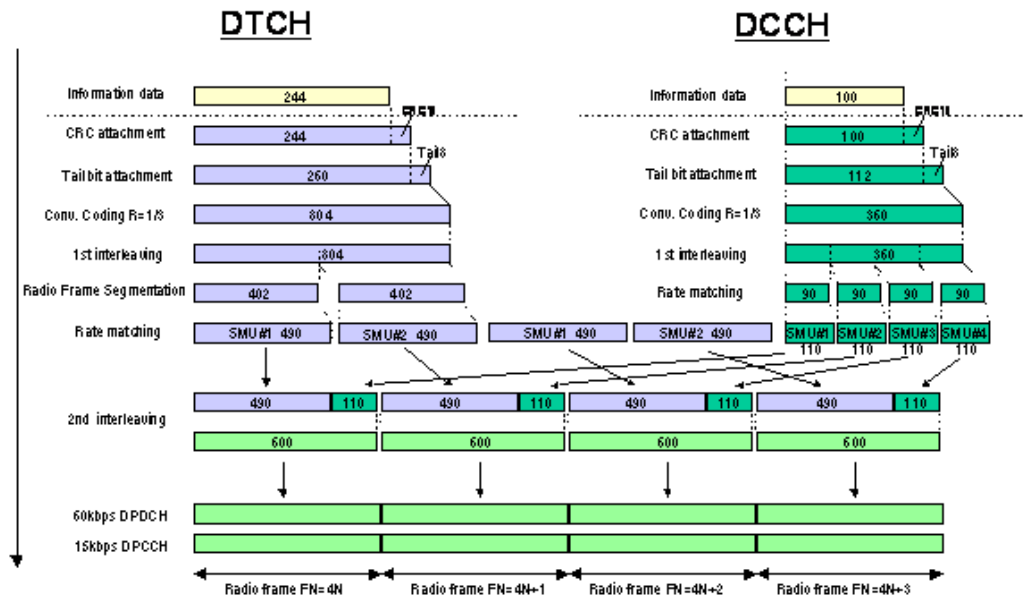


Fig. 5-29: Channel coding of the 12.2 kbps reference measurement channels (uplink)

Channel Coding State - Enhanced DPDCH UE1

Activates or deactivates channel coding.

Note: Annex A.1, 3GPP TS 25.141, lists the recommended DPCCH-settings.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPP:MSTation:ENHanced:DPDCh:CCODing:STAtE`
on page 499

Coding Type - Enhanced DPDCH UE1

Selects channel coding.

The 3GPP specification defines 4 reference measurement channel coding types, which differ in the input data bit rate bit to be processed (12.2, 64, 144 and 384 kbps). The additional AMR CODER coding scheme generates the coding of a voice channel.

"User" coding can be defined as required in the detailed coding settings menu section revealed with button "Show Details". They can be stored and loaded in the "User Coding" submenu. Selection "User" is indicated as soon as a coding parameter is modified after selecting a predefined coding type.

The input data bits are taken from the data source specified for the "Transport Channels" for channel coding. The bits are available with a higher rate at the channel coding output. The allocations between the measurement input data bit rate and the output symbol rate are fixed, that is to say, the overall symbol rate is adjusted automatically.

The following are available for selection:

- "RMC 12.2" 12.2 kbps measurement channel kbps"
- "RMC 64 kbps" 64 kbps measurement channel
- "RMC 144" 144 kbps measurement channel kbps"

"RMC 384 384 kbps measurement channel
kbps"

"AMR 12.2 Channel coding for the AMR coder
kbps"

SCPI command:

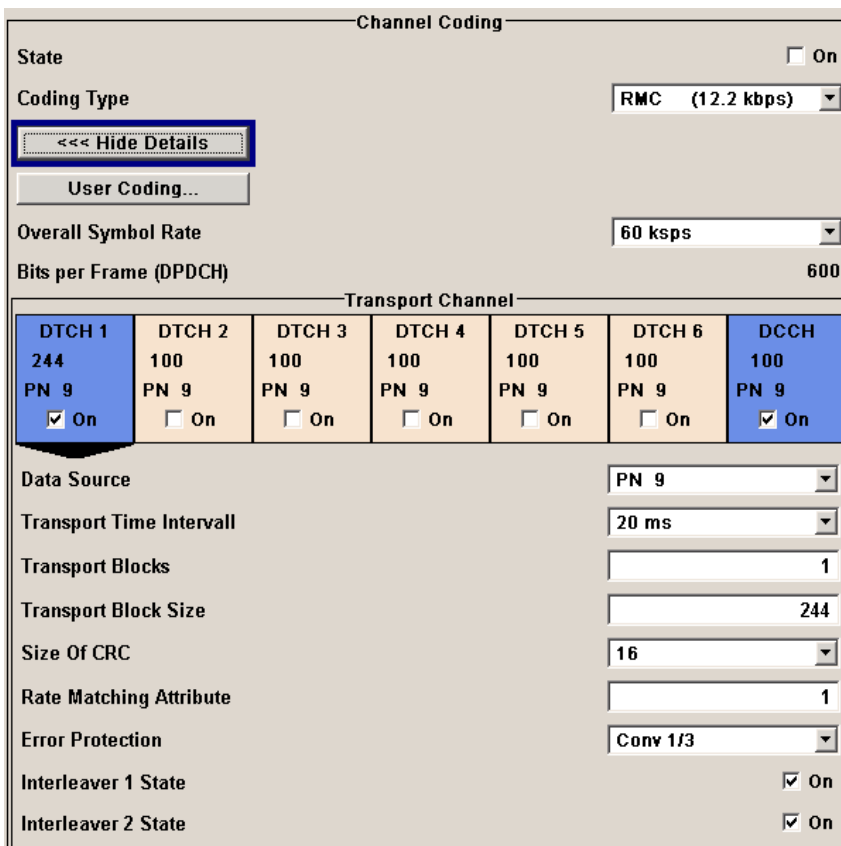
[:SOURce<hw>] :BB:W3GpP:MSTation:ENHanced:DPDCh:CCODing:TYPE
on page 499

Show Details - Enhanced DPDCH UE1

Reveals the detailed setting options for channel coding.

Available as well as the "Transport Channel" section are the "Overall Symbol Rate" and Bits "per Frame" parameters as well as the "User Coding" button.

Once the details are revealed, the labeling on the button changes to "Hide Details". Use this to hide the detailed setting options display again.



SCPI command:
n.a.

User Coding ... - DPDCH Enhanced UE

Calls the "User Coding" menu.

From the "User Coding" menu the "File Select" windows for saving and recalling user-defined channel coding and the "File Manager" can be called.



User coding of UE1 are stored as files with the predefined file extension * .

3g_ccod_ul. The file name and the directory they are stored in are user-definable; the file extension is assigned automatically.

The complete channel coding settings in the menu section "Show Details" are saved and recalled.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPP:MSTation:ENHanced:DPDCh:CCODing:USER:`

`CATalog` on page 500

`[:SOURCE<hw>] :BB:W3GPP:MSTation:ENHanced:DPDCh:CCODing:USER:`

`DELeTe` on page 501

`[:SOURCE<hw>] :BB:W3GPP:MSTation:ENHanced:DPDCh:CCODing:USER:LOAD`

on page 501

`[:SOURCE<hw>] :BB:W3GPP:MSTation:ENHanced:DPDCh:CCODing:USER:`

`STORe` on page 501

Overall Symbol Rate - Enhanced DPDCH UE1

Sets the overall symbol rate of the DPDCH.

The structure of the DPDCH channel table depends on this parameter. The overall symbol rate determines which DPDCHs are active, which symbol rate they have and which channelization codes they use.

DPDCHs that are not active by virtue of the overall rate, are also disabled for operation.

Note: Up to an overall rate of 960 ksps, only DPDCH 1 is active, its symbol rate is the same as the overall rate and the channelization code is the same as spreading factor/4 (spreading factor = chip rate / symbol rate). With an overall symbol rate greater than 960 ksps, all the active DPDCHs have the symbol rate 960 ksps.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPP:MSTation:ENHanced:DPDCh:ORATe` on page 504

Bits per Frame (DPDCH) - Enhanced DPDCH UE1

Displays the data bits in the DPDCH component of the frame at physical level. The value depends on the overall symbol rate.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPP:MSTation:ENHanced:DPDCh:BPFRame` on page 499

5.38.3 Transport Channel - Enhanced DPDCH UE1

In the "Transport Channel" section, up to 7 transport channels (TCHs) can be configured. The first one is always a DCCH; the other six are DTCHs (DTCH1 to 6). The most important parameters of the TCH are displayed (data source and transport block size). The associated parameters shown in the section below depend on which TCH is currently selected.

A wide arrow beneath the block indicates which TCH is currently selected.

Transport Channel						
DTCH 1 244 PN 9 <input checked="" type="checkbox"/> On	DTCH 2 100 PN 9 <input type="checkbox"/> On	DTCH 3 100 PN 9 <input type="checkbox"/> On	DTCH 4 100 PN 9 <input type="checkbox"/> On	DTCH 5 100 PN 9 <input type="checkbox"/> On	DTCH 6 100 PN 9 <input type="checkbox"/> On	DCCH 100 PN 9 <input checked="" type="checkbox"/> On
Data Source	PN 9					
Transport Time Interval	20 ms					
Transport Blocks	1					
Transport Block Size	244					
Size Of CRC	16					
Rate Matching Attribute	1					
Error Protection	Conv 1/3					
Interleaver 1 State	<input checked="" type="checkbox"/> On					
Interleaver 2 State	<input checked="" type="checkbox"/> On					

Transport Channel State - Enhanced DPDCH UE1

Activates or deactivates the transport channel.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPP:MSTation:ENHanced:DPDCh:TCHannel<ch> :
STATE on page 505
```

In case of remote control, DCCH corresponds to :TCHannel0, DTCH1 to :TCHannel1, etc.

Data Source - Enhanced DPDCH UE1

Selects the data source for the transport channel.

The data source for the DCCH and DTCH1 can also be selected in the main menu in the channel table.

The following are available for selection as data sources:

- "All 0, All1" 0 data and 1 data are generated internally.
- "PN xx" PRBS data as per CCITT with period lengths between 2^9-1 and $2^{23}-1$ is generated internally.
- "Pattern" A user-definable bit pattern with a maximum length of 64 bits is generated internally.
The bit pattern is defined in the "Data Pattern" entry field.
- "Data List,
Select Data
List" Internal data from a programmable data list generated with the Data Editor or externally, is used.
Data lists are selected in the "Select Data List" field.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPP:MSTation:ENHanced:DPDCh:TCHannel<di> :DATA
on page 506
```

```
[ :SOURCE<hw> ] :BB:W3GPP:MSTation:ENHanced:DPDCh:TCHannel<di> :
DATA: PATTern on page 507
```

```
[ :SOURCE<hw> ] :BB:W3GPP:MSTation:ENHanced:DPDCh:TCHannel<di> :
DATA: DSElect on page 506
```

Transport Time Interval - Enhanced DPDCH UE1

Sets the number of frames into which a TCH is divided. This setting also defines the interleaver depth.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPP:MSTation:ENHanced:DPDCh:TCHannel<ch> :
TTInterval on page 505
```

Number of Transport Blocks - Enhanced DPDCH UE1

Sets the number of transport blocks for the TCH.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPP:MSTation:ENHanced:DPDCh:TCHannel<ch> :
TBCount on page 505
```

Transport Block Size - Enhanced DPDCH UE1

Sets the size of the transport block at the channel coding input.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPP:MSTation:ENHanced:DPDCh:TCHannel<ch> :
TBSize on page 505
```

Size of CRC - Enhanced DPDCH UE1

Defines the type (length) of the CRC. Checksum determination can also be deactivated (setting None).

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPP:MSTation:ENHanced:DPDCh:TCHannel<di> :
CRCSize on page 506
```

Rate Matching Attribute - Enhanced DPDCH UE1

Sets data rate matching (Rate Matching).

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPP:MSTation:ENHanced:DPDCh:TCHannel<ch> :
RMATtribute on page 504
```

Error Protection - Enhanced DPDCH UE1

Selects error protection.

"None" No error protection

"Turbo 1/3" Turbo Coder of rate 1/3 in accordance with the 3GPP specifications.

"Conv 1/2 | 1/3" Convolution Coder of rate 1/2 or 1/3 with generator polynomials defined by 3GPP.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPP:MSTation:ENHanced:DPDCh:TCHannel<di> :
EProtection on page 507
```

Interleaver 1 State - Enhanced DPDCH UE1

Activates or deactivates channel coding interleaver state 1 of the transport channel. Interleaver state 1 can be set independently in each TCH. Activation does not change the symbol rate.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPP:MSTation:ENHanced:DPDCh:TCHannel<di>:
INTerleaver on page 508
```

Interleaver 2 State - Enhanced DPDCH UE1

Activates or deactivates channel coding interleaver state 2 of all the transport channels. Interleaver state 2 can only be set for all the TCHs together. Activation does not change the symbol rate.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPP:MSTation:ENHanced:DPDCh:INTerleaver2
on page 503
```

5.38.4 Error Insertion - Enhanced DPDCH UE1

In the "Bit Error Insertion" and "Block Error Insertion" sections, errors can be inserted into the data source and into the CRC checksum, in order, for example, to check the bit and block error rate testers.

Bit Error State - Enhanced DPDCH UE1

Activates or deactivates bit error generation.

Bit errors are inserted into the data fields of the enhanced channels. When channel coding is active, it is possible to select the layer in which the errors are inserted (physical or transport layer).

When the data source is read out, individual bits are deliberately inverted at random points in the data bit stream at the specified error rate in order to simulate an invalid signal.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPP:MSTation:ENHanced:DPDCh:DERRor:BIT:STATE
on page 502
```

Bit Error Rate TCH - Enhanced DPDCH UE1

Sets the bit error rate.

SCPI command:

```
[ :SOURCE<hw> ] :BB:W3GPP:MSTation:ENHanced:DPDCh:DERRor:BIT:RATE
on page 502
```

Insert Errors On - Enhanced DPDCH UE1

Selects the layer at which bit errors are inserted.

"Transport layer"	Bit errors are inserted in the transport layer. This layer is only available when channel coding is active.
-------------------	--

"Physical layer" Bit errors are inserted in the physical layer.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPP:MSTation:ENHanced:DPDCh:DERRor:BIT:LAYer`
on page 502

Block Error State - Enhanced DPDCH UE1

Activates or deactivates block error generation.

The CRC checksum is determined and then the last bit is inverted at the specified error probability in order to simulate an invalid signal.

Block error generation is only available when channel coding is active.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPP:MSTation:ENHanced:DPDCh:DERRor:BIT:STATe`
on page 502

Block Error Rate - Enhanced DPDCH UE1

Sets the block error rate.

SCPI command:

`[:SOURCE<hw>] :BB:W3GPP:MSTation:ENHanced:DPDCh:DERRor:BLOCK:RATE`
on page 503

6 Test Case Wizard

This chapter describes the "Test Case Wizard", provided for tests on Base Stations in Conformance with the 3G Standard 3GPP FDD.



Test Case Wizard is supported only by R&S SMU and R&S SMATE.

The following chapters describe the full functionality of the Test Case Wizard. Some of them require a Fading Simulator and hence are not supported by the R&S SMATE.

Expect as noted otherwise, the screenshots, pictures and figures in this chapter show an R&S SMU.

6.1 Introduction

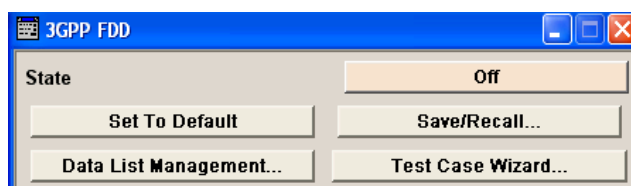
The Test Case Wizard supports tests on base stations in conformance with the 3G Standard 3GPP-FDD. It offers a selection of predefined settings according to Test Cases in TS 25.141.

The basic equipment layout for the test is the same as for the 3GPP FDD signal generation. It includes the options Baseband Main Module (B13), Baseband Generator (B10/B11) and Digital Standard 3GPP FDD (K42). However, some of the tests require further options. An overview of the available test cases is given in "[Test Case](#)" on page 260.

The Test Case Wizard has effect on frequency and level settings, link direction, trigger, baseband clock source, marker settings and base station or user equipment configuration. Besides the 3GPP required settings also interfering signals (AWGN, CW interferer, co-located modulation signals) or fading profiles are set.

The degree of freedom in setting the parameters can be determined. The "According to Standard" edit mode allows only settings in compliance with TS 25.141. The "User Definable" edit mode allows a wider range of settings.

The menu for selecting the 3GPP FDD test is either called in 3GPP FDD menu from the baseband block or from the menu tree under Baseband 3GPP FDD.



Button "Test Case Wizard" opens the menu.

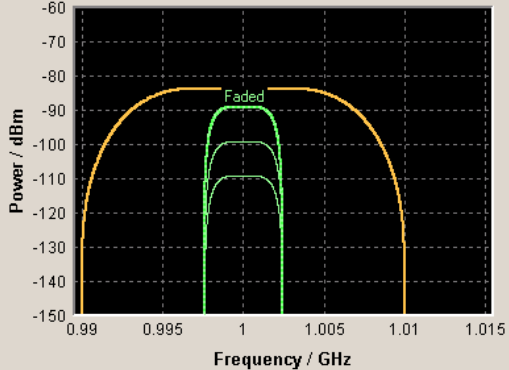
Test Case: 8.3.1. Demodulation of DCH in Multipath Fading Case 1 Conditions...

General Settings

Edit Mode: According to Standard
 Trigger Configuration: Auto (Ext. Trigger 1)
 Marker Configuration: Auto
 Diversity: Off
 Baseband A Signal Routing: To Path and RF Port A

Basestation Configuration

Scrambling Code (hex): 0
 Scrambling Mode: Long Scrambling Code
 Power Class: Wide Area BS



Wanted Signal

State: On
 Reference Measurement Channel: RMC 12.2 kbps
 RF Frequency: 1.000 000 000 GHz
 Power Level: -89.26 dBm

AWGN Configuration

State: On
 Required BLER: < 0.01
 Power Level (within 3.84 MHz BW): -84.00 dBm
 Eb/NO: 19.7 dB

Fading Configuration

State: On

Apply Settings

The "Test Wizard" dialog is divided into several sections:

At the top of the panel, the test case is selected. In the "General Settings" section the edit mode and the general signal generator parameters are set.

The base station parameters are input in the "Basestation Configuration" section.

The graph in the right upper section symbolizes the interference scenario defined by power level and frequency offset.

The middle section depends on the selected test case. It displays the input/output parameters of the wanted and the interfering signals and further configuration entries besides the default settings.

Button "Apply Settings" activates the preset settings for the selected test case. Further modification of the generator settings is still possible. Signal generation starts with the first trigger event.

With the "Test Case Wizard", it is possible to create highly complex test scenarios with just a few keystrokes, see the following example:

1. Preset the signal generator
2. Call the "Test Case Wizard" menu in the 3GPP menu
3. Choose the desired test case
4. Enter the specific settings for the selected test case , e.g. frequency, level, ...
5. Activate the settings using the "Apply Settings" button

6. Switch on RF output and further refine the generator settings if required
7. Start signal generation by a trigger from the base station at connector TRIGGER1.

6.1.1 General Considerations

Test Frequencies

For 3GPP-FDD, several paired frequency bands are used. The following table shows start and stop frequencies of both uplink (UE transmit, node B receive) and downlink (node B transmit, UE receive) frequency bands according to 3GPP.

Operating band	Uplink frequencies UE transmit, node B receive	Downlink frequencies UE receive, node B transmit
I	1920 MHz to 1980 MHz	2110 MHz to 2170 MHz
II	1850 MHz to 1910 MHz	1930 MHz to 1990 MHz
III	1710 MHz to 1785 MHz	1805 MHz to 1880 MHz
IV	1710 MHz to 1755 MHz	2110 MHz to 2155 MHz
V	824 MHz to 849MHz	869 MHz to 894MHz
VI	830 MHz to 840 MHz	875 MHz to 885 MHz

The measurements that have to be performed according to 3GPP in order to verify proper operation of FDD systems apply to appropriate frequencies in the bottom, middle and top of the operating frequency band of the base station (BS). These frequencies are denoted as RF channels B (bottom), M (middle) and T (top).

Reference Frequency

When building up the measurement setups according to TS 25.141 it might be useful that all the instruments share a common reference clock. However, after "Preset" the signal generator uses its internal clock reference. In order to feed in the clock of an external clock the RF module configuration should be switched to external reference frequency.

The image shows a configuration window titled "External Reference Frequency". It contains three dropdown menus:

- Source:** Set to "External"
- External Reference Frequency:** Set to "10 MHz"
- Synchronisation Bandwidth:** Set to "Standard"

In the external reference mode an external signal with selectable frequency and defined level must be input at the REF IN connector. This signal is output at the REF OUT connector. The reference frequency setting is effective for both paths. For very good reference sources of high spectral purity a wideband setting is provided.

Trigger Signal

For test cases with channel coded signal, e.g. an activated RMC, the base station that triggers the signal generation must emit an 'SFN (System Frame Number) mod 4' periodic trigger. A simple SFN periodic trigger probably will disturb the channel coding scheme.

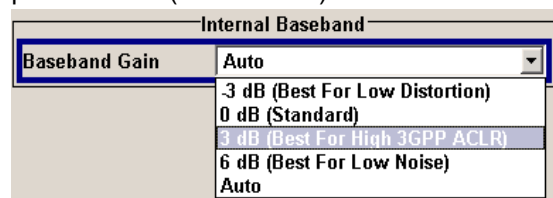
Baseband Clock

The clock source is automatically switched to internal when the test case settings are activated.

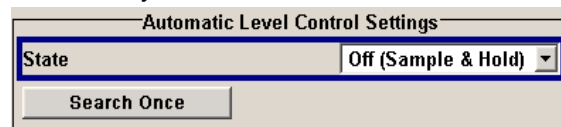
Improvement of signal quality

Improvement of signal quality is possible via several settings:

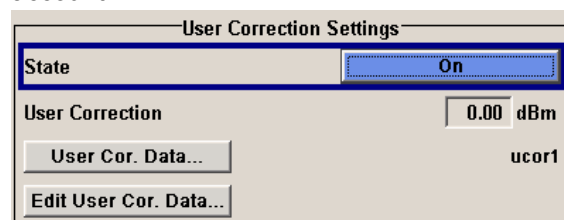
- In the "I/Q Settings" menu the internal baseband gain can be set to improved ACLR performance (3dB or 6 dB)



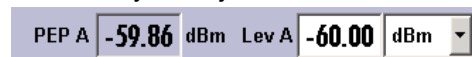
- In the "Automatic Level Control Settings" menu the RF output level can be recalibrated with "Search Once" in "Sample&Hold" mode. This is recommended if in CW mode the signal/intermodulation ratio is to be improved for multi-transmitter measurements. With setting "Auto", the level control is automatically adapted to the operating conditions, it may cause increased intermodulations, however.



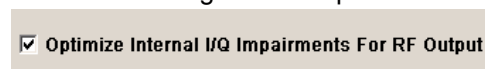
- In the "User Correction" menu a list of correction values can be created and subsequently activated. Thus, the frequency response of the test setup can be taken into account.



- In order to compensate cable loss and additionally inserted attenuators, the RF level can directly be adjusted in the "Level" input field.



- Additional settings in the impairments section of the AWGN block



6.1.2 General Settings

In the General Settings section the edit mode and the general signal generator parameters are set.

Test Case

Selects the test case.

The following table gives an overview of the available test cases, the type of signal transmitted by the signal generator and the required additional options besides the basic configuration. An equipment layout as required for 3GPP FDD signal generation for one-path instruments is assumed to be the basic configuration.

Table 6-1: Transmitter Tests

TS 25.141 chapter	Test case	Generator Signal	Additional options
6.4.2	Power control steps: Output power dynamics	Uplink	-
6.6	Transmit intermodulation	Interferer (downlink)	-

Table 6-2: Receiver Tests

TS 24.141 chapter	Test case	Generator Signal	Additional signal generator options
7.2	Reference sensitivity level	Uplink	-
7.3	Dynamic range	Uplink, AWGN	K62, AWGN
7.4	Adjacent Channel Selectivity (ACS)	Uplink, Interferer	B20x, RF path B 2nd B13, Baseband Main Module 2nd B10, Baseband Generator, 2nd K42, 3GPP FDD
7.5	Blocking characteristics	Uplink, Interferer	B20x, RF path B 2nd B13, Baseband Main Module 2nd B10, Baseband Generator, 2nd K42, 3GPP FDD
7.6	Intermodulation characteristics	Uplink, 2 x Interferer	B20x, RF path B 2nd B13, Baseband Main Module 2nd B10, Baseband Generator, 2nd K42, 3GPP FDD K62, AWGN
7.8	Verification of the internal BER calculation	Uplink	-

TS 24.141 chapter	Test case	Generator Signal	Additional signal generator options
8.2.1	Performance requirement - Demodulation in static propagation conditions: Demodulation of DCH	Uplink, AWGN	B20x, RF path B 2nd B13, Baseband Main Module 2x K62, AWGN
8.3.1	Performance requirement - Demodulation of DCH in multipath fading conditions: Multipath fading case 1	Uplink, AWGN Fading	B20x, RF path B 2nd B13, Baseband Main Module 2x K62, AWGN B14, B15, K71, Fading Options
8.3.2	Performance requirement - Demodulation of DCH in multipath fading conditions: Multipath fading case 2	Uplink, AWGN Fading	B20x, RF path B 2nd B13, Baseband Main Module 2x K62, AWGN B14, B15, K71, Fading Options
8.3.3	Performance requirement - Demodulation of DCH in multipath fading conditions: Multipath fading case 3	Uplink AWGN Fading	B20x, RF path B 2nd B13, Baseband Main Module 2x K62, AWGN B14, B15, K71, Fading Options
8.3.4	Performance requirement - Demodulation of DCH in multipath fading conditions: Multipath fading case 4	Uplink AWGN Fading	B20x, RF path B 2nd B13, Baseband Main Module 2x K62, AWGN B14, B15, K71, Fading Options
8.4	Demodulation of DCH in moving propagation conditions	Uplink AWGN Fading	B20x, RF path B 2nd B13, Baseband Main Module 2x K62, AWGN B14, B15, K71, Fading Options
8.5	Demodulation of DCH in birth/death propagation conditions	Uplink AWGN Fading	B20x, RF path B 2nd B13, Baseband Main Module 2x K62, AWGN B14, B15, K71, Fading Options
8.6	Verification of the internal BLER calculation	Uplink	B20x, RF path B 2nd B13, Baseband Main Module

TS 24.141 chapter	Test case	Generator Signal	Additional signal generator options
8.8.1	RACH performance: RACH preamble detection in static propagation conditions	Uplink AWGN	B20x, RF path B 2nd B13, Baseband Main Module 2x K62, AWGN
8.8.2	RACH performance: RACH preamble detection in multipath fading case 3	Uplink AWGN Fading	B20x, RF path B 2nd B13, Baseband Main Module 2x K62, AWGN B14, B15, K71, Fading Options
8.8.3	RACH performance: Demodulation of RACH message in static propagation conditions	Uplink AWGN	B20x, RF path B 2nd B13, Baseband Main Module 2x K62, AWGN
8.8.4	RACH performance: Demodulation of RACH message in multipath fading case 3	Uplink AWGN Fading	B20x, RF path B 2nd B13, Baseband Main Module 2x K62, AWGN B14, B15, K71, Fading Options
8.9.1	CPCH performance: CPCH access preamble and collision detection, preamble detection in static propagation conditions	Uplink AWGN	B20x, RF path B 2nd B13, Baseband Main Module 2x K62, AWGN
8.9.2	CPCH performance: CPCH access preamble and collision detection, preamble detection in multipath fading case 3	Uplink AWGN Fading	B20x, RF path B 2nd B13, Baseband Main Module 2x K62, AWGN B14, B15, K71, Fading Options
8.9.3	CPCH performance: Demodulation of CPCH message in static propagation conditions	Uplink AWGN	B20x, RF path B 2nd B13, Baseband Main Module 2x K62, AWGN
8.9.4	CPCH performance: Demodulation of CPCH message in multipath fading case 3	Uplink AWGN Fading	B20x, RF path B 2nd B13, Baseband Main Module 2x K62, AWGN B14, B15, K71, Fading Options

SCPI command:

[:SOURce] :BB:W3GPp:TS25141:TCASe on page 525

Edit Mode

Selects the edit mode.

"According to Standard" Only settings in compliance with TS 25.141 are possible in the wizard panel.

"User Defina-ble" A wider range of settings is possible in the wizard panel.

SCPI command:

[\[:SOURCE\]:BB:W3GPp:TS25141:EMODE](#) on page 514

Trigger Configuration

Selects the trigger configuration. The trigger is used to synchronize the signal generator to the other equipment.

"Auto" The trigger settings are customized for the selected test case. In most cases trigger setting "Armed Auto" with external trigger source "External Trigger 1" is used. Unless otherwise noted the trigger delay is set equal to zero. Thus, the base station frame timing is able to synchronize the signal generator by a SFN (System Frame Number) periodic trigger. If the signal generator offers a channel coded signal (as all the Reference Measurements Channels require) the base station must emit a 'SFN mod 4' periodic trigger.

"Unchanged" The current trigger settings of the signal generator are retained unchanged.

SCPI command:

[\[:SOURCE\]:BB:W3GPp:TS25141:TRIGger](#) on page 526

Marker Configuration

Selects the marker configuration. The marker can be used to synchronize the measuring equipment to the signal generator.

"Auto" The marker settings are customized for the selected test case. In most cases "Radio Frame" markers are output. Unless otherwise noted the marker delays are set equal to zero.

"Unchanged" The current marker settings of the signal generator are retained unchanged.

SCPI command:

[\[:SOURCE\]:BB:W3GPp:TS25141:TRIGger:OUTPut](#) on page 526

Diversity

Selects the signal routing according to the base station's diversity processing capability.

"ON"

The test signal is routed to both RF outputs.

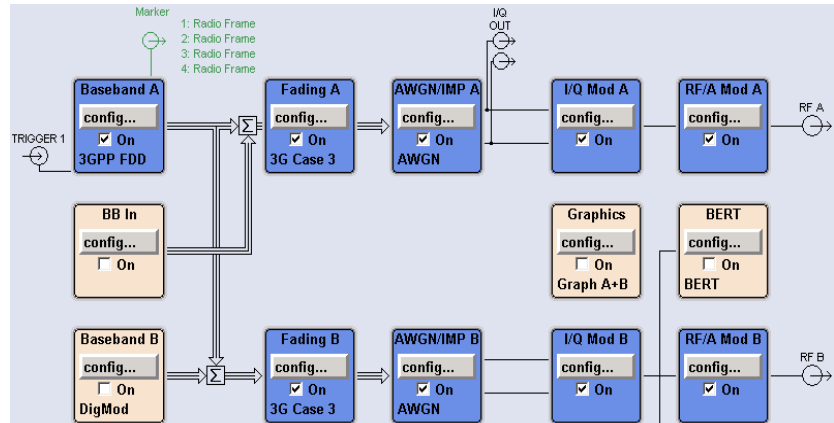


Fig. 6-1: Signal routing R&S SMU

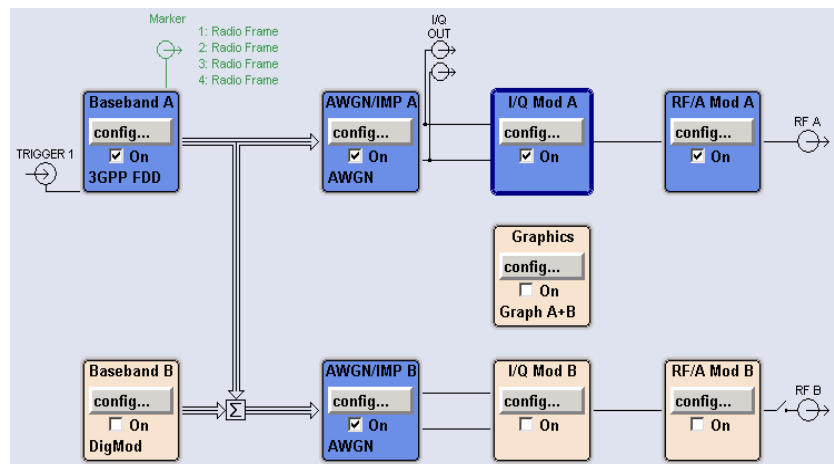


Fig. 6-2: Signal routing R&S SMATE

"Off"

The test signal is routed to the selected RF output.

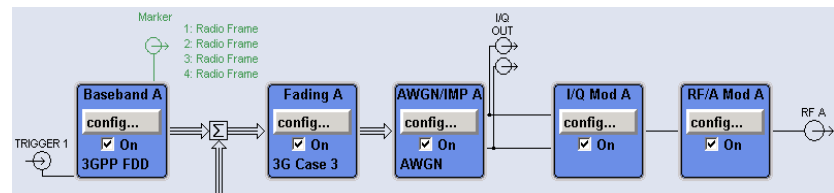


Fig. 6-3: Signal routing R&S SMU

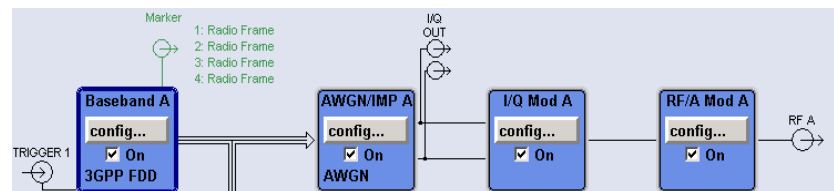


Fig. 6-4: Signal routing R&S SMATE

SCPI command:

[\[:SOURCE\]:BB:W3GPP:TS25141:RXDiversity](#) on page 523

Baseband A Signal Routing

Selects the signal routing for baseband A signal which in most test cases represents the wanted signal (exception test case 6.6).

"A" The baseband signal A is routed to RF output A.

"B" The baseband signal A is routed to RF output B.

SCPI command:

[\[:SOURCE\]:BB:W3GPP:TS25141:ROUTE](#) on page 523

6.1.3 Basestation Configuration

The base station parameters are input in the "Basestation Configuration" section.

Scrambling Code (hex)

Enters the scrambling code.

SCPI command:

[\[:SOURCE\]:BB:W3GPP:TS25141:SCODE](#) on page 524

Scrambling Mode

Sets the type of scrambling code.

With scrambling code, a distinction is made between "Long" and "Short Scrambling Code" for uplink signals. For downlink signals (test case 6.6) the scrambling code generator can be switched on and off.

"On " (downlink only)
Enables scrambling code generator.

"Off" Disables scrambling code generator for test purposes.

"Long Scrambling Code" (uplink only)
Sets the long scrambling code.

"Short Scrambling Code" (uplink only)
Sets short scrambling code.

SCPI command:

[\[:SOURCE\]:BB:W3GPP:TS25141:SCODE:MODE](#) on page 524

Power Class

Enters the base station power class. The selected power class determines the output level of the signal generator. The output level is indicated in the "Wanted Signal" section of the Wizard panel.

For edit mode "User Definable", the output level can be set in the "Wanted Signal" section of the Wizard panel.

"Wide Area BS" Enables power class wider area BS

"Medium Range BS" Enables power class medium range BS

"Local Area BS" Enables power class local area BS

SCPI command:

[\[:SOURCE\]:BB:W3GPP:TS25141:BSPClass](#) on page 513

6.1.4 Apply

Apply Settings

Activates the current settings of the test case wizard.

Initialization of the signal generator with the test case settings is performed by a partial reset that includes only the baseband, fading and AWGN module and the RF frequency and RF level settings. Other settings of the signal generator are not altered.

Before triggering the signal generator the user still can change these other settings. This is particularly useful when compensating for cable loss and additionally inserted attenuators by adjusting the RF power levels is required.

Signal generation is started at the first trigger received by the generator. The RF output is not activated /deactivated by the test case wizard, so care has to be taken that RF State is On at the beginning of the measurement.

Note: For safety reasons the RF is not active unless the button RF ON has been pressed.

SCPI command:

[\[:SOURCE\]:BB:W3GPP:TS25141:TCASE:EXECute](#) on page 525

6.2 Receiver Tests

6.2.1 Overview

6.2.1.1 Basic Configuration

The test cases for receiver tests require at least the following equipment layout for the signal generator:

- Digital Standard 3GPP FDD (K42)
- Universal Coder / Arbitrary Waveform Generator (B10/B11),
- Baseband Main module (B13),
- Frequency option (B10x: RF 100 kHz - x GHz).

If the test case requires further options they are listed together with the description of the test case.

Receiver test can be performed with the signal generator only, i.e. without additional measuring equipment.

6.2.1.2 Test Setups - Receiver Tests

The tests can be performed using the standard test setup according to TS 25.141. Test setups beside the two standard test setups described below are specified at the Test Case description.

Standard Test Setup - One Path

In case of two-path instruments signal routing to path A is assumed for the graph below. RF port A outputs the wanted signal (with or without fading and/or interference) and is connected to the Rx port of the base station. The signal generator will start signal generation at the first BS frame trigger sent to input TRIGGER 1.

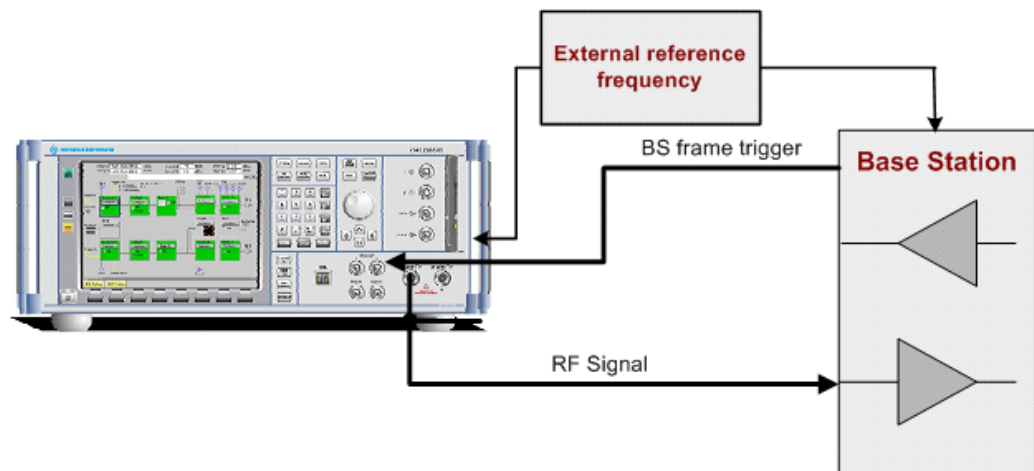


Fig. 6-5: Standard Test Setup (One Path) R&S SMU

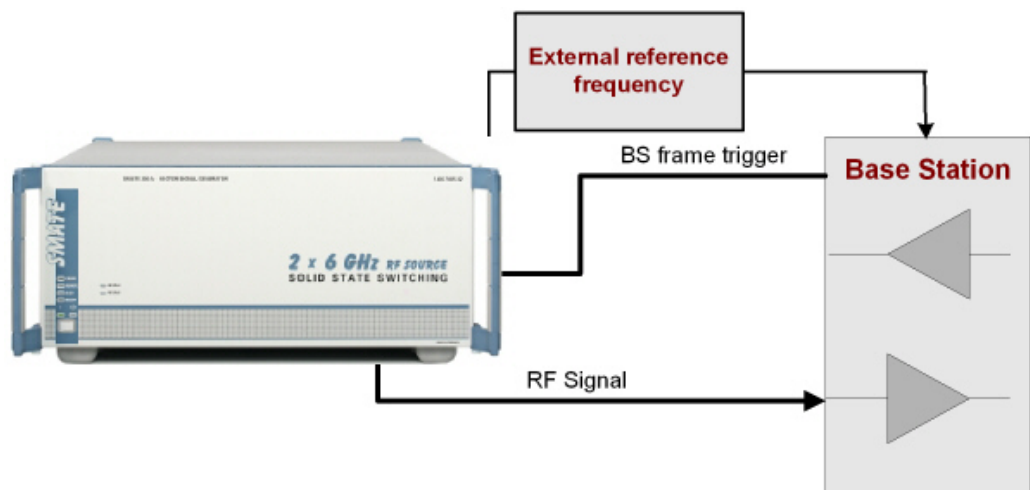


Fig. 6-6: Standard Test Setup (One Path) R&S SMATE

For two-path instruments it is also possible to route baseband signal A to RF output B and connect RF output B to the Rx port of the base station.

Example: Signal Routing "To Path and RF port A" for test case 6.3.2 Multipath Fading Case 2

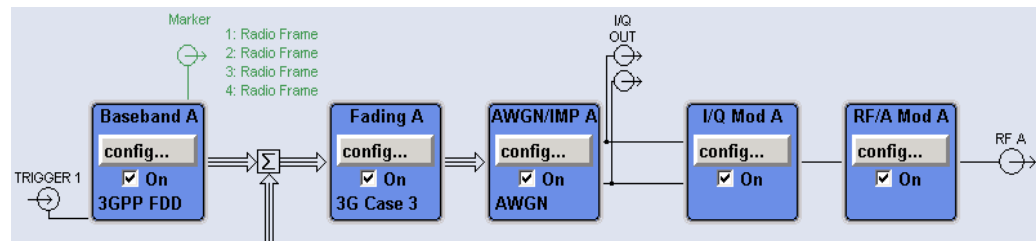


Fig. 6-7: Signal routing R&S SMU

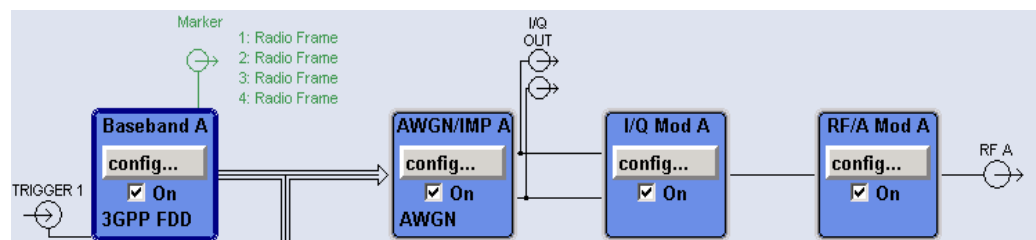


Fig. 6-8: Signal routing R&S SMATE

Standard Test Setup - Two Paths

For two-paths measurements, the test cases always require option Second RF path (B20x), a second option Baseband Main Module (B13) and at least one option to generate the interfering signal in addition to the basic configuration. The signal routing can be selected, the wanted signal can be provided either at output RF A or at output RF B.

The signal generator outputs the reference measurement channel signal (= wanted signal) at output RF A and the interfering signal(s) at output RF B. After combining the two(three) signals the sum signal is fed into the base station Rx port. The signal generator will start signal generation at the first BS frame trigger sent to input TRIGGER 1.

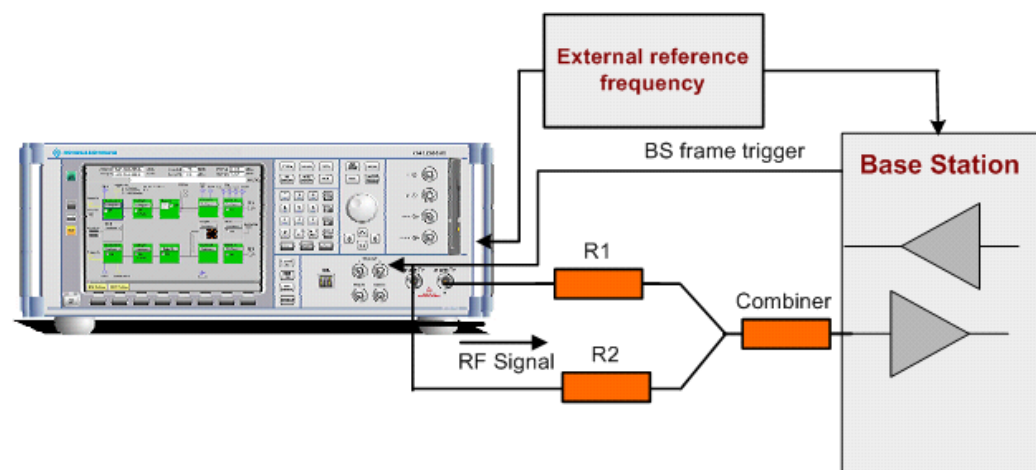


Fig. 6-9: Standard Test Setup (Two Paths) R&S SMU

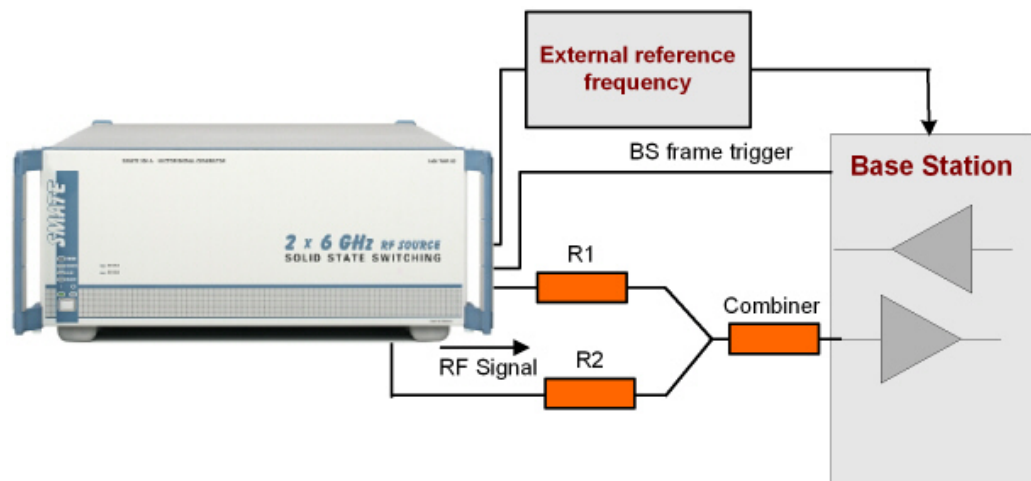


Fig. 6-10: Standard Test Setup (Two Paths) R&S SMATE

Example: Signal Routing To Path and RF port A for test case 7.6 Intermodulation Characteristics

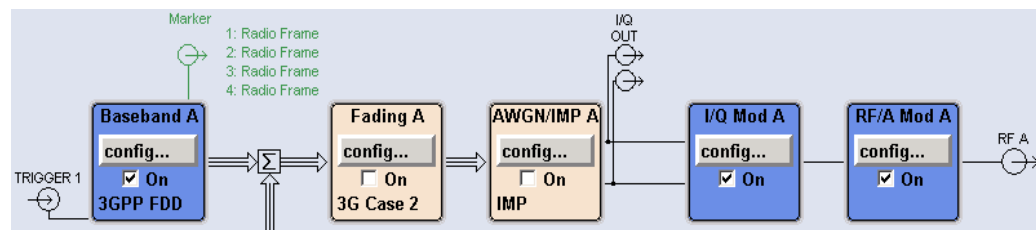


Fig. 6-11: Signal Routing R&S SMU

Example: Signal Routing To Path and RF port B for test case 7.6 Intermodulation Characteristics

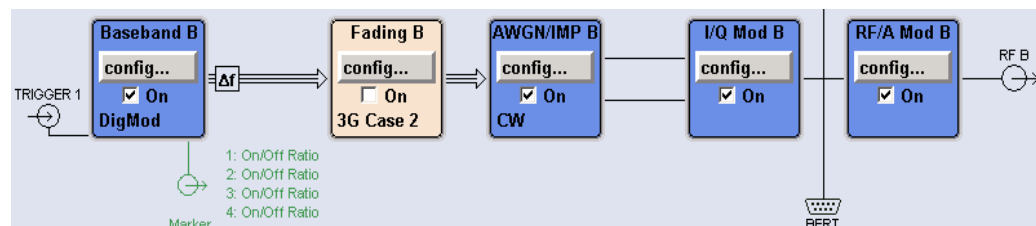


Fig. 6-12: Signal Routing R&S SMU

Standard Test Setup - Diversity Measurements

For **diversity measurements**, the test cases always require at least option Second RF path (B20x) and a second option Baseband Main Module (B13) in addition to the basic configuration. The signal routing is fixed.

RF output A and RF output B transmit the corrupted reference measurement channel signal (wanted signal) and are connected to the Rx ports of the base station for diversity reception. The signal generator will start signal generation at the first BS frame trigger sent to input "Trigger 1".

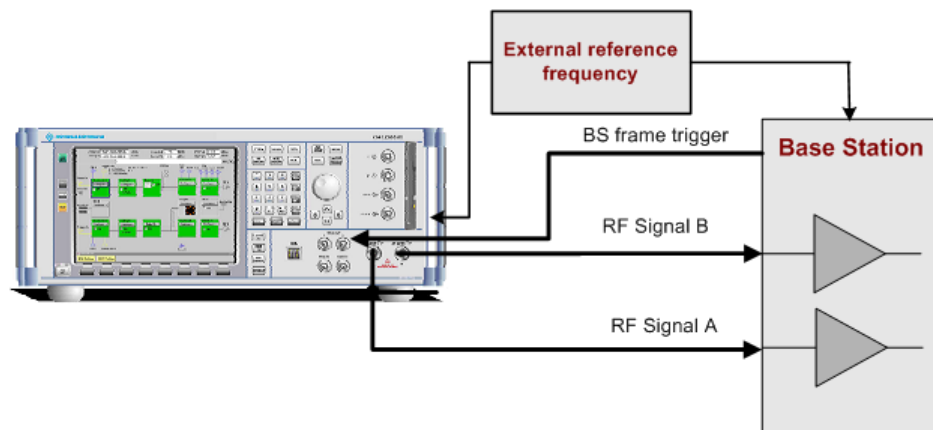


Fig. 6-13: Standard Test Setup (Diversity Measurements) R&S SMU

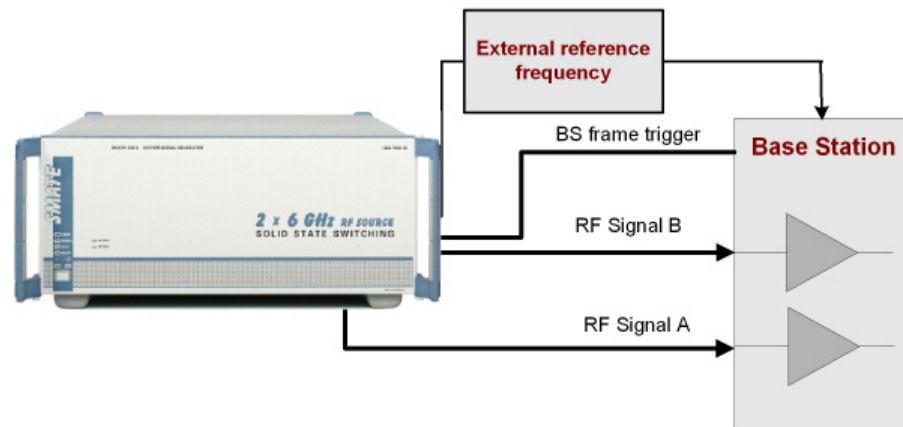


Fig. 6-14: Standard Test Setup (Diversity Measurements) R&S SMATE

Example: Signal Routing for test case 8.3.1 Multipath Fading Case 1

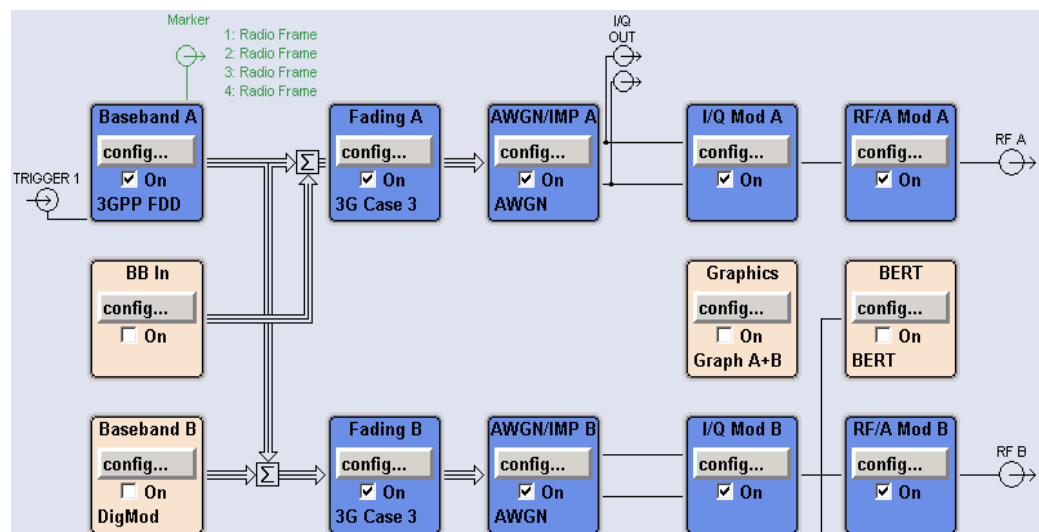


Fig. 6-15: Signal Routing R&S SMU



As signal routing takes place at the output of the baseband block, the interference settings of the two paths are identical for diversity measurements.

6.2.1.3 Carrying Out a Receiver Test Measurement

The following instructions list the general steps for performing a receiver test. Specific requirements are described together with the individual test case.

1. Set the base station to the basic state
 - a) Initialize the base station,
 - b) Set the scrambling scheme,
 - c) Set the frequency
 - d) Set the base station to receive the Reference Measurement Channel (for most test cases),
2. Set the signal generator to the basic state
 - a) reset the signal generator.
3. Set the test case wizard
 - a) Open the 3GPP FDD menu in the baseband block
 - b) Open the Test Case Wizard and select Test Case
The General Settings parameters are preset according to TS 25.141
 - c) Enter scrambling code and scrambling mode according to the base station scrambling scheme.
 - d) Enter additional required parameters, e.g. power class of base station.
 - e) Enter the test frequency (e.g. M). It must be the same as the base station has been set to.
 - f) Activate the settings with the "Apply Settings" button.
The signal generator is now ready to start signal generation
4. Switch on RF output
5. If required, make additional settings (e.g. in the "I/Q Mod" or "RF" block) or change test case settings (e.g. in the "Fading" block)
6. Start the measurement
 - a) Send a start trigger impulse (e.g. SFN modulo 4) from the base station to the signal generator.
The signal generator will start signal generation.
7. Calculate the result
The base station internally calculates the BER, BLER or Pd depending on the test case. This value is compared to the required value.

6.2.1.4 General Wanted Signal Parameters

The following parameters are available for all receiver tests. Specific parameters are listed together with the Test Case description.

Wanted Signal State - Receiver Tests

Enables/disables the signal generation of the wanted 3GPP signal.

In edit mode "According to Standard" the state is fixed to "On".

SCPI command:

[\[:SOURCE\]:BB:W3GPp:TS25141:WSIGnal:STATE](#) on page 538

RMC - Receiver Tests

Sets the reference measurement channel.

In edit mode "According to Standard" the selection of the reference measurement channel is restricted.

In edit mode "User definable", all following reference measurement channels are available for selection:

"RMC 12.2 12.2 kbps measurement channel
kbps"

"RMC 64 kbps" 64 kbps measurement channel

"RMC 144 144 kbps measurement channel
kbps"

"RMC 384 384 kbps measurement channel
kbps"

"AMR 12.2 channel coding for the AMR coder
kbps"

SCPI command:

[\[:SOURCE\]:BB:W3GPp:TS25141:WSIGnal:DPDCh:CCODing:TYPE](#) on page 533

Wanted Signal Frequency - Receiver Tests

Sets the RF frequency of the wanted signal.

SCPI command:

[\[:SOURCE\]:BB:W3GPp:TS25141:WSIGnal:FREQuency](#) on page 535

Wanted Signal Level - Receiver Tests

Sets the RF level in edit mode "User Definable".

In edit mode "According to Standard" the RF level is determined by the selected "Power Class".

SCPI command:

[\[:SOURCE\]:BB:W3GPp:TS25141:WSIGnal:POWer](#) on page 537

6.2.2 Receiver Characteristics

6.2.2.1 Test Case 7.2 - Reference Sensitivity Level

The test case requires the basic configuration and is performed using the standard test setup for one path. The signal generator outputs a reference measurement channel signal.

Table 6-3: The following table lists the settings on the base station:

Parameter	Value
Frequency	B, M and T
RMC	12.2 kbps
Scrambling code	Any
TPC function	OFF

Test Purpose and Test Settings - Test Case 7.2

The test case verifies that a BS receiver has the capability to correctly demodulate the signal sent by the signal generator at the specified (low) reference sensitivity power level.

The test is passed when the resulting BER (calculated internally by the BS) is below a 0.001 at the test frequencies B, M, and T. Note TS 25.141 Annex C: General Rules for Statistical Testing, where test conditions in terms of test methods and test conditions are defined.

Quotation from TS 25.141:

The reference sensitivity level is the minimum mean power received at the antenna connector at which the BER shall not exceed the specific value indicated in subclause 7.2.2. The test is set up according to Figure B.7 and performed without interfering signal power applied to the BS antenna connector. For duplex operation, the measurement configuration principle is indicated for one duplex branch in Figure B.7. For internal BER calculation an example of the test connection is as shown in figure B.7. The reference point for signal power is at the input of the receiver (antenna connector).

The measurement must be made at the three frequencies B, M and T.

Test Case: 7.2. Reference Sensitivity Level...

General Settings

Edit Mode: According to Standard

Trigger Configuration: Auto (Ext. Trigger 1)

Marker Configuration: Auto

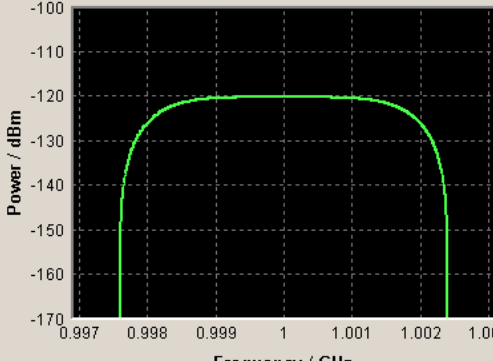
Baseband A Signal Routing: To Path and RF Port A

Basestation Configuration

Scrambling Code (hex): 0

Scrambling Mode: Long Scrambling Code

Power Class: Wide Area BS



State: **Wanted Signal** On

Reference Measurement Channel: RMC 12.2 kbps

RF Frequency: 1.000 000 000 GHz

Power Level: -120.3 dBm

Apply Settings

The settings of the wanted signal are described in [chapter 6.2.1.4, "General Wanted Signal Parameters"](#), on page 273.

6.2.2.2 Test Case 7.3 - Dynamic Range

The test case is performed using the standard test setup for one path.

It requires option K62 - Additional White Gaussian Noise (AWGN) in addition to the basic configuration.

The signal generator outputs a reference measurement channel signal disturbed by an interfering AWGN signal.

Table 6-4: The following table lists the settings on the base station:

Parameter	Value
Frequency	B, M and T
RMC	12.2 kbps
Scrambling code	Any

Test Purpose and Test Settings - Test Case 7.3

The test case verifies that a BS receiver has the capability to demodulate the useful signal sent by the signal generator even when it is superimposed by a heavy AWGN (Additive White Gaussian Noise) signal.

The test is passed when the resulting BER (calculated internally by the BS) is below 0.001 at the test frequencies B, M, and T. Note TS 25.141 Annex C: General Rules for Statistical Testing, where test conditions in terms of test methods and test conditions are defined.

Quotation from TS 25.141

Receiver dynamic range is the receiver ability to handle a rise of interference in the reception frequency channel. The receiver shall fulfil a specified BER requirement for a specified sensitivity degradation of the wanted signal in the presence of an interfering AWGN signal in the same reception frequency channel.

Test Case		7.3. Dynamic Range...	
General Settings			
Edit Mode	According to Standard		
Trigger Configuration	Auto (Ext. Trigger 1)		
Marker Configuration	Auto		
Baseband A Signal Routing	To Path and RF Port A		
Basestation Configuration			
Scrambling Code (hex)	0		
Scrambling Mode	Long Scrambling Code		
Power Class	Wide Area BS		
Wanted Signal			
State	On	Reference Measurement Channel	RMC 12.2 kbps
RF Frequency	1.000 000 000 00 GHz	Power Level	-89.80 dBm
AWGN Configuration			
State	On		
C/N	-16.80 dB	Power Level (within 3.84 MHz BW)	-73.00 dBm
Apply Settings			

Besides the settings described for all receiver tests, AWGN configuration is possible in edit mode "User Definable". In edit mode "According to Standard" the AWGN settings are preset:

AWGN State - Test Case 7.3

Enables/disables the generation of the AWGN signal.

In edit mode "According to Standard" the state is fixed to "On".

SCPI command:

C/N - Test Case 7.3

Sets the carrier/noise ratio.

In edit mode "According to Standard" the state is fixed to -16.8 dB.

SCPI command:

[\[:SOURce\]:BB:W3Gpp:TS25141:AWGN:CNRatio](#) on page 510

Power Level - Test Case 7.3

Sets the AWGN level in edit mode "User Definable".

In edit mode "According to Standard" the AWGN level is determined by the selected "Power Class".

- -73 dB for Wide Area BS

- -63 dB for Medium Range BS
- -59 dB for Local Area BS

SCPI command:

[:SOURce] :BB:W3GPP:TS25141:AWGN:POWer:NOISe on page 511

6.2.2.3 Test Case 7.4 - Adjacent Channel Selectivity

The test case requires option Second RF path (B20x), a second option Baseband Main Module (13), a second option Baseband Generator (B10/B11) and a second option Digital Standard 3GPP FDD (K42) in addition to the standard configuration. It is performed using the standard test setup for two paths.

The signal generator outputs the reference measurement channel signal (= wanted signal) at output RF A(B) and the adjacent channel interfering signal at output RF B(A). After combining the two signals the sum signal is fed into the base station Rx port. The signal generator will start signal generation at the first BS frame trigger sent to input "Trigger 1".

The measurement must be made at the three frequencies B, M and T.

Table 6-5: The following table lists the settings on the base station:

Parameter	Value
Frequency	B, M and T
RMC	12.2 kbps
Scrambling code	Any

Test Purpose and Test Settings - Test Case 7.4

The test case verifies that a BS receiver has the capability to demodulate a signal that is sent by the signal generator but superimposed by a heavy WCDMA signal in the adjacent channel.

The test is passed when the resulting BER (calculated internally by the BS) is below 0.001 at the test frequencies B, M, and T. Note TS 25.141 Annex C: General Rules for Statistical Testing, where test conditions in terms of test methods and test conditions are defined.

Quotation from TS 25.141:

Adjacent channel selectivity (ACS) is a measure of the receiver ability to receive a wanted signal at its assigned channel frequency in the presence of an adjacent channel signal at a given frequency offset from the center frequency of the assigned channel. ACS is the ratio of the receiver filter attenuation on the assigned channel frequency to the receiver filter attenuation on the adjacent channel(s).

The interference signal is offset from the wanted signal by the frequency offset F_{uw} . The interference signal shall be a W-CDMA signal as specified in Annex I.


Test Case: 7.4. Adjacent Channel Selectivity (ACS)...

General Settings

Edit Mode: According to Standard
 Trigger Configuration: Auto (Ext. Trigger 1)
 Marker Configuration: Auto
 Baseband A Signal Routing: To Path and RF Port A

Basestation Configuration

Scrambling Code (hex): 0
 Scrambling Mode: Long Scrambling Code
 Power Class: Wide Area BS



Wanted Signal

State: On
 Reference Measurement Channel: RMC 12.2 kbps
 RF Frequency: 1.000 000 000 GHz
 Power Level: -115.00 dBm

Interferer Configuration

State: On
 Frequency Offset: +5 MHz C/I: -63.00 dB
 Modulation: W-CDMA (3GPP FDD)

Apply Settings

Besides the settings described for all receiver test, interferer configuration is possible in edit mode "User Definable". In edit mode "According to Standard" the settings are preset.

Interferer State - Test Case 7.4

Enables/disables the signal generation of the interfering uplink signal in the second path. In edit mode "According to Standard" the state is fixed to "On".

SCPI command:

[\[:SOURce\]:BB:W3GPp:TS25141:IFSignal:STATe](#) on page 522

Frequency Offset - Test Case 7.4

Enters the frequency offset of the interfering signal versus the wanted signal.

In edit mode "According to Standard" the choice is limited to +/- 5 MHz.

SCPI command:

[\[:SOURce\]:BB:W3GPp:TS25141:IFSignal:Foffset](#) on page 518

C to I - Test Case 7.4

Enters the ratio of wanted signal level to interfering signal level.

In edit mode "According to Standard" the value is fixed to - 63 dB:

SCPI command:

[\[:SOURce\]:BB:W3GPp:TS25141:IFSignal:CNRatio](#) on page 515

Interferer Modulation - Test Case 7.4

Selects the type of modulation for the interfering uplink signal in the second path.

In edit mode "According to Standard" the modulation is fixed to "W-CDMA (3GPP FDD)".

- "W-CDMA (3GPP FDD)" A 3GPP FDD uplink signal with the following characteristic is generated for path B.
- DPCCH + DPDCH mode
 - DPDCH with 240 ksps, 0 dB relative power, PRBS23 data source
 - DPCCH with -5.46 dB relative power and slot format 2
 - Same scrambling code as the wanted signal ("3GPP FDD" menu)
- "QPSK (3.84 MHz, Root Cosine 0.22)" A QPSK signal (3.84 MHz bandwidth, root cosine filter 0.22, PRBS9 data source) is generated for path B ("Custom Dig Mod" menu).
- SCPI command:
[:SOURce]:BB:W3GPP:TS25141:IFSignal:TYPE on page 522

6.2.2.4 Test Case 7.5 - Blocking Characteristics

The test case requires option Second RF path (B20x), a second option Baseband Main Module (13), a second option Baseband Generator (B10/B11) and a second option Digital Standard 3GPP FDD (K42) in addition to the standard configuration. It is performed using the standard test setup for two paths.

The signal generator provides the reference measurement channel signal (= wanted signal) at output RF A and the interfering signal with a selectable frequency offset at output RF B. After combining the two signals the sum signal is fed into the base station Rx port. The signal generator will start signal generation at the first BS frame trigger sent to input TRIGGER 1.

The measurement must be made at the frequency M.

Table 6-6: The following table lists the settings on the base station:

Parameter	Value
Frequency	M
RMC	12.2 kbps
Scrambling code	Any



In comparison with test case 7.4 this test case requires very large offset frequencies for the interfering signal. Therefore, a second RF output is always required. Due to the maximum frequency range of 6 GHz (option B106), the test case can not be performed at all frequency offsets required by the standard (1 MHz to 12.75 GHz).

Test Purpose and Test Settings - Test Case 7.5

The test case verifies that a BS receiver has the capability to demodulate a signal that is sent by the signal generator but superimposed by a heavy interfering signal in the not adjacent channel.

The test is passed when the resulting BER (calculated internally by the BS) is below 0.001 at the test frequency M. Note TS 25.141 Annex C: General Rules for Statistical Testing, where test conditions in terms of test methods and test conditions are defined.

Quotation from TS 25.141:

The blocking characteristics is a measure of the receiver ability to receive a wanted signal at its assigned channel frequency in the presence of an unwanted interferer on frequencies other than those of the adjacent channels. The blocking performance requirement applies as specified in tables 7.4A to 7.4J.

The requirements shall apply to the indicated base station class, depending on which frequency band is used. The requirements in Tables 7.4D to 7.4J may be applied for the protection of FDD BS receivers when GSM900, DCS1800, PCS1900, GSM850 and/or FDD BS operating in Bands I to VI are co-located with a UTRA FDD BS.

The screenshot shows the configuration for Test Case 7.5. Blocking Characteristics. The interface includes the following sections:

- General Settings:** Edit Mode (According to Standard), Trigger Configuration (Auto (Ext. Trigger 1)), Marker Configuration (Auto), Baseband A Signal Routing (To Path and RF Port A).
- Basestation Configuration:** Scrambling Code (hex) (0), Scrambling Mode (Long Scrambling Code), Power Class (Wide Area BS).
- Wanted Signal:** State (On), Blocking Scenario (Wideband Blocking), Reference Measurement Channel (RMC 12.2 kbps), Operating Band (I: (1920 - 1980 MHz)), RF Frequency (1.000 000 000 GHz), Power Level (-115.0 dBm).
- Interferer Configuration:** State (On), Frequency Offset (5.000 000 00 MHz), Power Level (-15.00 dBm), Modulation (CW Carrier).

The graph on the right shows Power / dBm on the y-axis (ranging from -160 to 0) and Frequency / GHz on the x-axis (ranging from 0.996 to 1.008). A green curve shows a signal between 0.998 and 1.002 GHz, and a yellow spike shows a signal at approximately 1.005 GHz.

Besides the settings described for all receiver test, the following settings are possible in edit mode "User Definable". In edit mode "According to Standard" most settings are pre-set.

Additional settings in the "Wanted Signal" section:

Blocking Scenario - Test Case 7.5

Selects the type of blocking scenario in edit mode "According to Standard".

The type of blocking scenario presets the selected "Interferer Modulation" and the "Power Level".

"Wideband Blocking"	<p>The interferer signal for wide band blocking depends on the set "Operating Band" and "RF Frequency":</p> <ul style="list-style-type: none"> As long as the interferer "RF frequency" lies within or close to the selected "Operating Band", a "3GPP FDD" uplink signal with a defined power level (depending on the selected Power Class and RMC) is generated for path B. When the interferer "RF Frequency" lies outside the selected "Operating Band", a "CW carrier" interfering signal with a defined power level (depending on the selected Power Class and RMC) is generated for path B.
"Collocated BS Blocking"	A CW carrier interfering signal with a defined power level (depending on the selected Power Class and RMC) is generated for path B ("RF" menu)
"Narrowband Blocking"	A GMSK (270.833 kHz) interfering signal with a defined power level (depending on the selected Power Class and RMC) is generated for path B ("Custom Dig Mod" menu).

SCPI command:

[\[:SOURCE\]:BB:W3GPp:TS25141:WSIGnal:BTYPe](#) on page 527

Operating Band - Test Case 7.5

Selects the operating band of the base station for "Wideband Blocking". The operating band is required for the calculation of power levels and interferer modulation.

- Operating band I: (1920 – 1980 MHz)
- Operating band II: (1850 – 1910 MHz)
- Operating band III: (1710 – 1785 MHz)
- Operating band IV: (1710 – 1755 MHz)
- Operating band V: (824 – 849 MHz)
- Operating band VI: (830 – 840 MHz)

SCPI command:

[\[:SOURCE\]:BB:W3GPp:TS25141:WSIGnal:OBANd](#) on page 536

Interferer Signal

Settings in the "Interferer Signal" section:

Interferer State - Test Case 7.5

Enables/disables the signal generation of the interfering signal in the second path.

In edit mode "According to Standard" the state is fixed to "On".

SCPI command:

[\[:SOURCE\]:BB:W3GPp:TS25141:IFSignal:STATe](#) on page 522

Frequency Offset - Test Case 7.5

Enters the frequency offset of the interfering signal versus the wanted signal.

SCPI command:

[\[:SOURCE\]:BB:W3GPp:TS25141:IFSignal:FOFFset](#) on page 518

Power Level - Test Case 7.5

Enters the level of the interfering signal.

In edit mode "According to Standard" the value is fixed to a value determined by the selected "Blocking Scenario", the "RF frequency" and "Frequency Offset" and the base station "Power Class".

For blocking scenario "Colocated BS Blocking" several power settings are permitted by the standard. The following table show the blocking requirements for Medium Range and Local Area BS when co-located with BS in other bands.

For blocking performance requirement tables see ["Blocking performance requirements"](#) on page 282.

SCPI command:

[\[:SOURCE\]:BB:W3GPP:TS25141:IFSignal:POWER](#) on page 521

Interferer Modulation - Test Case 7.5

Selects the type of modulation for the adjacent channel interfering signal at output RF B.

In edit mode "According to Standard" the modulation is fixed to a value determined by the selected "Blocking Scenario".

"W-CDMA (3GPP FDD)" A 3GPP FDD uplink signal with the following characteristic is generated for path B.

- DPCCH + DPDCH mode
- DPDCH with 240 ksps, 0 dB relative power, PRBS23 data source
- DPCCH with -5.46 dB relative power and slot format 2
- Same scrambling code as the wanted signal ("3GPP FDD" menu)

"QPSK (3.84 MHz, Root Cosine 0.22)" A QPSK signal (3.84 MHz bandwidth, root cosine filter 0.22, PRBS9 data source) is generated for path B ("Custom Dig Mod" menu).

"CW Carrier" A QPSK signal (3.84 MHz bandwidth, root cosine filter 0.22, PRBS9 data source) is generated for path B ("Custom Dig Mod" menu).

"GMSK (270.833 kHz)" A GMSK signal (270.833 kHz bandwidth, PRBS9 data source) is generated for path B ("Custom Dig Mod" menu).

SCPI command:

[\[:SOURCE\]:BB:W3GPP:TS25141:IFSignal:TYPE](#) on page 522

Blocking performance requirements

The following tables are taken from TS25141 (V6.6.0), chapter 7.5.5.

Blocking performance requirement for Medium Range BS when co-located with BS in other bands

Co-located BS type	Center Frequency of Interfering Signal	Interfering Signal mean power
Micro GSM850	869 – 894 MHz	-3 dBm
MR UTRA-FDD Band V	869 – 894 MHz	+8 dBm
MR UTRA-FDD Band III	1805 – 1880 MHz	+8 dBm

Co-located BS type	Center Frequency of Interfering Signal	Interfering Signal mean power
Micro DCS1800	1805 – 1880 MHz	+5 dBm
Micro PCS1900	1930 – 1990 MHz	+5 dBm
MR UTRA-FDD Band II	1930 – 1990 MHz	+8 dBm

Blocking performance requirement for Local Area BS when co-located with BS in other bands

Co-located BS type	Center Frequency of Interfering Signal	Interfering Signal mean power
LA UTRA-FDD Band V	869 – 894 MHz	-6 dBm
Pico GSM850	869 – 894 MHz	-7 dBm
LA UTRA-FDD Band III	1805 – 1880 MHz	-6 dBm
Pico DCS1800	1805 – 1880 MHz	-4 dBm
LA UTRA-FDD Band II	1930 – 1990 MHz	-6 dBm
Pico PCS1900	1930 – 1990 MHz	-4 dBm

Blocking characteristics for Wide Area BS

Operating Band	Center Frequency of Interfering Signal	Interfering Signal mean power	Wanted Signal mean power	Minimum Offset of Interfering Signal	Type of Interfering Signal
I	1920 - 1980 MHz	-40 dBm	-115 dBm	10 MHz	WCDMA signal *
	1900 - 1920 MHz 1980 - 2000 MHz	-40 dBm	-115 dBm	10 MHz	WCDMA signal *
	1 MHz - 1900 MHz 2000 MHz - 12750 MHz	-15 dBm	-115 dBm		CW carrier
II	1850 - 1910 MHz	-40 dBm	-115 dBm	10 MHz	WCDMA signal *
	1830 - 1850 MHz 1910 - 1930 MHz	-40 dBm	-115 dBm	10 MHz	WCDMA signal *
	1 MHz - 1830 MHz 1930 MHz - 12750 MHz	-15 dBm	-115 dBm		CW carrier

Operating Band	Center Frequency of Interfering Signal	Interfering Signal mean power	Wanted Signal mean power	Minimum Offset of Interfering Signal	Type of Interfering Signal
III	1710-1785 MHz	-40 dBm	-115 dBm	10 MHz	WCDMA signal *
	1690 - 1710 MHz 1785-1805 MHz	-40 dBm	-115 dBm	10 MHz	WCDMA signal *
	1 MHz - 1690 MHz 1805 MHz - 12750 MHz	-15 dBm	-115 dBm		CW carrier
IV	1710-1755 MHz	-40 dBm	-115 dBm	10 MHz	WCDMA signal *
	1690 - 1710 MHz 1755-1775 MHz	-40 dBm	-115 dBm	10 MHz	WCDMA signal *
	1 MHz - 1690 MHz 1775 MHz - 12750 MHz	-15 dBm	-115 dBm		CW carrier
V	824-849 MHz	-40 dBm	-115 dBm	10 MHz	WCDMA signal *
	804-824 MHz 849-869 MHz	-40 dBm	-115 dBm	10 MHz	WCDMA signal *
	1 MHz-804 MHz 869 MHz - 12750 MHz	-15 dBm	-115 dBm		CW carrier
VI	810- 830 MHz 840- 860 MHz	-40 dBm	-115 dBm	10 MHz	WCDMA signal *
	1 MHz-810 MHz 860 MHz-12750 MHz	-15 dBm	-115 dBm		CW carrier

*: The characteristics of the W-CDMA interference signal are specified in Annex I of TS 25.141.

Blocking performance requirement for Wide Area BS when co-located with BS in other bands.

Co-located BS type	Center Frequency of Interfering Signal	Interfering Signal mean power	Wanted Signal mean power	Type of Interfering Signal
Macro GSM900	921- 960 MHz	+16 dBm	-115 dBm	CW carrier
Macro DCS1800	1805- 1880 MHz	+16 dBm	-115 dBm	CW carrier
Macro PCS1900	1930- 1990 MHz	+16 dBm	-115 dBm	CW carrier
Macro GSM850	869- 894 MHz	+16 dBm	-115 dBm	CW carrier
WA UTRA-FDD Band I	2110- 2170 MHz	+16 dBm	-115 dBm	CW carrier
WA UTRA-FDD Band II	1930- 1990 MHz	+16 dBm	-115 dBm	CW carrier
WA UTRA-FDD Band III	1805- 1880 MHz	+16 dBm	-115 dBm	CW carrier
WA UTRA-FDD Band IV	2110- 2155 MHz	+16 dBm	-115 dBm	CW carrier
WA UTRA-FDD Band V	869- 894 MHz	+16 dBm	-115 dBm	CW carrier
WA UTRA-FDD Band VI	875- 885 MHz	+16 dBm	-115 dBm	CW carrier

Blocking performance requirement for Medium Range BS when co-located with BS in other bands.

Co-located BS type	Center Frequency of Interfering Signal	Interfering Signal mean power	Wanted Signal mean power	Type of Interfering Signal
Micro GSM900	921- 960 MHz	-3 dBm	-105 dBm	CW carrier
Micro DCS1800	1805- 1880 MHz	+5 dBm	-105 dBm	CW carrier
Micro PCS1900	1930- 1990 MHz	+5 dBm	-105 dBm	CW carrier
Micro GSM850	869- 894 MHz	-3 dBm	-105 dBm	CW carrier
MR UTRA-FDD Band I	2110- 2170 MHz	+8 dBm	-105 dBm	CW carrier
MR UTRA-FDD Band II	1930- 1990 MHz	+8 dBm	-105 dBm	CW carrier
MR UTRA-FDD Band III	1805- 1880 MHz	+8 dBm	-105 dBm	CW carrier
MR UTRA-FDD Band IV	2110- 2155 MHz	+8 dBm	-105 dBm	CW carrier

Co-located BS type	Center Frequency of Interfering Signal	Interfering Signal mean power	Wanted Signal mean power	Type of Interfering Signal
MR UTRA-FDD Band V	869- 894 MHz	+8 dBm	-105 dBm	CW carrier
MR UTRA-FDD Band VI	875- 885 MHz	+8 dBm	-105 dBm	CW carrier

Blocking performance requirement for Local Area BS when co-located with BS in other bands.

Co-located BS type	Center Frequency of Interfering Signal	Interfering Signal mean power	Wanted Signal mean power	Type of Interfering Signal
Pico GSM900	921- 960 MHz	-7 dBm	-101 dBm	CW carrier
Pico DCS1800	1805- 1880 MHz	-4 dBm	-101 dBm	CW carrier
Pico PCS1900	1930- 1990 MHz	-4 dBm	-101 dBm	CW carrier
Pico GSM850	869- 894 MHz	-7 dBm	-101 dBm	CW carrier
LA UTRA-FDD Band I	2110- 2170 MHz	-6 dBm	-101 dBm	CW carrier
LA UTRA-FDD Band II	1930- 1990 MHz	-6 dBm	-101 dBm	CW carrier
LA UTRA-FDD Band III	1805- 1880 MHz	-6 dBm	-101 dBm	CW carrier
LA UTRA-FDD Band IV	2110- 2155 MHz	-6 dBm	-101 dBm	CW carrier
LA UTRA-FDD Band V	869- 894 MHz	-6 dBm	-101 dBm	CW carrier
LA UTRA-FDD Band VI	875- 885 MHz	-6 dBm	-101 dBm	CW carrier

Blocking performance requirement (narrowband) for Wide Area BS

Operating Band	Center Frequency of Interfering Signal	Interfering Signal mean power	Wanted Signal mean power	Minimum Offset of Interfering Signal	Type of Interfering Signal
II	1850 - 1910 MHz	- 47 dBm	-115 dBm	2.7 MHz	GMSK modulated*
III	1710- 1785 MHz	- 47 dBm	-115 dBm	2.8 MHz	GMSK modulated*
IV	1710- 1755 MHz	- 47 dBm	-115 dBm	2.7 MHz	GMSK modulated*
V	824- 849 MHz	- 47 dBm	-115 dBm	2.7 MHz	GMSK modulated*

* GMSK modulation as defined in TS 45.004.

Blocking performance requirement (narrowband) for Medium Range BS

Operating Band	Center Frequency of Interfering Signal	Interfering Signal mean power	Wanted Signal mean power	Minimum Offset of Interfering Signal	Type of Interfering Signal
II	1850 - 1910 MHz	- 42 dBm	-105 dBm	2.7 MHz	GMSK modulated*
III	1710- 1785 MHz	- 42 dBm	-105 dBm	2.8 MHz	GMSK modulated*
IV	1710- 1755 MHz	- 42 dBm	-105 dBm	2.7 MHz	GMSK modulated*
V	824- 849 MHz	- 42 dBm	-105 dBm	2.7 MHz	GMSK modulated*

* GMSK modulation as defined in TS 45.004 [12]

Blocking performance requirement (narrowband) for Local Area BS

Operating Band	Center Frequency of Interfering Signal	Interfering Signal mean power	Wanted Signal mean power	Minimum Offset of Interfering Signal	Type of Interfering Signal
II	1850 - 1910 MHz	- 37 dBm	-101 dBm	2.7 MHz	GMSK modulated*
III	1710- 1785 MHz	- 37 dBm	-101 dBm	2.8 MHz	GMSK modulated*
IV	1710- 1755 MHz	- 37 dBm	-101 dBm	2.7 MHz	GMSK modulated*
V	824- 849 MHz	- 37 dBm	-101 dBm	2.7 MHz	GMSK modulated*

* GMSK modulation as defined in TS 45.004.

6.2.2.5 Test Case 7.6 - Intermodulation Characteristics

The test case requires option Second RF path (B20x), a second option Baseband Main Module (13), a second option Baseband Generator (B10/B11), a second option Digital Standard 3GPP FDD (K42) and option AWGN (K62) in addition to the standard configuration. It is performed using the standard test setup for two paths.

The signal generator outputs the reference measurement channel signal (= wanted signal) at output RF A and both interfering signals (CW interferer and the WCDMA or GMSK modulated interferer) at output RF B. After combining the signals the sum signal is fed into the base station Rx port. The signal generator will start signal generation at the first BS frame trigger sent to input TRIGGER 1.

The measurement must be made at frequency M.



Note: In order to generate both interfering signals with the desired frequency offset, a frequency offset is introduced for baseband B. This baseband frequency offset has to be added to the RF frequency B.

Table 6-7: The following table lists the settings on the base station:

Parameter	Value
Frequency	M
RMC	12.2 kbps
Scrambling code	Any

Test Purpose and Test Settings - Test Case 7.6

The test case verifies that a BS receiver has the capability to demodulate a signal that is sent by the signal generator but superimposed by two heavy interfering signals in the adjacent channels, where the receiver intermodulation products disturb the wanted signal.

The test is passed when the resulting BER (calculated internally by the BS) is below 0.001 at the test frequency M. Note TS 25.141 Annex C: General Rules for Statistical Testing, where test conditions in terms of test methods and test conditions are defined.

Quotation from TS 25.141:

Third and higher order mixing of the two interfering RF signals can produce an interfering signal in the band of the desired channel. Intermodulation response rejection is a measure of the capability of the receiver to receive a wanted signal on its assigned channel frequency in the presence of two or more interfering signals which have a specific frequency relationship to the wanted signal.

Test Case		7.6. Intermodulation Characteristics...	
General Settings			
Edit Mode	According to Standard		
Trigger Configuration	Auto (Ext. Trigger 1)		
Marker Configuration	Auto		
Baseband A Signal Routing	To Path and RF Port A		
Basestation Configuration			
Scrambling Code (hex)	0		
Scrambling Mode	Long Scrambling Code		
Power Class	Wide Area BS		
Wanted Signal			
State	On		
Reference Measurement Channel	RMC 12.2 kbps		
RF Frequency	1.000 000 000 GHz		Power Level
			-115.0 dBm
Interferer Configuration			
Bandwidth Type	Wideband		
Interferer 1: CW Carrier			
State	On		
Frequency Offset	10.000 000 00 MHz		Power Level
			-48.00 dBm
Interferer 2: Modulated Signal			
State	On		
Modulation	W-CDMA (3GPP FDD)		
Frequency Offset	20.000 000 00 MHz		Power Level
			-48.00 dBm
Apply Settings			

Besides the settings described for all receiver tests, interferer 1 and 2 configuration is possible in edit mode "User Definable". In edit mode "According to Standard" most of the settings are preset.

Interferer Bandwidth Type - Test Case 7.6

Selects the interferer scenario.

"Wideband"

A 3GPP FDD uplink interfering signal with the following characteristic is generated for path B.

- DPCCH + DPDCH mode
- DPDCH with 240 kbps, 0 dB relative power, PRBS23 data source
- DPCCH with -5.46 dB relative power and slot format 2
- Same scrambling code as the wanted signal ("3GPP FDD" menu)

The 3GPP FDD uplink interfering signal is superimposed by a CW interfering signal with a frequency of 10 MHz and a level of -48 dBm ("AWGN" menu).

"Narrowband" GMSK interfering signal (270.833 kHz bandwidth, PRBS9 data source) is generated for path B ("Custom Dig Mod" menu).
The GMSK interfering signal is superimposed by a CW interfering signal with a frequency of 3.5 MHz and a level of -47 dBm ("AWGN" menu).

SCPI command:

`[:SOURce] :BB:W3GPp:TS25141:IFSignal:BWIDth` on page 515

Interferer 1 and 2 State - Test Case 7.6

Enables/disables the signal generation of the CW and modulation interfering signal in the second path.

In edit mode "According to Standard" both states are fixed to "On".

SCPI command:

`[:SOURce] :BB:W3GPp:TS25141:IFSignal:CW:STATe` on page 517

`[:SOURce] :BB:W3GPp:TS25141:IFSignal:MODulated:STATe` on page 520

Interferer 1 and 2 Frequency Offset - Test Case 7.6

Enters the frequency offset of the interfering signals versus the wanted signal.

In edit mode "According to Standard" the value is fixed to a value determined by the selected "Interferer Bandwidth".

SCPI command:

`[:SOURce] :BB:W3GPp:TS25141:IFSignal:CW:FOFFset` on page 516

`[:SOURce] :BB:W3GPp:TS25141:IFSignal:MODulated:FOFFset` on page 518

Interferer 1 and 2 Power Level - Test Case 7.6

Enters the level of the interfering signals..

In edit mode "According to Standard" the value is fixed to a value determined by the selected "Interferer Bandwidth Type".

SCPI command:

`[:SOURce] :BB:W3GPp:TS25141:IFSignal:CW:POWeR` on page 517

`[:SOURce] :BB:W3GPp:TS25141:IFSignal:MODulated:POWeR` on page 519

Interferer 2 Modulation - Test Case 7.6

Selects the type of modulation for the interfering modulation signal in the second path.

In edit mode "According to Standard" the value is fixed to a value determined by the selected "Interferer Bandwidth".

"W-CDMA (3GPP FDD)" A 3GPP FDD uplink signal with the following characteristic is generated for path B.

- DPCCH + DPDCH mode
- DPDCH with 240 kbps, 0 dB relative power, PRBS23 data source
- DPCCH with -5.46 dB relative power and slot format 2
- Same scrambling code as the wanted signal ("3GPP FDD" menu)

"GMSK (270833 kHz)" A GMSK signal (270.833 kHz bandwidth, PRBS9 data source) is generated for path B ("Custom Dig Mod" menu).

"QPSK (3.84 MHz, Root Cosine 0.22)"

A QPSK signal (3.84 MHz bandwidth, root cosine filter 0.22, PRBS9 data source) is generated for path B ("Custom Dig Mod" menu).

SCPI command:

`[:SOURce] :BB :W3GPp :TS25141 :IFSignal :MODulated :TYPE` on page 520

6.2.2.6 Test Case 7.8 - Verification of Internal BER

The test case requires the basic configuration and is performed using the standard test setup for one path.

The signal generator outputs a corrupted reference measurement channel signal (= wanted signal) at output RF A. The signal is fed into the base station Rx port.

The signal generator will start signal generation at the first BS frame trigger sent to input "Trigger 1".

The measurement must be made at the three frequencies B, M and T.

Table 6-8: The following table lists the settings on the base station:

Parameter	Value
Frequency	B, M and T
RMC	12.2 kbps
Scrambling code	Any

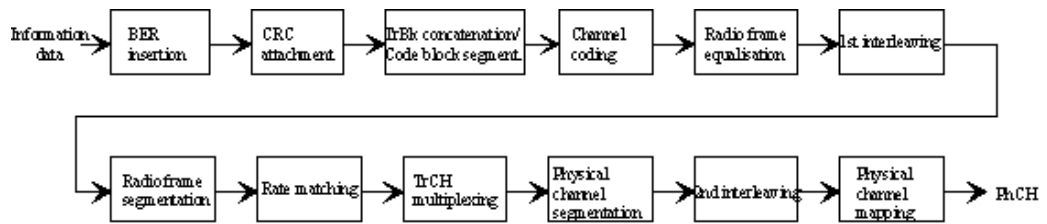
Test Purpose and Test Settings - Test Case 7.8

The test case verifies that a BS receiver has the capability to calculate the BER of a signal where erroneous bits are inserted in the data stream by the signal generator.

The test is passed when the calculated BER is within $\pm 10\%$ of the BER simulated by the signal generator the test frequencies B, M and T. Note TS 25.141 Annex C: General Rules for Statistical Testing, where test conditions in terms of test methods and test conditions are defined.

Quotation from TS 25.141:

Base Station System with internal BER calculation can synchronize it's receiver to known pseudo-random data sequence and calculates bit error ratio from the received data. This test is performed only if Base Station System has this kind of feature. This test is performed by feeding measurement signal with known BER to the input of the receiver. Locations of the erroneous bits shall be randomly distributed within a frame. Erroneous bits shall be inserted to the data bit stream as shown in the following figure.



Test Case: 7.8. Verification of Internal BER...

General Settings

Edit Mode: According to Standard

Trigger Configuration: Auto (Ext. Trigger 1)

Marker Configuration: Auto

Baseband A Signal Routing: To Path and RF Port A

Basestation Configuration

Scrambling Code (hex): 0

Scrambling Mode: Long Scrambling Code

Power Class: Wide Area BS

Wanted Signal

State: On

Reference Measurement Channel: RMC 12.2 kbps

RF Frequency: 1.000 000 000 GHz

Power Level: -110.3 dBm

Bit Error Rate: 0.00

Apply Settings

Besides the settings described for all receiver test, Bit Error Rate and Block Error Rate selection is possible in edit mode "User Definable". In edit mode "According to Standard" only the Bit Error Rate setting is possible.

Bit Error Rate - Test Case 7.8

Sets the bit error rate. In edit mode "According to Standard" only values 0.00 (no bit errors are inserted) and 0.01 (1 percent bit errors are inserted) are available.

SCPI command:

`[:SOURce] :BB:W3GPp:TS25141:WSIGnal:DPDCh:DERRor:BIT:RATE`

on page 534

Block Error Rate - Test Case 7.8

Sets the block error rate in edit mode "User Definable".

SCPI command:

`[:SOURce] :BB:W3GPp:TS25141:WSIGnal:DPDCh:DERRor:BLOCK:RATE`

on page 535

6.2.3 Performance Requirements

6.2.3.1 Test Case 8.2.1 - Demodulation of DCH in Static Propagation Conditions

For **non-diversity measurements**, the test case requires Additional White Gaussian Noise (AWGN) (K62) in addition to the basic configuration.

The measurement is performed using the standard test setup for one path.

The signal generator outputs a reference measurement channel signal (= wanted signal) that is superimposed by a AWGN signal at output RF A. The signal is fed into the base station Rx port.

The signal generator will start signal generation at the first BS frame trigger sent to input "Trigger 1".

The measurement must be made at the three frequencies B, M and T. The RMC data rates are 12.2 kbps, 64 kbps, 144 kbps and 384 kbps.

For **diversity measurements**, the test case requires option Second RF path (B20x), a second option Baseband Main Module (13), a second option Baseband Generator (B10/ B11) and two options Additional White Gaussian Noise (AWGN) (K62) in addition to the standard configuration. It is performed using the standard test setup for diversity measurement.

The signal generator outputs the reference measurement channel signal (= wanted signal) at output RF A and output RF B. The wanted signal is superimposed by a AWGN signal. The signals are fed into the base station Rx ports.

The signal generator will start signal generation at the first BS frame trigger sent to input Trigger 1.

The measurement must be made at the three frequencies B, M and T. The RMC data rates are 12.2 kbps, 64 kbps, 144 kbps and 384 kbps.

Table 6-9: The following table lists the settings on the base station:

Parameter	Value(s)
Frequency	B, M and T
RMC	12.2 kbps, 64 kbps, 144 kbps, 384 kbps
Scrambling code	Any

Test Purpose and Test Settings - Test Case 8.2.1

The test case shall verify that a BS receiver has the capability to demodulate a signal that is sent by the signal generator and is superimposed by a heavy AWGN signal.

The test is passed when the resulting BLER (calculated internally by the BS) does not exceed the required BLER settings. Note TS 25.141 Annex C: General Rules for Statistical Testing, where test conditions in terms of test methods and test conditions are defined.

Quotation from TS 25.141:

The performance requirement of DCH in static propagation conditions is determined by the maximum Block Error Ratio (BLER) allowed when the receiver input signal is at a specified E_b/N_0 limit. The BLER is calculated for each of the measurement channels supported by the base station.

Test Case		8.2.1 Demodulation of DCH in Static Propagation Conditions...	
General Settings			
Edit Mode	According to Standard		
Trigger Configuration	Auto (Ext. Trigger 1)		
Marker Configuration	Auto		
Diversity	Off		
Baseband A Signal Routing	To Path and RF Port A		
Basestation Configuration			
Scrambling Code (hex)	0		
Scrambling Mode	Long Scrambling Code		
Power Class	Wide Area BS		
Wanted Signal			
State	On		
Reference Measurement Channel	RMC 12.2 kbps		
RF Frequency	1.000 000 000 GHz		
Power Level	-77.80 dBm		
AWGN Configuration			
State	On		
Required BLER	< 0.01		
Power Level (within 3.84 MHz BW)	-84.00 dBm		
Eb/NO	8.7 dB		
Fading Configuration			
State	Off		
Apply Settings			

Besides the settings described for all receiver test, AWGN Configuration is possible in edit mode "User Definable". In edit mode "According to Standard" only the Required BLER setting is possible. Fading is always off.

AWGN State - Test Case 8.x

Enables/disables the generation of the AWGN signal.

In edit mode "According to Standard" the state is fixed to "On".

SCPI command:

[\[:SOURce\]:BB:W3GPp:TS25141:AWGN:STATE](#) on page 512

Required BLER - Test Case 8.x

Sets the required Block Error Rate in edit mode "According to Standard".

SCPI command:

[\[:SOURce\]:BB:W3GPp:TS25141:AWGN:RBLock:RATE](#) on page 511

Power Level - Test Case 8.x

Sets the AWGN level in edit mode "User Definable".

In edit mode "According to Standard" the AWGN level is determined by the selected "Power Class" .

- "-84 dBm" for "Wide Area BS"
- "-74 dBm" for "Medium Range BS"
- "-70 dBm" for "Local Area BS"

SCPI command:

[\[:SOURce\]:BB:W3GPp:TS25141:AWGN:POWer:NOISe](#) on page 511

E_b to N_0 - Test Case 8.x

Sets the ratio of bit energy to noise power density.

In edit mode "According to Standard" the value depends on the E_b/N_0 test requirements (see [table 6-10](#)).

Table 6-10: E_b/N_0 test requirements in AWGN channel

Measurement channel	Received E_b to N_0 for BS with Rx diversity	Received E_b to N_0 for BS without Rx diversity	Required BLER
12.2 kbps	n.a. (5.5 dB)	n.a. (8.7 dB)	$< 10^{-1}$
	5.5 dB	8.7 dB	$< 10^{-2}$
64 kbps	1.9 dB	5.1 dB	$< 10^{-1}$
	2.1 dB	5.2 dB	$< 10^{-2}$
144 kbps	1.2 dB	4.2 dB	$< 10^{-1}$
	1.3 dB	4.4 dB	$< 10^{-2}$
384 kbps	1.3 dB	4.4 dB	$< 10^{-1}$
	1.4 dB	4.5 dB	$< 10^{-2}$

SCPI command:

[\[:SOURce\]:BB:W3GPp:TS25141:AWGN:ENRatio](#) on page 510

Fading State - Test Case 8.2.1

Indicates the state of the Fader.

The state is fixed to 'Off'.

SCPI command:

[\[:SOURce\]:BB:W3GPp:TS25141:FSIMulator:STATe](#) on page 514

6.2.3.2 Test Case 8.3.1 - Demodulation of DCH in Multipath Fading Case 1 Conditions

For non-diversity measurements, the test case requires option Additional White Gaussian Noise (AWGN) (K62) and options Fading Simulator (B14), Path Extension (B15), and Enhanced Resolution and Dynamic Fading (K71) in addition to the basic configuration.

The measurement is performed using the standard test setup for one path.

The signal generator outputs a reference measurement channel signal (= wanted signal) that is disturbed by an AWGN signal and multipath fading effects at output RF A(B). The signal is fed into the base station Rx port.

The signal generator will start signal generation at the first BS frame trigger sent to input Trigger 1.

The measurement must be made at the three frequencies B, M and T. The RMC data rates are 12.2 kbps, 64 kbps, 144 kbps and 384 kbps.

For diversity measurements, the test case requires option Second RF path (B20x), a second option Baseband Main Module (13), two options Additional White Gaussian Noise (AWGN) (K62) and options Fading Simulator (B14) and Path Extension (B15), Enhanced Resolution and Dynamic Fading (K71) in addition to the basic configuration.

It is performed using the standard test setup for diversity measurement.

The signal generator outputs the reference measurement channel signal (= wanted signal) that is disturbed by an AWGN signal and multipath fading effects at output RF A and output RF B. The signals are fed into the base station Rx ports.

The signal generator will start signal generation at the first BS frame trigger sent to input "Trigger 1".

The measurement must be made at the three frequencies B, M and T. The RMC data rates are 12.2 kbps, 64 kbps, 144 kbps and 384 kbps.

Table 6-11: The following table lists the settings on the base station:

Parameter	Value(s)
Frequency	B, M and T
RMC	12.2 kbps, 64 kbps, 144 kbps, 384 kbps
Scrambling code	Any

Test Purpose and Test Settings - Test Case 8.3.1

The test case shall verify that a BS receiver has the capability to demodulate a signal that is sent by the signal generator but superimposed by a heavy AWGN signal and disturbed by multipath fading effects.

The test is passed when the resulting BLER (calculated internally by the BS) does not exceed the required BLER settings. Note TS 25.141 Annex C: General Rules for Statistical Testing, where test conditions in terms of test methods and test conditions are defined.

Test Case: 8.3.1. Demodulation of DCH in Multipath Fading Case 1 Conditions...

General Settings

Edit Mode: According to Standard

Trigger Configuration: Auto (Ext. Trigger 1)

Marker Configuration: Auto

Diversity: Off

Baseband A Signal Routing: To Path and RF Port A

Basestation Configuration

Scrambling Code (hex): 0

Scrambling Mode: Long Scrambling Code

Power Class: Local Area BS

Wanted Signal

State: On

Reference Measurement Channel: RMC 12.2 kbps

RF Frequency: 1.000 000 000 GHz

Power Level: -75.28 dBm

AWGN Configuration

State: On

Required BLER: < 0.01

Power Level (within 3.84 MHz BW): -70.00 dBm

Eb/NO: 19.7 dB

Fading Configuration

State: On

Apply Settings

This test case settings are identical to test case 8.2.1 except from the channel simulation that is set to "Multipath Fading Case 1" ("Fading" menu: Standard = 3GPP Case 1 UE/BS) and the specific E_b/N_0 test requirements (see table 6-12).

Table 6-12: E_b/N_0 Test requirements in multipath Case 1 channel

Measurement channel	Received E_b/N_0 for BS with Rx diversity	Received E_b/N_0 for BS without Rx diversity	Required BLER
12.2 kbps	n.a. (12.5 dB)	n.a. (19.7 dB)	< 10^{-1}
	12.5 dB	19.7 dB	< 10^{-2}
64 kbps	6.8 dB	12.2 dB	< 10^{-1}
	9.8 dB	16.5 dB	< 10^{-2}
144 kbps	6.0 dB	11.4 dB	< 10^{-1}
	9.0 dB	15.6 dB	< 10^{-2}
384 kbps	6.4 dB	11.8 dB	< 10^{-1}
	9.4 dB	16.1 dB	< 10^{-2}

Fading State - Test Case 8.x

Indicates the state of the Fader.

The state is fixed to "On". The "Fading" menu is preset with the required settings for the test case.

SCPI command:

[:SOURce] :BB:W3GPP:TS25141:FSIMulator:STATe on page 514

6.2.3.3 Test Case 8.3.2 - Demodulation of DCH in Multipath Fading Case 2 Conditions

This test case is identical to test case 8.3.1 except from the channel simulation that is set to "Multipath Fading Case 2" ("Fading" dialog: Standard = 3GPP Case 2 UE/BS) and the E_b/N_0 test requirements (see [table 6-13](#)).

Table 6-13: E_b/N_0 Test requirements in Multipath Case 2 channel

Measurement channel	Received E_b to N_0 for BS with Rx diversity	Received E_b to N_0 for BS without Rx diversity	Required BLER
12.2 kbps	n.a. (9.6 dB)	n.a. (15.6 dB)	$< 10^{-1}$
	9.6 dB	15.6 dB	$< 10^{-2}$
64 kbps	4.9 dB	9.8 dB	$< 10^{-1}$
	7.0 dB	12.9 dB	$< 10^{-2}$
144 kbps	4.3 dB	8.8 dB	$< 10^{-1}$
	6.2 dB	12.1 dB	$< 10^{-2}$
384 kbps	4.7 dB	9.3 dB	$< 10^{-1}$
	6.7 dB	12.7 dB	$< 10^{-2}$

6.2.3.4 Test Case 8.3.3 - Demodulation of DCH in Multipath Fading Case 3 Conditions

This test case is identical to test case 8.3.1 except from the channel simulation that is set to 'Multipath Fading Case 3' ("Fading" menu: Standard = 3GPP Case 3 UE/BS) and the E_b/N_0 test requirements (see [table 6-14](#)).

Table 6-14: E_b/N_0 Test requirements in multipath Case 3 channel

Measurement channel	Received E_b to N_0 for BS with Rx diversity	Received E_b to N_0 for BS without Rx diversity	Required BLER
12.2 kbps	n.a. (7.8 dB)	n.a. (11.4 dB)	$< 10^{-1}$
	7.8 dB	11.4 dB	$< 10^{-2}$
	8.6 dB	12.3 dB	$< 10^{-3}$
64 kbps	4.0 dB	7.7 dB	$< 10^{-1}$
	4.4 dB	8.3 dB	$< 10^{-2}$
	4.7 dB	9.1 dB	$< 10^{-3}$
144 kbps	3.4 dB	6.6 dB	$< 10^{-1}$

Measurement channel	Received E_b to N_0 for BS with Rx diversity	Received E_b to N_0 for BS without Rx diversity	Required BLER
	3.8 dB	7.3 dB	$< 10^{-2}$
	4.2 dB	7.8 dB	$< 10^{-3}$
384 kbps	3.8 dB	7.1 dB	$< 10^{-1}$
	4.2 dB	7.8 dB	$< 10^{-2}$
	4.8 dB	8.5 dB	$< 10^{-3}$

6.2.3.5 Test Case 8.3.4 - Demodulation of DCH in Multipath Fading Case 4 Conditions

This test case is identical to test case 8.3.1 except from the channel simulation that is set to "Multipath Fading Case 4" ("Fading" menu: Standard = 3GPP Case 4 UE) and the E_b/N_0 test requirements (see following table).

Table 6-15: E_b/N_0 Test requirements in multipath Case 4 channel

Measurement channel	Received E_b to N_0 for BS with Rx diversity	Received E_b to N_0 for BS without Rx diversity	Required BLER
12.2 kbps	n.a. (10.8 dB)	n.a. (14.4 dB)	$< 10^{-1}$
	10.8 dB	14.4 dB	$< 10^{-2}$
	11.6 dB	15.3 dB	$< 10^{-3}$
64 kbps	7.0 dB	10.7 dB	$< 10^{-1}$
	7.4 dB	11.3 dB	$< 10^{-2}$
	7.7 dB	12.1 dB	$< 10^{-3}$
144 kbps	6.4 dB	9.6 dB	$< 10^{-1}$
	6.8 dB	10.3 dB	$< 10^{-2}$
	7.2 dB	10.8 dB	$< 10^{-3}$
384 kbps	6.8 dB	10.1 dB	$< 10^{-1}$
	7.2 dB	10.8 dB	$< 10^{-2}$
	7.8 dB	11.5 dB	$< 10^{-3}$

Table 6-16: E_b/N_0 Test requirements in multipath Case 4 channel

Measurement channel	Received E_b to N_0 for BS with Rx diversity	Received E_b to N_0 for BS without Rx diversity	Required BLER
12.2 kbps	n.a. (10.8 dB)	n.a. (14.4 dB)	$< 10^{-1}$
	10.8 dB	14.4 dB	$< 10^{-2}$
	11.6 dB	15.3 dB	$< 10^{-3}$
64 kbps	7.0 dB	10.7 dB	$< 10^{-1}$
	7.4 dB	11.3 dB	$< 10^{-2}$

Measurement channel	Received E_b to N_0 for BS with Rx diversity	Received E_b to N_0 for BS without Rx diversity	Required BLER
	7.7 dB	12.1 dB	$< 10^{-3}$
144 kbps	6.4 dB	9.6 dB	$< 10^{-1}$
	6.8 dB	10.3 dB	$< 10^{-2}$
	7.2 dB	10.8 dB	$< 10^{-3}$
384 kbps	6.8 dB	10.1 dB	$< 10^{-1}$
	7.2 dB	10.8 dB	$< 10^{-2}$
	7.8 dB	11.5 dB	$< 10^{-3}$

Table 6-17: E_b/N_0 Test requirements in multipath Case 4 channel

Measurement channel	Received E_b to N_0 for BS with Rx diversity	Received E_b to N_0 for BS without Rx diversity	Required BLER
12.2 kbps	n.a. (10.8 dB)	n.a. (14.4 dB)	$< 10^{-1}$
	10.8 dB	14.4 dB	$< 10^{-2}$
	11.6 dB	15.3 dB	$< 10^{-3}$
64 kbps	7.0 dB	10.7 dB	$< 10^{-1}$
	7.4 dB	11.3 dB	$< 10^{-2}$
	7.7 dB	12.1 dB	$< 10^{-3}$
144 kbps	6.4 dB	9.6 dB	$< 10^{-1}$
	6.8 dB	10.3 dB	$< 10^{-2}$
	7.2 dB	10.8 dB	$< 10^{-3}$
384 kbps	6.8 dB	10.1 dB	
	7.2 dB	10.8 dB	$< 10^{-2}$
	7.8 dB	11.5 dB	$< 10^{-3}$

6.2.3.6 Test Case 8.4 - Demodulation of DCH in Moving Propagation Conditions

This test case is identical to test case 8.3.1 except from the channel simulation that is set to "Moving Propagation" ("Fading" menu: Standard = Moving Propagation) and the E_b/N_0 test requirements.

Table 6-18: E_b/N_0 Test requirements in moving channel

Measurement channel	Received E_b to N_0 for BS with Rx diversity	Received E_b to N_0 for BS without Rx diversity	Required BLER
12.2 kbps	n.a. (6.3 dB)	n.a. (9.3 dB)	$< 10^{-1}$
	6.3 dB	9.3 dB	$< 10^{-2}$

Measurement channel	Received E_b to N_0 for BS with Rx diversity	Received E_b to N_0 for BS without Rx diversity	Required BLER
64 kbps	2.7 dB	5.9 dB	$< 10^{-1}$
	2.8 dB	6.1 dB	$< 10^{-2}$

6.2.3.7 Test Case 8.5 - Demodulation of DCH in Birth/Death Propagation Conditions

This test case is identical to test case 8.3.1 except from the channel simulation that is set to "Birth/Death Propagation" ("Fading" menu: Standard = Birth/Death Propagation) and the E_b/N_0 test requirements.

Measurement channel	Received E_b to N_0 for BS with Rx diversity	Received E_b to N_0 for BS without Rx diversity	Required BLER
12.2 kbps	n.a. (8.3 dB)	n.a. (11.4 dB)	$< 10^{-1}$
	8.3 dB	11.4 dB	$< 10^{-2}$
64 kbps	4.7 dB	8.0 dB	$< 10^{-1}$
	4.8 dB	8.1 dB	$< 10^{-2}$

6.2.3.8 Test Case 8.6 - Verification of Internal BLER

For **non-diversity** measurements, the test case requires the basic configuration and is performed using the standard test setup for one path.

The signal generator outputs a corrupted reference measurement channel signal (= wanted signal) at output RF A. The signal is fed into the base station Rx port.

The signal generator will start signal generation at the first BS frame trigger sent to input "Trigger 1".

The measurement must be made at the three frequencies B, M and T. The RMC data rates are 12.2 kbps, 64 kbps, 144 kbps and 384 kbps.

For **diversity measurements**, the test case requires option Second RF path (B20x) and a second option Baseband Main Module (B13) in addition to the basic configuration.

It is performed using the standard test setup for diversity measurement.

The signal generator outputs the corrupted reference measurement channel signal (= wanted signal) at output RF A and output RF B. The signals are fed into the base station Rx ports.

The signal generator will start signal generation at the first BS frame trigger sent to input "Trigger 1".

The measurement must be made at the three frequencies B, M and T. The RMC data rates are 12.2 kbps, 64 kbps, 144 kbps and 384 kbps.

Table 6-19: The following table lists the settings on the base station

Parameter	Value
Frequency	B, M and T
RMC	12.2 kbps, 64 kbps, 144 kbps, 384 kbps
Scrambling code	Any

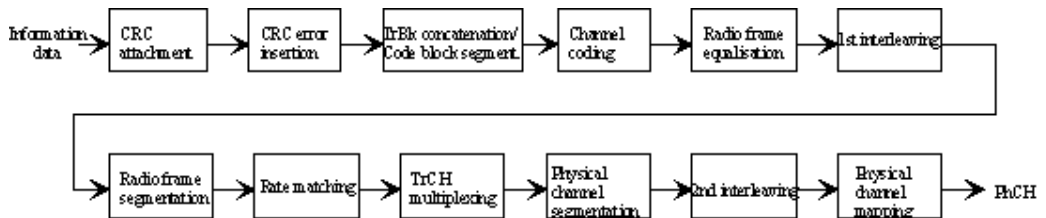
Test Purpose and Test Settings - Test Case 8.6

The test case verifies that a BS receiver has the capability to calculate the BLER of a signal where erroneous blocks are inserted in the data stream by the signal generator.

The test is passed when the calculated BLER is within $\pm 10\%$ of the BLER simulated by the signal generator the test frequencies B, M and T. Note TS 25.141 Annex C: General Rules for Statistical Testing, where test conditions in terms of test methods and test conditions are defined.

Quotation from TS 25.141:

Base Station System with internal BLER calculates block error rate from the CRC blocks of the received. This test is performed only if Base Station System has this kind of feature. All data rates which are used in clause 8 Performance requirement testing shall be used in verification testing. This test is performed by feeding measurement signal with known BLER to the input of the receiver. Locations of the erroneous blocks shall be randomly distributed within a frame. Erroneous blocks shall be inserted into the UL signal as shown in the following figure.



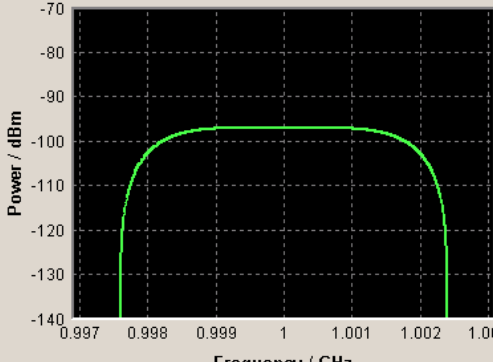
Test Case: 8.6. Verification of Internal BLER...

General Settings

Edit Mode: According to Standard
 Trigger Configuration: Auto (Ext. Trigger 1)
 Marker Configuration: Auto
 Diversity: Off
 Baseband A Signal Routing: To Path and RF Port A

Basestation Configuration

Scrambling Code (hex): 0
 Scrambling Mode: Long Scrambling Code
 Power Class: Local Area BS



Wanted Signal

State: On
 Reference Measurement Channel: RMC 12.2 kbps
 RF Frequency: 1.000 000 000 GHz
 Power Level: -97.00 dBm
 Block Error Rate: 0.00

Apply Settings

Besides the settings described for all receiver test, Bit Error Rate and Block Error Rate selection is possible in edit mode "User Definable". In edit mode "According to Standard" only the Block Error Rate setting is possible.

Table 6-20: UL signal levels for different data rates

Data rate	Signal level for Wide Area BS	Signal level for Medium Range BS	Signal level for Local Area BS	Unit
12,2 kbps	-111	-101	-97	dBm/3.84 MHz
64 kbps	-107	-97	-93	dBm/3.84 MHz
144 kbps	-104	-94	-90	dBm/3.84 MHz
384 kbps	-100	-90	-86	dBm/3.84 MHz

Block Error Rate - Test Case 8.6

Sets the block error rate. In edit mode "According to Standard" only values 0.00 (no block errors are inserted) and 0.01 (1 percent block errors are inserted) are available.

SCPI command:

`[:SOURCE] :BB:W3GPp:TS25141:WSIGnal:DPDCh:DERRor:BLOCK:RATE`
 on page 535

Bit Error Rate - Test Case 8.6

Sets the bit error rate in edit mode "User Definable".

SCPI command:

`[:SOURCE] :BB:W3GPp:TS25141:WSIGnal:DPDCh:DERRor:BIT:RATE`
 on page 534

6.2.3.9 Test Case 8.8.1 - RACH Preamble Detection in Static Propagation Conditions

For **non-diversity measurements**, the test case requires option K62 - Additional White Gaussian Noise (AWGN) in addition to the basic configuration.

The measurement is performed using the standard test setup for one path.

The signal generator outputs a continuous sequence of preambles (wanted signal) that is superimposed by a AWGN signal at output RF A(B). The signal is fed into the base station Rx port.

The signal generator will start signal generation at the first BS frame trigger sent to input "Trigger 1".

The measurement must be made at the three frequencies B, M and T.

For **diversity measurements**, the test case requires option Second RF path (B20x), a second option Baseband Main Module (13), and two options Additional White Gaussian Noise (AWGN) (K62) in addition to the standard configuration. It is performed using the standard test setup for diversity measurement.

The signal generator outputs a continuous sequence of preambles (wanted signal) that is superimposed by a AWGN signal at output RF A and output RF B. The signals are fed into the base station Rx ports.

The signal generator will start signal generation at the first BS frame trigger sent to input "Trigger 1".

The measurement must be made at the three frequencies B, M and T.

Table 6-21: The following table lists the settings on the base station:

Parameter	Value(s)
Frequency	B, M and T
RMC	RACH
Scrambling code	Any

Test Purpose and Test Settings - Test Case 8.8.1

The test case verifies that a BS receiver has the capability to detect the RACH preamble that is sent by the signal generator and is superimposed by a heavy AWGN signal.

The test is passed when internally calculated Pd is equal or above the required Pd settings at the test frequencies B, M and T. Note TS 25.141 Annex C: General Rules for Statistical Testing, where test conditions in terms of test methods and test conditions are defined.

Quotation from TS 25.141:

The performance requirement of RACH for preamble detection in static propagation conditions is determined by the two parameters probability of false detection of the preamble (P_{fa}) and the probability of detection of preamble (P_d). The performance is measured by the required at probability of detection, P_d of 0.99 and 0.999. P_{fa} is defined as a conditional probability of erroneous detection of the preamble when input is only noise (+interference). P_d is defined as conditional probability of detection of the preamble when

the signal is present. Pfa shall be 10^{-3} or less. Only one signature is used and it is known by the receiver.



The Probability of false detection of the preamble (Pfa) test is not supported.

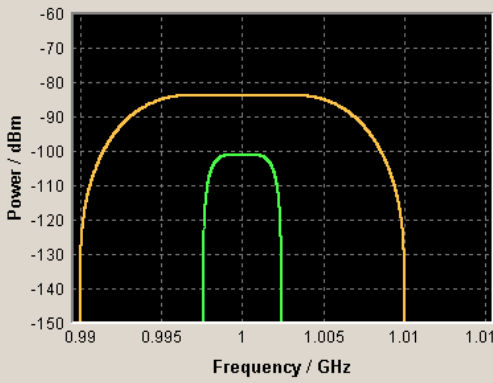
Test Case: 8.8.1. RACH Preamble Detection in Static Propagation Conditions...

General Settings

Edit Mode: According to Standard
 Trigger Configuration: Auto (Ext. Trigger 1)
 Marker Configuration: Auto
 Diversity: Off
 Baseband A Signal Routing: To Path and RF Port A

Basestation Configuration

Scrambling Code (hex): 0
 Scrambling Mode: Long Scrambling Code
 Power Class: Wide Area BS



Wanted Signal

State: On
 RF Frequency: 1.000 000 000 GHz
 Power Level: -101.2 dBm

AWGN Configuration

State: On
 Required Pd: ≥ 0.99
 Power Level (within 3.84 MHz BW): -84.00 dBm
 Ec/NO: -17.20 dB

Fading Configuration

State: Off

Apply Settings

Besides the settings described for all receiver test, AWGN and Fading Configuration is possible in edit mode "User Definable". In edit mode "According to Standard" only the "Required Pd" setting is possible.

AWGN State - Test Case 8.x

Enables/disables the generation of the AWGN signal.

In edit mode "According to Standard" the state is fixed to "On".

SCPI command:

`[:SOURce] :BB:W3GPp:TS25141:AWGN:STATE on page 512`

Required Pd - Test Case 8.x

Sets the Required Probability of Detection of Preamble (Required Pd) in edit mode "According to Standard":

- ≥ 0.99
- ≥ 0.999

This figure determines the ratio E_c/N_0 according to the following table of E_c/N_0 test requirements.

Table 6-22: Preamble detection test requirements in AWGN channel

	E_c/N_0 for required Pd (0.99	E_c/N_0 for required Pd (0.999
"BS with Rx Diversity"	-20.1 dB	-19.7 dB
"BS without Rx Diversity"	-17.2 dB	-16.4 dB

SCPI command:

[\[:SOURCE\]:BB:W3GPP:TS25141:AWGN:RPdetection:RATE](#) on page 512

Power Level - Test Case 8.x

Sets the AWGN level in edit mode "User Definable".

In edit mode "According to Standard" the AWGN level is determined by the selected "Power Class" .

- "-84 dBm" for "Wide Area BS"
- "-74 dBm" for "Medium Range BS"
- "-70 dBm" for "Local Area BS"

SCPI command:

[\[:SOURCE\]:BB:W3GPP:TS25141:AWGN:POWER:NOISE](#) on page 511

E_b/N_0 - Test Case 8.x

Sets the ratio of bit energy to noise power density.

In edit mode "According to Standard" the value depends on the selected "Required Pd".

SCPI command:

[\[:SOURCE\]:BB:W3GPP:TS25141:AWGN:ENRatio](#) on page 510

Fading State - Test Case 8.x.1

Indicates the state of the Fader.

The state is fixed to "Off".

SCPI command:

[\[:SOURCE\]:BB:W3GPP:TS25141:FSIMulator:STATE](#) on page 514

6.2.3.10 Test Case 8.8.2 - RACH Preamble Detection in Multipath Fading Case 3

For **non-diversity** measurements, the test case requires option - Additional White Gaussian Noise (AWGN) (K62) and options Fading Simulator (B14), Path Extension (B15), and Enhanced Resolution and Dynamic Fading (K71) in addition to the basic configuration.

The measurement is performed using the standard test setup for one path.

The signal generator outputs a continuous sequence of preambles (= wanted signal) that is disturbed by an AWGN signal and multipath fading effects at output RF A(B). The signal is fed into the base station Rx port.

The signal generator will start signal generation at the first BS frame trigger sent to input "Trigger 1".

The measurement must be made at the three frequencies B, M and T. The RMC data rates are 12.2 kbps, 64 kbps, 144 kbps and 384 kbps.

For **diversity measurements**, the test case requires option Second RF path (B20x), a second option Baseband Main Module (13), two options Additional White Gaussian Noise (AWGN) (K62) and options Fading Simulator (B14) and Path Extension (B15), Enhanced Resolution and Dynamic Fading (K71) in addition to the basic configuration.

It is performed using the standard test setup for diversity measurement.

The signal generator outputs a continuous sequence of preambles (= wanted signal) that is disturbed by an AWGN signal and multipath fading effects at output RF A and output RF B. The signals are fed into the base station Rx ports.

The signal generator will start signal generation at the first BS frame trigger sent to input "Trigger 1".

The measurement must be made at the three frequencies B, M and T. The RMC data rates are 12.2 kbps, 64 kbps, 144 kbps and 384 kbps.

Table 6-23: The following table lists the settings on the base station:

Parameter	Value(s)
Frequency	B, M and T
RMC	12.2 kbps, 64 kbps, 144 kbps, 384 kbps
Scrambling code	Any

Test Purpose and Test Settings - Test Case 8.8.2

The test case shall verify that a BS receiver has the capability to detect the RACH preamble that is sent by the signal generator and is superimposed by a heavy AWGN signal and disturbed by multipath fading effects.

The test is passed when internally calculated Pd is equal or above the required Pd settings at the test frequencies B, M and T. Note TS 25.141 Annex C: General Rules for Statistical Testing, where test conditions in terms of test methods and test conditions are defined.

The screenshot shows the Test Case Wizard configuration for '8.8.2 RACH Preamble Detection in Multipath Fading Case 3'. The interface is divided into several sections:

- General Settings:** Edit Mode (According to Standard), Trigger Configuration (Auto (Ext. Trigger 1)), Marker Configuration (Auto), Diversity (Off), Baseband A Signal Routing (To Path and RF Port A).
- Basestation Configuration:** Scrambling Code (hex) (0), Scrambling Mode (Long Scrambling Code), Power Class (Wide Area BS).
- Wanted Signal:** State (On), RF Frequency (1.000 000 000 GHz), Power Level (-92.80 dBm).
- AWGN Configuration:** State (On), Required Pd (>=0.99), Power Level (within 3.84 MHz BW) (-84.00 dBm), Ec/NO (-8.80 dB).
- Fading Configuration:** State (On).

On the right, a graph plots Power / dBm (from -160 to -60) against Frequency / GHz (from 0.99 to 1.01). It shows a wideband signal with a narrower 'Faded' signal trace overlaid, indicating a signal drop in a specific frequency band.

This test case is identical to test case 8.8.1 except from the channel simulation that is set to "Multipath Fading Case 3" ("Fading" menu: Standard = 3GPP Case 3 UE/BS) by default and the specific E_c/N_0 ratio requirements (see following table).

	E_c/N_0 for required Pd (0.99	E_c/N_0 for required Pd (0.999
"BS with Rx Diversity"	-14.9 dB	-12.8 dB
"BS without Rx Diversity"	-8.8 dB	-5.8 dB

Fading State - Test Case 8.x

Indicates the state of the Fader.

The state is fixed to "On". The "Fading" menu is preset with the required settings for the test case.

SCPI command:

`[:SOURce] :BB:W3GPp:TS25141:FSIMulator:STATe` on page 514

6.2.3.11 Test Case 8.8.3 - RACH Demodulation of Message Part in Static Propagation Conditions

For **non-diversity** measurements, the test case requires option K62 - Additional White Gaussian Noise (AWGN) in addition to the basic configuration.

The measurement is performed using the standard test setup for one path.

The signal generator outputs a RACH message signal (= wanted signal) that is superimposed by a AWGN signal at output RF A(B). The signal is fed into the base station Rx port.

The signal generator will start signal generation at the first BS frame trigger sent to input "Trigger 1".

The measurement must be made at the three frequencies B, M and T. The Transport Block Sizes are 168 bits and 360 bits.

For **diversity** measurements, the test case requires option Second RF path (B20x), a second option Baseband Main Module (13), and two options Additional White Gaussian Noise (AWGN) (K62) in addition to the standard configuration. It is performed using the standard test setup for diversity measurement.

The signal generator outputs the RACH message signal (= wanted signal) that is superimposed by a AWGN signal at output RF A and output RF B. The signals are fed into the base station Rx ports.

The signal generator will start signal generation at the first BS frame trigger sent to input "Trigger 1".

The measurement must be made at the three frequencies B, M and T. The Transport Block Sizes are 168 bits and 360 bits.

Table 6-24: The following table lists the settings on the base station:

Parameter	Value(s)
Frequency	B, M and T
Transport Block Size	168 bits, 360 bits
RMC	RACH
Scrambling code	Any

Test Purpose and Test Settings - Test Case 8.8.3

The test case shall verify that a BS receiver has the capability to demodulate the RACH message sent by the signal generator but superimposed by AWGN.

The test is passed when the resulting BLER (calculated internally by the BS) does not exceed the required BLER settings. Note TS 25.141 Annex C: General Rules for Statistical Testing, where test conditions in terms of test methods and test conditions are defined.

Quotation from TS 25.141:

The performance requirement of RACH in static propagation conditions is determined by the maximum Block Error Ratio (BLER) allowed when the receiver input signal is at a specified E_b/N_0 limit. The BLER is calculated for each of the measurement channels supported by the base station.

The preamble threshold factor is chosen to fulfil the requirements on Pfa and Pd in sub-clauses 8.8.1 and 8.8.2. Only one signature is used and it is known by the receiver.

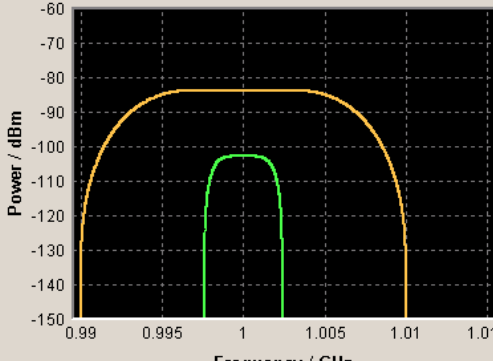
Test Case: **8.8.3. Demodulation of RACH Message in Static Propagation Conditions...**

General Settings

Edit Mode:
 Trigger Configuration:
 Marker Configuration:
 Diversity:
 Baseband A Signal Routing:

Basestation Configuration

Scrambling Code (hex):
 Scrambling Mode:
 Power Class:



Wanted Signal

State:
 Transport Block Size:
 RF Frequency: GHz
 Power Level: dBm

AWGN Configuration

State:
 Required BLER:
 Power Level (within 3.84 MHz BW): dBm
 Eb/NO: dB

Fading Configuration

State:

Besides the settings described for all receiver test, selection of "Transport Block Size" of the wanted signal and AWGN Configuration is possible in edit mode "According to Standard".

Transport Block Size - Test Case 8.8.x

Sets the Transport Block Size:

- 168 bits
- 360 bits

SCPI command:

[\[:SOURce\]:BB:W3GPp:TS25141:WSIGnal:PRACH:CCODing:TYPE](#) on page 537

AWGN State - Test Case 8.8.3

Enables/disables the generation of the AWGN signal.

In edit mode "According to Standard" the state is fixed to "On".

SCPI command:

[\[:SOURce\]:BB:W3GPp:TS25141:AWGN:STATe](#) on page 512

Required BLER - Test Case 8.x

Sets the required Block Error Rate in edit mode "According to Standard".

- < 0.1
- < 0.01

This figure determines the ratio E_b/N_0 according to the list of E_b/N_0 test requirements (see following table).

E_b/N_0 requirements in AWGN channel

Table 6-25: Transport Block size TB and TTI in frames: 168 bits, TTI = 20 ms / 360 bits, TTI = 20 ms

	E_b/N_0 for required BLER < 10^{-1}	E_b/N_0 for required BLER < 10^{-2}	E_b/N_0 for required BLER < 10^{-1}	E_b/N_0 for required BLER < 10^{-2}
"BS with Rx Diversity"	4.5 dB	5.4 dB	4.3 dB	5.2 dB
"BS without Rx Diversity"	7.6 dB	8.5 dB	7.3 dB	8.2 dB

SCPI command:

[:SOURCE] :BB:W3GPp:TS25141:AWGN:RBLock:RATE on page 511

Power Level - Test Case 8.8.3

Sets the AWGN level in edit mode "User Definable".

In edit mode "According to Standard" the AWGN level is determined by the selected "Power Class" .

"-84 dBm" for "Wide Area BS"

"-74 dBm" for "Medium Range BS"

"-70 dBm" for "Local Area BS"

SCPI command:

[:SOURCE] :BB:W3GPp:TS25141:AWGN:POWer:NOISe on page 511

E_b/N_0 - Test Case 8.8.3

Sets the ratio of bit energy to noise power density.

In edit mode "According to Standard" the value depends on the selected "Required BLER".

SCPI command:

[:SOURCE] :BB:W3GPp:TS25141:AWGN:ENRatio on page 510

Fading State - Test Case 8.8.3

Indicates the state of the Fader.

The state is fixed to "Off".

SCPI command:

[:SOURCE] :BB:W3GPp:TS25141:FSIMulator:STATe on page 514

6.2.3.12 Test Case 8.8.4 - RACH Demodulation of Message Part in Multipath Fading Case 3

For **non-diversity** measurements, the test case requires option Additional White Gaussian Noise (AWGN) (K62) and options Fading Simulator (B14), Path Extension (B15), and Enhanced Resolution and Dynamic Fading (K71) in addition to the basic configuration.

The measurement is performed using the standard test setup for one path.

The signal generator outputs a RACH message signal (= wanted signal) that is disturbed by an AWGN signal and multipath fading effects at output RF A. The signal is fed into the base station Rx port.

The signal generator will start signal generation at the first BS frame trigger sent to input "Trigger 1".

The measurement must be made at the three frequencies B, M and T. The Transport Block Sizes are 168 bits and 360 bits.

For **diversity** measurements, the test case requires option Second RF path (B20x), a second option Baseband Main Module (13), two options Additional White Gaussian Noise (AWGN) (K62), and options Fading Simulator (B14), Path Extension (B15), and Enhanced Resolution and Dynamic Fading (K71) in addition to the standard configuration. It is performed using the standard test setup for diversity measurement.

The signal generator outputs a RACH message signal (= wanted signal) that is disturbed by an AWGN signal and multipath fading effects at output RF A and output RF B. The signals are fed into the base station Rx ports.

The signal generator will start signal generation at the first BS frame trigger sent to input "Trigger 1".

The measurement must be made at the three frequencies B, M and T. The Transport Block Sizes are 168 bits and 360 bits.

Test Purpose and Test Settings - Test Case 8.8.4

The test case shall verify that a BS receiver has the capability to demodulate the RACH message sent by the signal generator but superimposed by AWGN and disturbed by multipath fading effects.

The test is passed when the resulting BLER (calculated internally by the BS) does not exceed the required BLER settings. Note TS 25.141 Annex C: General Rules for Statistical Testing, where test conditions in terms of test methods and test conditions are defined.

Test Case 8.8.4 Demodulation of RACH Message in Multipath Fading Case 3

General Settings

Edit Mode: According to Standard
 Trigger Configuration: Auto (Ext. Trigger 1)
 Marker Configuration: Auto
 Diversity: Off
 Baseband A Signal Routing: To Path and RF Port A

Basestation Configuration

Scrambling Code (hex): 0
 Scrambling Mode: Long Scrambling Code
 Power Class: Wide Area BS

Wanted Signal

State: On
 Transport Block Size: 168 bits
 RF Frequency: 1.000 000 000 GHz
 Power Level: -98.90 dBm

AWGN Configuration

State: On
 Required BLER: <0.1
 Power Level (within 3.84 MHz BW): -84.00 dBm
 Eb/NO: 11.70 dB

Fading Configuration

State: On

Apply Settings

This test case is identical to test case 8.8.3 except from the channel simulation that is set to "Multipath Fading Case 3" ("Fading" menu: Standard = 3GPP Case 3 UE/BS) and the specific E_b/N_0 ratio requirements.

E_b/N_0 test requirements in fading case 3 channel

Transport Block size TB and TTI in frames: 168 bits, TTI = 20 ms / 360 bits, TTI = 20 ms

	E_b/N_0 for required BLER < 10^{-1}	E_b/N_0 for required BLER < 10^{-2}	E_b/N_0 for required BLER < 10^{-1}	E_b/N_0 for required BLER < 10^{-2}
"BS with Rx Diversity"	8.0 dB	9.1 dB	7.9 dB	8.9 dB
"BS without Rx Diversity"	11.7 dB	13.0 dB	11.6 dB	12.7 dB

6.2.3.13 Test Case 8.9.1 - CPCH Access Preamble and Collision Detection Preamble Detection in Static Propagation Conditions

This test case is identical to test case 8.8.1 except that the CPCH Preamble is used instead of the RACH preamble.

6.2.3.14 Test Case 8.9.2 - CPCH Access Preamble and Collision Detection Preamble Detection in Multipath Fading Case 3

This test case is identical to test case 8.8.2 except that the CPCH Preamble is used instead of the RACH preamble.

6.2.3.15 Test Case 8.9.3 - Demodulation of CPCH Message in Static Propagation Conditions

This test case is identical to test case 8.8.3 except from differing E_b/N_0 ratio requirements and the demodulation of CPCH Message instead of the RACH Message.

Test requirements in AWGN channel

Transport Block size TB and TTI in frames: 168 bits, TTI = 20 ms / 360 bits, TTI = 20 ms

	E_b/N_0 for required BLER < 10^{-1}	E_b/N_0 for required BLER < 10^{-2}	E_b/N_0 for required BLER < 10^{-1}	E_b/N_0 for required BLER < 10^{-2}
"BS with Rx Diversity"	4.5 dB	5.4 dB	4.3 dB	5.2 dB
"BS without Rx Diversity"	7.5 dB	8.4 dB	7.3 dB	8.2 dB

Transport Block Size (TB) - Test Case 8.9.3

Sets the Transport Block Size:

168 bits

360 bits

SCPI command:

[:SOURce] :BB:W3GPp:TS25141:WSIGnal:PCPCh:CCODing:TYPE on page 537

6.2.3.16 Test Case 8.9.4 - Demodulation of CPCH Message in Multipath Fading Case 3

This test case is identical to test case 8.8.4 except from differing E_b/N_0 ratio requirements and the demodulation of the CPCH Message instead of the RACH Message.

Test requirements in fading case 3 channel

Transport Block size TB and TTI in frames: 168 bits, TTI = 20 ms / 360 bits, TTI = 20 ms

	E_b/N_0 for required BLER < 10^{-1}	E_b/N_0 for required BLER < 10^{-2}	E_b/N_0 for required BLER < 10^{-1}	E_b/N_0 for required BLER < 10^{-2}
"BS with Rx Diversity"	8.1 dB	9.1 dB	7.9 dB	8.7 dB
"BS without Rx Diversity"	11.4 dB	12.6 dB	11.3 dB	12.3 dB

6.3 Transmitter Tests

6.3.1 Basic Configuration

The test cases for transmitter tests require at least the following equipment layout for the signal generator:

- Digital Standard 3GPP FDD (K42)
- Universal Coder / Arbitrary Waveform Generator (B10/B11),
- Baseband Main module (DACIF; B13),
- Frequency option (B10x: RF 100 kHz - x GHz).

Transmitter tests always require a separate measuring equipment to perform the tests, e.g. the Vector Signal Analyzer R&S FSQ.

Test cases where the signal generator hardware equipment is not sufficient are shown in grey color but are not selectable. RF power and frequency limitations of the hardware equipment restrict the setting ranges.

6.3.2 Test Case 6.4.2 - Power Control Steps

The test case requires the basic configuration.

It can be performed using the standard test setup according to TS 25.141. A vector signal analyzer is required, e.g. the Vector Signal Analyzer R&S FSQ.

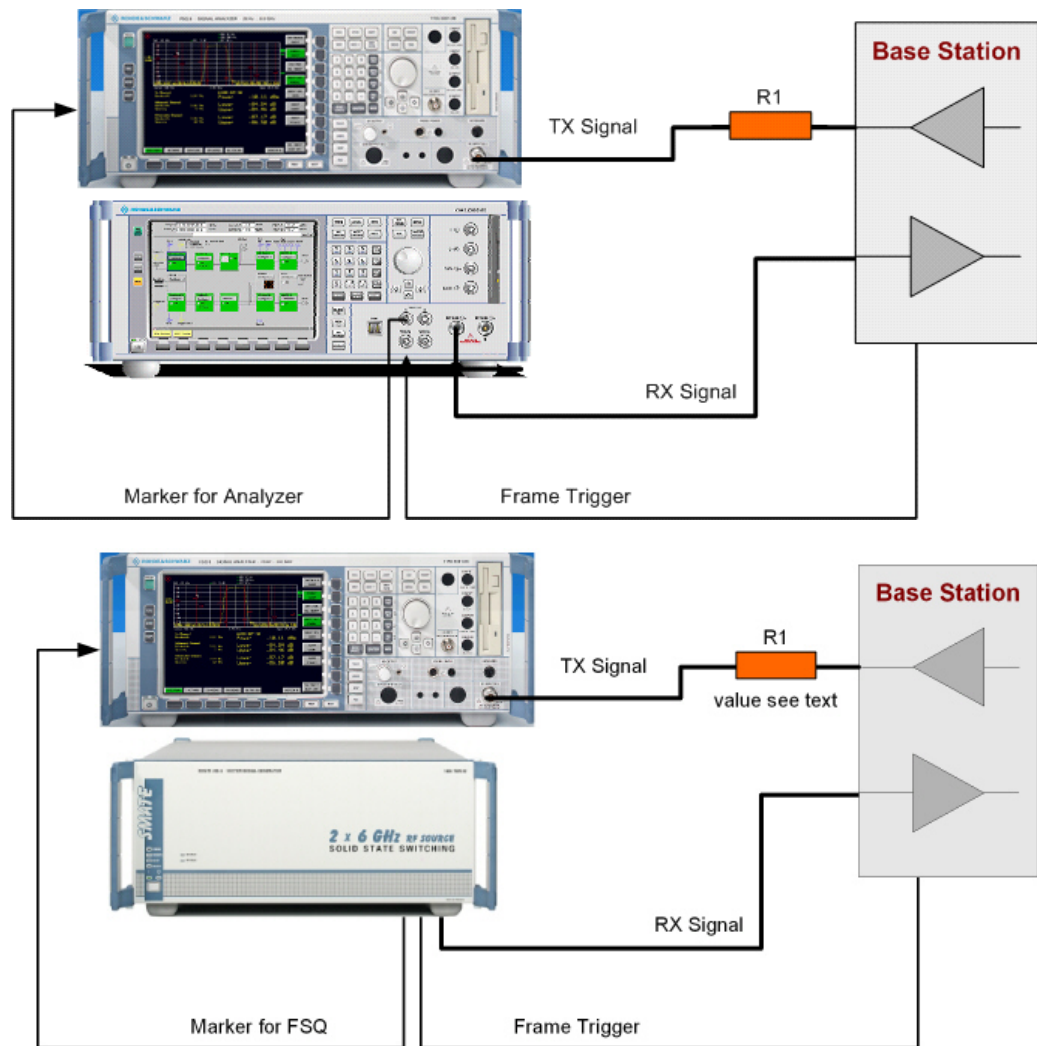
For the signal generator, in case of two-path instruments signal routing to path A is assumed.

Output RF A of the signal generator is connected to the Rx port of the base station. The Tx Signal of the base station is connected to the RF input of the analyzer via an attenuator.

The signal generator will start signal generation at the first BS frame trigger sent to input Trigger 1. The analyzer is triggered by a marker signal (MARKER 1) of the generator.

The signal generator provides an uplink link signal with a precisely defined TPC bit sequence. The base station responds to the TPC bits by controlling the transmitted power of the data channel which is checked by the analyzer.

The analyzer measures the base station transmit power in the code domain to verify the transmitter power control step tolerance and aggregated power control step range.



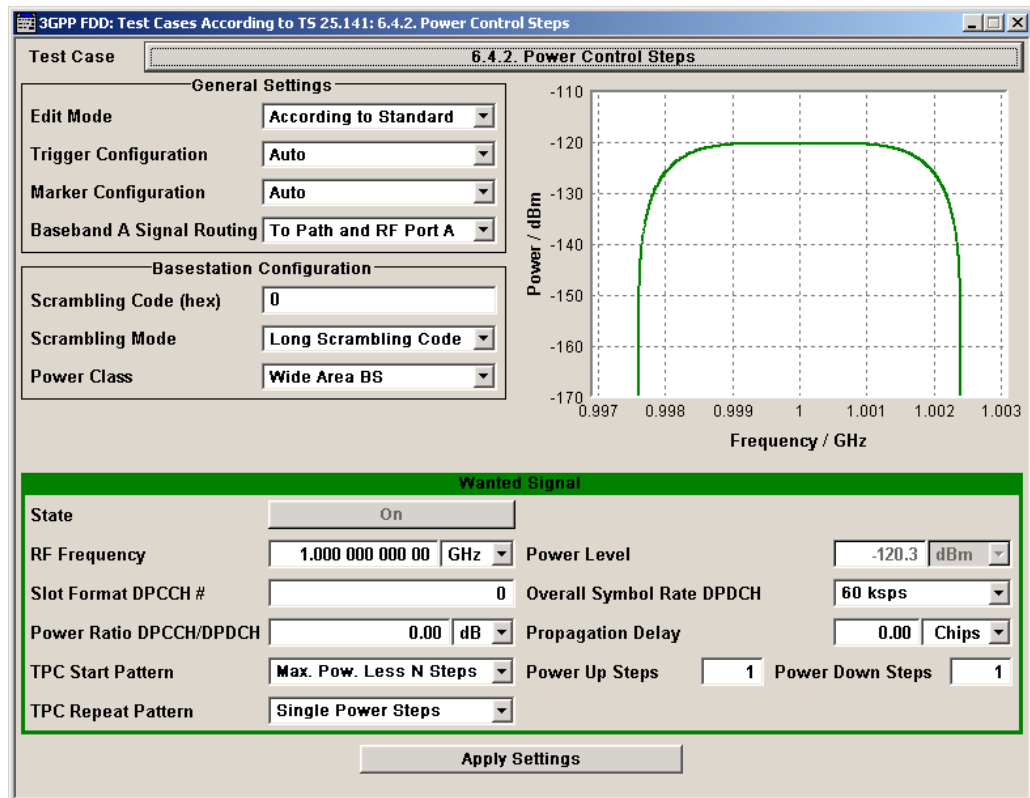
6.3.2.1 Test Purpose and Test Settings - Test Case 6.4.2

The test case verifies that a BS receiver has the capability to adjust its transmit power in response to the uplink TPC pattern. The cumulative power change as a result of ten successive (identical) TPC bits is also checked (aggregated transmit power).

The test is passed when the single or aggregated power control steps are within tolerance throughout the total dynamic range at the test frequencies B, M, and T.

Quotation from TS 25.141

The power control step is the required step change in the code domain power of a code channel in response to the corresponding power control command. The combined output power change is the required total change in the DL transmitter output power of a code channel in response to multiple consecutive power control commands corresponding to that code channel.



Wanted Signal State - Test Case 6.4.2

Enables/disables the signal generation of the wanted 3GPP signal.

In edit mode "According to Standard" the state is fixed to On.

SCPI command:

[\[:SOURce\]:BB:W3GPp:TS25141:WSIGnal:STATe](#) on page 538

Wanted Signal Frequency - Test Case 6.4.2

Sets the RF frequency of the wanted signal.

SCPI command:

[\[:SOURce\]:BB:W3GPp:TS25141:WSIGnal:FREQuency](#) on page 535

Wanted Signal Level - Test Case 6.4.2

Sets the RF level in edit mode "User Definable".

In edit mode "According to Standard" the RF level is determined by the selected "Power Class".

It is always 10 dBm above the reference sensitivity:

- "-120.3 dB + 10 dBm" when "Wide Area BS"
- "-110.3 dB + 10 dBm" when "Medium Range BS"
- "-106.3 dB + 10 dBm" when "Local Area BS"

SCPI command:

[\[:SOURce\]:BB:W3GPp:TS25141:WSIGnal:POWer](#) on page 537

Slot Format DPCCH - Test Case 6.4.2

Selects the slot format.

Slot formats 0 to 5 are available for the DPCCH channel. The slot format defines the FBI mode and the TFCI status.

"Slot format 0" no FBI field / TFCI on

"Slot format 1" no FBI field / TFCI off

"Slot format 2" 1 FBI field / TFCI on

"Slot format 3" 1 FBI field / TFCI off

"Slot format 4" 2 FBI field / TFCI off

"Slot format 5" 2 FBI field / TFCI on

SCPI command:

`[:SOURce] :BB:W3GPp:TS25141:WSIGnal:DPCCh:SFORmat` on page 528

Overall Symbol Rate - Test Case 6.4.2

Sets the overall symbol rate of all the DPDCH channels.

The structure of the DPDCH channel table depends on this parameter. The overall symbol rate determines which DPDCHs are active, which symbol rate they have and which channelization codes they use.

SCPI command:

`[:SOURce] :BB:W3GPp:TS25141:WSIGnal:DPDCh:ORATe` on page 535

Power Ratio DPCCH to DPDCH - Test Case 6.4.2

Sets the channel power ratio of DPCCH to DPDCH.

SCPI command:

`[:SOURce] :BB:W3GPp:TS25141:WSIGnal:DCRatio` on page 528

Propagation Delay - Test Case 6.4.2

Sets an additional propagation delay besides the fixed DL-UL timing offset of 1024 chip periods.

Note: The additional propagation delay is achieved by charging the start trigger impulse with the respective delay (= entering the value as an "External Delay" in the 3GPP "Trigger /Marker" dialog).

SCPI command:

`[:SOURce] :BB:W3GPp:TS25141:WSIGnal:TRIGger[:EXTernal<ch>]:DELay`
on page 538

TPC Start Pattern - Test Case 6.4.2

Sets the TPC pattern for initialization of the base stations power level in edit mode U"ser Definable". The TPC start pattern is sent before the TPC repeat pattern.

In edit mode "According to Standard" the pattern is fixed to "Maximum Power Less n Steps."

Note: In edit mode "According to Standard", the TPC bits are read out of predefined data lists.

The TPC start pattern ensures that the base station responds reliably to the TPC bits from the generator. It sets the base station to a defined initial state for the actual recording of the measurement data. The analyzer is only triggered after the generation of the start pattern using marker 1 of the generator.

"Maximum Power Less n Steps"	A sequence of power up steps (TPC bits "1") is followed by a number of power down steps (TPC bits "0"). A sufficiently long sequence of TPC bits "1" ('power up' commands) forces the base station to maximum transmit power. By the n 'power down' commands the base station is set to a defined number of n power steps (e.g. 1 dB or 0.5 dB) below its maximum transmit power at the beginning of the measurement.
"Data List"	The TPC start pattern is taken from a user defined data list. When "Data List" is selected, a button appears for calling the "File Select" window.

SCPI command:

[\[:SOURce\]:BB:W3GPp:TS25141:WSIGnal:DPCCh:TPC:SDATa](#) on page 531
[\[:SOURce\]:BB:W3GPp:TS25141:WSIGnal:DPCCh:TPC:SDATa:DSElect](#)
 on page 531

TPC Power Up Steps - Test Case 6.4.2

Sets the number of power up bits ("1") in the TPC start pattern. The total TPC start pattern length is the number of 'power up' bits plus the number of n 'power down' bits.

This parameter is only available for TPC Start Pattern = Max. Pow. Less N Steps.

SCPI command:

[\[:SOURce\]:BB:W3GPp:TS25141:WSIGnal:DPCCh:TPC:SDATa:PUSteps](#)
 on page 533

TPC Power Down Steps - Test Case 6.4.2

Sets the number of power down bits ('0') in the TPC start pattern. The total TPC start pattern length is the number of 'power up' ('1') bits plus the number of n 'power down' ('0') bits.

This parameter is only available for TPC Start Pattern = "Max. Pow. Less N Steps".

SCPI command:

[\[:SOURce\]:BB:W3GPp:TS25141:WSIGnal:DPCCh:TPC:SDATa:PDSteps](#)
 on page 532

TPC Repeat Pattern - Test Case 6.4.2

Sets the TPC pattern for verification of the base stations power control steps.

In edit mode "According to Standard" the selection is limited.

"Single Power Steps"	A 01 pattern is sent periodically for measurement of the transmitter power control step tolerance.
"Aggregated Power Steps"	A 00000000001111111111 pattern is sent periodically for measurement of the transmitter aggregated power control step range. The power of the base station is measured after 10 consecutive equal TPC bits ('1' or '0').

- "(All 1) Maximum Power" A all 1 pattern is sent continuously. The base station is forced to maximum power. This selection is only available in edit mode "User Definable"
- "(All 0) Minimum Power" A all 0 pattern is sent continuously. The base station is forced to minimum power. This selection is only available in edit mode "User Definable"
- "User Defined Pattern" The TPC repeat pattern can be input. When "User Defined Pattern" is selected, an input field appears for entering the pattern. The maximum bit pattern length is 64 bits. This selection is only available in edit mode "User Definable"

SCPI command:

`[:SOURce] :BB:W3GPp:TS25141:WSIGnal:DPCCh:TPC:RDATa:PATtern`

on page 530

- "Data List" The TPC repeat pattern is taken from a data list. When "Data List" is selected, a button appears for calling the "File Select" window.

SCPI command:

`[:SOURce] :BB:W3GPp:TS25141:WSIGnal:DPCCh:TPC:RDATa:DSElect`

on page 529

SCPI command:

`[:SOURce] :BB:W3GPp:TS25141:WSIGnal:DPCCh:TPC:RDATa` on page 528

6.3.2.2 Carrying Out the Test Case 6.4.2 Measurement

For the preset Marker Configuration "Auto", Marker 1 starts delayed by the TPC start pattern length.

Each slot takes 0.625 ms and consists of 2560 chips. Depending on the slot format 1 or 2 TPC bits are sent for each slot.

Table 6-26: The following table lists the settings on the base station:

Parameter	Value
Frequency	B, M and T
Test Model	2
Transmit power	Any
Scrambling Code	Any

1. Set the base station to the basic state
 - a) Initialize the base station,
 - b) Set the scrambling scheme,
 - c) Set the base station to test model 2,
 - d) Set the frequency
2. Set the signal generator to the basic state
 - a) Preset the signal generator unless some settings (e.g. in terms of I/Q and RF blocks) have to be kept.

3. Set the analyzer to the basic state
 - a) Set the test case wizard
 - b) Open the 3GPP FDD menu in the baseband block
 - c) Open the Test Case Wizard and select Test Case 6.4.2.
The General Settings parameters are preset according to TS 25.141
 - d) Enter scrambling code and scrambling mode according to the base station scrambling scheme.
 - e) Enter the power class of the base station under test. The RF level is automatically adjusted to the selected power class.
 - f) Enter the test frequency (e.g. M). It must be the same as the base station has been set to.
 - g) Enter the Wanted Signal parameters.
 - h) Activate the settings with the "Apply Settings" button.
The signal generator is now ready to start signal generation
4. Set the analyzer to the measurement frequency
5. Switch on RF output
6. Start the measurement
 - a) Send a start trigger impulse from the base station to the signal generator and to the analyzer.
Signal generation and measurement procedures are started.
7. Calculate the result
The analyzer calculates the resulting code domain power of the BS downlink channel.

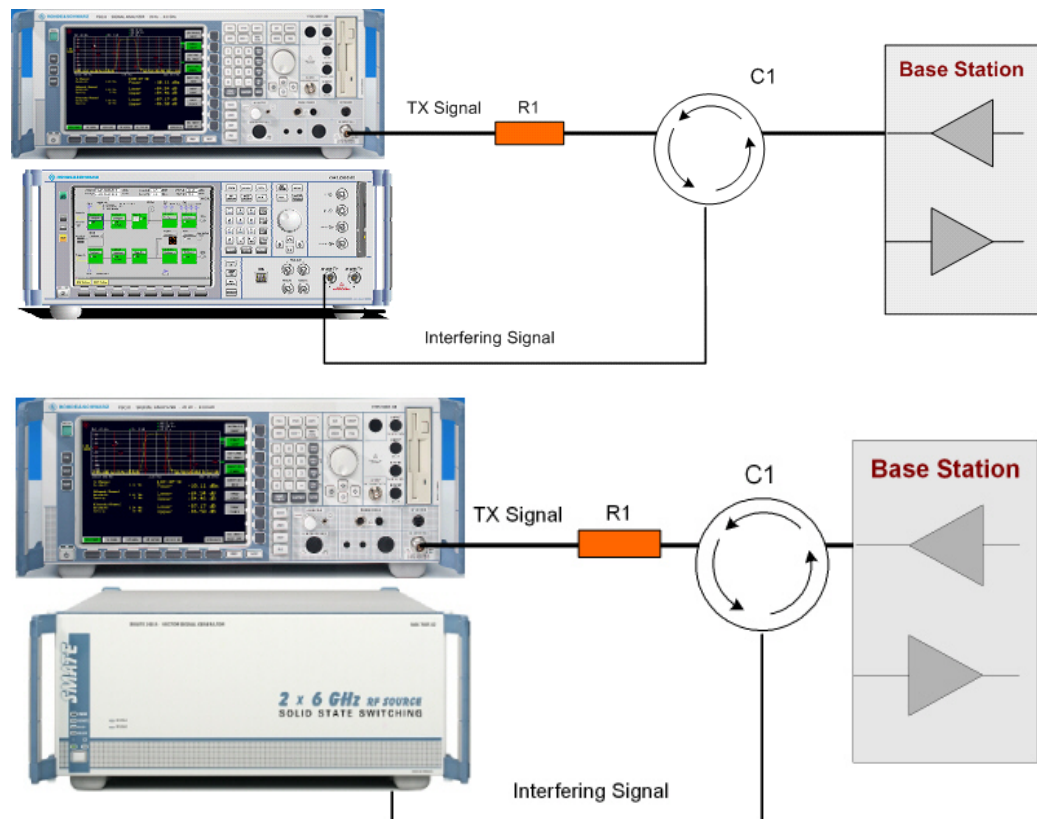
6.3.3 Test Case 6.6 - Transmit Intermodulation

The test case requires the basic configuration.

It can be performed using the standard test setup according to TS 25.141. A vector signal analyzer is required, e.g. the Vector Signal Analyzer R&S FSQ.

For the signal generator, in case of two-path instruments signal routing to path A is assumed.

RF port A is connected to the RF input of the analyzer via a circulator and an external attenuator. The Tx Signal of the base station is connected to the RF input of the analyzer via a circulator.



The signal generator outputs the test model interfering signal with different frequency offsets in relation to the BS carrier frequency and provides the trigger for the analyzer (MARKER 1).

6.3.3.1 Test Purpose and Test Settings - Test Case 6.6

The test case verifies that a BS transmitter has the capability to inhibit intermodulation products of non linear elements caused by the presence of an interfering signal at the adjacent frequency channels from the signal generator.

The test is passed when the transmit intermodulation level is below an upper out of band emission and spurious emission threshold at the test frequencies B, M, and T.

Quotation from TS 25.141

The transmit intermodulation performance is a measure of the capability of the transmitter to inhibit the generation of signals in its non linear elements caused by presence of the wanted signal and an interfering signal reaching the transmitter via the antenna

The transmit intermodulation level is the power of the intermodulation products when a WCDMA modulated interference signal is injected into an antenna connector at a mean power level of 30 dB lower than that of the mean power of the wanted signal. The frequency of the interference signal shall be 5 MHz, 10 MHz and 15 MHz offset from the subject signal carrier frequency, but exclude interference frequencies that are outside of the allocated frequency band for UTRA-FDD downlink specified in subclause 3.4.1.

The requirements are applicable for single carrier.

BS Frequency - Test Case 6.6

Enters the RF frequency of the base station.

Note: In this test case the signal generator generates no wanted signal, but just the interfering signal.

SCPI command:

[\[:SOURCE\]:BB:W3GPp:TS25141:BSSignal:FREQUENCY](#) on page 513

BS RF Power - Test Case 6.6

Enters the RF power of the base station.

Note: In this test case the signal generator generates no wanted signal, but just the interfering signal.

SCPI command:

[\[:SOURCE\]:BB:W3GPp:TS25141:BSSignal:POWER](#) on page 514

Interferer State - Test Case 6.6

Enables/disables the signal generation of the interfering 3GPP signal.

In edit mode "According to Standard" the state is fixed to "On".

Note: In this test case the signal generator generates no wanted signal, but just the interfering signal.

SCPI command:

[\[:SOURCE\]:BB:W3GPp:TS25141:IFSignal:STATE](#) on page 522

Interferer Mode - Test Case 6.6

Selects the interfering signal from a list of test models in accordance with TS 25.141. All test models refer to the predefined downlink configurations. In edit mode "According to Standard" Test Model 1, 64 DPCHs is fixed.

The following test models are available for selection in edit mode "User Definable":

- Test Model 1; 64 DPCHs
- Test Model 1; 16 Channels
- Test Model 1; 32 Channels
- Test Model 2
- Test Model 3; 16 Channels
- Test Model 3; 32 Channels
- Test Model 4
- Test Model 5; 38 Channels
- Test Model 5; 28 Channels
- Test Model 5; 8 Channels

Remote-control command: TM164

SCPI command:

`[:SOURce] :BB:W3GPp:TS25141:IFSignal:SETTing:TMODeL:BSTation`
on page 522

Frequency Offset - Test Case 6.6

Enters the frequency offset of the interfering signal versus the wanted signal.

In edit mode "According to Standard" the choice is limited to values between +/- 15 MHz in 5 MHz steps:

Remote-control command: -15 MHz

SCPI command:

`[:SOURce] :BB:W3GPp:TS25141:IFSignal:FOFFset` on page 518

Interferer Level to Signal Level - Test Case 6.6

Enters the ratio of interfering signal level versus wanted signal level.

In edit mode "According to Standard" the value is fixed to - 30 dB:

Remote-control command: -30

SCPI command:

`[:SOURce] :BB:W3GPp:TS25141:IFSignal:CNRatio` on page 515

6.3.3.2 Carrying Out a Test Case 6.6 Measurement

The signal generator outputs the test model interfering signal.

Table 6-27: The following table lists the settings on the base station:

Parameter	Value
Frequency	B, M and T
Test Model	1
Transmit power	Maximum
Scrambling Code	any

1. Set the base station to the basic state
 - a) Initialize the base station,

- b) Set the scrambling scheme,
 - c) Set the base station to test model 1,
 - d) Set maximum transmit power,
 - e) Set the frequency
2. Set the signal generator to the basic state
 - a) Preset the signal generator unless some settings (e.g. in terms of I/Q and RF blocks) have to be kept.
 3. Set the analyzer to the basic state
 4. Set the test case wizard
 - a) Open the 3GPP FDD menu in the baseband block
 - b) Open the Test Case Wizard and select Test Case 6.6.
The "General Settings" parameters are preset according to TS 25.141
 - c) Enter scrambling code and scrambling mode according to the base station scrambling scheme.
 - d) Enter the power class of the base station under test. The RF level is automatically adjusted to the selected power class.
 - e) Enter the test frequency (e.g. M). It must be the same as the base station has been set to.
 - f) Enter the Interfering Signal parameters.
 - g) Activate the settings with the "Apply Settings" button.
The signal generator is now ready to start signal generation
 5. Set the analyzer to the measurement frequency
 6. Switch on RF output
 7. Start the measurement
 - a) Send a start trigger impulse from the base station to the signal generator and to the analyzer.
Signal generation and measurement procedures are started.
 8. Calculate the result
The analyzer calculates the out of band emission and the spurious emission.

7 Remote-Control Commands

The commands in the `SOURce:BB:W3GPP` subsystem are described in three sections, separated into general remote commands, commands for base station settings and commands for user equipment settings.

This subsystem contains commands for the primary and general settings of the 3GPP FDD standard. These settings concern activation and deactivation of the standard, setting the transmission direction, filter, clock, trigger and clipping settings, defining the chip rate and the sequence length, as well as the preset and power adjust setting.

The commands for setting the base station and the user equipment, the enhanced channels of the base and user equipment, as well as the commands for selecting the test models and the test setups, are described in separate sections. The commands are divided up in this way to make the extremely comprehensive `SOURce:BB:W3GPP` subsystem clearer.

SOURce<hw>

For one-path instruments, the keyword `SOURce` is optional and can be omitted.

The numeric suffix to `SOURce` distinguishes between signal generation for path A and path B in the case of two-path instruments:

- `SOURce[1]` = path A
The keyword `SOURce` is optional and can be omitted
- `SOURce2` = path B
The keyword `SOURce` is mandatory, i.e. the command must contain the keyword with suffix 2.

OUTPut<ch>

The numeric suffix to `OUTPut` distinguishes between the available markers.

Only two markers are available for the R&S SMBV, i.e. the allowed values for the suffix are 1 or 2.

Placeholder <root>

For commands that read out or save files in the default directory, the default directory is set using command `MME:CDIRectory`. The examples in this description use the placeholder `<root>` in the syntax of the command.

- `D:\` - for selecting the internal hard disk of Windows instruments
- `E:\` - for selecting the memory stick which is inserted at the USB interface of Windows instruments
- `/var/<instrument>` - for selecting the internal flash card of Linux instrument, where `<instrument>` is the instrument name, e.g. `smbv`.
- `/usb` - for selecting the memory stick which is inserted at the USB interface of Linux instrument.

7.1 General Commands

<code>[:SOURce<hw>]:BB:W3GPp:BSTation:PRESet</code>	327
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<code>[:SOURce<hw>]:BB:W3GPp:COPY:DESTination</code>	328
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<code>[:SOURce<hw>]:BB:W3GPp:LINK</code>	329
<code>[:SOURce<hw>]:BB:W3GPp:POWER:ADJust</code>	329
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`[:SOURce<hw>]:BB:W3GPp:BSTation:PRESet`

The command produces a standardized default for all the base stations. The settings correspond to the *RST values specified for the commands.

All base station settings are preset.

Example: `BB:W3GP:BST:PRESet`
resets all the base station settings to default values.

Usage: Event

`[:SOURce<hw>]:BB:W3GPp:COPY:COFFset <Coffset>`

The command sets the offset for the channelization code in the destination base station.

This command is only available in the downlink (`SOUR:BB:W3GP:LINK FORW/DOWN`).

Parameters:

<code><Coffset></code>	float
Range:	0 to 511
Increment:	1
*RST:	0

Example: `BB:W3GP:COPY:COFF 10`
the channelization code is shifted by 10 when the source base station is copied to the destination base station.

[:SOURce<hw>]:BB:W3GPp:COPY:DESTination <Destination>

The command selects the station to which data is to be copied. Whether the data is copied to a base station or a user equipment depends on which transmission direction is selected (command `W3GPp:LINK UP | DOWN`).

Parameters:

<Destination> 1 | 2 | 3 | 4
 Range: 1 to 4
 *RST: 2

Example:

`BB:W3GP:LINK DOWN`
 selects the downlink transmit direction (base station to user equipment).
`BB:W3GP:COPY:SOUR 1`
 selects base station 1 as the source.
`BB:W3GP:COPY:DEST 4`
 selects base station 4 as the destination.
`BB:W3GP:COPY:EXEC`
 starts copying the parameter set of base station 1 to base station 4.

[:SOURce<hw>]:BB:W3GPp:COPY:EXECute

The command starts the copy process. The dataset of the source station is copied to the destination station. Whether the data is copied to a base station or a user equipment depends on which transmission direction is selected (command `W3GPp:LINK UP | DOWN`).

Example:

`BB:W3GP:COPY:EXEC`
 starts copying the parameter set of the selected source station to the selected destination station.

Usage: Event

[:SOURce<hw>]:BB:W3GPp:COPY:SOURce <Source>

The command selects the station that has data to be copied. Whether the station copied is a base or user equipment depends on which transmission direction is selected (command `W3GPp:LINK UP | DOWN`).

Parameters:

<Source> 1 | 2 | 3 | 4
 Range: 1 to 4
 *RST: 1

Example: `BB:W3GP:LINK UP`
 selects the uplink transmit direction (user equipment to base station).
`BB:W3GP:COPY:SOUR 1`
 selects user equipment 1 as the source.
`BB:W3GP:COPY:DEST 4`
 selects user equipment 4 as the destination.
`BB:W3GP:COPY:EXEC`
 starts copying the parameter set of user equipment 1 to user equipment 4.

[:SOURce<hw>]:BB:W3GPp:LINK <Link>

The command defines the transmission direction. The signal either corresponds to that of a base station (`FORWARD|DOWN`) or that of a user equipment (`REVERSE|UP`).

Parameters:

<Link> `FORWARD | DOWN | REVERSE | UP`
 *RST: `FORWARD|DOWN`

Example: `BB:W3GP:LINK DOWN`
 the transmission direction selected is base station to user equipment. The signal corresponds to that of a base station.

[:SOURce<hw>]:BB:W3GPp:POWER:ADJUST

The command sets the power of the active channels in such a way that the total power of the active channels is 0 dB. This will not change the power ratio among the individual channels.

Example: `BB:W3GP:POW:ADJ`
 the total power of the active channels is set to 0 dB, the power ratio among the individual channels is unchanged.

Usage: Event

[:SOURce<hw>]:BB:W3GPp:POWER[:TOTAL]?

The command queries the total power of the active channels. After "Power Adjust", this power corresponds to 0 dB.

Return values:

<Total> float

Example: `BB:W3GP:POW?`
 queries the total power of the active channels.
 Response: `-22.5`
 the total power is -25 dB.

Usage: Query only

[[:SOURce<hw>]:BB:W3GPp:PRESet

The command produces a standardized default for the 3GPP FDD standard. The settings correspond to the *RST values specified for the commands.

All 3GPP FDD settings are preset.

Example: BB:W3GP:PRES
resets all the 3GPP FDD settings to default values.

Usage: Event

[[:SOURce<hw>]:BB:W3GPp:SETTing:CATalog?

This command reads out the files with 3GPP FDD settings in the default directory. The default directory is set using command MMEM:CDIRectory. Only files with the file extension *.3g will be listed.

Return values:

<Catalog> string

Example: MMEM:CDIR '<root>\user\dig_mod'
sets the default directory to <root>\user\dig_mod.
BB:W3GP:SETT:CAT?
reads out all the files with 3GPP FDD settings in the default directory.
Response: UPLINK, DOWNLINK
the files UPLINK and DOWNLINK are available.

Usage: Query only

[[:SOURce<hw>]:BB:W3GPp:SETTing:DELeTe <Delete>

This command deletes the selected file with 3GPP FDD settings. The directory is set using command MMEM:CDIRectory. A path can also be specified, in which case the files in the specified directory are read. The file extension may be omitted. Only files with the file extension *.3g will be deleted.

Setting parameters:

<Delete> <file_name>

Example: BB:W3GP:SETT:DEL 'UPLINK'
deletes file UPLINK.

Usage: Setting only

[[:SOURce<hw>]:BB:W3GPp:SETTing:LOAD <Load>

This command loads the selected file with 3GPP FDD settings. The directory is set using command MMEM:CDIRectory. A path can also be specified, in which case the files in the specified directory are read. The file extension may be omitted. Only files with the file extension *.3g will be loaded.

Setting parameters:

<Load> <file_name>

Example:

```
BB:W3GP:SETT:LOAD 'UPLINK'
loads file UPLINK.
```

Usage:

Setting only

[[:SOURce<hw>]:BB:W3GPp:SETTING:STORE <Store>

This command stores the current 3GPP FDD settings into the selected file. The directory is set using command `MMEM:CDIRECTORY`. A path can also be specified, in which case the files in the specified directory are read. Only the file name has to be entered. 3GPP FDD settings are stored as files with the specific file extensions `*.3g`.

Setting parameters:

<Store> string

Example:

```
BB:W3GP:SETT:STOR 'UPLINK'
stores the current 3GPP FDD settings into file UPLINK.
```

Usage:

Setting only

[[:SOURce<hw>]:BB:W3GPp:SETTING:STORE:FAST <Fast>

Determines whether the instrument performs an absolute or a differential storing of the settings.

Enable this function to accelerate the saving process by saving only the settings with values different to the default ones.

Note: This function is not affected by the "Preset" function.

Parameters:

<Fast> 0 | 1 | OFF | ON
*RST: ON

[[:SOURce<hw>]:BB:W3GPp:SLENGth <Slength>

The command sets the sequence length of the arbitrary waveform component of the 3GPP signal in the number of frames. This component is calculated in advance and output in the arbitrary waveform generator. It is added to the realtime signal components (Enhanced Channels).

The maximum number of frames is calculated as follows:

Max. No. of Frames = Arbitrary waveform memory size/(3.84 Mcps x 10 ms).

When working in Advanced Mode (`W3GP:BST1:CHAN:HSDP:HSET:AMOD ON`), it is recommended to adjust the current ARB sequence length to the suggested one.

Parameters:

<Slength> float
 Range: 1 to Max frames
 *RST: 1

Example:

BB:W3GP:SLen 10
 sets the sequence length to 10 frames.

[:SOURCE<hw>]:BB:W3GPP:STATe <State>

The command activates modulation in accordance with the 3GPP FDD standard. Activating this standard deactivates all the other digital standards and digital modulation modes.

In case of two-path instruments, this affects the same path.

BB:W3GP:STAT ON deactivates the other standards and digital modulation.

Parameters:

<State> ON | OFF
 *RST: OFF

Example:

BB:W3GP:STAT ON
 activates modulation in accordance with the 3GPP FDD standard.

[:SOURCE<hw>]:BB:W3GPP:WAVEform:CREate <Create>

This command creates a waveform using the current settings of the 3GPP FDD menu. The file name is entered with the command. The file is stored with the predefined file extension *.wav. The file name and the directory it is stored in are user-definable.

Setting parameters:

<Create> <file_name>

Example:

M MEM:CDIR '<root>\user\waveform'
 sets the default directory to <root>\user\waveform.
 BB:W3GP:WAV:CRE 'gpp3_bs'
 creates the waveform file gpp3_bs.wav in the default directory.

Usage:

Setting only

[:SOURCE]:BB:W3GPP:GPP3:VERSion?

The command queries the version of the 3GPP standard underlying the definitions.

Return values:

<Version> string

Example:

BB:W3GP:GPP3:VERS?
 queries the 3GPP version.

Usage:

Query only

7.2 Filter/Clipping Settings

<code>[:SOURce<hw>]:BB:W3GPp:CLIPping:LEVel</code>	333
<code>[:SOURce<hw>]:BB:W3GPp:CLIPping:MODE</code>	333
<code>[:SOURce<hw>]:BB:W3GPp:CLIPping:STATe</code>	334
<code>[:SOURce<hw>]:BB:W3GPp:CRATe</code>	334
<code>[:SOURce<hw>]:BB:W3GPp:CRATe:VARiation</code>	334
<code>[:SOURce<hw>]:BB:W3GPp:FILTer:ILENgtH</code>	335
<code>[:SOURce<hw>]:BB:W3GPp:FILTer:ILENgtH:AUTO</code>	335
<code>[:SOURce<hw>]:BB:W3GPp:FILTer:OSAMpling</code>	335
<code>[:SOURce<hw>]:BB:W3GPp:FILTer:OSAMpling:AUTO</code>	335
<code>[:SOURce<hw>]:BB:W3GPp:FILTer:PARAmeter:APCO25</code>	336
<code>[:SOURce<hw>]:BB:W3GPp:FILTer:PARAmeter:COSSine</code>	336
<code>[:SOURce<hw>]:BB:W3GPp:FILTer:PARAmeter:GAUSSs</code>	336
<code>[:SOURce<hw>]:BB:W3GPp:FILTer:PARAmeter:LPASs</code>	336
<code>[:SOURce<hw>]:BB:W3GPp:FILTer:PARAmeter:LPASSEVM</code>	337
<code>[:SOURce<hw>]:BB:W3GPp:FILTer:PARAmeter:RCOSine</code>	337
<code>[:SOURce<hw>]:BB:W3GPp:FILTer:PARAmeter:SPHase</code>	337
<code>[:SOURce<hw>]:BB:W3GPp:FILTer:TYPe</code>	337

`[:SOURce<hw>]:BB:W3GPp:CLIPping:LEVel <Level>`

The command sets the limit for level clipping (Clipping). This value indicates at what point the signal is clipped. It is specified as a percentage, relative to the highest level. 100% indicates that clipping does not take place.

Level clipping is activated with the command `SOUR:BB:W3GP:CLIP:STAT ON`

Parameters:

`<Level>` float
 Range: 0 to 100 PCT
 Increment: 1
 *RST: 100 PCT

Example:

```
BB:W3GP:CLIP:LEV 80PCT
sets the limit for level clipping to 80% of the maximum level.
BB:W3GP:CLIP:STAT ON
activates level clipping.
```

`[:SOURce<hw>]:BB:W3GPp:CLIPping:MODE <Mode>`

The command sets the method for level clipping (Clipping).

Parameters:

`<Mode>` VECTor | SCALar
VECTor
 The reference level is the amplitude $|i+jq|$
SCALar
 The reference level is the absolute maximum of the I and Q values.
 *RST: VECTor

Example: `BB:W3GP:CLIP:MODE SCAL`
 selects the absolute maximum of all the I and Q values as the reference level.
`BB:W3GP:CLIP:LEV 80PCT`
 sets the limit for level clipping to 80% of this maximum level.
`BB:W3GP:CLIP:STAT ON`
 activates level clipping.

[[:SOURce<hw>]:BB:W3GPp:CLIPping:STATe <State>

The command activates level clipping (Clipping). The value is defined with the command `BB:W3GPp:CLIPping:LEVel`, the mode of calculation with the command `BB:W3GPp:CLIPping:MODE`.

Parameters:

<State> 0 | 1 | OFF | ON
 *RST: OFF

Example: `BB:W3GP:CLIP:STAT ON`
 activates level clipping.

[[:SOURce<hw>]:BB:W3GPp:CRATe?

The command queries the set system chip rate. The output chip rate can be set with the command `SOUR:BB:W3GP:CRAT:VAR`.

Return values:

<Crate> R3M8

Example: `BB:W3GP:CRAT?`
 queries the system chip rate.
 Response: R3M8
 the system chip rate is 3.8 Mcps.

Usage: Query only

[[:SOURce<hw>]:BB:W3GPp:CRATe:VARiation <Variation>

The command enters the output chip rate.

The chip rate entry changes the output clock and the modulation bandwidth, as well as the synchronization signals that are output. It does not affect the calculated chip sequence.

Parameters:

<Variation> float
 Range: 1 Mcps to 5 Mcps
 *RST: 3.84 MCps

Example: `BB:W3GP:CRAT:VAR 4086001`
 sets the chip rate to 4.08 Mcps.

[[:SOURce<hw>]:BB:W3GPp:FILTer:ILENgtH <llength>

available for R&S WinIQSIM2 only

The command sets the impulse length (number of filter tabs).

Parameters:

<llength> float
 Range: 1 to 128
 *RST: 10

Example:

BB:W3GP:FILT:ILEN 10
 sets the number of filter tabs to 10.

[[:SOURce<hw>]:BB:W3GPp:FILTer:ILENgtH:AUTO <Auto>

available for R&S WinIQSIM2 only

The command activates/deactivates the impulse length state. If activated, the most sensible parameter values are selected. The value depends on the coherence check.

Parameters:

<Auto> ON | OFF
 *RST: ON

Example:

BB:W3GP:FILT:ILEN:AUTO ON
 the most sensible parameters are selected automatically.

[[:SOURce<hw>]:BB:W3GPp:FILTer:OSAMplIng <Osampling>

available for R&S WinIQSIM2 only

The command sets the upsampling factor.

Parameters:

<Osampling> float
 Range: 1 to 32
 *RST: 32

Example:

BB:W3GP:FILT:OSAM 32
 sets the upsampling factor to 32.

[[:SOURce<hw>]:BB:W3GPp:FILTer:OSAMplIng:AUTO <Auto>

available for R&S WinIQSIM2 only

The command activates/deactivates the upsampling factor state. If activated, the most sensible parameter values are selected. The value depends on the coherence check. If deactivated, the values can be changed manually.

Parameters:

<Auto> ON | OFF
 *RST: ON

Example: `BB:W3GP:FILT:OSAM:AUTO ON`
the most sensible parameters are selected automatically.

[:SOURCE<hw>]:BB:W3GPP:FILT:PARAMeter:APCO25 <Apco25>

The command sets the roll-off factor for filter type APCO25.

Parameters:

<Apco25> float
Range: 0.05 to 0.99
Increment: 0.01
*RST: 0.20

Example: `BB:W3GP:FILT:PAR:APCO25 0.2`
sets the roll-off factor to 0.2 for filter type APCO25.

[:SOURCE<hw>]:BB:W3GPP:FILT:PARAMeter:COSine <Cosine>

The command sets the roll-off factor for the Cosine filter type.

Parameters:

<Cosine> float
Range: 0 to 1.0
Increment: 0.01
*RST: 0.35

Example: `BB:W3GP:FILT:PAR:COS 0.35`
sets the roll-off factor to 0.35 for filter type Cosine.

[:SOURCE<hw>]:BB:W3GPP:FILT:PARAMeter:GAUSS <Gauss>

The command sets the roll-off factor for the Gauss filter type.

Parameters:

<Gauss> float
Range: 0.15 to 2.50
Increment: 0.01
*RST: 0.50

Example: `BB:W3GP:FILT:PAR:GAUS 0.5`
sets B x T to 0.5 for the Gauss filter type.

[:SOURCE<hw>]:BB:W3GPP:FILT:PARAMeter:LPASS <Lpass>

The command sets the cut off frequency factor for the Lowpass (ACP opt.) filter type. The minimum/maximum values depend on the current symbol rate:

Parameters:

<Lpass> float
Range: 0.05 to 2.0
*RST: 0.5

Example: `BB:W3GP:FILT:PAR:LPAS 0.5`
the cut of frequency factor is set to 0.5.

[:SOURCE<hw>]:BB:W3GP:FILT:PARAMeter:LPASSEVM <Lpassevm>

The command sets the cut off frequency factor for the Lowpass (EVM opt.) filter type.
The minimum/maximum values depend on the current symbol rate:

Parameters:

<Lpassevm> float
Range: 0.05 to 2.0
*RST: 0.50

Example: `BB:W3GP:FILT:PAR:LPASSEVM 0.5`
the cut of frequency factor is set to 0.5.

[:SOURCE<hw>]:BB:W3GP:FILT:PARAMeter:RCOSine <Rcosine>

The command sets the roll-off factor for the Root Cosine filter type.

Parameters:

<Rcosine> float
Range: 0 to 1.0
Increment: 0.01
*RST: 0.22

Example: `BB:W3GP:FILT:PAR:RCOS 0.22`
sets the roll-off factor to 0.22 for filter type Root Cosine.

[:SOURCE<hw>]:BB:W3GP:FILT:PARAMeter:SPHase <Sphase>

The command sets B x T for the Split Phase filter type.

Parameters:

<Sphase> float
Range: 0.15 to 2.50
Increment: 0.01
*RST: 2.00

Example: `BB:W3GP:FILT:PAR:SPH 0.5`
sets B x T to 0.5 for the Split Phase filter type.

[:SOURCE<hw>]:BB:W3GP:FILT:TYPE <Type>

The command selects the filter type.

Parameters:

<Type> RCOSine | COSine | GAUSs | LGAuss | CONE | COF705 |
 COEqualizer | COFequalizer | C2K3x | APCO25 | LPASs |
 LPASSEVM | SPHase | RECTangle | DIRac | ENPShape |
 EWPSshape
 *RST: RCOSine

Example:

BB:W3GP:FILT:TYPE COS
 sets the filter type COSine.

7.3 Trigger Settings



The trigger settings are available for R&S SMx and R&S AMU instruments only.

EXTernal<ch>

The numeric suffix to **EXTernal<ch>** distinguishes between the external trigger via the TRIGGER 1 (suffix 1) and TRIGGER 2 (suffix 2) connector.

<code>[:SOURce<hw>]:BB:W3GPp:TRIGger:ARM:EXECute</code>	338
<code>[:SOURce<hw>]:BB:W3GPp:TRIGger:EXECute</code>	339
<code>[:SOURce<hw>]:BB:W3GPp:TRIGger:EXTernal:SYNChronize:OUTPut</code>	339
<code>[:SOURce<hw>]:BB:W3GPp:TRIGger:OBASeband:DELay</code>	340
<code>[:SOURce<hw>]:BB:W3GPp:TRIGger:OBASeband:INHibit</code>	340
<code>[:SOURce<hw>]:BB:W3GPp:TRIGger:RMODE</code>	340
<code>[:SOURce<hw>]:BB:W3GPp:TRIGger:SLENgth</code>	341
<code>[:SOURce<hw>]:BB:W3GPp:TRIGger:SLUNit</code>	341
<code>[:SOURce<hw>]:BB:W3GPp:TRIGger:SOURce</code>	342
<code>[:SOURce<hw>]:BB:W3GPp:TRIGger[:EXTernal<ch>]:DELay</code>	342
<code>[:SOURce<hw>]:BB:W3GPp:TRIGger[:EXTernal<ch>]:INHibit</code>	343
<code>[:SOURce<hw>]:BB:W3GPp[:TRIGger]:SEQuence</code>	343

`[:SOURce<hw>]:BB:W3GPp:TRIGger:ARM:EXECute`

The command stops signal generation for trigger modes Armed_Auto and Armed_Ret-rigger. A subsequent internal or external trigger event restart signal generation.

Example:

```
BB:W3GP:TRIG:SOUR INT
sets internal triggering.
BB:W3GP:TRIG:SEQ ARET
sets Armed_Retrigger mode, i.e. every trigger event causes signal
generation to restart.
BB:W3GP:TRIG:EXEC
executes a trigger, signal generation is started.
BB:W3GP:TRIG:ARM:EXEC
signal generation is stopped.
BB:W3GP:TRIG:EXEC
executes a trigger, signal generation is started again.
```

Usage: Event

[:SOURce<hw>]:BB:W3GPp:TRIGger:EXECute

The command executes a trigger. The internal trigger source must be selected using the command `BB:W3GP:TRIG:SOUR INT` and a trigger mode other than `AUTO` must be selected using the command `:BB:W3GP:TRIG:SEQ`.

Example:

```
BB:W3GP:TRIG:SOUR INT
sets internal triggering.
BB:W3GP:TRIG:SEQ RETR
sets Retrigger mode, i.e. every trigger event causes signal gen-
eration to restart.
BB:W3GP:TRIG:EXEC
executes a trigger.
```

Usage: Event

[:SOURce<hw>]:BB:W3GPp:TRIGger:EXTernal:SYNChronize:OUTPut <Output>

Enables/disables output of the signal synchronous to the external trigger event.

See also "[Sync. Output to External Trigger](#)" on page 75 for a detailed description of the applications of this parameter.

Parameters:

<Output> ON | OFF

ON

The signal calculation starts simultaneously with the external trigger event but because of the instrument's processing time the first samples are cut off and no signal is outputted. After elapsing of the internal processing time, the output signal is synchronous to the trigger event.

OFF

The signal output begins after elapsing of the processing time and starts with sample 0, i.e. the complete signal is outputted.

*RST: ON

Example: `BB:W3GPp:TRIG:SOUR EXT`
sets external triggering.
`BB:W3GPp:TRIG:EXT:SYNC:OUTP ON`
enables synchronous output to external trigger

[:SOURce<hw>]:BB:W3GPp:TRIGger:OBASeband:DELay <Delay>

The command specifies the trigger delay (expressed as a number of chips) for triggering by the trigger signal from the second path.

Parameters:

<Delay> float
Range: 0 chip2 to 2³²-1 chips
Increment: 1 chip
*RST: 0 chips

Example: `BB:W3GP:TRIG:SOUR OBAS`
sets for path A the internal trigger executed by the trigger signal from the second path (path B).
`BB:W3GP:TRIG:OBAS:DEL 50`
sets a delay of 50 chips for the trigger.

[:SOURce<hw>]:BB:W3GPp:TRIGger:OBASeband:INHibit <Inhibit>

The command specifies the number of chips by which a restart is to be inhibited following a trigger event. This command applies only for triggering by the second path (two-path instruments only).

Parameters:

<Inhibit> float
Range: 0 chips to 2³²-1 chips
Increment: 1 chip
*RST: 0 chips

Example: `BB:W3GP:TRIG:SOUR OBAS`
sets for path A the internal trigger executed by the trigger signal from the second path (path B).
`BB:W3GP:TRIG:INH 200`
sets a restart inhibit for 200 chips following a trigger event.

[:SOURce<hw>]:BB:W3GPp:TRIGger:RMODE?

The command queries the current status of signal generation for all trigger modes with 3GPP FDD modulation on.

Return values:

<Rmode> STOP | RUN

STOP

the signal is not generated. A trigger event did not occur in the triggered modes, or signal generation was stopped by the command `:BB:W3GP:TRIG:ARM:EXECute` (armed trigger modes only).

RUN

the signal is generated. A trigger event occurred in the triggered mode.

Example:

```
BB:W3GP:TRIG:SOUR EXT
```

sets external triggering via the TRIGGER 1 connector.

```
BB:W3GP:TRIG:MODE ARET
```

selects the Armed_Retrigger mode.

```
BB:W3GP:TRIG:RMOD?
```

queries the current status of signal generation.

```
Response: RUN
```

the signal is generated, an external trigger was executed.

Usage:

Query only

[:SOURCE<hw>]:BB:W3GPp:TRIGger:SLENgth <Slength>

The command defines the length of the signal sequence to be output in the Single trigger mode (`SOUR:BB:W3GPp:SEQ SING`). The unit is defined with command `SOUR:BB:W3GP:TRIG:SLUNit`.

It is possible to output deliberately just part of the frame, an exact sequence of the frame, or a defined number of repetitions of the frame.

Parameters:

<Slength>	float
Range:	1 to (2 ³² -1) chips
*RST:	1 frame length

Example:

```
BB:W3GP:SEQ SING
```

sets trigger mode Single.

```
BB:W3GP:TRIG:SLUN CHIP
```

sets unit chips for the entry of sequence length.

```
BB:W3GP:TRIG:SLEN 200
```

sets a sequence length of 200 chips. The first 200 chips of the current frame will be output after the next trigger event.

[:SOURCE<hw>]:BB:W3GPp:TRIGger:SLUNit <Slunit>

The command defines the unit for the entry of the length of the signal sequence (`SOUR:BB:W3GPp:TRIG:SLEN`) to be output in the Single trigger mode (`SOUR:BB:W3GPp:SEQ SING`).

Parameters:

<Slunit> FRAME | SLOT | CHIP | SEQUENCE
 *RST: SEQUENCE

Example:

```
BB:W3GP:SEQ SING
sets trigger mode Single.
BB:W3GP:TRIG:SLUN FRAM
sets unit frames for the entry of sequence length.
BB:W3GP:TRIG:SLEN 2
sets a sequence length of 2 frames. The current frame will be out-
put twice after the next trigger event.
```

[:SOURCE<hw>]:BB:W3GPP:TRIGGER:SOURCE <Source>

The command selects the trigger source.

Parameters:

<Source> INTERNAL | EXTERNAL | BEXTERNAL | OBASBAND

INTERNAL

Triggering is executed by means of the Trigger command

BB:W3GP:TRIGGER:EXECUTE or *TRG in the case of remote control and by means of "Execute Trigger" in the case of manual operation.

EXTERNAL

Triggering is executed by means of the signal on the TRIGGER 1 connector.

BEEXTERNAL

Triggering is executed by means of the signal on the TRIGGER 2 connector.

OBASBAND

Triggering is executed by means of the trigger signal from the second path (two-path instruments only).

*RST: INTERNAL

Example:

```
BB:W3GP:TRIG:SOUR EXT
sets external triggering via the TRIGGER 1 connector.
```

[:SOURCE<hw>]:BB:W3GPP:TRIGGER[:EXTERNAL<ch>]:DELAY <Delay>

The command specifies the trigger delay (expressed as a number of chips) for external triggering.

Parameters:

<Delay> float
 Range: 0 chips to 2³²-1 chip
 Increment: 1 chip
 *RST: 0 chips

Example: `BB:W3GP:TRIG:SOUR EXT`
sets an external trigger via the TRIGGER 1 connector.
`BB:W3GP:TRIG:DEL 50`
sets a delay of 50 chips for the trigger.

[:SOURCE<hw>]:BB:W3GPP:TRIGGER[:EXTERNAL<ch>]:INHIBIT <Inhibit>

The command specifies the number of chips by which a restart is to be inhibited following a trigger event. This command applies only in the case of external triggering.

Parameters:

<Inhibit> float
Range: 0 chips to $2^{32}-1$ chips
Increment: 1 chip
*RST: 0 chips

Example: `BB:W3GP:TRIG:SOUR EXT`
selects an external trigger via the TRIGGER 1 connector.
`BB:W3GP:TRIG:INH 200`
sets a restart inhibit for 200 chips following a trigger event.

[:SOURCE<hw>]:BB:W3GPP:TRIGGER[:SEQUENCE <Sequence>

The command selects the trigger mode.

Parameters:

<Sequence>

AUTO | RETRigger | AAUTo | ARETrigger | SINGle

AUTO

The modulation signal is generated continuously.

RETRigger

The modulation signal is generated continuously. A trigger event (internal or external) causes a restart.

AAUTo

The modulation signal is generated only when a trigger event occurs. After the trigger event the signal is generated continuously. Signal generation is stopped with command

`SOUR:BB:W3GP:TRIG:ARM:EXEC` and started again when a trigger event occurs.**ARETrigger**

The modulation signal is generated only when a trigger event occurs. The device automatically toggles to RETRIG mode. Every subsequent trigger event causes a restart.

Signal generation is stopped with command

`SOUR:BB:W3GP:TRIG:ARM:EXEC` and started again when a trigger event occurs.**SINGle**The modulation signal is generated only when a trigger event occurs. Then the signal is generated once to the length specified with command `SOUR:BB:W3GP:TRIG:SLen`. Every subsequent trigger event causes a restart.`*RST: AUTO`**Example:**`BB:W3GP:SEQ AAUT`sets the Armed_auto trigger mode; the device waits for the first trigger (e.g. with `*TRG`) and then generates the signal continuously.

7.4 Marker Settings

This section lists the remote control commands, necessary to configure the markers.



The marker delay settings are available for R&S SMx and R&S AMU instruments only.

OUTPut<ch>The numeric suffix to `OUTPut` distinguishes between the available markers.

Only two markers are available for the R&S SMBV, i.e. the allowed values for the suffix are 1 or 2.

[\[:SOURce<hw>\]:BB:W3GPp:TRIGger:OUTPut:DELay:FIXed.....](#)345

<code>[:SOURce<hw>]:BB:W3GPp:TRIGger:OUTPut<ch>:DELay</code>	345
<code>[:SOURce<hw>]:BB:W3GPp:TRIGger:OUTPut<ch>:DELay:MAXimum</code>	345
<code>[:SOURce<hw>]:BB:W3GPp:TRIGger:OUTPut<ch>:DELay:MINimum</code>	346
<code>[:SOURce<hw>]:BB:W3GPp:TRIGger:OUTPut<ch>:MODE</code>	346
<code>[:SOURce<hw>]:BB:W3GPp:TRIGger:OUTPut<ch>:ONTime</code>	347
<code>[:SOURce<hw>]:BB:W3GPp:TRIGger:OUTPut<ch>:OFFTime</code>	347
<code>[:SOURce<hw>]:BB:W3GPp:TRIGger:OUTPut<ch>:PERiod</code>	348

`[:SOURce<hw>]:BB:W3GPp:TRIGger:OUTPut:DELay:FIXed <Fixed>`

The command restricts the marker delay setting range to the dynamic range. In this range the delay can be set without restarting the marker and signal. If a delay is entered in setting ON but is outside this range, the maximum possible delay is set and an error message is generated.

The numeric suffix in `OUTPut` has no significance for this command, since the setting always affects every marker.

Parameters:

`<Fixed>` ON | OFF
 *RST: OFF

Example:

`BB:W3GP:TRIG:OUTP:DEL:FIX ON`
 restricts the marker signal delay setting range to the dynamic range.

`[:SOURce<hw>]:BB:W3GPp:TRIGger:OUTPut<ch>:DELay <Delay>`

The command defines the delay between the signal on the marker outputs and the start of the signal, expressed in terms of chips. Command `:BB:W3GPp:TRIGger:OUTPut:DELay:FIXed` can be used to restrict the range of values to the dynamic range, i.e. the range within which a delay of the marker signals can be set without restarting the marker and signal.

Parameters:

`<Delay>` float
 Range: 0 chips to $2^{32}-1$ chips
 Increment: 1 chip
 *RST: 0 chips

Example:

`BB:W3GP:TRIG:OUTP2:DEL 16000`
 sets a delay of 16000 chips for the signal on connector MARKER 2.

`[:SOURce<hw>]:BB:W3GPp:TRIGger:OUTPut<ch>:DELay:MAXimum?`

The command queries the maximum marker delay for setting `:BB:W3GPp:TRIG:OUTP:DEL:FIX ON`.

Return values:

`<Maximum>` float

Example: `BB:W3GP:TRIG:OUTP:DEL:FIX ON`
 restricts the marker signal delay setting range to the dynamic range.
`BB:W3GP:TRIG:OUTP:DEL:MAX`
 queries the maximum of the dynamic range.
 Response: 20000
 the maximum for the marker delay setting is 20000 chips.

Usage: Query only

[[:SOURce<hw>]:BB:W3GPp:TRIGger:OUTPut<ch>:DELay:MINimum?

The command queries the minimum marker delay for setting `:BB:W3GPp:TRIGger:OUTPut:DELay:FIXed ON`.

Return values:
 <Minimum> float

Example: `BB:W3GP:TRIG:OUTP:DEL:FIX ON`
 restricts the marker signal delay setting range to the dynamic range.
`BB:W3GP:TRIG:OUTP:DEL:MIN`
 queries the minimum of the dynamic range.
 Response: 0
 the minimum for the marker delay setting is 0 chips.

Usage: Query only

[[:SOURce<hw>]:BB:W3GPp:TRIGger:OUTPut<ch>:MODE <Mode>

The command defines the signal for the selected marker output.

Parameters:

<Mode>

SLOT | RFRame | CSPeriod | SFNR | RATio | USER | DPC | HFE

SLOT

A marker signal is generated at the start of each slot (every 2560 chips or 0.667 ms).

RFRame

A marker signal is generated at the start of each frame (every 38400 chips or 10 ms).

CSPeriod

A marker signal is generated at the start of every arbitrary waveform sequence (depending on the setting for the arbitrary waveform sequence length). If the signal does not contain an arbitrary waveform component, a radio frame trigger is generated.

SFNR

A marker signal is generated at the start of every SFN period (every 4096 frames).

RATio

A marker signal corresponding to the Time Off / Time On specifications in the commands

`SOURce:BB:W3GPp:TRIGger:OUTPut:OFFT` and

`SOURce:BB:W3GPp:TRIGger:OUTPut:ONT` is generated.

USER

A marker signal is generated at the beginning of every user-defined period. The period is defined with command

`SOUR:BB:W3GP:TRIG:OUTP:PERiod`.

DPC

(the parameter is not available for R&S SMBV)

This marker is used internally. Marker 4 is set automatically to this value if "Dynamic Power Control" is enabled.

HFE

(the parameter is not available for R&S SMBV)

This marker is used internally. Marker 4 is set automatically to this value if "HARQ Feedback" is enabled.

*RST: RFRame

Example:

`BB:W3GP:TRIG:OUTP2:MODE SLOT`

selects the slot marker signal on output MARKER 2.

`[:SOURce<hw>]:BB:W3GPp:TRIGger:OUTPut<ch>:ONTime <OnTime>`

`[:SOURce<hw>]:BB:W3GPp:TRIGger:OUTPut<ch>:OFFTime <OffTime>`

The command sets the number of chips in a period (ON time + OFF time) during which the marker signal in setting `SOURce:BB:W3GPp:TRIGger:OUTPut:MODE RATio` on the marker outputs is OFF.

Parameters:

<Offtime> float
 Range: 1 chips to $2^{24}-1$ chips
 Increment: 1 chip
 *RST: 1 chip

Example:

BB:W3GP:TRIG:OUTP2:OFFT 2000
 sets an OFF time of 2000 chips for marker signal 2.

[:SOURce<hw>]:BB:W3GPp:TRIGger:OUTPut<ch>:PERiod <Period>

The command sets the repetition rate for the signal at the marker outputs, expressed in terms of chips. The setting is only valid for selection USER
 in :W3GP:TRIG:OUTP:MODE.

Parameters:

<Period> float
 Range: 1 chip to $2^{32}-1$ chips
 Increment: 1 chip
 *RST: 1 Frame (38 400 Chips)

Example:

BB:W3GP:TRIG:OUTP2:MODE USER
 selects the user marker for the signal on connector MARKER 2.
 BB:W3GP:TRIG:OUTP2:PER 1600
 sets a period of 1600 chips, i.e. the marker signal is repeated every 1600th chip.

7.5 Clock Settings

This section lists the remote control commands, necessary to configure the clock.



The clock settings are available for R&S SMx and R&S AMU instruments only.

[:SOURce<hw>]:BB:W3GPp:CLOCK:MODE.....	348
[:SOURce<hw>]:BB:W3GPp:CLOCK:MULTiplier.....	349
[:SOURce<hw>]:BB:W3GPp:CLOCK:SOURce.....	349
[:SOURce<hw>]:BB:W3GPp:CLOCK:SYNChronization:EXECute.....	350
[:SOURce<hw>]:BB:W3GPp:CLOCK:SYNChronization:MODE.....	350

[:SOURce<hw>]:BB:W3GPp:CLOCK:MODE <Mode>

The command enters the type of externally supplied clock (:BB:W3GPp:CLOCK:SOURce EXTERNAL).

When MCHIP is used, a multiple of the chip clock is supplied via the CLOCK connector and the chip clock is derived internally from this. The multiplier is entered with the command :BB:W3GPp:CLOCK:MULTiplier.

For two-path instruments, the only numerical suffix allowed for **SOURCE** is 1, since the external clock source is permanently allocated to path A.

Parameters:

<Mode> CHIP | MCHip
*RST: Chip

Example:

BB:W3GP:CLOC:MODE CHIP
selects clock type Chip, i.e. the supplied clock is a chip clock.

[:SOURCE<hw>]:BB:W3GPp:CLOCK:MULTIPLIER <Multiplier>

The command specifies the multiplier for clock type Multiplied (:BB:W3GPp:CLOCK:MODE MCHip) in the case of an external clock source.

For two-path instruments, the only numerical suffix allowed for **SOURCE** is 1, since the external clock source is permanently allocated to path A.

Parameters:

<Multiplier> float
Range: 1 to 64
Increment: 1
*RST: 4

Example:

BB:W3GP:CLOC:SOUR EXT
selects the external clock source. The clock is supplied via the CLOCK connector.
BB:W3GP:CLOC:MODE MCH
selects clock type Multiplied, i.e. the supplied clock has a rate which is a multiple of the chip rate.
BB:W3GP:CLOC:MULT 12
the multiplier for the external clock rate is 12.

[:SOURCE<hw>]:BB:W3GPp:CLOCK:SOURCE <Source>

The command selects the clock source.

For two-path instruments, selecting **EXTERNAL** is only possible for path A, since the external clock source is permanently allocated to path A. Selection **AINTERNAL** is only possible for path B.

Parameters:

<Source> INTERNAL | EXTERNAL | AINTERNAL

INTERNAL

The internal clock reference is used.

EXTERNAL

The external clock reference is supplied to the CLOCK connector.

AINTERNAL

The clock source of path A is used for path B.

*RST: INTERNAL

Example: `BB:W3GP:CLOC:SOUR EXT`
selects an external clock reference. The clock is supplied via the CLOCK connector.

`BB:W3GP:CLOC:MODE CHIP`
specifies that a chip clock is supplied via the CLOCK connector.

[[:SOURce<hw>]:BB:W3GPp:CLOCK:SYNChronization:EXECute

Performs automatically adjustment of the instrument's settings required for the synchronization mode, set with the command `BB:W3GP:CLOC:SYNC:MODE`.

Example: `:BB:W3GP:CLOC:SYNC:MODE MAST`
the instrument is configured to work as a master one.

`:BB:W3GP:CLOC:SYNC:EXEC`
all synchronization's settings are adjusted accordingly.

Usage: Event

[[:SOURce<hw>]:BB:W3GPp:CLOCK:SYNChronization:MODE <Mode>

Selects the synchronization mode.

This parameter is used to enable generation of very precise synchronous signal of several connected R&S SMBVs.

Note: If several instruments are connected, the connecting cables from the master instrument to the slave one and between each two consecutive slave instruments must have the same length and type. This applies for all connections, the REF OUT to REF IN connection, the MARKER 1 to TRIGGER connection and the CLOCK OUT to CLOCK IN connection. Avoid unnecessary cable length and branching points.

Parameters:

<Mode>

NONE | MASTer | SLAVe

NONE

The instrument is working in stand-alone mode.

MASTer

The instrument provides all connected instrument with its synchronisation (including the trigger signal) and reference clock signal.

SLAVe

The instrument receives the synchronisation and reference clock signal from another instrument working in a master mode.

*RST: NONE

Example: `:BB:W3GP:CLOC:SYNC:MODE MAST`
the instrument is configured to work as a master one.

7.6 Test Models and Predefined Settings

The R&S Signal Generator gives you the opportunity to generate standardized or pre-defined test settings:

- Test Models:
 - election of test models for the downlink in accordance with 3GPP standard 25.141.
 - Selection of non-standardized test models for the uplink.
- Predefined Settings:

Definition of Predefined Settings for base station 1 which enable the creation of highly complex scenarios for the downlink by presetting the channel table of base station 1. The settings take effect only after execution of command

```
BB:W3GPp:PPARameter:EXECute.
```

<code>[:SOURce<hw>]:BB:W3GPp:PPARameter:CRESt</code>	351
<code>[:SOURce<hw>]:BB:W3GPp:PPARameter:DPCH:COUNt</code>	352
<code>[:SOURce<hw>]:BB:W3GPp:PPARameter:DPCH:SRATe</code>	352
<code>[:SOURce<hw>]:BB:W3GPp:PPARameter:EXECute</code>	353
<code>[:SOURce<hw>]:BB:W3GPp:PPARameter:SCCPch:SRATe</code>	353
<code>[:SOURce<hw>]:BB:W3GPp:PPARameter:SCCPch:STATe</code>	353
<code>[:SOURce<hw>]:BB:W3GPp:PPARameter:SCHannels</code>	353
<code>[:SOURce<hw>]:BB:W3GPp:SETTing:TMODeL:BSTation</code>	354
<code>[:SOURce<hw>]:BB:W3GPp:SETTing:TMODeL:BSTation:CATalog</code>	355
<code>[:SOURce<hw>]:BB:W3GPp:SETTing:TMODeL:MSTation</code>	355
<code>[:SOURce<hw>]:BB:W3GPp:SETTing:TMODeL:MSTation:CATalog</code>	356

`[:SOURce<hw>]:BB:W3GPp:PPARameter:CRESt <Crest>`

This commands selects the desired range for the crest factor of the test scenario. The crest factor of the signal is kept in the desired range by automatically setting appropriate channelization codes and timing offsets.

The setting takes effect only after execution of command

```
BB:W3GPp:PPARameter:EXECute.
```

The settings of commands

- `BB:W3GP:BST<n>:CHAN<n>:CCODE` and
- `BB:W3GP:BST<n>:CHAN<n>:TOFFset`

are adjusted according to the selection.

Parameters:

<Crest>

MINimum | AVERage | WORSt

MINimum

The crest factor is minimized. The channelization codes are distributed uniformly over the code domain. The timing offsets are increased by 3 per channel.

AVERage

An average crest factor is set. The channelization codes are distributed uniformly over the code domain. The timing offsets are all set to 0.

WORSt

The crest factor is set to an unfavorable value (i.e. maximum). The channelization codes are assigned in ascending order. The timing offsets are all set to 0.

*RST: MINimum

Example:

BB:W3GP:PPAR:CRES WORS

sets the crest factor to an unfavorable value.

[[:SOURce<hw>]:BB:W3GPp:PPARameter:DPCH:COUNT <Count>

This command sets the number of activated DPCHs. The maximum number is the ratio of the chip rate and the symbol rate (maximum 512 at the lowest symbol rate of 7.5 ksp/s).

The setting takes effect only after execution of command

BB:W3GPp:PPARameter:EXECute.

Parameters:

<Count>

integer

Range: 0 to 512

*RST: 10

Example:

BB:W3GP:PPAR:DPCH:COUN 21

the predefined signal contains 21 DPCHs.

[[:SOURce<hw>]:BB:W3GPp:PPARameter:DPCH:SRATE <Srate>

This command sets the symbol rate of DPCHs.

The setting takes effect only after execution of command

BB:W3GPp:PPARameter:EXECute.

Parameters:

<Srate>

D7K5 | D15K | D30K | D60K | D120k | D240k | D480k | D960k

*RST: D30k

Example:

BB:W3GP:PPAR:DPCH:SRAT D240K

sets the symbol rate of the DPCHs to 240ksp/s.

[:SOURce<hw>]:BB:W3GPp:PPARameter:EXECute

This command presets the channel table of base station 1 with the parameters defined by the PPARameter commands.

Example: `BB:W3GP:PPAR:EXEC`
configures the signal sequence as defined by the `:PPARameter` commands.

Usage: Event

[:SOURce<hw>]:BB:W3GPp:PPARameter:SCCPch:SRATe <Srate>

The command sets the symbol rate of S-CCPCH.

The setting takes effect only after execution of command

`BB:W3GPp:PPARameter:EXECute`.

Parameters:

<Srate> D15K | D30K | D60K | D120k | D240k | D480k | D960k
*RST: D30k

Example: `BB:W3GP:PPAR:SCCP:SRAT D240K`
'sets the SCCPCH to 240 ksps.

[:SOURce<hw>]:BB:W3GPp:PPARameter:SCCPch:STATe <State>

The command activates/deactivates the S-CCPCH.

The setting takes effect only after execution of command

`BB:W3GPp:PPARameter:EXECute`.

Parameters:

<State> ON | OFF
*RST: OFF

Example: `BB:W3GP:PPAR:SCCP:STAT ON`
S-CCPCH is activated.

[:SOURce<hw>]:BB:W3GPp:PPARameter:SCHannels <Schannels>

The command activates/deactivates the PCPICH, PSCH, SSCH and PCCPCH. These "special channels" are required by a user equipment for synchronization.

The setting takes effect only after execution of command

`BB:W3GPp:PPARameter:EXECute`.

Parameters:

<Schannels> 0 | 1 | OFF | ON
*RST: OFF

[:SOURCE<hw>]:BB:W3GPP:SETTING:TMODEL:BSTATION <Bstation>

The command selects a test model defined by the standard for the downlink.

Parameters:

<Bstation>

string

Test_Model_1_04channels

Test models for Home BS

Test_Model_1_8channels

Test models for Home BS

Test_Model_1_16channels

Measurement: Spectrum emission mask ACLR; 16 Channels

Test_Model_1_32channels

Measurement: Spectrum emission mask ACLR; 32 Channels

Test_Model_1_64channels

Measurement: Spectrum emission mask ACLR; 64 Channels

Test_Model_2

Measurement: Output power dynamics

Test_Model_3_04channels

Test models for Home BS

Test_Model_3_8channels

Test models for Home BS

Test_Model_3_16channels

Measurement: Peak code domain error; 16 Channels

Test_Model_3_32channels

Measurement: Peak code domain error; 32 Channels

Test_Model_4

Measurement: Error Vector Magnitude, optional P-CPICH is not active

Test_Model_4_CPICH

Measurement: Error Vector Magnitude, optional P-CPICH is active

Test_Model_5_04_4channels

Test models for Home BS

Test_Model_5_30_8channels

Measurement: Error Vector Magnitude; 8 High Speed Channels

Test_Model_5_14_4channels

Measurement: Error Vector Magnitude; 4 High Speed Channels

Test_Model_5_06_2channels

Measurement: Error Vector Magnitude; 2 High Speed Channels

Test_Model_6_04_4channels

Test models for Home BS

Test_Model_6_30_8channels

Measurement: Relative Code Domain Error, only applicable for 64QAM modulated codes

Example: `BB:W3GP:SETT:TMOD:BST 'Test_Model_1_64channels'`
selects the test model Measurement: Spectrum emission mask ACLR; 64 Channels.

Usage: Setting only

[:SOURCE<hw>]:BB:W3GPp:SETTING:TMODEL:BSTation:CATalog?

The command queries the list of test models defined by the standard for the downlink.

Return values:

<Catalog> string

Example: `BB:W3GP:SETT:TMOD:BST:CAT?`
queries the list of available test models for the downlink transmission direction.

Response: `Test_Model_1_16channels,...`

Usage: Query only

[:SOURCE<hw>]:BB:W3GPp:SETTING:TMODEL:MSTation <Mstation>

The command selects a test model that is not defined by the standard for the uplink.

Parameters:

<Mstation> string

DPCCH_DPDCH_60ksps

Preset, Uplink, UE1 on, DPDCH + DPCCH, Overall symbol rate 60 ksps.

DPCCH_DPDCH960ksps

Preset, Uplink, UE1 on, DPDCH + DPCCH, Overall symbol rate 960 ksps

TS34121_R6_Table_C_10_1_4_Subtest4

Uplink test model according to 3GPP TS 34.121 Release 6, Table C.10.1.4.

TS34121_R8_Table_C_10_1_4_Subtest3

Uplink test models for transmitter characteristics tests with HS-DPCCH according to 3GPP TS 34.121 Release 8, Table C.10.1.4.

TS34121_R8_Table_C_11_1_3_Subtest2

Uplink test models for transmitter characteristics tests with HS-DPCCH and E-DCH according to 3GPP TS 34.121 Release 8, Table C.11.1.3.

TS34121_R8_Table_C_11_1_4_Subtest1

Uplink test model for transmitter characteristics tests with HS-DPCCH and E-DCH with 16QAM according to 3GPP TS 34.121 Release 8, Table C.11.1.4.

Example: `BB:W3GP:SETT:TMOD:MST 'DPCCH_DPDCH960ksps'`
selects the test model with a symbol rate of 960 ksps.

[:SOURCE<hw>] : BB : W3GPp : SETTING : TMODEL : MSTation : CATALOG ?

The command queries the list of non-standardized test models for the uplink.

Return values:

<Catalog> string

Example:

BB : W3GP : SETT : TMODEL : MST : CAT ?

queries the list of available test models

Response: DPCCH_DPDCH960ksps, DPCCH_DPDCH_60ksps

Usage:

Query only

7.7 Setting Base Stations

The `SOURCE : BB : W3GPp : BSTation` system contains commands for setting base stations. The commands of this system only take effect if the 3GPP FDD standard is activated, the `DOWN` transmission direction is selected and the particular base station is enabled:

```
SOURCE : BB : W3GPp : STATE ON
```

```
SOURCE : BB : W3GPp : LINK DOWN
```

```
SOURCE : BB : W3GPp : BSTation2 : STATE ON
```

BSTation<st>

The numeric suffix to `BSTation` determines the base station. The value range is 1 .. 4. If the suffix is omitted, BS1 is selected.

CHANNEL<ch>

In case of remote control, suffix counting for channels corresponds to the suffix counting with 3GPP FDD (channel 0 to channel 138). SCPI prescribes that suffix 1 is the default state and used when no specific suffix is specified. Therefore, channel 1 (and not channel 0) is selected when no suffix is specified.

The commands for setting the enhanced channels of base station 1 are described in [chapter 7.8, "Enhanced Channels of Base Station 1"](#), on page 402.

[:SOURCE<hw>] : BB : W3GPp : BSTation : OCNS : STATE <State>

The command activates OCNS channels, as defined in the standard.

Four different OCNS scenarios are defined in the standard; one standard scenario, two scenarios for testing HSDPA channels and one for enhanced performance type 3i tests. The required scenario can be selected with the command `[:SOURCE<hw>] : BB : W3GPp : BSTation : OCNS : MODE`.

Parameters:

<State> ON | OFF
 *RST: OFF

Example:

BB:W3GP:BST:OCNS:MODE STAN
 selects the standard scenario.
 BB:W3GP:BST:OCNS:STAT ON
 activates the OCNS channels with the settings defined in the standard.

[:SOURCE<hw>]:BB:W3GPP:BSTation:OCNS:MODE <Mode>

The command selects the scenario for setting the OCNS channels.

Four different OCNS scenarios are defined in the standard; one standard scenario, two scenarios for testing HSDPA channels and one for enhanced performance type 3i tests.

Parameters:

<Mode> STANdard | HSDPa | HSDP2 | M3I
 *RST: STANdard

Example:

BB:W3GP:BST:OCNS:MODE HSDP
 selects the scenario for testing the high-speed channels.
 BB:W3GP:BST:OCNS:STAT ON
 activates the OCNS channels with the settings defined in the standard.

Options:

M3I requires option R&S SMx/AMU-K43 and -K59

[:SOURCE<hw>]:BB:W3GPP:BSTation:OCNS:SEED <Seed>

In "3i" OCNS mode, sets the seed for both the random processes, the power control simulation process and the process controlling the switch over of the channelization codes.

Parameters:

<Seed> integer
 Range: 0 to 65535
 Increment: 1
 *RST: 0 for path A, 1 for path B

Options:

R&S SMx/AMU-K43 and -K59

[:SOURCE<hw>]:BB:W3GPP:BSTation:PRESet

The command produces a standardized default for all the base stations. The settings correspond to the *RST values specified for the commands.

All base station settings are preset.

Example:

BB:W3GP:BST:PRES
 resets all the base station settings to default values.

Usage: Event

[:SOURCE<hw>]:BB:W3GPp:BSTation<st>:CHANnel:HSDPa:HSET:PRESet

The command calls the default settings of the channel table for the HSDPA H-Set mode. Channels 12 to 17 are preset for HSDPA H-Set 1.

Example: BB:W3GP:BST1:CHAN12:HSDP:MODE HSET
selects H-Set mode.
BB:W3GP:BST1:CHAN12:HSDP:HSET:PRE
presets the H-Set.

Usage: Event

[:SOURCE<hw>]:BB:W3GPp:BSTation<st>:CHANnel:PRESet

The command calls the default settings of the channel table.

Example: BB:W3GP:BST:CHAN:PRES
presets all channels of the base station.

Usage: Event

[:SOURCE<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>:AICH:ASLOt <Aslot>

The command selects the slot in which the burst is transmitted.

Parameters:

<Aslot> float
Range: 0 to 15
*RST: 0

Example: BB:W3GP:BST1:CHAN7:AICH:ASLO 5
defines the slot to transmit the burst.

**[:SOURCE<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>:AICH:SAPattern
<Sapattern>**

Enters the 16 bit pattern for the ACK/NACK field.

This field is used by the base station to acknowledge, refuse or ignore requests of up to 16 user equipments.

Parameters:

<Sapattern> <16 bit pattern>
*RST: +000000000000

Example: SOUR:BB:W3GP:BST1:CHAN7:AICH:SAP
"+000000000000"
sets the bit pattern to "+000000000000" (ACK).

[:SOURce<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>:APAIch:ASLOt <Aslot>

The command selects the slot in which the burst is transmitted.

Parameters:

<Aslot> float
 Range: 0 to 15
 *RST: 0

Example: BB:W3GP:BST1:CHAN7:APAI:ASLO 5
 defines the slot to transmit the burst.

[:SOURce<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>:APAIch:SAPattern <Sapattern>

Enters the 16 bit pattern for the ACK/NACK field.

This field is used by the base station to acknowledge, refuse or ignore requests of up to 16 user equipments.

Parameters:

<Sapattern> <16 bit pattern>
 *RST: "+000000000000"

Example: SOUR:BB:W3GP:BST1:CHAN8:APAI:SAP
 "+000000000000"
 sets the bit pattern to "+" (ACK).

[:SOURce<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>:CCODE <Ccode>

The command sets the channelization code (formerly the spreading code number). The range of values of the channelization code depends on the symbol rate of the channel. The standard assigns a fixed channelization code to some channels (P-CPICH, for example, always uses channelization code 0).

$[\text{chip-rate}(=3.84\text{Mcps}) / \text{symbol_rate}] - 1$

The slot format determines the symbol rate (and thus the range of values for the channelization code), the TFCI state and the pilot length. If the value of any one of the four parameters is changed, all the other parameters will be adapted as necessary.

In the case of enhanced channels with active channel coding, the selected channel coding also affects the slot format and thus the remaining parameters. If these parameters are changed, the channel coding type is set to user.

Parameters:

<Ccode> float
 Range: 0 to 511
 Increment: 1
 *RST: Depends on the channel type.

Example: BB:W3GP:BST1:CHAN15:CCOD 123
 sets channelization code 123 for channel 15 of base station 1.

```
[ :SOURce<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>:DATA <Data>
```

The command determines the data source for the data fields of the specified channel.

For enhanced channels with channel coding, the data source is set with the command `[:SOURce<hw>]:BB:W3GPp:BSTation:ENHanced:CHANnel<ch0>:DPCH: TCHannel<di>:DATA` on page 410.

Parameters:

<Data> PN9 | PN11 | PN15 | PN16 | PN20 | PN21 | PN23 | DLISt | ZERO | ONE | PATTErn

PNxx

The pseudo-random sequence generator is used as the data source. Different random sequence lengths can be selected.

DLISt

A data list is used. The data list is selected with the command `:BB:W3GPp:BST:CHANnel:DATA:DSElect.`

ZERO | ONE

Internal 0 and 1 data is used.

PATTErn

Internal data is used. The bit pattern for the data is defined by the command `:BB:W3GPp:BST:CHANnel:DATA:PATTErn.`

*RST: PN9

Example:

```
BB:W3GP:BST2:CHAN13:DATA PATT
selects as the data source for the data fields of channel 13 of base
station 2, the bit pattern defined with the following command.
BB:W3GP:BST2:CHAN13:DATA:PATT #H3F,8
defines the bit pattern.
```

```
[ :SOURce<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>:DATA:DSElect
<Dselect>
```

The command selects the data list for the DLISt data source selection.

The lists are stored as files with the fixed file extensions `*.dm_iqd` in a directory of the user's choice. The directory applicable to the following commands is defined with the command `MMEMoRY:CDIR`. To access the files in this directory, you only have to give the file name, without the path and the file extension.

Parameters:

<Dselect> string

Example:

```
BB:W3GP:BST2:CHAN13:DATA DLIS
selects the Data Lists data source.
MMEMoRY:CDIR '<root>\Lists\DM\IqData'
selects the directory for the data lists.
BB:W3GP:BST2:CHAN13:DATA:DSEL '3gpp_list1'
selects file '3gpp_list1' as the data source. This file must be in
the directory <root>\Lists\DM\IqData and have the file
extension *.dm_iqd.
```

[:SOURce<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>:DATA:PATtern
 <Pattern>

The command determines the bit pattern for the PATtern selection. The maximum length is 64 bits.

Parameters:

<Pattern> < 64 bit pattern>
 *RST: 0

Example: BB:W3GP:BST2:CHAN13:DATA:PATT #H3F,8
 defines the bit pattern.

[:SOURce<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>:DPCCh:MCODE
 <Mcode>

The command activates multicode transmission for the selected channel (ON) or deactivates it (OFF). The multicode channels are destined for the same receiver, that is to say, are part of a radio link. The first channel of this group is used as the master channel. The common components (Pilot, TPC and TCFI) for all the channels are then spread using the spreading code of the master channel.

Suffix:

<ch> 11 ... 138
 This setting is only valid for DPCHs.

Parameters:

<Mcode> 0 | 1 | OFF | ON
 *RST: OFF

Example: BB:W3GP:BST2:CHAN12:DPCC:MCOD ON
 activates the simulation in multicode mode for channel 12 of base station 2.
 BB:W3GP:BST2:CHAN13:DPCC:MCOD ON
 activates the simulation in multicode mode for channel 13 of base station 2. Channel 12 is the master channel.

[:SOURce<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>:DPCCh:PLENght
 <Plenght>

The command sets the length of the pilot fields. The range of values for this parameter depends on the channel type and the symbol rate. To achieve a constant slot length, the data fields are lengthened or shortened depending on the pilot length, as defined in the standard.

The slot format determines the symbol rate (and thus the range of values for the channelization code), the TFCI state and the pilot length. If the value of any one of the four parameters is changed, all the other parameters will be adapted as necessary.

In the case of enhanced channels with active channel coding, the selected channel coding also affects the slot format and thus the remaining parameters. If these parameters are changed, the channel coding type is set to user.

Parameters:

<Plength> BIT0 | BIT2 | BIT4 | BIT8 | BIT16
 *RST: BIT4, bei S-CCPCH 0

Example:

BB:W3GP:BST2:CHAN12:DPCC:PLEN BIT2
 sets the length of the pilot fields for channel 12 of base station 2.

**[:SOURCE<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>:DPCCCh:POFFset:PILot
 <Pilot>**

The command sets an offset to the set channel power for the pilot field.

Parameters:

<Pilot> float
 Range: -10 dB to 10 dB
 Increment: 0.1 dB
 *RST: 0 dB

Example:

BB:W3GP:BST2:CHAN12:DPCC:POFF:PIL -2 dB
 in the pilot field, sets an offset of -2 dB relative to the channel power.

**[:SOURCE<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>:DPCCCh:POFFset:TFCI
 <Tfci>**

The command sets an offset to the set channel power for the TFCI field.

Parameters:

<Tfci> float
 Range: -10 dB to 10 dB
 Increment: 0.01 dB
 *RST: 0 dB

Example:

BB:W3GP:BST2:CHAN12:DPCC:POFF:PIL -2 dB
 in the TFCI field, sets an offset of -2 dB relative to the channel power.

**[:SOURCE<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>:DPCCCh:POFFset:TPC
 <Tpc>**

The command sets an offset to the set channel power for the TPC field.

This setting is only valid for the DPCHs.

Parameters:

<Tpc> float
 Range: -10 dB to 10 dB
 Increment: 0.01 dB
 *RST: 0 dB

Example: `BB:W3GP:BST2:CHAN12:DPCC:POFF:TPC -2 dB`
in the TPC field, sets an offset of -2 dB relative to the channel power.

[:SOURCE<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>:DPCCh:TFCI <Tfci>

The command enters the value of the TFCI field (Transport Format Combination Indicator) for the selected channel of the specified base station. The TFCI field is always filled with exactly 10 bits with leading zeros.

Parameters:

<Tfci> float
Range: 0 to 1023
Increment: 1
*RST: 0

Example: `BB:W3GP:BST2:CHAN12:DPCC:TFCI 22`
sets the value 22 for the TFCI field of channel 12 of base station 2.

[:SOURCE<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>:DPCCh:TFCI:STATe <State>

The command activates the TFCI field (Transport Format Combination Identifier) for the selected channel of the specified base station.

The slot format determines the symbol rate (and thus the range of values for the channelization code), the TFCI state and the pilot length. If the value of any one of the four parameters is changed, all the other parameters will be adapted as necessary.

In the case of enhanced channels with active channel coding, the selected channel coding also affects the slot format and thus the remaining parameters. If these parameters are changed, the channel coding type is set to user.

Parameters:

<State> ON | OFF
*RST: OFF

Example: `BB:W3GP:BST2:CHAN12:DPCC:TFCI:STAT OFF`
sets that the TFCI field of channel 12 of base station 2 is not used.

[:SOURCE<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>:DPCCh:TPC:DATA <Data>

The command determines the data source for the TPC field of the channel.

Parameters:

<Data> DLISt | ZERO | ONE | PATTErn

DLISt

A data list is used. The data list is selected with the command

```
[ :SOURce<hw> ] :BB:W3Gpp:BSTation<st> :
CHANnel<ch> :DPCCh :TPC :DATA :DSElect.
```

ZERO | ONE

Internal 0 and 1 data is used.

PATTErn

Internal data is used. The bit pattern for the data is defined by the command [:SOURce<hw>] :BB:W3Gpp:BSTation<st> : CHANnel<ch> :DPCCh :TPC :DATA :PATTErn. The maximum length is 32 bits.

```
*RST:      PATTErn
```

Example:

```
BB:W3GP:BST2:CHAN13:DPCC:TPC:DATA PATT
selects as the data source for the TPC field of channel 13 of base
station 2, the bit pattern defined with the following command.
BB:W3GP:BST2:CHAN13:DPCC:TPC:DATA:PATT #H3F,8
defines the bit pattern.
```

```
[ :SOURce<hw> ] :BB:W3Gpp:BSTation<st> :CHANnel<ch> :DPCCh :TPC :DATA :
DSElect <Dselect>
```

The command selects the data list for the DLISt data source selection.

The lists are stored as files with the fixed file extensions *.dm_iqd in a directory of the user's choice. The directory applicable to the following commands is defined with the command MMEMoRY:CDIR. To access the files in this directory, you only have to give the file name, without the path and the file extension.

Parameters:

<Dselect> <data list name>

Example:

```
BB:W3GP:BST2:CHAN13:DPCC:TPC:DATA DLIS
selects the Data Lists data source.
MMEM:CDIR '<root>\Lists\DM\IqData'
selects the directory for the data lists.
BB:W3GP:BST2:CHAN13:DPCC:TPC:DATA:DSEL
'tpc_ch4'
selects the file tpc_ch4 as the data source. This file must be
in the directory <root>\Lists\DM\IqData and have the file
extension *.dm_iqd.
```

```
[ :SOURce<hw> ] :BB:W3Gpp:BSTation<st> :CHANnel<ch> :DPCCh :TPC :DATA :
PATTErn <Pattern>
```

The command determines the bit pattern for the PATTErn selection. The maximum bit pattern length is 32 bits.

Parameters:

<Pattern> <32 bit pattern>
 *RST: #H0,1

Example:

BB:W3GP:BST2:CHAN13:DPCC:TPC:DATA:PATT #H3F, 8
 defines the bit pattern for the TPC field of channel 13 of base station 2.

[:SOURCE<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>:DPCCCh:TPC:MISuse
 <Misuse>

The command activates "mis-" use of the TPC field (Transmit Power Control) of the selected channel for controlling the channel powers of these channels of the specified base station.

The bit pattern (see commands :W3GPp:BSTation<n>:CHANnel<n>:DPCCCh:TPC...) of the TPC field of each channel is used to control the channel power. A "1" leads to an increase of channel powers, a "0" to a reduction of channel powers. Channel power is limited to the range 0 dB to -60 dB. The step width of the change is defined with the command [:SOURCE<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>:DPCCCh:TPC:PSTep.

Parameters:

<Misuse> ON | OFF
 *RST: OFF

[:SOURCE<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>:DPCCCh:TPC:PSTep
 <Pstep>

The command defines the step width for the change of channel powers in the case of "mis-" use of the TPC field.

Parameters:

<Pstep> float
 Range: -10.0 dB to 10.0 dB
 Increment: 0.01 dB
 *RST: 0 dB

Example:

BB:W3GP:BST2:CHAN13:DPCC:TPC:PST 1 dB
 sets the step width for the change of channel powers for channel 13 of base station 2 to 1 dB.

[:SOURCE<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>:DPCCCh:TPC:READ
 <Read>

The command sets the read out mode for the bit pattern of the TPC field.

The bit pattern is defined with the commands :BB:W3GPp:BST<i>:CHANnel<n>:DPCCCh:TPC... .

Parameters:

<Read>

CONTInuous | S0A | S1A | S01A | S10A

CONTInuous

The bit pattern is used cyclically.

S0A

The bit pattern is used once, then the TPC sequence continues with 0 bits.

S1A

The bit pattern is used once, then the TPC sequence continues with 1 bits.

S01A

The bit pattern is used once and then the TPC sequence is continued with 0 and 1 bits alternately (in multiples, depending on by the symbol rate, for example, 00001111).

S10A

The bit pattern is used once and then the TPC sequence is continued with 1 and 0 bits alternately (in multiples, depending on by the symbol rate, for example, 11110000).

*RST: CONTInuous

Example:

BB:W3GP:BST2:CHAN13:DPCC:TPC:READ S0A

the bit pattern is used once, after which a 0 sequence is generated (applies to channel 13 of base station 2).

[:SOURce<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>:FDPCh:DPCCCh:TPC:
DATA <Data>

The command determines the data source for the TPC field of the channel.

Parameters:

<Data>

DLISt | ZERO | ONE | PATTErn

DLISt

A data list is used. The data list is selected with the command

[:SOURce<hw>]:BB:W3GPp:BSTation<st>:
CHANnel<ch>:FDPCh:DPCCCh:TPC:DATA:DSElect**ZERO | ONE**

Internal 0 and 1 data is used.

PATTErn

Internal data is used. The bit pattern for the data is defined by the command

[:SOURce<hw>]:BB:W3GPp:BSTation<st>:
CHANnel<ch>:FDPCh:DPCCCh:TPC:DATA:PATTErn.

*RST: PATTErn

Example: BB:W3GP:BST1:CHAN11:FDPC:DPCC:TPC:DATA PATT
selects as the data source for the TPC field of channel 11 of base station 1, the bit pattern defined with the following command:
BB:W3GP:BST1:CHAN11:FDPC:DPCC:TPC:DATA:PATT
#H3F, 8
defines the bit pattern.

[:SOURCE<hw>]:BB:W3GPP:BSTation<st>:CHANnel<ch>:FDPCh:DPCC:TPC:DATA:DSElect <Dselect>

The command selects the data list for the DLIS data source selection.

The lists are stored as files with the fixed file extensions *.dm_iqd in a directory of the user's choice. The directory applicable to the following commands is defined with the command MMEMory:CDIR. To access the files in this directory, you only have to give the file name, without the path and the file extension.

Parameters:

<Dselect> <data list name>

Example:

BB:W3GP:BST1:CHAN11:FDPC:DPCC:TPC:DATA DLIS
selects the "Data Lists" data source.

MMEM:CDIR '<root>\Lists\DM\IqData'

selects the directory for the data lists.

BB:W3GP:BST1:CHAN11:FDPC:DPCC:TPC:DATA:DSEL
'tpc_ch4'

selects the file 'tpc_ch4' as the data source. This file must be in the directory <root>\Lists\DM\IqData and have the file extension *.dm_iqd.

[:SOURCE<hw>]:BB:W3GPP:BSTation<st>:CHANnel<ch>:FDPCh:DPCC:TPC:DATA:PATtern <Pattern>

The command determines the bit pattern for the PATtern selection. The maximum bit pattern length is 32 bits.

Parameters:

<Pattern> <32 bit pattern>

*RST: #H0,1

Example:

BB:W3GP:BST1:CHAN11:FDPC:DPCC:TPC:DATA:PATT
#H3F, 8

defines the bit pattern for the TPC field of channel 11 of base station 1.

```
[:SOURCE<hw>]:BB:W3GPP:BSTation<st>:CHANnel<ch>:FDPCh:DPCCCh:TPC:
MISuse <Misuse>
```

The command activates "mis-" use of the TPC field (Transmit Power Control) of the selected channel for controlling the channel powers of these channels of the specified base station.

The bit pattern (see command `[:SOURCE<hw>]:BB:W3GPP:BSTation<st>:CHANnel<ch>:FDPCh:DPCCCh:TPC:DATA:PATtern`) of the TPC field of each channel is used to control the channel power. A "1" leads to an increase of channel powers, a "0" to a reduction of channel powers. Channel power is limited to the range 0 dB to -60 dB. The step width of the change is defined with the command `[:SOURCE<hw>]:BB:W3GPP:BSTation<st>:CHANnel<ch>:FDPCh:DPCCCh:TPC:PSTep`.

Parameters:

<Misuse> ON | OFF
 *RST: OFF

Example:

```
BB:W3GP:BST1:CHAN11:FDPC:DPCC:TPC:MIS ON
activates regulation of channel power for channel 11 of base sta-
tion 1 via the bit pattern of the associated TPC field.
BB:W3GP:BST1:CHAN11:FDPC:DPCC:TPC:PST 1dB
sets the step width for the change of channel powers for channel
11 of base station 1 to 1 dB.
```

```
[:SOURCE<hw>]:BB:W3GPP:BSTation<st>:CHANnel<ch>:FDPCh:DPCCCh:TPC:
PSTep <Pstep>
```

The command defines the step width for the change of channel powers in the case of "mis-" use of the TPC field.

Parameters:

<Pstep> float
 Range: -10.0 dB to 10.0 dB
 Increment: 0.01 dB
 *RST: 0 dB

Example:

```
BB:W3GP:BST1:CHAN11:FDPC:DPCC:TPC:PST 1.5dB
sets the step width for the change of channel powers for channel
11 of base station 1 to 1.5 dB.
```

```
[:SOURCE<hw>]:BB:W3GPP:BSTation<st>:CHANnel<ch>:FDPCh:DPCCCh:TPC:
READ <Read>
```

The command sets the read out mode for the bit pattern of the TPC field.

Parameters:

<Read>

CONTInuous | S0A | S1A | S01A | S10A

CONTInuous

The bit pattern is used cyclically.

S0A

The bit pattern is used once, then the TPC sequence continues with 0 bits.

S1A

The bit pattern is used once, then the TPC sequence continues with 1 bits.

S01A

The bit pattern is used once and then the TPC sequence is continued with 0 and 1 bits alternately (in multiples, depending on by the symbol rate, for example, 00001111).

S10A

The bit pattern is used once and then the TPC sequence is continued with 1 and 0 bits alternately (in multiples, depending on by the symbol rate, for example, 11110000).

*RST: CONTInuous

Example:

BB:W3GP:BST1:CHAN11:FDPC:DPCC:TPC:READ S0A

the bit pattern is used once, after which a 0 sequence is generated (applies to channel 11 of base station 1).

[:SOURce<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:BMODE[:STATE] <State>

The command activates/deactivates burst mode. The signal is bursted when on, otherwise dummy data are sent during transmission brakes.

Parameters:

<State>

ON | OFF

*RST: ON

Example:

BB:W3GP:BST1:CHAN12:HSDP:BMOD OFF

deactivates burst mode, dummy data are sent during the transmission brakes.

[:SOURce<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:CVPB <Cvpb>

The command switches the order of the constellation points of the 16QAM and 64QAM mapping. The re-arrangement is done according to 3GPP TS25.212.

Suffix:

<ch>

11 ... 138

Parameters:

<Cvpb>

0 | 1 | 2 | 3

*RST: 0

Example: BB:W3GP:BST1:CHAN12:HSDP:CVPB 1
selects interchange of MSBs with LSBs.

**[:SOURCE<hw>]:BB:W3GPP:BSTation<st>:CHANnel<ch>:HSDPa:HSET:AMODE
<Amode>**

Activates/deactivates the advanced mode in which the H-Set will be generated by the ARB.

The parameter can be configured only for H-Sets 1 - 5.

For H-Sets 6 - 12 and User it is always enabled.

Parameters:

<Amode> ON | OFF
*RST: OFF (H-Sets 1..5); ON (H-Sets 6..12, User);

Example: BB:W3GP:BST1:CHAN12:HSDP:MODE HSET
selects H-Set mode.
BB:W3GP:BST1:CHAN12:HSDP:HSET:PRED P1QAM16
selects H-Set 1 (16QAM).
BB:W3GP:BST1:CHAN12:HSDP:HSET:AMOD ON
enables advanced mode for the selected H-Set.

**[:SOURCE<hw>]:BB:W3GPP:BSTation<st>:CHANnel<ch0>:HSDPa:HSET:
ACLength <Aclength>**

Sets the alternative number of HS-PDSCH channelization codes (see [chapter 5.13.9, "Randomly Varying Modulation and Number of Codes"](#), on page 127).

Parameters:

<Aclength> float
Range: 1 to dynamic
Increment: 1
*RST: 5

Example: SOURCE:BB:W3GP:BST1:CHANnel12:HSDPa:HSET:
CLength 8
SOURCE:BB:W3GP:BST1:CHANnel12:HSDPa:HSET:
ACLength 8

Options: R&S SMx/AMU-K59

**[:SOURCE<hw>]:BB:W3GPP:BSTation<st>:CHANnel<ch0>:HSDPa:HSET:
ALTModulation <ALTModulation>**

Sets the alternative modulation (see [chapter 5.13.9, "Randomly Varying Modulation and Number of Codes"](#), on page 127).

Parameters:

<ALTModulation> QPSK | QAM16 | QAM64
*RST: QAM16

Example: :SOURCE:BB:W3GPp:BSTation1:CHANnel12:HSDPa:
HSET:ALTModulation QPSK

Options: R&S SMx/AMU-K59

**[:SOURCE<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:HSET:
BCBTti<di>?**

Displays the binary channel bits per TTI and per stream.

The value displayed is calculated upon the values sets with the commands:

- [:SOURCE<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:HSET:
MODulation<di>,
- [:SOURCE<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>:SRATE and
- [:SOURCE<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:HSET:
HSCCode.

Suffix:
<di> 1|2

Return values:
<Bcbtti> float

Example: BB:W3GP:BST1:CHAN12:HSDP:MODE HSET
selects H-Set mode.
BB:W3GP:BST1:CHAN12:HSDP:HSET:TYPE MIMO
sets the H-set type.
BB:W3GP:BST1:CHAN12:HSDP:HSET:BCBT2?
queries the binary channel bits per TTI for stream 2.
Response: "4800"

Usage: Query only

**[:SOURCE<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:HSET:
BPAYload<di>?**

The command queries the payload of the information bit. This value determines the number of transport layer bits sent in each subframe.

Suffix:
<di> 1|2

Return values:
<Bpayload> float

Example: BB:W3GP:BST1:CHAN12:HSDP:MODE HSET
selects H-Set mode.
BB:W3GP:BST1:CHAN12:HSDP:HSET:BPAY2?
queries the payload of the information bit.
Response: "256"

Usage: Query only

**[:SOURCE<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:HSET:CLENGTH
<Clength>**

The command queries the number of physical HS-PDSCH data channels assigned to the HS-SCCH.

Parameters:

<Clength> float
 Range: 1 to 15
 *RST: 5

Example:

BB:W3GP:BST1:CHAN12:HSDP:MODE HSET
 selects H-Set mode.
 BB:W3GP:BST1:CHAN12:HSDP:HSET:CLEN?
 queries the number of physical HS-PDSCH data channels
 assigned to the HS-SCCH.
 Response: "4"

**[:SOURCE<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:HSET:
CRATe<di>?**

Queries the resulting coding rate per stream.

The coding rate is calculated as a relation between the "Information Bit Payload" and "Binary Channel Bits per TTI".

Suffix:

<di> 1|2

Return values:

<Crate> float

Example:

BB:W3GP:BST1:CHAN12:HSDP:MODE HSET
 selects H-Set mode.
 BB:W3GP:BST1:CHAN12:HSDP:HSET:CRAT2?
 queries the coding rate of stream 2.
 Response: "0.658"

Usage: Query only

**[:SOURCE<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:HSET:DATA
<Data>**

Selects the data source for the transport channel.

Parameters:

<Data> ZERO | ONE | PATtern | PN9 | PN11 | PN15 | PN16 | PN20 |
PN21 | PN23 | DLISt

ZERO | ONE

Internal 0 and 1 data is used.

PATtern

Internal data is used. The bit pattern for the data is defined by the command `[:SOURce<hw>] :BB:W3GPp:BSTation<st> :CHANnel<ch> :HSDPa:HSET:DATA:PATtern.`

DLISt

A data list is used. The data list is selected with the command `[:SOURce<hw>] :BB:W3GPp:BSTation<st> :CHANnel<ch> :HSDPa:HSET:DATA:DSElect`

Example:

```
BB:W3GP:BST1:CHAN11:HSDP:HSET:DATA PATT
selects as the data source for the transport channel
BB:W3GP:BST1:CHAN11:HSDP:HSET:DATA:PATT #H3F, 8
defines the bit pattern.
```

[:SOURce<hw>] :BB:W3GPp:BSTation<st> :CHANnel<ch> :HSDPa:HSET:DATA: DSElect <Dselect>

The command selects the data list for the DLISt data source selection.

The lists are stored as files with the fixed file extensions `*.dm_iqd` in a directory of the user's choice. The directory applicable to the following commands is defined with the command `MMEMoRY:CDIR`. To access the files in this directory, you only have to give the file name, without the path and the file extension.

Parameters:

<Dselect> string

Example:

```
BB:W3GP:BST1:CHAN11:HSDP:HSET:DATA DLIS
selects the Data Lists data source.
MMEMoRY:CDIR '<root>\H-Sets'
selects the directory for the data lists.
BB:W3GP:BST1:CHAN11:HSDP:HSET:DATA:DSEL
'hset_ch11'
selects the file hset_ch11 as the data source. This file must be
in the directory <root>\H-Sets and have the file extension
*.dm_iqd.
```

[:SOURce<hw>] :BB:W3GPp:BSTation<st> :CHANnel<ch> :HSDPa:HSET:DATA: PATtern <Pattern>

The command determines the bit pattern for the PATtern selection. The maximum bit pattern length is 32 bits.

Parameters:

<Pattern> <32 bit pattern>
 *RST: #H0,1

Example:

BB:W3GP:BST1:CHAN11:HSDP:HSET:DATA PATT
 selects as the data source for the H-set
 BB:W3GP:BST1:CHAN11:HSDP:HSET:DATA:PATT #H3F,
 8
 defines the bit pattern for the H-set.

**[:SOURCE<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:HSET:HARQ:
 LENGth <Length>**

Sets the number of HARQ processes. This value determines the distribution of the payload in the subframes.

Parameters:

<Length> integer
 Range: 1 to 8
 *RST: 0

Example:

BB:W3GP:BST1:CHAN12:HSDP:MODE HSET
 selects H-Set mode.
 BB:W3GP:BST1:CHAN12:HSDP:HSET:HARQ:LENG?
 queries the number of HARQ processes.
 Response: "2"

**[:SOURCE<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:HSET:HARQ:
 MODE <Mode>**

Sets the HARQ Simulation Mode.

Parameters:

<Mode> CACK | CNACK
CACK
 New data is used for each new TTI.
CNACK
 Enables NACK simulation, i.e. depending on the sequence selected for the parameter Redundancy Version Parameter Sequence packets are retransmitted.
 *RST: CACK

Example:

BB:W3GP:BST1:CHAN12:HSDP:MODE HSET
 selects H-Set mode.
 BB:W3GP:BST1:CHAN12:HSDP:HSET:AMOD ON
 enables advanced mode.
 BB:W3GP:BST1:CHAN12:HSDP:HSET:HARQ:MODE CNAC
 sets Constant NACK HARQ Mode.

**[:SOURce<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:HSET:
HSCCode <Hsccode>**

Sets the channelization code of the HS-SCCH.

Note: To let the instrument generate a signal equal to the one generated by an instrument equipped with an older firmware, set the same Channelization Codes as the codes used for your physical channels.

Parameters:

<Hsccode> float
Range: 0 to 17
*RST: 5

Example:

BB:W3GP:BST1:CHAN12:HSDP:MODE HSET
selects H-Set mode.
BB:W3GP:BST1:CHAN12:HSDP:HSET:HSCC 10
sets channelization code 10 for the HS-SCCH.

**[:SOURce<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:HSET:
MODulation<di> <Modulation>**

Sets the modulation for stream 1 and stream 2 to QPSK, 16QAM or 64QAM.

The modulation 64QAM is available for instruments equipped with option SMx-K59 only.

For HS-SCCH Type 2, the available modulation scheme is QPSK only.

Suffix:

<di> 1|2

Parameters:

<Modulation> QPSK | QAM16 | QAM64
*RST: HSQP

Example:

BB:W3GP:BST1:CHAN12:HSDP:HSET:TYPE MIMO
sets MIMO operation mode.
BB:W3GP:BST1:CHAN12:HSDP:HSET:MOD1 HS64Q
sets the modulation of stream 2 to 64QAM

**[:SOURce<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:HSET:
NAIBitrate?**

The command queries the average data rate on the transport layer (Nominal Average Information Bitrate).

Return values:

<Naibitrate> float

Example: BB:W3GP:BST1:CHAN12:HSDP:MODE HSET
selects H-Set mode.
BB:W3GP:BST1:CHAN12:HSDP:HSET:NAIB?
queries the average data rate on the transport layer.
Response: "455"

Usage: Query only

**[:SOURCE<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:HSET:
PREDEFINED <Predefined>**

The command selects the H-Set and the modulation according to TS 25.101 Annex A.7.

Parameters:
<Predefined> P1QPSK | P1QAM16 | P2QPSK | P2QAM16 | P3QPSK |
P3QAM16 | P4QPSK | P5QPSK | P6QPSK | P6QAM16 |
P7QPSK | P8QAM64 | P9QAM16QPSK | P10QPSK |
P10QAM16 | P11QAM64QAM16 | P12QPSK | USER
*RST: P1QPSK

Example: BB:W3GP:BST1:CHAN12:HSDP:MODE HSET
selects H-Set mode.
BB:W3GP:BST1:CHAN12:HSDP:HSET:PRED P3QPSK
selects H-Set 3 (QPSK).

**[:SOURCE<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:HSET:
PWPATTERN <Pwpattern>**

Sets the precoding weight parameter w2 for MIMO precoding.

The values of the weight parameters w1, w3 and w4 are calculated based on the value for w2 (see [chapter 3.14, "MIMO in HSPA+",](#) on page 31).

Parameters:
<Pwpattern> string
*RST: 0

Example: BB:W3GP:BST1:CHAN12:HSDP:HSET:PWP "0,1,3"
selects the pattern.

**[:SOURCE<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:HSET:
RVParameter<di> <Rvparameter>**

The parameter is enabled for "HARQ Simulation Mode" set to Constant ACK.

The command sets the Redundancy Version Parameter. This value determines the processing of the Forward Error Correction and Constellation Arrangement (QAM16 and 64QAM modulation), see TS 25.212 4.6.2.

For HS-SCCH Type 2 (less operation), the Redundancy Version Parameter is always 0.

Suffix:

<di> 1|2

Parameters:

<Rvparameter> float

Range: 0 to 7

*RST: 0

Example:

BB:W3GP:BST1:CHAN12:HSDP:MODE HSET

selects H-Set mode.

BB:W3GP:BST1:CHAN12:HSDP:HSET:HARQ:MODE CACK

sets Constant ACK HARQ Mode.

BB:W3GP:BST1:CHAN12:HSDP:HSET:RVP 7

sets the Redundancy Version Parameter to 7.

BB:W3GP:BST1:TDIV ANT1

enables transmit diversity

BB:W3GP:BST1:CHAN12:HSDP:HSET:TYPE MIMO

selects HS-SCCH Type 3 (MIMO).

BB:W3GP:BST1:CHAN12:HSDP:HSET:RVP2 4

sets the Redundancy Version Parameter of stream 2.

**[:SOURce<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:HSET:
RVPSequence<di> <Rvpsequence>**

The parameter is enabled for "HARQ Simulation Mode" set to Constant NACK.

Enters a sequence of Redundancy Version Parameters per stream. The value of the RV parameter determines the processing of the Forward Error Correction and Constellation Arrangement (16/64QAM modulation), see TS 25.212 4.6.2.

The sequence has a length of maximum 30 values. The sequence length determines the maximum number of retransmissions. New data is used after reaching the end of the sequence.

For HS-SCCH Type 2 (less operation), the Redundancy Version Parameter Sequence is a read-only parameter.

Suffix:

<di> 1|2

Parameters:

<Rvpsequence> string

Example: BB:W3GP:BST1:CHAN12:HSDP:MODE HSET
selects H-Set mode.
BB:W3GP:BST1:CHAN12:HSDP:HSET:AMOD ON
enables advanced mode.
BB:W3GP:BST1:CHAN12:HSDP:HSET:HARQ:MODE CNAC
sets Constant NACK HARQ Mode.
BB:W3GP:BST1:TDIV ANT1
enables transmit diversity
BB:W3GP:BST1:CHAN12:HSDP:HSET:TYPE MIMO
selects HS-SCCH Type 3 (MIMO).
BB:W3GP:BST1:CHAN12:HSDP:HSET:RVPS2
'0,1,3,2,0,1,2,3'
sets the Redundancy Version Parameter sequence of stream 2.

Example: BB:W3GP:BST1:CHAN12:HSDP:HSET:TYPE LOP
selects HS-SCCH Type 2 (less operation).
BB:W3GP:BST1:CHAN12:HSDP:HSET:RVPS?
queries the Redundancy Version Parameter sequence.
Response: 0,3,4

[:SOURCE<hw>]:BB:W3GPP:BSTation<st>:CHANnel<ch0>:HSDPa:HSET:RVState <rvstate>

Enables/disables the random variation of the modulation and number of codes (see [chapter 5.13.9, "Randomly Varying Modulation and Number of Codes"](#), on page 127).

Parameters:

<rvstate> 0 | 1 | OFF | ON
*RST: OFF

Example: SOURCE:BB:W3GPP:BST1:CHAN12:HSDPa:HSET:RVState
ON

Options: R&S SMx/AMU-K59

[:SOURCE<hw>]:BB:W3GPP:BSTation<st>:CHANnel<ch0>:HSDPa:HSET:SEED <Seed>

Sets the seed for the random process deciding between the four option (see [chapter 5.13.9, "Randomly Varying Modulation and Number of Codes"](#), on page 127).

Parameters:

<Seed> float
Range: 0 to 65535
Increment: 1
*RST: 0 for path A, 1 for path B

Example: SOURCE:BB:W3GPP:BST1:CHANnel12:HSDPa:HSET:SEED
5

Options: R&S SMx/AMU-K59

```
[ :SOURce<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:HSET:S64Qam
<S64qam>
```

Enables/disables UE support of 64QAM.

This command is enabled only for HS-SCCH Type 1 (normal operation) and 16QAM modulation.

In case this parameter is disabled, i.e. the UE does not support 64QAM, the xccs,7 bit is used for channelization information.

Parameters:

```
<S64qam>          ON | OFF
*RST:             OFF
```

Example:

```
BB:W3GP:BST1:CHAN12:HSDP:MODE HSET
selects H-Set mode.
BB:W3GP:BST1:CHAN12:HSDP:HSET:TYPE NORM
selects HS-SCCH Type 1 (normal operation).
BB:W3GP:BST1:CHAN12:HSDP:HSET:MOD QAM16
sets 16QAM modulation.
BB:W3GP:BST1:CHAN12:HSDP:HSET:S64Q ON
enables UE to support 64QAM
```

```
[ :SOURce<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:HSET:SCCode
<Sccode>
```

Sets the channelization code of the first HS-PDSCH channel in the H-Set. The channelization codes of the rest of the HS-PDSCHs in this H-Set are set automatically.

Note: To let the instrument generate a signal equal to the one generated by an instrument equipped with an older firmware, set the same Channelization Codes as the codes used for your physical channels.

Parameters:

```
<Sccode>          float
Range:           1 to 15
*RST:            8
```

Example:

```
BB:W3GP:BST1:CHAN12:HSDP:MODE HSET
selects H-Set mode.
BB:W3GP:BST1:CHAN12:HSDP:HSET:SCC 10
sets channelization code of the first HS-PDSCH.
```

```
[ :SOURce<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:HSET:
SLENgth?
```

Displays the suggested ARB sequence length.

The suggested ARB sequence length is the calculated minimum length that depends on several parameters, like TTI distance, Number of HARQ Processes, HARQ Mode, HARQ cycles, RV Parameter Sequence, HS-SCCH Type, Precoding Weight Pattern and Stream 2 Active Pattern.

When working in Advanced Mode (`W3GP:BST1:CHAN:HSDP:HSET:AMOD ON`), it is recommended to adjust the current ARB sequence length to the suggested one.

Return values:

<Slength> float

Example:

```
BB:W3GP:BST1:CHAN12:HSDP:MODE HSET
selects H-Set mode.
BB:W3GP:BST1:CHAN12:HSDP:HSET:AMOD ON
enables advanced mode.
BB:W3GP:BST1:CHAN12:HSDP:HSET:SLEN?
queries the suggested ABR sequence length.
Response: 21
BB:W3GP:BST1:CHAN12:HSDP:HSET:SLEN:ADJ
sets the ARB sequence length to the suggested value.
```

Usage: Query only

**[:SOURCE<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:HSET:
SLENgth:ADJust**

Sets the ARB sequence length to the suggested value.

When working in Advanced Mode (`W3GP:BST1:CHAN:HSDP:HSET:AMOD ON`), it is recommended to adjust the current ARB sequence length to the suggested one.

Example:

```
BB:W3GP:BST1:CHAN12:HSDP:MODE HSET
selects H-Set mode.
BB:W3GP:BST1:CHAN12:HSDP:HSET:AMOD ON
enables advanced mode.
BB:W3GP:BST1:CHAN12:HSDP:HSET:SLEN?
queries the suggested ABR sequence length.
Response: 21
BB:W3GP:SLEN?
queries the current ABR sequence length.
Response: 12
BB:W3GP:BST1:CHAN12:HSDP:HSET:SLEN:ADJ
sets the ARB sequence length to the suggested value.
BB:W3GP:SLEN?
queries the current ABR sequence length.
Response: 21
```

Usage: Event

[:SOURce<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:HSET:SPATtern<di>?

Queries the distribution of packets over time. A "-" indicates no packet

Suffix:

<di> 1|2

Return values:

<Spattern> string

Example:

BB:W3GP:BST1:CHAN15:HSDP:TTID 3

sets the TTI

BB:W3GP:BST1:CHAN12:HSDP:HSET:HARQ:LENG 2

sets the number of HARQ processes

BB:W3GP:BST1:CHAN12:HSDP:HSET:SPAT1?

queries the signaling pattern for stream 1

Response: 0,-,-1,-,-

Usage:

Query only

[:SOURce<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:HSET:STAPattern <Stapattern>

Enables/disables a temporal deactivation of Stream 2 per TTI in form of sending pattern.

The stream 2 sending pattern is a sequence of max 16 values of "1" (enables Stream 2 for that TTI) and "-" (disabled Stream 2 for that TTI).

Parameters:

<Stapattern> string

*RST: 1

Example:

BB:W3GP:BST1:CHAN12:HSDP:HSET:STAP "11-"

selects the pattern.

[:SOURce<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch0>:HSDPa:HSET:TPOWer <Tpower>

Sets the total power of the HS-PDSCH channels in the H-Set.

The individual power levels of the HS-PDSCHs are calculated automatically and can be queried with the command `[:SOURce<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>:POWer`.

Parameters:

<Tpower>

float

The min/max values depend on the number of HS-PDSCH channelization codes ([:SOURce<hw>] :BB:W3GPP:

BSTation<st>:CHANnel<ch>:HSDPa:HSET:CLENGTH) and are calculated as follow:

min = -80 dB + 10*log₁₀(NumberOfHS-PDSCHChannelizationCodes)

max = 0 dB + 10*log₁₀(NumberOfHS-PDSCHChannelizationCodes)

Range: dynamic to dynamic

Increment: 0.01

*RST: -13.01

Example:

```
:SOURce:BB:W3GPP:BST1:CHAN12:HSDPa:MODE HSET
```

```
:SOURce:BB:W3GPP:BST1:CHAN12:HSDPa:HSET:
```

```
CLENGTH?
```

```
Response: 5
```

```
:SOURce:BB:W3GPP:BST1:CHAN13:POWER -10
```

```
:SOURce:BB:W3GPP:BST1:CHAN12:HSDPa:HSET:TPOWER?
```

```
Response: -3.01029995663981 dB
```

```
:SOURce:BB:W3GPP:BST1:CHAN12:HSDPa:HSET:TPOWER
```

```
-5
```

```
:SOURce:BB:W3GPP:BST1:CHAN13:POWER?
```

```
Response: -11.9897000433602 dB
```

[:SOURce<hw>]:BB:W3GPP:BSTation<st>:CHANnel<ch>:HSDPa:HSET:TBS:INDEX<di> <Index>

Selects the Index ki for the corresponding table and stream, as described in in 3GPP TS 25.321.

Suffix:

<di>

1|2

Parameters:

<Index>

float

Range: 0 to 62

Example:

```
BB:W3GP:BST1:CHAN12:HSDP:MODE HSET
```

selects H-Set mode.

```
BB:W3GP:BST1:CHAN12:HSDP:HSET:TBS:TABL2 TAB0
```

selects Table 0 for stream 2.

```
BB:W3GP:BST1:CHAN12:HSDP:HSET:TBS:IND2 25
```

sets the Index ki

[:SOURce<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:HSET:TBS:REfERENCE <Reference>

While working in less operation mode, this command is signaled instead of the command
BB:W3GP:BST:CHAN:HSDP:HSET:TBS:IND.

Parameters:

<Reference> float
Range: 0 to 3
*RST: 0

Example:

BB:W3GP:BST1:CHAN12:HSDP:MODE HSET
selects H-Set mode.
BB:W3GP:BST1:CHAN12:HSDP:HSET:TYPE LOP
selects less operation mode.
BB:W3GP:BST1:CHAN12:HSDP:HSET:TBS:TABL2 TAB0
selects Table 0 for stream 2.
BB:W3GP:BST1:CHAN12:HSDP:HSET:TBS:REF 2
sets the reference.

[:SOURce<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:HSET:TBS:TABLE<di> <Table>

Selects Table 0 or Table 1 as described in in 3GPP TS 25.321.

For HS-PDSCH Modulation set to 64QAM, only Table 1 is available.

Parameters:

<Table> TAB0 | TAB1
*RST: TAB0

Example:

BB:W3GP:BST1:CHAN12:HSDP:MODE HSET
selects H-Set mode.
BB:W3GP:BST1:CHAN12:HSDP:HSET:TBS:TABL2 TAB0
selects Table 0 for stream 2.

[:SOURce<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:HSET:TYPE <Type>

Sets the HS-SCCH type.

Parameters:

<Type>

NORMal | LOPeration | MIMO

NORMal

Normal operation mode.

LOPeration

HS-SCCH less operation mode.

MIMO

HS-SCCH Type 3 mode is defined for MIMO operation.

Enabling this operation mode, enables the MIMO parameters [:

SOURce<hw>]:BB:W3GPP:BSTation<st>:CHANnel<ch>:

HSDPa:MIMO:CVPB<di>, [:SOURce<hw>]:BB:W3GPP:

BSTation<st>:CHANnel<ch>:HSDPa:MIMO:

MODulation<di>, [:SOURce<hw>]:BB:W3GPP:

BSTation<st>:CHANnel<ch>:HSDPa:MIMO:PWPattern

and [:SOURce<hw>]:BB:W3GPP:BSTation<st>:

CHANnel<ch>:HSDPa:MIMO:STAPattern and all Stream 2

parameters.

Example:

BB:W3GP:BST1:TDIV ANT1

enables transmit diversity and antenna 1.

BB:W3GP:BST1:CHAN12:HSDP:HSET:TYPE MIMO

sets MIMO operation mode.

[:SOURce<hw>]:BB:W3GPP:BSTation<st>:CHANnel<ch>:HSDPa:HSET:UECategory?

Queries the UE category number.

Return values:

<Uecategory>

float

Range: 0 to 5000

Example:

BB:W3GP:BST1:CHAN12:HSDP:MODE HSET

selects H-Set mode.

BB:W3GP:BST1:CHAN12:HSDP:HSET:PREDEF P3QPSK

selects H-Set 3 (QPSK).

BB:W3GP:BST1:CHAN12:HSDP:HSET:UEC?

queries the UE Category.

Response: 5

Usage:

Query only

[:SOURce<hw>]:BB:W3GPP:BSTation<st>:CHANnel<ch>:HSDPa:HSET:UEID<Ueid>

The command sets the UE identity which is the HS-DSCH Radio Network Identifier (H-RNTI) defined in 3GPP TS 25.331: "Radio Resource Control (RRC); Protocol Specification".

Parameters:

<Ueid> float
 Range: 0 to 65535
 *RST: 0

Example:

BB:W3GP:BST1:CHAN12:HSDP:MODE HSET
 selects H-Set mode.
 BB:W3GP:BST1:CHAN12:HSDP:HSET:UEID 256
 sets the UE identity.

**[:SOURCE<hw>]:BB:W3GPP:BSTation<st>:CHANnel<ch>:HSDPa:HSET:
 VIBSize<di> <Vibsize>**

Sets the size of the Virtual IR Buffer (Number of SMLs per HARQ-Process) per stream.

Suffix:

<di> 1|2

Parameters:

<Vibsize> float
 Range: 0 to 304000
 Increment: 800

Example:

BB:W3GP:BST1:CHAN12:HSDP:HSET:VIBS1 9600
 sets the Virtual IR Buffer Size of stream 1.

**[:SOURCE<hw>]:BB:W3GPP:BSTation<st>:CHANnel<ch>:HSDPa:MIMO:
 CVPB<di> <Cvpb>**

The command switches the order of the constellation points of the 16QAM and 64QAM mapping.

The re-arrangement is done according to 3GPP TS25.212.

Suffix:

<di> 1|2

Parameters:

<Cvpb> 0 | 1 | 2 | 3
 Range: 0 to 3
 *RST: 0

Example:

BB:W3GP:BST1:CHAN12:HSDP:MIMO:CVPB2 1
 selects interchange of MSBs with LSBs for stream 2.

**[:SOURCE<hw>]:BB:W3GPP:BSTation<st>:CHANnel<ch>:HSDPa:MIMO:
 MODulation<di> <Modulation>**

Sets the modulation for stream 1 and stream 2 to QPSK, 16QAM or 64QAM.

The modulation 64QAM is available for instruments equipped with option SMx-K59 only.

Suffix:

<di> 1|2

Parameters:

<Modulation> QPSK | QAM16 | QAM64

*RST: HSQP

Example:

BB:W3GP:BST1:CHAN12:HSDP:MIMO:MOD1 HS64Q
sets the modulation of stream 2 to 64QAM

**[:SOURCE<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:MIMO:
PWPattern <Pwpattern>**

Sets the precoding weight parameter w2 for MIMO precoding.

The values of the weight parameters w1, w3 and w4 are calculated based on the value for w2 (see [chapter 3.14, "MIMO in HSPA+"](#), on page 31).

Parameters:

<Pwpattern> string

*RST: 0

Example:

BB:W3GP:BST1:CHAN12:HSDP:MIMO:PWP "0,1,3"
selects the pattern.

**[:SOURCE<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:MIMO:
STAPattern <Stapattern>**

Enables/disables a temporal deactivation of Stream 2 per TTI in form of sending pattern.

The stream 2 sending pattern is a sequence of max 16 values of "1" (enables Stream 2 for that TTI) and "-" (disabled Stream 2 for that TTI).

Parameters:

<Stapattern> string

*RST: 1

Example:

BB:W3GP:BST1:CHAN12:HSDP:MIMO:STAP "11-"
selects the pattern.

[:SOURCE<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>:HSDPa:MODE <Mode>

The command selects the HSDPA mode.

Parameters:

<Mode> CONTInuous | PSF0 | PSF1 | PSF2 | PSF3 | PSF4 | HSET

CONTInuous

The high speed channel is generated continuously. This mode is defined in test model 5.

PSFx

The high speed channel is generated in packet mode. The start of the channel is set by selecting the subframe in which the first packet is sent.

HSET

The high speed channels are preset according to TS 25.1401 Annex A.7, H-Set.

*RST: CONTInuous

Example:

BB:W3GP:BST1:CHAN12:HSDP:MODE PSF1

selects packet mode for channel 12. The first packet is sent in packet subframe 1 (PSF1).

[[:SOURCE<hw>]:BB:W3GPP:BSTation<st>:CHANnel<ch>:HSDPa:TTIDistance <Ttidistance>

The command selects the distance between two packets in HSDPA packet mode. The distance is set in number of sub-frames (3 slots = 2 ms). An "Inter TTI Distance" of 1 means continuous generation.

Parameters:

<Ttidistance> float
 Range: 1 to 16
 *RST: 5

Example:

BB:W3GP:BST1:CHAN12:HSDP:TTID 2

selects an Inter TTI Distance of 2 subframes.

[[:SOURCE<hw>]:BB:W3GPP:BSTation<st>:CHANnel<ch>:POWER <Power>

The command sets the channel power relative to the powers of the other channels. This setting also determines the starting power of the channel for Misuse TPC, Dynamic Power Control and the power control sequence simulation of OCNS mode 3i channels.

With the command `SOURCE:BB:W3GPP:POWER:ADJUST`, the power of all the activated channels is adapted so that the total power corresponds to 0 dB. This will not change the power ratio among the individual channels.

Parameters:

<Power> float
 Range: -80 dB to 80 dB
 Increment: 0.01 dB
 *RST: 0 dB

Example:

```
BB:W3GP:BST2:CHAN12:POW -10dB
```

sets the channel power of channel 12 of base station 2 to -10 dB relative to the power of the other channels.

```
[:SOURCE<hw>]:BB:W3GPP:BSTation<st>:CHANNEL<ch>:SFORMAT <Sformat>
```

The command sets the slot format of the selected channel. The value range depends on the selected channel.

The slot format determines the symbol rate (and thus the range of values for the channelization code), the TFCI state and the pilot length. If the value of any one of the four parameters is changed, all the other parameters will be adapted as necessary.

In the case of enhanced channels with active channel coding, the selected channel coding also affects the slot format and thus the remaining parameters. If these parameters are changed, the channel coding type is set to user.

Parameters:

<Sformat>	float
*RST:	DPCH 8; S-CCPCH (CHAN6) 0; PDSCH (CHAN10) 0; DL-DPCCH (CHAN11) 0

Example:

```
BB:W3GP:BST2:CHAN12:SFOR 8
```

selects slot format 8 for channel 12 of base station 2.

```
[:SOURCE<hw>]:BB:W3GPP:BSTation<st>:CHANNEL<ch>:SRATE <Srate>
```

The command sets the symbol rate of the selected channel. The value range depends on the selected channel and the selected slot format.

The slot format determines the symbol rate (and thus the range of values for the channelization code), the TFCI state and the pilot length. If the value of any one of the four parameters is changed, all the other parameters will be adapted as necessary.

In the case of enhanced channels with active channel coding, the selected channel coding also affects the slot format and thus the remaining parameters. If these parameters are changed, the channel coding type is set to user.

Parameters:

<Srate>	D7K5 D15K D30K D60K D120k D240k D480k D960k
*RST:	DPCHs D30K; CHAN1..10 D15K; DL-DPCCH (CHAN11) D7K5;

Example:

```
BB:W3GP:BST2:CHAN12:SRAT D120K
```

sets the symbol rate for channel 12 of base station 2 to 120 ksp/s.

```
[:SOURCE<hw>]:BB:W3GPP:BSTation<st>:CHANNEL<ch>:STATE <State>
```

The command activates the selected channel.

Parameters:

<State> ON | OFF
 *RST: OFF

Example:

BB:W3GP:BST2:CHAN12:STAT OFF
 deactivates channel 12 of base station 2.

[:SOURCE<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>:TOFFset <Toffset>

The command sets the timing offset. The timing offset defines the number of chips by which the absolute starting time of the frames (slot 0) is shifted relative to the start of the scrambling code sequence: TOffset * 256 Chips. This procedure is used to reduce the crest factor.

Note:

For F-DPCH channels, the value range is 0 to 9.

Parameters:

<Toffset> float
 Range: 0 to 149
 *RST: 0

Example:

BB:W3GP:BST2:CHAN12:TOFF 20
 defines a frame shift relative to the scrambling code sequence of 20*256 chips.

[:SOURCE<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>:TYPE <Type>

The command selects the channel type.

The channel type is fixed for channel numbers 0 ... 8, for the remaining channel numbers, the choice lies between the relevant standard channels and the high-speed channels.

Parameters:

<Type> PCPich | SCPich | PSCH | SSCH | PCCPch | SCCPch | PICH | AICH | APAich | PDSch | DPCCh | DPCH | HSSCch | HSQPsk | HSQam | HS16Qam | HS64Qam | HSMimo | EAGCh | ERGCh | EHICH | FDPCh

Example:

BB:W3GP:BST2:CHAN12:TYPE HSQP
 selects channel type HS-PDS, QPSK for channel 12 of the channel table.

[:SOURCE<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>[:HSUPa]:EAGCh:IFCoding <Ifcoding>

Enables/disables the information coding. Disabling this parameter corresponds to a standard operation, i.e. no coding is performed and the data is sent uncoded.

Enabling this parameter allows you to configure the way the data is coded.

Parameters:

<Ifcoding> ON | OFF
 *RST: OFF

Example:

BB:W3GP:BST1:CHAN10:HSUP:EAGC:IFC ON
 enables information coding.

**[:SOURCE<hw>]:BB:W3GPP:BSTation<st>:CHANnel<ch>[:HSUPa]:EAGCh:
 TTI<di0>:AGScope <Agscope>**

Sets the scope of the selected grant. According to the TS 25.321, the impact of each grant on the UE depends on this parameter.

For E-DCH TTI = 10ms, the Absolute Grant Scope is always All HARQ Processes.

Suffix:

<di0> 1 .. 9

Parameters:

<Agscope> ALL | PER
 *RST: ALL

Example:

BB:W3GP:BST1:CHAN10:HSUP:EAGC:IFC ON
 enables information coding.
 BB:W3GP:BST1:CHAN10:HSUP:EAGC:TTIL 10
 enables 10 TTIs for configuration.
 BB:W3GP:BST1:CHAN10:HSUP:EAGC:TTI9:AGSC PER
 sets the grant scope to Per HARQ Process.

**[:SOURCE<hw>]:BB:W3GPP:BSTation<st>:CHANnel<ch>[:HSUPa]:EAGCh:
 TTI<di0>:AGVIndex <Agvindex>**

Sets the Index for the selected TTI. According to the TS 25.212 (4.10.1A.1), there is a cross-reference between the grant's index and the grant value.

The TTI configuration of the table is used cyclically. Depending on the selection made for the parameter E-DCH TTI, each table row corresponds to a 2ms TTI or to a 10ms TTI.

Suffix:

<di0> 1 .. 9

Parameters:

<Agvindex> float
 Range: 0 to 31
 *RST: 0

Example:

BB:W3GP:BST1:CHAN10:HSUP:EAGC:IFC ON
 enables information coding.
 BB:W3GP:BST1:CHAN10:HSUP:EAGC:TTIL 10
 enables 10 TTIs for configuration.
 BB:W3GP:BST1:CHAN10:HSUP:EAGC:TTI9:AGVI 20
 sets the absolute grant value index

**[:SOURCE<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>[:HSUPa]:EAGCh:
TTI<di0>:UEID <Ueid>**

Sets the UE Id for the selected TTI.

Suffix:

<di0> 1 .. 9

Parameters:

<Ueid> float
Range: 0 to 65535
*RST: 0

Example:

BB:W3GP:BST1:CHAN10:HSUP:EAGC:IFC ON
enables information coding.
BB:W3GP:BST1:CHAN10:HSUP:EAGC:TTIL 10
enables 10 TTIs for configuration.
BB:W3GP:BST1:CHAN10:HSUP:EAGC:TTI9:UEID 2000
sets the UE ID

**[:SOURCE<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>[:HSUPa]:EAGCh:
TTICount <Tticount>**

Sets the number of configurable TTIs.

Parameters:

<Tticount> float
Range: 0 to 10
*RST: 1

Example:

BB:W3GP:BST1:CHAN10:HSUP:EAGC:TTIC 5
sets the number of configurable TTIs.

**[:SOURCE<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>[:HSUPa]:EAGCh:
TTIEdch <Ttiedch>**

The command sets processing duration.

Parameters:

<Ttiedch> 2ms | 10ms
*RST: 2ms

Example:

BB:W3GP:BST1:CHAN10:HSUP:EAGC:TTIE 2ms
sets the processing duration to 2 ms.

**[:SOURCE<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>[:HSUPa]:EHICH:CTYPE
<Ctype>**

The command selects the cell type.

Parameters:

<Ctype> SERVing | NOSERVing
 *RST: SERVing

Example:

SOUR:BB:W3GP:BST1:CHAN9:HSUP:EHIC:CTYP SERV
 selects the serving cell type.

[:SOURce<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>[:HSUPa]:EHICH:DTAU
 <Dtau>

The command sets the offset of the downlink dedicated offset channels.

Parameters:

<Dtau> float
 Range: 0 to 149
 *RST: 0

Example:

SOUR:BB:W3GP:BST1:CHAN12:HSUP:EHIC:DTAU 5
 selects the offset of the downlink dedicated offset channels.

[:SOURce<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>[:HSUPa]:EHICH:ETAU?

The command queries the offset of the P-CCPCH frame boundary.

Return values:

<Etau> float

Example:

SOUR:BB:W3GP:BST1:CHAN12:HSUP:EHIC:ETAU?
 queries the offset of the P-CCPCH frame boundary.

Usage:

Query only

[:SOURce<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>[:HSUPa]:EHICH:
RGPAtern <Rgpattern>

The command sets the bit pattern for the ACK/NACK field.

For Non Serving Cell only "+" (ACK) and "0" (no signal) is allowed. For Serving Cells only "+" (ACK) and "-" (NACK) is allowed.

Parameters:

<Rgpattern> <bit pattern>
 *RST: +

Example:

SOUR:BB:W3GP:BST1:CHAN10:HSUP:EHIC:RGPA "+"
 sets the bit pattern to "+" (ACK).

[:SOURce<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>[:HSUPa]:EHICH:
SSINDEX <Ssindex>

The command sets the value that identifies the user equipment. The values are defined in TS 25.211.

Parameters:

<Ssindex> float
 Range: 0 to 39
 *RST: 0

Example:

SOUR:BB:W3GP:BST1:CHAN9:HSUP:EHIC:SSIN 0
 sets the value to identify the user equipment.

**[:SOURCE<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>[:HSUPa]:EHICH:
 TTIEDch <Ttiedch>**

The command sets processing duration.

Parameters:

<Ttiedch> 2ms | 10ms
 *RST: 2ms

Example:

SOUR:BB:W3GP:BST1:CHAN10:HSUP:EHIC:TTIE 2ms
 sets the processing duration to 2 ms.

**[:SOURCE<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>[:HSUPa]:ERGCh:
 CTYPe <Ctype>**

The command selects the cell type.

Parameters:

<Ctype> SERVing | NOSERVing
 *RST: SERVing

Example:

SOUR:BB:W3GP:BST1:CHAN9:HSUP:ERGC:CTYP SERV
 selects the serving cell type.

**[:SOURCE<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>[:HSUPa]:ERGCh:DTAU
 <Dtau>**

The command sets the offset of the downlink dedicated offset channels.

Parameters:

<Dtau> float
 Range: 0 to 149
 *RST: 0

Example:

SOUR:BB:W3GP:BST1:CHAN12:HSUP:ERGC:DTAU 5
 sets the offset of the downlink dedicated offset channels.

**[:SOURCE<hw>]:BB:W3GPp:BSTation<st>:CHANnel<ch>[:HSUPa]:ERGCh:
 ETAU?**

The command queries the offset of the P-CCPCH frame boundary.

Return values:

<Etau> float

Example:

SOUR:BB:W3GP:BST1:CHAN12:HSUP:ERGC:ETAU?
queries the offset of the P-CCPCH frame boundary.

Usage:

Query only

**[:SOURCE<hw>]:BB:W3GP:BSTation<st>:CHANNEL<ch>[:HSUPa]:ERGC:
RGPattern <Rgpattern>**

The command sets the bit pattern for the Relative Grant Pattern field.

Parameters:

<Rgpattern> string

Example:

SOUR:BB:W3GP:BST1:CHAN10:HSUP:ERGC:RGPA "-"
sets the bit pattern to "-" (Down).

**[:SOURCE<hw>]:BB:W3GP:BSTation<st>:CHANNEL<ch>[:HSUPa]:ERGC:
SSINDEX <Ssindex>**

The command sets the value that identifies the user equipment. The values are defined in TS 25.211.

Parameters:

<Ssindex> float
Range: 0 to 39
*RST: 0

Example:

SOUR:BB:W3GP:BST1:CHAN9:HSUP:ERGC:SSIN 0
sets the value to identify the user equipment.

**[:SOURCE<hw>]:BB:W3GP:BSTation<st>:CHANNEL<ch>[:HSUPa]:ERGC:
TTIEDch <Ttiedch>**

The command sets processing duration.

Parameters:

<Ttiedch> 2ms | 10ms
*RST: 2ms

Example:

SOUR:BB:W3GP:BST1:CHAN10:HSUP:ERGC:TTIE 2ms
sets the processing duration to 2 ms.

[:SOURCE<hw>]:BB:W3GP:BSTation<st>:CMODE:DLFStructure <Dlfstructure>

The command selects the frame structure. The frame structure determines the transmission of TPC and pilot field in the transmission gaps.

Suffix:

<st>

2|3|4

Compressed Mode can be configured for base stations 2, 3 and 4.

Parameters:

<Dlfstructure>

A | B

A

Type A, the pilot field is sent in the last slot of each transmission gap.

B

Type B, the pilot field is sent in the last slot of each transmission gap. The first TPC field of the transmission gap is sent in addition.

*RST: A

Example:

```
BB:W3GP:BST2:CMOD:DLFS A
```

selects frame structure of type A.

```
[:SOURCE<hw>]:BB:W3GPP:BSTation<st>:CMODE:METHod <Method>
```

The command selects compressed mode method.

Suffix:

<st>

2|3|4

Compressed Mode can be configured for base stations 2, 3 and 4.

Parameters:

<Method>

PUNcturing | HLSCheduling | SF2

PUNcturing

The data is compressed by reducing error protection.

HLSCheduling

The data is compressed by stopping the transmission of the data stream during the transmission gap.

SF2

The data is compressed by halving the spreading factor.

*RST: PUNcturing

Example:

```
BB:W3GP:BST2:CMOD:METH HLSC
```

selects compressed mode method High Layer Scheduling.

```
[:SOURCE<hw>]:BB:W3GPP:BSTation<st>:CMODE:PATtern<ch>:TGD <Tgd>
```

The command sets the transmission gap distances.

The transmission gap distances of the user equipment with the same suffix as the selected base station is set to the same value.

Suffix:**<st>** 2|3|4

Compressed Mode can be configured for base stations 2, 3 and 4.

<ch> 1|2**Parameters:****<Tgd>** float

Range: 3 slots to 100 slots

*RST: 15 slots

Example:

BB:W3GP:BST2:CMOD:PATT2:TGD 7

sets transmission gap distance of pattern 2 to 7 slots.

[<SOURce<hw>]:BB:W3GPp:BSTation<st>:CMODE:PATTErn<ch>:TGL<di> <Tgl>

The command sets the transmission gap lengths.

The transmission gap lengths of the user equipment with the same suffix as the selected base station are set to the same value.

Suffix:**<st>** 2|3|4

Compressed Mode can be configured for base stations 2, 3 and 4.

<ch> 1|2**<di>** 1|2**Parameters:****<Tgl>** float

Range: 3 slots to 14 slots

*RST: 3 slots

Example:

BB:W3GP:BST2:CMOD:PATT2:TGL1 4

sets transmission gap length of gap 1 of pattern 2 to 4 slots.

[<SOURce<hw>]:BB:W3GPp:BSTation<st>:CMODE:PATTErn<ch>:TGPL <Tgpl>

The command sets the transmission gap pattern lengths. Setting 0 is available only for pattern 2.

The transmission gap pattern length of the user equipment with the same suffix as the selected base station is set to the same value.

Suffix:**<st>** 2|3|4

Compressed Mode can be configured for base stations 2, 3 and 4.

<ch> 1|2

Parameters:

<Tgpl> float
 Range: 0 frames to 100 frames
 *RST: 2 frames

Example:

BB:W3GP:BST2:CMOD:PATT2:TGPL 7
 sets transmission gap pattern length of pattern 2 to 7 frames.

[:SOURCE<hw>]:BB:W3GPp:BSTation<st>:CMODE:PATTERN<ch>:TGSN <Tgsn>

The command sets the transmission gap slot number of pattern 1.

The slot numbers of the user equipment with the same suffix as the selected base station are set to the same value.

Suffix:

<st> 2|3|4
 Compressed Mode can be configured for base stations 2, 3 and 4.

<ch> 1|2

Parameters:

<Tgsn> float
 Range: slot 0 to slot14
 *RST: slot 7

Example:

BB:W3GP:BST2:CMOD:PATT:TGSN 4
 sets slot number of pattern 1 to slot 4.

[:SOURCE<hw>]:BB:W3GPp:BSTation<st>|MSTation<st>:CMODE:POFFset <Poffset>

The command sets the power offset for mode USER.

Suffix:

<st> 2|3|4
 Compressed Mode can be configured for base stations 2, 3 and 4 and for user equipment 2, 3 and 4.

Parameters:

<Poffset> float
 Range: 0 dB to 10 dB
 Increment: 0.01 dB
 *RST: 0 dB

Example:

BB:W3GP:BST2|UE2:CMOD:POFF 4
 sets the power offset value to 4 dB.
 BB:W3GP:BST2|UE2:CMOD:POM USER
 selects power offset mode USER

```
[ :SOURce<hw>]:BB:W3GPp:BSTation<st>|MSTation<st>:CMODE:POMode  
  <Pomode>
```

The command selects the power offset mode.

Suffix:

```
<st>                2|3|4
```

Compressed Mode can be configured for base stations 2, 3 and 4 and for user equipment 2, 3 and 4.

Parameters:

```
<Pomode>           AUTO | USER
```

AUTO

The power offset is obtained by pilot bit ratio as follows:
Number of pilots bits of non-compressed slots / Number of pilot bits by compressed slots.

USER

The power offset is defined by command `[:SOURce<hw>]:BB:W3GPp:BSTation<st>|MSTation<st>:CMODE:POFFset`.

```
*RST:              AUTO
```

Example:

```
BB:W3GP:BST2|UE2:CMOD:POFF 4  
sets the power offset value to 4 dB.  
BB:W3GP:BST2|UE2:CMOD:POM USER  
selects power offset mode USER.
```

```
[ :SOURce<hw>]:BB:W3GPp:BSTation<st>:CMODE:STATe <State>
```

The command activates/deactivates the compressed mode.

Suffix:

```
<st>                2|3|4
```

Compressed Mode can be configured for base stations 2, 3 and 4.

Parameters:

```
<State>            ON | OFF
```

```
*RST:              OFF
```

Example:

```
BB:W3GP:BST2:CMOD:STAT ON  
activates compressed mode for base station 2.
```

```
[ :SOURce<hw>]:BB:W3GPp:BSTation<st>:DCONflict:RESolve
```

The command resolves existing domain conflicts by modifying the Channelization Codes of the affected channels.

Example: `BB:W3GP:BST2:DCON:STAT?`
 queries whether a code domain conflict exists for base station 2.
 Response: 1
 there is a conflict.
`BB:W3GP:BST2:DCON:RES`
 resolves the code domain error by modifying the Channelization codes of the affected channels.

Usage: Event

[[:SOURce<hw>]:BB:W3GPp:BSTation<st>:DCONflict[:STATe]?

The command queries whether there is (response 1) or is not (response 0) a conflict (overlap) in the hierarchically-structured channelization codes. The cause of a possible domain conflict can be ascertained by manual operation in the "BS > Code Domain" dialog.

Return values:
 <State> 0 | 1 | OFF | ON

Example: `BB:W3GP:BST2:DCON:STAT?`
 queries whether a code domain conflict exists for base station 2.
 Response: 0
 there is no conflict.

Usage: Query only

[[:SOURce<hw>]:BB:W3GPp:BSTation<st>:OLTDiversity <Oltdiversity>

Activates/deactivates open loop transmit diversity.

The antenna whose signal is to be simulated is selected with the command `[[:SOURce<hw>]:BB:W3GPp:BSTation<st>:TDIVersity`.

Parameters:
 <Oltdiversity> ON | OFF
 *RST: OFF

Example: `BB:W3GP:BST2:TDIV ANT2`
 calculates and applies the output signal for antenna 2 of one two-antenna system.
`BB:W3GP:BST2:OLTD ON`
 enables open loop transmit diversity.

[[:SOURce<hw>]:BB:W3GPp:BSTation<st>:PINDicator:COUNT <Count>

The command sets the number of page indicators (PI) per frame in the page indicator channel (PICH).

Parameters:
 <Count> D18 | D36 | D72 | D144
 *RST: D18

Example: `BB:W3GP:BST2:PIND:COUN D36`
sets the number of page indicators (PI) per frame in the page indicator channel (PICH) to 36.

[:SOURCE<hw>]:BB:W3GPp:BSTation<st>:SCODE <Scode>

The command sets the identification for the base station. This value is simultaneously the initial value of the scrambling code generator.

Parameters:

<Scode> integer
Range: #H0 to #H5FFF
*RST: #H0

Example: `BB:W3GP:BST2:SCOD #H5FFF`
sets scrambling code #HFFF.

[:SOURCE<hw>]:BB:W3GPp:BSTation<st>:SCODE:STATE <State>

The command makes it possible to deactivate base station scrambling for test purposes.

Parameters:

<State> ON | OFF
*RST: ON

Example: `BB:W3GP:BST2:SCOD:STAT OFF`
deactivates scrambling for base station 2.

[:SOURCE<hw>]:BB:W3GPp:BSTation<st>:SCPich:PREference[:STATE] <State>

The command activates or deactivates the use of S-CPICH as reference phase.

Parameters:

<State> ON | OFF
*RST: OFF

Example: `BB:W3GP:BST2:SCP:PREF ON`
activates the use of S-CPICH as reference phase for base station 2.

[:SOURCE<hw>]:BB:W3GPp:BSTation<st>:SSCG?

The command queries the secondary synchronization code group. This parameter is specified in the table defined by the 3GPP standard "Allocation of SSCs for secondary SCH". This table assigns a specific spreading code to the synchronization code symbol for every slot in the frame. The value is calculated from the scrambling code.

Return values:

<Scgc> float

Example: `BB:W3GP:BST2:SSCG?`
 queries the 2nd search code group for base station 2.
 Response: 24
 the base station is part of second search group 24.

Usage: Query only

[:SOURCE<hw>]:BB:W3GP:BSTation<st>:STATE <State>

The command activates and deactivates the specified base station.

Parameters:

<State> ON | OFF
 *RST: OFF

Example: `BB:W3GP:BST2:STAT OFF`
 deactivates base station 2.

[:SOURCE<hw>]:BB:W3GP:BSTation<st>:TDElay <Tdelay>

The command sets the time shift of the selected base station compared to base station 1 in chips.

Suffix:

<st> 2|3|4

Parameters:

<Tdelay> float
 Range: 0 chips to 38400 chips
 *RST: 0 chips

Example: `BB:W3GP:BST2:TDEL 256`
 shifts base station 2 by 256 chips compared to base station 1.

[:SOURCE<hw>]:BB:W3GP:BSTation<st>:TDIVersity <Tdiversity>

Selects the antenna and the antenna configuration to be simulated.

The R&S Signal Generator supports two antenna configurations: a single-antenna system and a two-antenna system. Thus, an instrument equipped with two paths can simulate simultaneously the signals of both antennas of one two-antenna system. Moreover, for this two-antenna system, transmit diversity can be additionally activated or deactivated.

To simulate transmit diversity, a two-antenna system has to be selected and Open Loop Transmit Diversity has to be activated (command `BB:W3GP:BST:OLTD ON`).

Parameters:

<Tdiversity>

SANT | ANT1 | ANT2 | OFF

SANT

The signal of single-antenna system is calculated and applied. No transmit diversity is possible.

ANT1

Calculates and applies the output signal for antenna 1 of a two-antenna system.

ANT2

Calculates and applies the output signal for antenna 2 of a two-antenna system.

*RST: SANT

Example:

BB:W3GP:BST2:TDIV ANT2

the signal of antenna 2 of one two-antenna system is simulated.

7.8 Enhanced Channels of Base Station 1

The `SOURCE:BB:W3GPp:BSTation:ENHanced` subsystem contains the commands for setting the enhanced channels of base station 1. The commands of this system only take effect when the 3GPP FDD standard is activated, the downlink transmission direction is selected, base station 1 is enabled and enhanced channels are activated:

SOURCE:BB:W3GPp:STATE ON

SOURCE:BB:W3GPp:LINK DOWN

SOURCE:BB:W3GPp:BST1:STATE ON

SOURCE:BB:W3GPp:BST:ENHanced:CHANnel<11...13>:DPCH:STATE ON

or

SOURCE:BB:W3GPp:BST:ENHanced:PCCPch:STATE ON

BSTation<st>

The numeric suffix to `BSTation` determines the base station. Enhanced channels are enabled for base station 1 only.

CHANnel<ch0>

The value range is `CHANnel<11|12|13>` for enhanced DPCHs and `CHANnel<4>` for P-CCPCH.

TCHannel<di>

The transport channel designations for remote control are `TCHannel0` for DCCH, `TCHannel1` to `TCHannel6` for DTCH1 to DTCH6.

7.8.1 General Settings

<code>[:SOURCE<hw>]:BB:W3GPp:BSTation:ENHanced:CHANnel<ch0>:DPCH:STATe</code>	403
<code>[:SOURCE<hw>]:BB:W3GPp:BSTation:ENHanced:PCCPch:STATe</code>	403
<code>[:SOURCE<hw>]:BB:W3GPp:BSTation<st>:ENHanced:PCPich:PATTern</code>	403

`[:SOURCE<hw>]:BB:W3GPp:BSTation:ENHanced:CHANnel<ch0>:DPCH:STATe`
<State>

The command switches the selected channel to the enhanced state.

Parameters:

<State> ON | OFF
 *RST: OFF

Example: `BB:W3GP:BST:ENH:CHAN13:DPCH:STAT ON`
 switches DPCH 13 to Enhanced State.

`[:SOURCE<hw>]:BB:W3GPp:BSTation:ENHanced:PCCPch:STATe` <State>

The command activates or deactivates the enhanced state of the P-CCPCH (BCH).

Parameters:

<State> ON | OFF
 *RST: OFF

Example: `BB:W3GP:BST:ENH:PCCP:STAT ON`
 switches the P-CCPCH to Enhanced State.

`[:SOURCE<hw>]:BB:W3GPp:BSTation<st>:ENHanced:PCPich:PATTern` <Pattern>

Sets the P-CPICH pattern (channel 0).

Parameters:

<Pattern> ANT1 | ANT2
 *RST: ANT1

Example: `BB:W3GP:BST2:ENH:PCP:PATT ANT2`
 sets the P-CPICH Pattern to Antenna 2.

7.8.2 Channel Coding

<code>[:SOURCE<hw>]:BB:W3GPp:BSTation:ENHanced:CHANnel:DPCH:CCODing:USER:DELeTe</code>	404
<code>[:SOURCE<hw>]:BB:W3GPp:BSTation:ENHanced:CHANnel<ch0>:DPCH:CCODing:BPFRame</code>	405
<code>[:SOURCE<hw>]:BB:W3GPp:BSTation:ENHanced:CHANnel<ch0>:DPCH:CCODing:SFORmat</code>	405
<code>[:SOURCE<hw>]:BB:W3GPp:BSTation:ENHanced:CHANnel<ch0>:DPCH:CCODing:SRATe</code>	406

[:SOURce<hw>]:BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH:CCODing: STATE.....	406
[:SOURce<hw>]:BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH:CCODing: TYPE.....	407
[:SOURce<hw>]:BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH:CCODing: USER:CATalog.....	408
[:SOURce<hw>]:BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH:CCODing: USER:LOAD.....	409
[:SOURce<hw>]:BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH:CCODing: USER:STORE.....	409
[:SOURce<hw>]:BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH:INTerleaver2.....	410
[:SOURce<hw>]:BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH: TCHannel<di>:CRCSize.....	410
[:SOURce<hw>]:BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH: TCHannel<di>:DATA.....	410
[:SOURce<hw>]:BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH: TCHannel<di>:DATA:DSElect.....	411
[:SOURce<hw>]:BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH: TCHannel<di>:DATA:PATtern.....	412
[:SOURce<hw>]:BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH: TCHannel<di>:DTX.....	412
[:SOURce<hw>]:BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH: TCHannel<di>:EPRotectiOn.....	413
[:SOURce<hw>]:BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH: TCHannel<di>:INTerleaver.....	413
[:SOURce<hw>]:BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH: TCHannel<di>:RMATtribute.....	414
[:SOURce<hw>]:BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH: TCHannel<di>:STATE.....	414
[:SOURce<hw>]:BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH: TCHannel<di>:TBCount.....	414
[:SOURce<hw>]:BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH: TCHannel<di>:TBSize.....	415
[:SOURce<hw>]:BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH: TCHannel<di>:TTInterval.....	415
[:SOURce<hw>]:BB:W3GPP:BSTation:ENHanced:PCCPch:CCODing:INTerleaver<di>.....	415
[:SOURce<hw>]:BB:W3GPP:BSTation:ENHanced:PCCPch:CCODing:STATE.....	416
[:SOURce<hw>]:BB:W3GPP:BSTation:ENHanced:PCCPch:CCODing:TYPE.....	416

[:SOURce<hw>]:BB:W3GPP:BSTation:ENHanced:CHANnel:DPCH:CCODing: USER:DELeTe <Delete>

The command deletes the specified files with stored user channel codings.

The files are stored with the fixed file extensions *.3g_ccod_d1 in a directory of the user's choice. The directory applicable to the commands is defined with the command `MMEMory:CDIR`. To access the files in this directory, you only have to give the file name, without the path and the file extension.

The numerical suffix at CHANnel must not be used for this command.

Setting parameters:**<Delete>** string

Example: MMEM:CDIR '<root>\Lists\Wcdma\CcodDpchUser'
selects the directory for the user channel coding files.
BB:W3GP:BST:ENH:CHAN:DPCH:CCOD:USER:DEL
'user_cc1'
deletes the specified file with user coding.

Usage: Setting only
**[:SOURce<hw>]:BB:W3GPp:BSTation:ENHanced:CHANnel<ch0>:DPCH:
CCODing:BPFRame?**

The command queries the number of data bits in the DPDCH component of the frame at the physical layer. The number of data bits depends on the slot format.

The value returned depends on the selected slot format (W3GPp:BST:ENH:CHAN<n>:DPCH:SFOR), and if the slot format changes, this changes automatically as well.

Return values:**<Bpframe>** float

Example: BB:W3GP:BST:ENH:CHAN13:DPCH:CCOD:BPFR?
queries the number of data bits.
Response: 1
the number of data bits is 1.

Usage: Query only
**[:SOURce<hw>]:BB:W3GPp:BSTation:ENHanced:CHANnel<ch0>:DPCH:
CCODing:SFORmat <Sformat>**

The command sets the slot format for the selected enhanced DPCH of base station 1. The slot format is fixed for channel-coded measurement channels conforming to the standard - "Reference Measurement Channel". Changing the slot format automatically activates User coding (W3GP:BST:ENH:CHAN<11...13>:DPCH:CCOD:TYPE USER). The slot format also fixes the symbol rate, bits per frame, pilot length and TFCI state parameters.

When a channel coding type conforming to the standard is selected ([:SOURce<hw>]:BB:W3GPp:BSTation:ENHanced:CHANnel<ch0>:DPCH:CCODing:TYPE) and channel coding is activated, the slot format is ([:SOURce<hw>]:BB:W3GPp:BSTation:ENHanced:CHANnel<ch0>:DPCH:CCODing:STAtE) automatically set to the associated value.

Changing the slot format automatically activates User coding (W3GP:BST:ENH:CHAN<11...13>:DPCH:CCOD:TYPE USER).

The command sets the symbol rate (`W3GP:BST:ENH:CHAN:DPCH:CCOD:SRAT`), the bits per frame (`W3GP:BST:ENH:CHAN:DPCH:CCOD:BPFR`), the pilot length (`W3GP:BST1:CHAN:DPCC:PLEN`), and the TFCI state (`W3GP:BST1:CHAN:DPCC:TFCI STAT`) to the associated values.

Parameters:

`<Sformat>` float
 Range: 0 to 16
 *RST: 8

Example:

`BB:W3GP:BST:ENH:CHAN13:DPCH:CCOD:SFOR 4`
 sets slot format 4 for Enhanced DPCH13.

`[:SOURCE<hw>]:BB:W3GPp:BSTation:ENHanced:CHANnel<ch0>:DPCH:CCODing:SRATe?`

The command queries the symbol rate.

The symbol rate depends on the selected slot format (`[:SOURCE<hw>]:BB:W3GPp:BSTation:ENHanced:CHANnel<ch0>:DPCH:CCODing:SFORmat`), and if the slot format changes, this changes automatically as well.

Return values:

`<Srate>`

Example:

`BB:W3GP:BST:ENH:CHAN13:DPCH:CCOD:SRAT?`
 queries the symbol rate.
 Response: 'D30K'
 the symbol rate of Enhanced DPCH 13 is 30 ksps.

Usage:

Query only

`[:SOURCE<hw>]:BB:W3GPp:BSTation:ENHanced:CHANnel<ch0>:DPCH:CCODing:STATE <State>`

The command activates or deactivates channel coding for the selected enhanced DPCH.

When channel coding is activated and a channel coding type conforming to the standard is selected, (`BB:W3GP:BST:ENH:CHAN:DPCH:CCOD:TYPE`) the slot format, (`BB:W3GP:BST:ENH:CHAN:DPCH:CCOD:SFOR`) and thus the symbol rate, (`BB:W3GP:BST:ENH:CHAN:DPCH:CCOD:SRAT`) the bits per frame, (`BB:W3GP:BST:ENH:CHAN:DPCH:CCOD:BPFR`), the pilot length (`BB:W3GP:BST1:CHAN:DPCC:PLEN`) and the TFCI state (`BB:W3GP:BST1:CHAN:DPCC:TFCI STAT`) are set to the associated values.

Parameters:

`<State>` ON | OFF
 *RST: OFF

Example: `BB:W3GP:BST:ENH:CHAN13:DPCH:CCOD:TYPE M12K2`
 selects channel coding type RMC 12.2 kbps for Enhanced DPCH 13.
`BB:W3GP:BST:ENH:CHAN13:DPCH:CCOD:STAT ON`
 activates channel coding.

[:SOURCE<hw>]:BB:W3GPp:BSTation:ENHanced:CHANnel<ch0>:DPCH:CCODing:TYPE <Type>

The command selects the channel coding scheme in accordance with the 3GPP specification.

The 3GPP specification defines 4 reference measurement channel coding types, which differ in the input data bit rate to be processed (12.2, 64, 144 and 384 ksps). The additional AMR CODER coding scheme generates the coding of a voice channel. The BTFD coding types with different data rates are also defined in the 3GPP specification (TS 34.121). They are used for the receiver quality test Blind Transport Format Detection.

When a channel coding type conforms to the standard and channel coding is activated, (`:BB:W3GP:BST:ENH:CHAN<n>:DPCH:CCOD:STAT`) the slot format (`:BB:W3GP:BST:ENH:CHAN<n>:DPCH:CCOD:SFOR`) and thus the symbol rate (`:BB:W3GP:BST:ENH:CHAN<n>:DPCH:CCOD:SRAT`), the bits per frame, (`:BB:W3GP:BST:ENH:CHAN<n>:DPCH:CCOD:BPFR`), the pilot length (`:BB:W3GP:BST1:CHAN<n>:DPCC:PLEN`) and the TFCI state (`:BB:W3GP:BST1:CHAN<n>:DPCC:TFCI:STAT`) are set to the associated values.

Parameters:

<Type>

M12K2 | M64K | M144k | M384k | AMR | BTFD1 | BTFD2 | BTFD3

M12K2

Measurement channel with an input data bit rate of 12.2 kbps.

M64K

Measurement channel with an input data bit rate of 64 kbps.

M144k

Measurement channel with an input data bit rate of 144 kbps.

M384k

Measurement channel with an input data bit rate of 384 kbps.

AMR

Channel coding for the AMR Coder (coding a voice channel).

USER

This parameter cannot be set. USER is returned whenever a user-defined channel coding is active, that is to say, after a channel coding parameter has been changed or a user coding file has been loaded. The file is loaded by the command `[:SOURCE<hw>] : BB:W3Gpp:BSTation:ENHanced:CHANnel<ch0>:DPCH:CCODing:USER:LOAD.`

BTFD1

Blind Transport Format Detection Rate 1 (12.2 kbps).

BTFD2

Blind Transport Format Detection Rate 2 (7.95 kbps).

BTFD3

Blind Transport Format Detection Rate 3 (1.95 kbps).

*RST: M12K2

Example:

```
BB:W3GP:BST:ENH:CHAN13:DPCH:CCOD:TYPE M144
selects channel coding scheme RMC 144 kbps.
```

[:SOURCE<hw>] : BB:W3Gpp:BSTation:ENHanced:CHANnel<ch0>:DPCH:CCODing:USER:CATalog?

The command queries existing files with stored user channel codings.

The files are stored with the fixed file extensions `*.3g_ccod_d1` in a directory of the user's choice. The directory applicable to the commands is defined with the command `MMEMory:CDIR.`

The numerical suffix at CHANnel must not be used for this command.

Return values:

<Catalog> string

Example: MMEM:CDIR '<root>\Lists\Wcdma\CcodDpchUser'
selects the directory for the user channel coding files.
BB:W3GP:BST:ENH:CHAN:DPCH:CCOD:USER:CAT?
queries the existing files with user coding.
Response: user_cc1
there is one file with user coding.

Usage: Query only

**[:SOURCE<hw>]:BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH:
CCODing:USER:LOAD <Load>**

The command loads the specified files with stored user channel codings.

The files are stored with the fixed file extensions *.3g_ccod_d1 in a directory of the user's choice. The directory applicable to the commands is defined with the command MMEMory:CDIR. To access the files in this directory, you only have to give the file name, without the path and the file extension.

Setting parameters:

<Load> <user_coding>

Example: MMEM:CDIR '<root>\Lists\Wcdma\CcodDpchUser'
selects the directory for the user channel coding files.
BB:W3GP:BST:ENH:CHAN13:DPCH:CCOD:USER:LOAD
'user_cc1'
loads the specified file with user coding.

Usage: Setting only

**[:SOURCE<hw>]:BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH:
CCODing:USER:STORE <Store>**

The command saves the current settings for channel coding as user channel coding in the specified file.

The files are stored with the fixed file extensions *.3g_ccod_d1 in a directory of the user's choice. The directory in which the file is stored is defined with the command MMEMory:CDIR. To store the files in this directory, you only have to give the file name, without the path and the file extension.

Setting parameters:

<Store> string

Example: MMEM:CDIR '<root>\Lists\Wcdma\CcodDpchUser'
selects the directory for the user channel coding files.
BB:W3GP:BST:ENH:CHAN13:DPCH:CCOD:USER:STOR
'user_cc1'
saves the current channel coding setting in file user_cc1 in direc-
tory <root>\Lists\Wcdma\CcodDpchUser.

Usage: Setting only

```
[:SOURCE<hw>]:BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH:
  INTerleaver2 <Interleaver2>
```

The command activates or deactivates channel coding interleaver state 2 for the selected channel.

Interleaver state 2 is activated or deactivated for all the transport channels together. Interleaver state 1 can be activated and deactivated for each transport channel individually (command `[:SOURCE<hw>]:BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH:TCHannel<di>:INTerleaver`).

Note: The interleaver states do not cause the symbol rate to change.

Parameters:

```
<Interleaver2>      ON | OFF
                    *RST:      ON
```

Example:

```
BB:W3GP:BST:ENH:CHAN13:DPCH:INT OFF
deactivates channel coding interleaver state 2 for all the TCHs of
DPCH13.
```

```
[:SOURCE<hw>]:BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH:
  TCHannel<di>:CRCSize <Crcsize>
```

The command defines the CRC length for the selected transport channel. It is also possible to deactivate checksum determination.

Suffix:

```
<di>                0 .. 6
                    The transport channel designations for remote control are
                    TCHannel10 for DCCH, TCHannel11 to TCHannel16 for DTCH1 to
                    DTCH6.
```

Parameters:

```
<Crcsize>          NONE | 8 | 12 | 16 | 24
                    *RST:      16
```

Example:

```
BB:W3GP:BST:ENH:CHAN13:DPCH:TCH0:CRCS NONE
deactivates checksum determination for the DCCH of DPCH13.
```

```
[:SOURCE<hw>]:BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH:
  TCHannel<di>:DATA <Data>
```

The command determines the data source for the data fields of enhanced channels with channel coding. If channel coding is not active, the DPCH data source is used (`:SOURCE:BB:W3GPP:BST:CHANnel:DATA`).

Suffix:

```
<di>                0 .. 6
                    The transport channel designations for remote control are
                    TCHannel10 for DCCH, TCHannel11 to TCHannel16 for DTCH1 to
                    DTCH6.
```


Parameters:

<Data> PN9 | PN11 | PN15 | PN16 | PN20 | PN21 | PN23 | DLISt | ZERO | ONE | PATTErn |

PNxx

The pseudo-random sequence generator is used as the data source. Different random sequence lengths can be selected.

DLISt

A data list is used. The data list is selected with the command

```
[ :SOURce<hw> ] :BB:W3GPp:BSTation:ENHanced:
CHANnel<ch0>:DPCH:TCHannel<di>:DATA:DSElect.
```

ZERO | ONE

Internal 0 and 1 data is used.

PATTErn

Internal data is used The bit pattern for the data is defined with the

```
command [ :SOURce<hw> ] :BB:W3GPp:BSTation:
ENHanced:CHANnel<ch0>:DPCH:TCHannel<di>:DATA:
PATTErn.
```

```
*RST:      PN9
```

Example:

```
BB:W3GP:BST:ENH:CHAN13:DPCH:TCH1:DATA PATT
selects the Pattern data source for the data fields of DTCH1 of
DPCH13. The bit pattern is defined with the following command.
BB:W3GP:BST:ENH:CHAN13:DPCH:TCH1:DATA:PATT
#H3F, 8
defines the bit pattern.
```

```
[ :SOURce<hw> ] :BB:W3GPp:BSTation:ENHanced:CHANnel<ch0>:DPCH:
TCHannel<di>:DATA:DSElect <Dselect>
```

The command selects the data list for enhanced channels for the DLISt selection.

The files are stored with the fixed file extensions *.dm_iqd in a directory of the user's choice. The directory applicable to the commands is defined with the command MME-Mory:CDIR. To access the files in this directory, you only have to give the file name, without the path and the file extension.

Suffix:

<di> 0 .. 6
The transport channel designations for remote control are TCHannel0 for DCCH, TCHannel11 to TCHannel16 for DTCH1 to DTCH6.

Parameters:

<Dselect> string

Example: BB:W3GP:BST:ENH:CHAN13:DPCH:TCH1:DATA DLIS
selects the Data Lists data source for DTCH1 of DPCH13.
MMEM:CDIR '<root>\Lists\Dm\IQData'
selects the directory for the data lists.
BB:W3GP:BST:ENH:CHAN13:DPCH:TCH1:DATA:DSEL
'bts_tch'
selects the file bts_tch as the data source.

**[[:SOURCE<hw>]:BB:W3GPp:BSTation:ENHanced:CHANnel<ch0>:DPCH:
TCHannel<di>:DATA:PATtern <Pattern>**

The command determines the bit pattern for the PATtern selection. The maximum length is 64 bits.

Suffix:

<di>

0 .. 6

The transport channel designations for remote control are TCHannel0 for DCCH, TCHannel1 to TCHannel6 for DTCH1 to DTCH6.

Parameters:

<Pattern>

<64 bit pattern>

*RST: #H0, 1

Example:

BB:W3GP:BST:ENH:CHAN13:DPCH:TCH1:DATA:PATT
#H3F, 8
defines the bit pattern.

**[[:SOURCE<hw>]:BB:W3GPp:BSTation:ENHanced:CHANnel<ch0>:DPCH:
TCHannel<di>:DTX <Dtx>**

The command sets the number of DTX (Discontinuous Transmission) bits. These bits are entered in the data stream between rate matching and interleaver 1 and used for the BTFD reference measurement channels rate 2 and rate 3.

Suffix:

<di>

0 .. 6

The transport channel designations for remote control are TCHannel0 for DCCH, TCHannel1 to TCHannel6 for DTCH1 to DTCH6.

Parameters:

<Dtx>

float

Range: 0 to 1024

*RST: 0

Example:

BB:W3GP:BST:ENH:CHAN13:DPCH:TCH1:DTX 257
257 bits are entered in the data stream between rate matching and interleaver 1.

```
[ :SOURce<hw>]:BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH:
  TCHannel<di>:EPRotectio n <Eprotection>
```

The command determines the error protection.

Note:

The transport channel designations for remote control are TCHannel0 for DCCH, TCHannel1 to TCHannel6 for DTCH1 to DTCH6.

Parameters:

<Eprotection> NONE | TURBo3 | CON2 | CON3

NONE

No error protection

TURBo3

Turbo Coder of rate 1/3 in accordance with the 3GPP specifications.

CON2 | CON3

Convolution Coder of rate 1/2 or 1/3 with generator polynomials defined by 3GPP.

*RST: CON3

Example:

```
BB:W3GP:BST:ENH:CHAN13:DPCH:TCH1:EPR NONE
error protection for transport channel DTCH1 of DPCH13 is
deactivated.
```

```
[ :SOURce<hw>]:BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH:
  TCHannel<di>:INTerleaver <Interleaver>
```

The command activates or deactivates channel coding interleaver state 1 for the selected channel.

Interleaver state 1 can be activated and deactivated for each transport channel individually. The channel is selected via the suffix at TCHannel.

Interleaver state 2 can only be activated or deactivated for all the transport channels together ([:SOURce<hw>]:BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH:INTerleaver2).

Note: The interleaver states do not cause the symbol rate to change.

Suffix:

<di> 0 .. 6

The transport channel designations for remote control are TCHannel0 for DCCH, TCHannel1 to TCHannel6 for DTCH1 to DTCH6.

Parameters:

<Interleaver> ON | OFF

*RST: ON

The transport channel designations for remote control are TCHannel0 for DCCH, TCHannel1 to TCHannel6 for DTCH1 to DTCH6.

**[:SOURCE<hw>]:BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH:
TCHannel<di>:RMATtribute <Rmattribute>**

The command sets data rate matching (Rate Matching).

Suffix:

<di> 0 .. 6

The transport channel designations for remote control are TCHannel10 for DCCH, TCHannel11 to TCHannel16 for DTCH1 to DTCH6.

Parameters:

<Rmattribute> float

Range: 16 to 1024

*RST: 256

Example:

BB:W3GP:BST:ENH:CHAN13:DPCH:TCH1:RMAT 1024
sets the rate matching attribute for DTCH1 of DPCH13 to 1024.

**[:SOURCE<hw>]:BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH:
TCHannel<di>:STATe <State>**

The command activates/deactivates the selected transport channel.

Suffix:

<di> 0 .. 6

The transport channel designations for remote control are TCHannel10 for DCCH, TCHannel11 to TCHannel16 for DTCH1 to DTCH6.

Parameters:

<State> ON | OFF

*RST: OFF

Example:

BB:W3GP:BST:ENH:CHAN13:DPCH:TCH1:STAT ON
activates DTCH1 of DPCH13.

**[:SOURCE<hw>]:BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH:
TCHannel<di>:TBCount <Tbcount>**

The command defines the number of blocks used for the selected transport channel.

Suffix:

<di> 0 .. 6

The transport channel designations for remote control are TCHannel10 for DCCH, TCHannel11 to TCHannel16 for DTCH1 to DTCH6.

Parameters:

<Tbcount> float

Range: 1 to 16

*RST: 4

Example: BB:W3GP:BST:ENH:CHAN13:DPCH:TCH:TBC 4
sets 4 transport blocks for DTCH1 of DPCH13.

**[:SOURCE<hw>]:BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH:
TCHannel<di>:TBSize <Tbsize>**

The command sets the size of the data blocks.

Suffix:

<di>

0 .. 6

The transport channel designations for remote control are TCHannel10 for DCCH, TCHannel11 to TCHannel16 for DTCH1 to DTCH6.

Parameters:

<Tbsize>

float

Range: 0 to 4096

*RST: 100

Example:

BB:W3GP:BST:ENH:CHAN13:DPCH:TCH:TBS 1024
sets the length of the transport blocks for DTCH1 of DPCH13 to 1024.

**[:SOURCE<hw>]:BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH:
TCHannel<di>:TTINterval <Ttinterval>**

The command sets the number of frames into which a TCH is divided. This setting also defines the interleaver depth.

Suffix:

<di>

0 .. 6

The transport channel designations for remote control are TCHannel10 for DCCH, TCHannel11 to TCHannel16 for DTCH1 to DTCH6.

Parameters:

<Ttinterval>

10MS | 20MS | 40MS

*RST: 40MS

Example:

BB:W3GP:BST:ENH:CHAN13:DPCH:TCH1:TTIN 20ms
sets that DTCH1 of DPCH13 is divided into 2 frames.

**[:SOURCE<hw>]:BB:W3GPP:BSTation:ENHanced:PCCPch:CCODing:
INTerleaver<di> <Interleaver>**

The command activates or deactivates channel coding interleaver state 1 or 2 for the P-CCPCH.

Note: The interleaver states do not cause the symbol rate to change.

Suffix:

<di>

1|2

Parameters:

<Interleaver> ON | OFF
 *RST: ON

Example:

BB:W3GP:BST:ENH:PCCP:CCOD:INT1 OFF
 deactivates channel coding interleaver state 1 for the P-CCPCH.

[:SOURCE<hw>]:BB:W3GP:BSTation:ENHanced:PCCPch:CCODing:STATe
 <State>

The command activates or deactivates channel coding for the enhanced P-CCPCH. The coding scheme of the P-CCPCH (BCH) is defined in the standard.

Parameters:

<State> ON | OFF
 *RST: OFF

Example:

BB:W3GP:BST:ENH:PCCP:CCOD:STAT ON
 activates channel coding for the enhanced P-CCPCH.

[:SOURCE<hw>]:BB:W3GP:BSTation:ENHanced:PCCPch:CCODing:TYPE?

The command queries the channel coding scheme in accordance with the 3GPP specification. The coding scheme of the P-CCPCH (BCH) is defined in the standard. The channel is generated automatically with the counting system frame number (SFN). The system information after the SFN field is completed from the selected data source.

Return values:

<Type> BCHSfn

Example:

BB:W3GP:BST:ENH:PCCP:CCOD:TYPE?
 queries the channel coding scheme of the P-CCPCH.
 Response: 'BCHS'
 the channel coding scheme with SFN is used.

Usage:

Query only

7.8.3 Dynamic Power Control Settings

Example: Configuring the Dynamic Power Control Settings

The following is a simple programming example with the purpose to show **all** commands for this task. In real application, some of the commands may be omitted.

```
SOURce:BB:W3GP:BSTation:ENHanced:CHAN11:DPCH:DPCControl:DIRection UP
// selects direction up, a high level of the control signals leads to an increase of the chan
SOURce:BB:W3GP:BSTation:ENHanced:CHAN11:DPCH:DPCControl:STEP 1 dB
// selects a step width of 1 dB.
// A high level of the control signal leads to an increase of 1 dB of the channel power,
// a low level to a decrease of 1 dB.
```

```

SOURCE:BB:W3GPP:BSTation:ENHanced:CHAN11:DPCH:DPControl:RANGe:DOWN 10 dB
// selects a dynamic range of 10 dB for ranging up the channel power
SOURCE:BB:W3GPP:BSTation:ENHanced:CHAN11:DPCH:DPControl:RANGe:UP 50 dB
// selects a dynamic range of 50 dB for ranging up the channel power
// The overall increase and decrease of channel power, i.e. the dynamic range is limited to 6
SOURCE:BB:W3GPP:BSTation:ENHanced:CHAN11:DPCH:DPControl:MODE TPC
// selects the source of the power control signal
SOURCE:BB:W3GPP:BSTation:ENHanced:CHAN11:DPCH:DPControl:STATe ON
// activates Dynamic Power Control for DPCH 11
SOURCE:BB:W3GPP:BSTation:ENHanced:CHAN11:DPCH:DPControl:POWer?
// queries the deviation of the channel power of DPCH 11

```

<code>[:SOURCE<hw>]:BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH:DPControl:DIRection</code>	417
<code>[:SOURCE<hw>]:BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH:DPControl:MODE</code>	417
<code>[:SOURCE<hw>]:BB:W3GPP:BSTation<st>:ENHanced:CHANnel<ch0>:DPCH:DPControl:RANGe:UP</code>	418
<code>[:SOURCE<hw>]:BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH:DPControl:RANGe:DOWN</code>	418
<code>[:SOURCE<hw>]:BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH:DPControl:STATe</code>	418
<code>[:SOURCE<hw>]:BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH:DPControl:STEP:MANual</code>	418
<code>[:SOURCE<hw>]:BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH:DPControl:STEP[:EXTernal]</code>	419
<code>[:SOURCE<hw>]:BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH:DPControl[:POWer]</code>	419

`[:SOURCE<hw>]:BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH:DPControl:DIRection <Direction>`

The command selects the Dynamic Power Control direction. The selected mode determines if the channel power is increased (UP) or decreased (DOWN) by a control signal with high level.

Parameters:

<Direction> UP | DOWN
*RST: UP

Example: see [example "Configuring the Dynamic Power Control Settings"](#) on page 416

`[:SOURCE<hw>]:BB:W3GPP:BSTation:ENHanced:CHANnel<ch0>:DPCH:DPControl:MODE <Mode>`

The command selects the control signal source for Dynamic Power Control.

Note: R&S SMBV instruments do not support External Dynamic Power Control.

Parameters:

<Mode> TPC | MANual | EXTernal
 *RST: EXTernal

Example: see [example "Configuring the Dynamic Power Control Settings"](#) on page 416

```
[ :SOURce<hw>]:BB:W3GPp:BSTation<st>:ENHanced:CHANnel<ch0>:DPCH:
  DPCControl:RANGe:UP <Up>
```

```
[ :SOURce<hw>]:BB:W3GPp:BSTation:ENHanced:CHANnel<ch0>:DPCH:
  DPCControl:RANGe:DOWN <Down>
```

The command selects the dynamic range for ranging down the channel power.

Parameters:

<Down> float
 Range: 0 to 60
 Increment: 0.01
 *RST: 10
 Default unit: dB

Example: see [example "Configuring the Dynamic Power Control Settings"](#) on page 416

```
[ :SOURce<hw>]:BB:W3GPp:BSTation:ENHanced:CHANnel<ch0>:DPCH:
  DPCControl:STATe <State>
```

The command activates/deactivates Dynamic Power Control.

Parameters:

<State> 0 | 1 | OFF | ON
 *RST: 0

Example: see [example "Configuring the Dynamic Power Control Settings"](#) on page 416

```
[ :SOURce<hw>]:BB:W3GPp:BSTation:ENHanced:CHANnel<ch0>:DPCH:
  DPCControl:STEP:MANual <Manual>
```

This command provides the control signal for manual mode of Dynamic Power Control.

Setting parameters:

<Manual> MAN0 | MAN1
 *RST: MAN0

Example: BB:W3GP:BST:ENH:CHAN11:DPCH:DPC:MODE MAN
 BB:W3GP:BST:ENH:CHAN11:DPCH:DPC:STEP 0.5 dB
 BB:W3GP:BST:ENH:CHAN11:DPCH:DPC:STAT ON
 BB:W3GP:BST:ENH:CHAN11:DPCH:DPC:STEP:MAN MAN0

Usage: Setting only

```
[:SOURce<hw>]:BB:W3GPp:BSTation:ENHanced:CHANnel<ch0>:DPCH:
  DPControl:STEP[:EXTernal] <External>
```

This command sets step width by which – with Dynamic Power Control being switched on - the channel power of the selected enhanced channel is increased or decreased.

Parameters:

```
<External>          float
                    Range:    0.5 to 6
                    Increment: 0.01
                    *RST:     1
                    Default unit: dB
```

Example: see [example "Configuring the Dynamic Power Control Settings"](#) on page 416

```
[:SOURce<hw>]:BB:W3GPp:BSTation:ENHanced:CHANnel<ch0>:DPCH:
  DPControl[:POWER]?
```

The command queries the deviation of the channel power (delta POW) from the set power start value of the corresponding enhanced channels.

Return values:

```
<Power>            float
                    Range:    -60 to 60
                    Increment: 0.01
                    *RST:     0
```

Example: see [example "Configuring the Dynamic Power Control Settings"](#) on page 416

Usage: Query only

7.8.4 Error Insertion

```
[:SOURce<hw>]:BB:W3GPp:BSTation:ENHanced:CHANnel<ch0>:DPCH:DERRor:BIT:
  LAYer.....420
[:SOURce<hw>]:BB:W3GPp:BSTation:ENHanced:CHANnel<ch0>:DPCH:DERRor:BIT:
  RATE.....420
[:SOURce<hw>]:BB:W3GPp:BSTation:ENHanced:CHANnel<ch0>:DPCH:DERRor:BIT:
  STATe.....420
[:SOURce<hw>]:BB:W3GPp:BSTation:ENHanced:CHANnel<ch0>:DPCH:DERRor:
  BLOCK:RATE.....421
[:SOURce<hw>]:BB:W3GPp:BSTation:ENHanced:CHANnel<ch0>:DPCH:DERRor:
  BLOCK:STATe.....421
[:SOURce<hw>]:BB:W3GPp:BSTation[:ENHanced]:CHANnel<ch>:HSDPa:DERRor:
  BIT:LAYer.....421
[:SOURce<hw>]:BB:W3GPp:BSTation[:ENHanced]:CHANnel<ch>:HSDPa:DERRor:
  BIT:RATE.....422
```

<code>[:SOURce<hw>]:BB:W3GPp:BSTation[:ENHanced]:CHANnel<ch>:HSDPa:DERRor: BIT:STATe</code>	422
<code>[:SOURce<hw>]:BB:W3GPp:BSTation[:ENHanced]:CHANnel<ch>:HSDPa:DERRor: BLOCK:RATE</code>	422
<code>[:SOURce<hw>]:BB:W3GPp:BSTation[:ENHanced]:CHANnel<ch>:HSDPa:DERRor: BLOCK:STATe</code>	423

**`[:SOURce<hw>]:BB:W3GPp:BSTation:ENHanced:CHANnel<ch0>:DPCH:DERRor:
BIT:LAYer <Layer>`**

The command selects the layer in the coding process in which bit errors are inserted.

Parameters:

<Layer> TRANsport | PHYSical

TRANsport

Transport Layer (Layer 2). This layer is only available when channel coding is active.

PHYSical

Physical layer (Layer 1).

*RST: PHYSical

Example:

`BB:W3GP:BST:ENH:CHAN13:DPCH:DERR:BIT:LAY PHYS`
selects layer 1 for entering bit errors.

**`[:SOURce<hw>]:BB:W3GPp:BSTation:ENHanced:CHANnel<ch0>:DPCH:DERRor:
BIT:RATE <Rate>`**

The command sets the bit error rate.

Parameters:

<Rate> float

Range: 1E-7 to 5E-1

*RST: 1E-1

Example:

`BB:W3GP:BST:ENH:CHAN13:DPCH:DERR:BIT:RATE 1E-4`
sets a bit error rate of 0.0001.

**`[:SOURce<hw>]:BB:W3GPp:BSTation:ENHanced:CHANnel<ch0>:DPCH:DERRor:
BIT:STATe <State>`**

The command activates bit error generation or deactivates it.

Bit errors are inserted into the data fields of the enhanced channels. When channel coding is active, it is possible to select the layer in which to insert the errors (the physical or the transport layer, `[:SOURce<hw>]:BB:W3GPp:BSTation:ENHanced:CHANnel<ch0>:DPCH:DERRor:BIT:LAYer`). When the data source is read out, individual bits are deliberately inverted at random points in the data bit stream at the specified error rate in order to simulate an invalid signal.

Parameters:

<State> ON | OFF
 *RST: OFF

Example:

BB:W3GP:BST:ENH:CHAN13:DPCH:DERR:BIT:STAT ON
 activates bit error generation.

**[[:SOURce<hw>]:BB:W3GPp:BSTation:ENHanced:CHANnel<ch0>:DPCH:DERRor:
 BLOCK:RATE <Rate>**

The command sets the block error rate.

Parameters:

<Rate> float
 Range: 1E-4 to 5E-1
 *RST: 5E-1

Example:

BB:W3GP:BST:ENH:CHAN13:DPCH:DERR:BLOC:RATE 1E-2
 sets the block error rate to 0.01.

**[[:SOURce<hw>]:BB:W3GPp:BSTation:ENHanced:CHANnel<ch0>:DPCH:DERRor:
 BLOCK:STATE <State>**

The command activates or deactivates block error generation. Block error generation is only possible when channel coding is activated.

During block error generation, the CRC checksum is determined and then the last bit is inverted at the specified error probability in order to simulate a defective signal.

Parameters:

<State> ON | OFF
 *RST: OFF

Example:

BB:W3GP:BST:ENH:CHAN13:DPCH:CCOD:STAT ON
 activates channel coding.
 BB:W3GP:BST:ENH:CHAN13:DPCH:DERR:BLOC:RATE 5E-1
 sets the block error rate to 0.1.
 BB:W3GP:BST:ENH:CHAN13:DPCH:DERR:BLOC:STAT ON
 activates block error generation.

**[[:SOURce<hw>]:BB:W3GPp:BSTation[:ENHanced]:CHANnel<ch>:HSDPa:
 DERRor:BIT:LAYer <Layer>**

The command selects the layer in the coding process in which bit errors are inserted.

Parameters:

<Layer> TRANsport | PHYSical
TRANsport
 Transport Layer (Layer 2)
PHYSical
 Physical layer (Layer 1)
 *RST: PHYSical

Example:

BB:W3GP:BST:ENH:CHAN12:HSDP:DERR:BIT:LAY PHYS
 selects layer 1 for entering bit errors.

**[:SOURce<hw>]:BB:W3GPP:BSTation[:ENHanced]:CHANnel<ch>:HSDPa:
 DERRor:BIT:RATE <Rate>**

The command sets the bit error rate.

Parameters:

<Rate> float
 Range: 1E-7 to 5E-1
 *RST: 5E-3

Example:

BB:W3GP:BST:ENH:CHAN12:HSDP:DERR:BIT:RATE 1E-4
 sets a bit error rate of 0.0001.

**[:SOURce<hw>]:BB:W3GPP:BSTation[:ENHanced]:CHANnel<ch>:HSDPa:
 DERRor:BIT:STATe <State>**

The command activates bit error generation or deactivates it.

Bit errors are inserted into the data stream of the coupled HS-PDSCHs. It is possible to select the layer in which the errors are inserted (physical or transport layer). When the data source is read out, individual bits are deliberately inverted at random points in the data bit stream at the specified error rate in order to simulate an invalid signal.

Parameters:

<State> ON | OFF
 *RST: OFF

Example:

BB:W3GP:BST:ENH:CHAN12:HSDP:DERR:BIT:STAT ON
 activates bit error generation.

**[:SOURce<hw>]:BB:W3GPP:BSTation[:ENHanced]:CHANnel<ch>:HSDPa:
 DERRor:BLOCK:RATE <Rate>**

The command sets the block error rate.

Parameters:

<Rate> float
 Range: 1E-4 to 5E-1
 *RST: 5E-1

Example: `BB:W3GP:BST:ENH:CHAN12:HSDP:DERR:BLOC:RATE 1E-2`
sets the block error rate to 0.01.

**[:SOURce<hw>]:BB:W3GPp:BSTation[:ENHanced]:CHANnel<ch>:HSDPa:
DERRor:BLOCK:STATe <State>**

The command activates or deactivates block error generation. During block error generation, the CRC checksum is determined and then the last bit is inverted at the specified error probability in order to simulate a defective signal.

Parameters:

<State> ON | OFF
*RST: OFF

Example: `BB:W3GP:BST:ENH:CHAN12:HSDP:DERR:BLOC:RATE 5E-1`
sets the block error rate to 0.1.
`BB:W3GP:BST:ENH:CHAN12:HSDP:DERR:BLOC:STAT ON`
activates block error generation.

7.9 User Equipment Settings

The `SOURce:BB:W3GPp:MSTation` system contains commands for setting the user equipment. The commands of this system only take effect when the 3GPP FDD standard is activated, the UP transmission direction is selected and the particular user equipment is enabled:

```
SOURce:BB:W3GPp:STATe ON
SOURce:BB:W3GPp:LINK UP
SOURce:BB:W3GPp:MSTation2:STATe ON
```

MSTation<st>

The numeric suffix to `MSTation` determines the user equipment. The value range is 1 .. 4. If the suffix is omitted, MS1 is selected.



The R&S WinIQSIM2 does not support Dynamic Power Control.

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• DPDCH Settings	454
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• PRACH Settings	467
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• Dynamic Power Control Settings	494

7.9.1 General Settings

<code>[SOURce<hw>]:BB:W3GPp:MSTation:ADDITIONal:COUNT</code>	424
<code>[SOURce<hw>]:BB:W3GPp:MSTation:ADDITIONal:POWER:OFFSet</code>	424
<code>[SOURce<hw>]:BB:W3GPp:MSTation:ADDITIONal:SCODE:STEP</code>	425
<code>[SOURce<hw>]:BB:W3GPp:MSTation:ADDITIONal:STATE</code>	425
<code>[SOURce<hw>]:BB:W3GPp:MSTation:ADDITIONal:TDElay:STEP</code>	425
<code>[SOURce<hw>]:BB:W3GPp:MSTation:PRESet</code>	426
<code>[SOURce<hw>]:BB:W3GPp:MSTation<st>:MODE</code>	426
<code>[SOURce<hw>]:BB:W3GPp:MSTation<st>:SCODE</code>	427
<code>[SOURce<hw>]:BB:W3GPp:MSTation<st>:SCODE:MODE</code>	427
<code>[SOURce<hw>]:BB:W3GPp:MSTation<st>:STATE</code>	427
<code>[SOURce<hw>]:BB:W3GPp:MSTation<st>:TDElay</code>	427
<code>[SOURce<hw>]:BB:W3GPp:LREFerence</code>	428

`[SOURce<hw>]:BB:W3GPp:MSTation:ADDITIONal:COUNT <Count>`

The command sets the number of additional user equipment.

The R&S Signal Generator gives you the opportunity to simulate up to 128 additional user equipment - corresponding to a receive signal for a base station with high capacity utilization. The fourth user equipment (UE4) serves as a template for all other stations. The only parameters of the additional user equipment to be modified are the scrambling code and the power.

Parameters:

<code><Count></code>	integer
Range:	1 to 128
*RST:	4

Example:

```
BB:W3GP:MST:ADD:COUN 20
sets 20 additional user equipment.
BB:W3GP:MST:ADD:POW:OFFS -3.0
sets the power offset to -3 dB.
BB:W3GP:MST:ADD:SCOD:STEP 1
sets the step width for increasing the scrambling code to 1.
BB:W3GP:MST:ADD:STAT ON
connects the 20 user equipment to the 3GPP FDD signal.
```

`[SOURce<hw>]:BB:W3GPp:MSTation:ADDITIONal:POWER:OFFSet <Offset>`

The command sets the power offset of the active channels of the additional user equipment relative to the power of the active channels of the reference station UE4.

The offset applies to all the additional user equipment. The resultant overall power must fall within the range 0 ... - 80 dB. If the value is above or below this range, it is limited automatically.

Parameters:

<Offset> float
 Range: -80 dB to 0 dB
 Increment: 0.1 dB
 *RST: 0 dB

Example:

BB:W3GP:MST:ADD:POW:OFFS -3.0
 sets the offset to -3 dB.

[:SOURce<hw>]:BB:W3GPp:MSTation:ADDITIONal:SCODE:STEP <Step>

The command sets the step width for increasing the scrambling code of the additional user equipment. The start value is the scrambling code of UE4.

Parameters:

<Step> integer
 Range: #H1 to #FFFFFFF
 *RST: #H1

Example:

BB:W3GP:MST:ADD:SCOD:STEP #H55
 sets the step width for increasing the scrambling code to #H55.

[:SOURce<hw>]:BB:W3GPp:MSTation:ADDITIONal:STATE <State>

The command activates additional user equipment.

The suffix at `MSTation` has no significance for this command and should not be specified.

Parameters:

<State> ON | OFF
 *RST: OFF

Example:

BB:W3GP:MST:ADD:STAT ON
 connects the additional user equipment to the 3GPP FDD signal.

[:SOURce<hw>]:BB:W3GPp:MSTation:ADDITIONal:TDElay:STEP <Step>

The command sets the step width for the time delay of the additional user equipment to one another. The start value is the time delay of UE4. Entry is made in chips and can be a maximum of 1 frame.

Parameters:

<Step> float
 Range: 0 chips to 38400 chips
 *RST: 0 chips

Example:

BB:W3GP:MST:ADD:TDEL:STEP 256
 shifts each of the user equipment 256 chips apart, starting from the time delay of UE4.

[:SOURCE<hw>]:BB:W3GPP:MSTation:PRESet

The command produces a standardized default for all the user equipment. The settings correspond to the *RST values specified for the commands.

All user equipment settings are preset.

Example: BB:W3GPP:MST:PRESet
resets all the user equipment settings to default values.

Usage: Event

[:SOURCE<hw>]:BB:W3GPP:MSTation<st>:MODE <Mode>

The command selects the operating mode for the user equipment.

Parameters:

<Mode> PRACH | PPRACH | PCPCH | PPCPch | DPCDch

PRACH

The user equipment only generates a signal with a physical random access channel (PRACH). This channel is used to set up the user equipment connection with the base station. The channel-specific parameters of the PRACH can be set with the commands :SOURCE:BB:W3GPP:MSTation<n>:PRACH:....

PPRACH

The user equipment only generates a signal with the preamble component of a physical random access channel (PRACH). The parameters of the PRACH preamble can be set with the commands :SOURCE:BB:W3GPP:MSTation<n>:PRACH:....

PCPCH

The user equipment only generates a signal with a physical common packet channel (PCPCH). This channel is used to transmit packet-oriented services (e.g. SMS). The channel-specific parameters of the PCPCH can be set with the commands :SOURCE:BB:W3GPP:MSTation<n>:PCPCH:....

PPCPch

The user equipment only generates a signal with the preamble component of a physical common packet channel (PCPCH). The parameters of the PCPCH preamble can be set with the commands :SOURCE:BB:W3GPP:MSTation<n>:PCPch:....

DPCDch

The user equipment generates a signal with a dedicated physical control channel (DPCCH), up to 6 dedicated physical data channels (DPDCH), up to one HS-DPCCH channel, up to one E-DPCCH channel and up to four E-DPDCH channels. This signal is used for voice and data transmission.

*RST: DPCDch

Example: `BB:W3GP:MST1:MODE DPCD`
switches the user equipment to standard mode - transmission of voice and data.

[:SOURce<hw>]:BB:W3GPp:MSTation<st>:SCODE <Scode>

The command sets the scrambling code. Long or short scrambling codes can be generated (command `[:SOURce<hw>]:BB:W3GPp:MSTation<st>:SCODE:MODE`).

Parameters:

<Scode> integer
Range: #H0 to #FFFFFF
*RST: #H0

Example: `BB:W3GP:MST2:SCOD #H12`
sets scrambling code #12.

[:SOURce<hw>]:BB:W3GPp:MSTation<st>:SCODE:MODE <Mode>

The command sets the type for the scrambling code. The scrambling code generator can also be deactivated for test purposes.

SHORT is only standardized for the selection `:BB:W3GP:MST:MODE DPCDh` and `:BB:W3GP:MST:MODE PCPCh`. But it can also be generated for the PCPCH for test purposes.

Parameters:

<Mode> LONG | SHORT | OFF
*RST: LONG

Example: `BB:W3GP:MST2:SCOD:MODE OFF`
deactivates the scrambling code generator.

[:SOURce<hw>]:BB:W3GPp:MSTation<st>:STATE <State>

The command activates and deactivates the specified user equipment.

Parameters:

<State> 0 | 1 | OFF | ON
*RST: ON

Example: `BB:W3GP:MST2:STAT OFF`
deactivates user equipment 2.

[:SOURce<hw>]:BB:W3GPp:MSTation<st>:TDElay <Tdelay>

The command sets the time shift of the selected user equipment compared to user equipment 1 in chips.

Suffix:

<st> 2|3|4

The command is only valid for user equipment 2, 3 and 4.

Parameters:

<Tdelay> float

Range: 0 chips to 38400 chips

*RST: 0 chips

Example:

BB:W3GP:MST2:TDEL 256

shifts user equipment 2 by 256 chips compared to user equipment 1.

[:SOURCE<hw>]:BB:W3GP:LREFERENCE <Reference>Determines the level reference for the calculation of the output signal power in uplink direction (see "[Level Reference](#)" on page 64).**Parameters:**

<Reference> RMS | DPCC | PMP | LPP

*RST: RMS

Example:

BB:W3GP:LREF LPP

7.9.2 Compressed Mode Settings

[:SOURCE<hw>]:BB:W3GP:MSTation<st>:CMODE:METHOD	428
[:SOURCE<hw>]:BB:W3GP:MSTation<st>:CMODE:PATTERN<ch>:TGD	429
[:SOURCE<hw>]:BB:W3GP:MSTation<st>:CMODE:PATTERN<ch>:TGL<di>	429
[:SOURCE<hw>]:BB:W3GP:MSTation<st>:CMODE:PATTERN<ch>:TGPL	429
[:SOURCE<hw>]:BB:W3GP:MSTation<st>:CMODE:PATTERN<ch>:TGSN	430
[:SOURCE<hw>]:BB:W3GP:MSTation<st>:CMODE:STATE	430

[:SOURCE<hw>]:BB:W3GP:MSTation<st>:CMODE:METHOD <Method>

The command selects compressed mode method.

Suffix:

<st> 2|3|4

Compressed Mode can be configured for user equipment 2, 3 and 4.

Parameters:

<Method> HLScheduling | SF2

SF2

The data is compressed by halving the spreading factor.

HLScheduling

The data is compressed by stopping the transmission of the data stream during the transmission gap.

*RST: SF2

Example: `BB:W3GP:MST2:CMOD:METH HLSC`
selects compressed mode method High Layer Scheduling.

[:SOURCE<hw>]:BB:W3GPp:MSTation<st>:CMODE:PATTERN<ch>:TGD <Tgd>

The command sets the transmission gap distances.

The transmission gap distances of the base station with the same suffix as the selected user equipment is set to the same value

Suffix:

<st> 2|3|4
Compressed Mode can be configured for user equipment 2, 3 and 4.

Parameters:

<Tgd> float
Range: 3 slots to 100 slots
*RST: 15 slots

Example: `BB:W3GP:MST2:CMOD:PATT2:TGD 7`
sets transmission gap distance of pattern 2 to 7 slots.

[:SOURCE<hw>]:BB:W3GPp:MSTation<st>:CMODE:PATTERN<ch>:TGL<di> <Tgl>

The command sets the transmission gap lengths.

The transmission gap lengths of the base station with the same suffix as the selected user equipment is set to the same value.

Suffix:

<st> 2|3|4
Compressed Mode can be configured for user equipment 2, 3 and 4.

<di> [1]|2

Parameters:

<Tgl> float
Range: 3 slots to 14 slots
*RST: 3 slots

Example: `BB:W3GP:MST2:CMOD:PATT2:TGL1 4`
sets transmission gap length of gap 1 of pattern 2 to 4 slots.

[:SOURCE<hw>]:BB:W3GPp:MSTation<st>:CMODE:PATTERN<ch>:TGPL <Tgpl>

The command sets the transmission gap pattern lengths. Setting 0 is available only for pattern 2.

The transmission gap pattern lengths of the base station with the same suffix as the selected user equipment is set to the same value.

Suffix:
 <st> 2|3|4
 Compressed Mode can be configured for user equipment 2, 3 and 4.

Parameters:
 <Tgpl> float
 Range: 0 frame to 100 frames
 *RST: 2 frames

Example: BB:W3GP:MST2:CMOD:PATT2:TGPL 7
 sets transmission gap pattern length of pattern 2 to 7 frames.

[:SOURCE<hw>]:BB:W3GPp:MSTation<st>:CMODE:PATTERN<ch>:TGSN <Tgsn>

The command sets the transmission gap slot number of pattern 1.

The transmission gap slot number of the base station with the same suffix as the selected user equipment is set to the same value.

Suffix:
 <st> 2|3|4
 Compressed Mode can be configured for user equipment 2, 3 and 4.

Parameters:
 <Tgsn> float
 Range: slot 0 to slot 14
 *RST: slot 7

Example: BB:W3GP:MST2:CMOD:PATT:TGSN 4
 sets slot number of pattern 1 to slot 4.

[:SOURCE<hw>]:BB:W3GPp:MSTation<st>:CMODE:STATE <State>

The command activates/deactivates the compressed mode.

Suffix:
 <st> 2|3|4
 Compressed Mode can be configured for user equipment 2, 3 and 4.

Parameters:
 <State> ON | OFF
 *RST: OFF

Example: BB:W3GP:MST2:CMOD:STAT ON
 activates compressed mode for user equipment 2.

7.9.3 DPCCH Settings

[:SOURCE<hw>]:BB:W3GPp:MSTation<st>:DPCCh:CCODE.....431

[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:FBI:MODE.....	431
[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:FBI:PATtern.....	432
[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:POWer.....	432
[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:SFOrmat.....	432
[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:TFCI.....	433
[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:TFCI:STATe.....	433
[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:TOFFset.....	433
[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:TPC:DATA.....	434
[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:TPC:DATA:DSElect.....	434
[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:TPC:DATA:PATtern.....	434
[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:TPC:MISuse.....	435
[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:TPC:MODE.....	435
[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:TPC:PSTep.....	436
[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:TPC:READ.....	436

[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:CCODE?

The command queries the channelization code and the modulation branch of the specified channel. The value is fixed.

Return values:

<Ccode> float

Example:

BB:W3GP:MST1:DPCC:CCOD?

queries the channelization code for DPCCH of user equipment 1.

Response: Q, 64

Usage:

Query only

[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:FBI:MODE <Mode>

The command sets the number of bits for the FBI field. With OFF, the FBI field is not used.

Note: The former 2-bits long FBI Mode "D2B" according to 3GPP Release 4 specification TS 25.211 is not supported any more.

The command sets the slot format ([\[:SOURce<hw>\]:BB:W3GPp:MSTation<st>:DPCCh:SFOrmat](#)) in conjunction with the set TFCI status ([\[:SOURce<hw>\]:BB:W3GPp:MSTation<st>:DPCCh:TFCI:STATe](#)) and the TPC Mode ([\[:SOURce<hw>\]:BB:W3GPp:MSTation<st>:DPCCh:TPC:MODE](#)) to the associated values.

Parameters:

<Mode> OFF | D1B

*RST: OFF

Example:

BB:W3GP:MST1:DPCC:FBI:MODE OFF

an FBI field is not used.

[:SOURce<hw>]:BB:W3Gpp:MSTation<st>:DPCCh:FBI:PATtern <Pattern>

The command determines the bit pattern when the `PATtern` data source is selected for the FBI field.

Parameters:

<Pattern> <32 bit pattern>

The first parameter determines the bit pattern (choice of hexadecimal, octal or binary notation), the second specifies the number of bits to use.

The maximum length is 32 bits.

*RST: #H0,1

Example:

`BB:W3GP:MST1:DPCC:FBI:PATT #H3F,8`
defines the bit pattern of the data for the FBI field.

[:SOURce<hw>]:BB:W3Gpp:MSTation<st>:DPCCh:POWer <Power>

The command defines the channel power for the DPCCH.

Parameters:

<Power> float

Range: -80 dB to 0 dB

Increment: 0.1 dB

*RST: 0 dB

Example:

`BB:W3GP:MST1:DPCC:POW -10 dB`
sets the channel power to -10 dB.

[:SOURce<hw>]:BB:W3Gpp:MSTation<st>:DPCCh:SFORmat <Sformat>

The command sets the slot format for the DPCCH. The slot format defines the structure of the DPCCH slots and the control fields.

Slot Format # 4 is available only for instruments equipped with R&S SMx/AMU-K59.

Slot formats 0 to 4 are available for the DPCCH channel as defined in the 3GPP Release 7 specification TS 25.211.

Note:

The former slot formats 4 and 5 according to 3GPP Release 4 specification TS 25.211 are not supported any more.

The command sets the FBI mode (`[:SOURce<hw>]:BB:W3Gpp:MSTation<st>:DPCCh:FBI:MODE`), the TFCI status (`[:SOURce<hw>]:BB:W3Gpp:MSTation<st>:DPCCh:TFCI:STATe`) and the TPC Mode (`[:SOURce<hw>]:BB:W3Gpp:MSTation<st>:DPCCh:TPC:MODE`) to the associated values.

Parameters:

<Sformat> float

Range: 0 to 4

*RST: 0

Example: `BB:W3GP:MST2:DPCC:SFOR 3`
selects slot format 3 for the DPCCH of user equipment 2.

[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:TFCI <Tfci>

The command sets the value of the TFCI (Transport Format Combination Indicator) field. This value selects a combination of 30 bits, which are divided into two groups of 15 successive slots.

Parameters:

<Tfci> float
Range: 0 to 1023
*RST: 0

Example: `BB:W3GP:MST1:DPCC:TFCI 21`
sets the TFCI value to 21.

[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:TFCI:STATe <State>

The command activates the TFCI (Transport Format Combination Indicator) field for the DPCCH.

The command sets the slot format (`[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:SFORmat`) in conjunction with the set FBI mode (`[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:FBI:MODE`) and the TPC Mode (`[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:TPC:MODE`) to the associated values.

Parameters:

<State> ON | OFF
*RST: OFF

Example: `BB:W3GP:MST1:DPCC:TFCI:STAT ON`
activates the TFCI field.

[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:TOFFset <TOffset>

Sets the timing offset. The timing offset indicates the time difference between the user equipment signal and the base station signal.

Parameters:

<TOffset> integer
Range: 0 to 1024
Increment: 1024
*RST: 1024

Example: `BB:W3GP:MST1:DPCC:TOFF?`
queries the timing offset.

[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:TPC:DATA <Data>

The command determines the data source for the TPC field of the DPCCH.

Parameters:

<Data> DLIS | ZERO | ONE | PATTern |

DLIS

A data list is used. The data list is selected with the command
`[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:TPC:DATA:DSElect.`

ZERO | ONE

Internal 0 and 1 data is used.

PATTern

Internal data is used. The bit pattern for the data is defined by the command
`[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:TPC:DATA:PATTern.` The maximum length is 64 bits.

*RST: PATTern

Example:

`BB:W3GP:MST2:DPCC:TPC:DATA PATT`
 selects as the data source for the TPC field of user equipment 2 the bit pattern defined with the following command.
`BB:W3GP:MST2:DPCC:TPC:DATA:PATT #H48D0,16`
 defines the bit pattern.

[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:TPC:DATA:DSElect <Dselect>

The command selects the data list when the DLIS data source is selected for the TPC field of the DPCCH.

The files are stored with the fixed file extensions `*.dm_iqd` in a directory of the user's choice. The directory applicable to the commands is defined with the command `MMEMemory:CDIR`. To access the files in this directory, you only have to give the file name, without the path and the file extension.

Parameters:

<Dselect> string

Example:

`BB:W3GP:MST1:DPCC:TPC:DATA DLIS`
 selects the Data Lists data source.
`MMEMemory:CDIR '<root>\Lists\Dm\IQData'`
 selects the directory for the data lists.
`BB:W3GP:MST1:DPCC:TPC:DATA:DSEL 'dpcch_tpc_1'`
 selects the data list `dpcch_tpc1`.

[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:TPC:DATA:PATTern <Pattern>

The command determines the bit pattern for the PATTern data source selection. The maximum length of the bit pattern is 64 bits.

Parameters:

<Pattern> <64 bit pattern>
 *RST: #H0, 1

Example:

BB:W3GP:MST1:DPCC:TPC:DATA:PATT #B11110000,8
 defines the bit pattern of the data for the TPC field.

[:SOURCE<hw>]:BB:W3GPP:MSTation<st>:DPCC:TPC:MISuse <Misuse>

The command activates "mis-" use of the TPC field (Transmit Power Control) for controlling the channel power of the user equipment.

The bit pattern (see commands `:SOURCE:BB:W3GPP:MSTation:DPCC:TPC:DATA...`) of the TPC field of the DPCC is used to control the channel power. A "1" leads to an increase of channel powers, a "0" to a reduction of channel powers. Channel power is limited to the range 0 dB to -60 dB. The step width for the change is defined by the command `[:SOURCE<hw>]:BB:W3GPP:MSTation<st>:DPCC:TPC:PSTep`.

Note: "Mis-"using the TPC field is available for UE2, UE3,UE4 only.

Parameters:

<Misuse> ON | OFF
 *RST: OFF

Example:

BB:W3GP:MST2:DPCC:TPC:MIS ON
 activates regulation of the channel power via the bit pattern of the TPC field.
 BB:W3GP:MST2:DPCC:TPC:PST 1 dB
 sets the step width for the change of channel power to 1 dB.

[:SOURCE<hw>]:BB:W3GPP:MSTation<st>:DPCC:TPC:MODE <Mode>

Selects the TPC (Transmit Power Control) mode.

The command sets the slot format (`[:SOURCE<hw>]:BB:W3GPP:MSTation<st>:DPCC:SFORmat`) in conjunction with the set TFCI status (`[:SOURCE<hw>]:BB:W3GPP:MSTation<st>:DPCC:TFCI:STATe`) and the FBI Mode (`[:SOURCE<hw>]:BB:W3GPP:MSTation<st>:DPCC:FBI:MODE`) to the associated values.

Parameters:

<Mode>

D2B | D4B

D2B

A TPC field with a length of 2 bits is used.

D4B

(enabled only for instruments equipped with R&S SMx/AMU-K59)

A TPC field with a length of 4 bits is used.

A 4 bits long TPC field can be selected, only for Slot Format 4 and disabled FBI and TFCI fields.

*RST: D2B

Example:

BB:W3GP:MST1:DPCC:TPC:MODE D2B

an TPC field with a length of 2 bits is used.

[[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCC:TPC:PSTep <Pstep>

The command sets the level of the power step in dB for controlling the transmit power via the data of the TPC field.

Parameters:

<Pstep>

float

Range: -10 dB to 10 dB

Increment: 0.1 dB

*RST: 0 dB

Example:

BB:W3GP:MST:DPCC:TPC:MIS ON

activates regulation of the channel power via the bit pattern of the TPC field.

BB:W3GP:MST:DPCC:TPC:PST 1 dB

sets the step width for the change of channel power to 1 dB.

[[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCC:TPC:READ <Read>

The command sets the read out mode for the bit pattern of the TPC field of the DPCCH.

The bit pattern is selected with the command

SOUR:BB:W3GPp:MST:DPCC:TPC:DATA:PATT.

Parameters:

<Read>

CONTInuous | S0A | S1A | S01A | S10A

CONTInuous

The bit pattern is used cyclically.

S0A

The bit pattern is used once, then the TPC sequence continues with 0 bits.

S1A

The bit pattern is used once, then the TPC sequence continues with 1 bits.

S01A

The bit pattern is used once and then the TPC sequence is continued with 0 and 1 bits alternately (in multiples, depending on by the symbol rate, for example, 00001111).

S10A

The bit pattern is used once and then the TPC sequence is continued with 1 and 0 bits alternately (in multiples, depending on by the symbol rate, for example, 11110000).

*RST: CONTInuous

Example:

BB:W3GP:MST2:DPCC:TPC:READ CONT

the selected bit pattern is repeated continuously for the TPC sequence.

7.9.4 HS-DPCCH Settings

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7.9.4.1 Common Settings

[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:HS:STATe <State>

This command activates or deactivates the HS-DPCCH.

Parameters:

<State>

0 | 1 | OFF | ON

*RST: 0

Example:

BB:W3GP:MST1:DPCC:HS:STAT ON

activates HS-DPCCH.

[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:HS:POWer <Power>

The command sets the channel power in dB. The power entered is relative to the powers of the other channels. If "Adjust Total Power to 0 dB" is executed (`[:SOURce<hw>]:BB:W3GPp:POWer:ADJust`), the power is normalized to a total power for all channels of 0 dB. The power ratios of the individual channels remains unchanged.

Parameters:

<Power> float
 Range: -80 dB to 0 dB
 Increment: 0.01
 *RST: 0 dB

Example: `BB:W3GP:MST1:DPCC:HS:POW -30`
 sets the channel power to -30 dB.

[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:HS:COMPatibility <Compatibility>

The concept of the graphical user interface for the configuration of HS-DPCCH has been adapted to support simultaneous DC-HSDPA and MIMO operation, as required in 3GPP Release 9 onwards.

This command enables the configuration of the HS-DPCCH settings provided for backwards compatibility ("Up to Release 7").

Parameters:

<Compatibility> REL7 | REL8 | REL8RT
 *RST: REL8

Example: `BB:W3GP:MST1:DPCC:HS:COMP REL8`
 sets the compatibility mode to Release 8 and Later.

[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:HS:CCODE?

The command queries the channelization code and the modulation branch of the HS-DPCCH.

Return values:

<CCode> float

Example: `BB:W3GP:MST1:DPCC:HS:CCOD?`
 queries the channelization code.
 Response: `Q,32`
 the channelization code is 32 and the modulation branch is Q.

Usage: Query only

[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:HS:SDElay <SDelay>

This command sets the delay between the uplink HS-DPCCH and the frame of uplink DPCH. The delay is entered as a multiple *m* of 256 chips according to TS 25.211 7.7

Parameters:

<SDelay> float
 Range: 0 to 250
 *RST: 101
 Default unit: * 256 Chips

Example:

BB:W3GP:MST1:DPCC:HS:SDEL 101
 sets a start delay of 101 x 256 chips.

[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCch:HS:TTIDistance <TtiDistance>

The command selects the distance between two packets in HSDPA packet mode. The distance is set in number of sub-frames (3 slots = 2 ms). An Inter TTI Distance of 1 means continuous generation.

Regarding the HS-DPCCH uplink transmission, this parameter determines where HS-DPCCH transmissions are possible in principle. In order to have actual HS-DPCCH transmissions, HARQ-ACK and/or PCI/CQI transmissions have to be scheduled.

Parameters:

<TtiDistance> float
 Range: 1 to 16 subframes
 *RST: 5

Example:

BB:W3GP:MST1:DPCC:HS:TTID 4
 selects an Inter TTI Distance of 4 subframes.

7.9.4.2 Up to Release 7 Settings

[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCch:HS:POACK.....	439
[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCch:HS:PONack.....	440
[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCch:HS:HAPattern.....	440
[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCch:HS:CQI:PLENgt.....	441
[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCch:HS:CQI<ch>:[:VALues].....	441
[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCch:HS:MIMO:[:MODE].....	441
[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCch:HS:MIMO:POAack.....	442
[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCch:HS:MIMO:POANack.....	442
[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCch:HS:MIMO:PONack.....	443
[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCch:HS:MIMO:PONNack.....	443
[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCch:HS:MIMO:POCA.....	444
[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCch:HS:MIMO:TTICount.....	444
[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCch:HS:MIMO:TTI<ch0>:HACK.....	445
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[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCch:HS:MIMO:TTI<ch0>:CQI<di>.....	446

[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCch:HS:POACK <Poack>

(Up to Release 7)

The command sets the channel power part of the ACK in dB.

Parameters:

<Poack> float
 Range: -10 to 10 dB
 Increment: 0.1
 *RST: 0 dB

Example:

BB:W3GP:MST1:DPCC:HS:POAC -2.5dB
 sets the channel power part of the ACK to 2.5 dB.

[:SOURCE<hw>]:BB:W3GPp:MSTation<st>:DPCCh:HS:PONack <PoNack>

(Up to Release 7)

The command sets the channel power part of the NACK in dB.

Parameters:

<PoNack> float
 Range: -10 dB to 10 dB
 Increment: 0.1
 *RST: 0 dB

Example:

BB:W3GP:MST1:DPCC:HS:PONA -2.5dB
 sets the channel power part of the NACK to 2.5 dB.

[:SOURCE<hw>]:BB:W3GPp:MSTation<st>:DPCCh:HS:HAPattern <HaPattern>

(Up to Release 7)

The command enters the pattern for the HARQ-ACK field (Hybrid-ARQ Acknowledgement). One bit is used per HS-DPCCH packet.

Parameters:

<HaPattern> string

The pattern is entered as string, the maximum number of entries is 32. Three different characters are permitted.

1

The HARQ ACK is sent (ACK). Transmission was successful and correct.

0

The NACK is sent (NACK). Transmission was not correct. With an NACK, the UE requests retransmission of the incorrect data.

-

Nothing is sent. Transmission is interrupted (Discontinuous Transmission, DTX).

*RST: <empty>

Example:

BB:W3GP:MST1:DPCC:HS:COMP REL7
 BB:W3GP:MST1:DPCC:HS:HAP "110--110-0"
 enters the pattern for the HARQ-ACK field.

[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:HS:CQI:PLENgtH <PLength>

The command sets the length of the CQI sequence. The values of the CQI sequence are defined with command `[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:HS:CQI<ch>[:VALues]`. The pattern is generated cyclically.

Parameters:

<PLength> float
 Range: 1 to 10
 *RST: 1

Example:

```
BB:W3GP:MST1:DPCC:HS:CQI:PLEN 2
the CQI sequence length is 2 values.
BB:W3GP:MST1:DPCC:HS:CQI1 -1
the first CQI value is -1.
BB:W3GP:MST1:DPCC:HS:CQI2 2
the second CQI value is 2.
```

[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:HS:CQI<ch>[:VALues]
 <Values>

The command sets the values of the CQI sequence.

The length of the CQI sequence is defined with command `[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:HS:CQI:PLENgtH`. The pattern is generated cyclically.

Suffix:

<ch> 1 ... <PLength>
 Sequence Index

Parameters:

<Values> float
 Value -1 means that no CQI is sent (DTX - Discontinuous Transmission).
 Range: -1 to 30
 *RST: 1

Example:

```
BB:W3GP:MST1:DPCC:HS:CQI:PLEN 2
the CQI sequence length is 2 values.
BB:W3GP:MST1:DPCC:HS:CQI1 1
the first CQI value is -1.
BB:W3GP:MST1:DPCC:HS:CQI2 2
the second CQI value is 2.
```

[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:HS:MIMO[:MODE] <Mode>

Enables/disables working in MIMO mode for the selected UE.

Parameters:

<Mode> 0 | 1 | OFF | ON
 *RST: 0

Example:

BB:W3GP:MST1:DPCC:HS:MIMO:MODE ON
 enables MIMO mode for UE 1.

Options:

R&S SMx/AMU-K59

[:SOURCE<hw>] : BB : W3GPp : MSTation<st> : DPCC : HS : MIMO : POAAck <PoaAck>

(up to Release 7)

Sets the power offset $P_{\text{off_ACK/ACK}}$ of an ACK/ACK response to two scheduled transport blocks relative to the CQI Power P_{CQI} (**[:SOURCE<hw>] : BB : W3GPp : MSTation<st> : DPCC : HS : POWER**).

The power $P_{\text{ACK/ACK}}$ used during the HARQ-ACK slots is calculated as:

$$P_{\text{ACK/ACK}} = P_{\text{CQI}} + P_{\text{off_ACK/ACK}}$$

Parameters:

<PoaAck> float
 Range: -10 to 10 dB
 Increment: 0.1
 *RST: 0 dB

Example:

BB:W3GP:MST1:DPCC:HS:MIMO:MODE ON
 enables MIMO mode for UE 1.
 BB:W3GP:MST1:DPCC:HS:MIMO:TTI2:HACK AACK
 sets the HARQ-ACK to ACK/ACK.
 BB:W3GP:MST1:DPCC:HS:MIMO:POAA -2.5dB
 sets the power offset to -2.5 dB.

Options:

R&S SMx/AMU-K59

[:SOURCE<hw>] : BB : W3GPp : MSTation<st> : DPCC : HS : MIMO : POANack <PoaNack>

(up to Release 7)

Sets the power offset $P_{\text{off_ACK/NACK}}$ of an ACK/NACK response to two scheduled transport blocks relative to the CQI Power P_{CQI} (**[:SOURCE<hw>] : BB : W3GPp : MSTation<st> : DPCC : HS : POWER**).

The power $P_{\text{ACK/NACK}}$ used during the HARQ-ACK slots is calculated as:

$$P_{\text{ACK/NACK}} = P_{\text{CQI}} + P_{\text{off_ACK/NACK}}$$

Parameters:

<PoaNack> float
 Range: -10 to 10 dB
 Increment: 0.1
 *RST: 0 dB

Example:

BB:W3GP:MST1:DPCC:HS:MIMO:MODE ON
 enables MIMO mode for UE 1.
 BB:W3GP:MST1:DPCC:HS:MIMO:TTI2:HACK ANAC
 sets the HARQ-ACK to ACK/NACK.
 BB:W3GP:MST1:DPCC:HS:MIMO:POAN -1.5dB
 sets the power offset to -1.5 dB.

Options:

R&S SMx/AMU-K59

[[:SOURCE<hw>]:BB:W3GPp:MSTation<st>:DPCC:HS:MIMO:PONack <PoNack>

(up to Release 7)

Sets the power offset $P_{\text{off_NACK/ACK}}$ of an NACK/ACK response to two scheduled transport blocks relative to the CQI Power P_{CQI} (**[[:SOURCE<hw>]:BB:W3GPp:MSTation<st>:DPCC:HS:POWER)**).

The power $P_{\text{NACK/ACK}}$ used during the HARQ-ACK slots is calculated as:

$$P_{\text{NACK/ACK}} = P_{\text{CQI}} + P_{\text{off_NACK/ACK}}$$

Parameters:

<PoNack> float
 Range: -10 to 10 dB
 Increment: 0.1
 *RST: 0 dB

Example:

BB:W3GP:MST1:DPCC:HS:MIMO:MODE ON
 enables MIMO mode for UE 1.
 BB:W3GP:MST1:DPCC:HS:MIMO:TTI2:HACK NACK
 sets the HARQ-ACK to NACK/ACK.
 BB:W3GP:MST1:DPCC:HS:MIMO:PONA -1dB
 sets the power offset to -1dB.

Options:

R&S SMx/AMU-K59

**[[:SOURCE<hw>]:BB:W3GPp:MSTation<st>:DPCC:HS:MIMO:PONNack
 <PonNack>**

(up to Release 7)

Sets the power offset $P_{\text{off_NACK/NACK}}$ of an NACK/NACK response to two scheduled transport blocks relative to the CQI Power P_{CQI} (**[[:SOURCE<hw>]:BB:W3GPp:MSTation<st>:DPCC:HS:POWER)**).

The power $P_{\text{NACK/NACK}}$ used during the HARQ-ACK slots is calculated as:

$$P_{\text{NACK/NACK}} = P_{\text{CQI}} + P_{\text{off_NACK/NACK}}$$

Parameters:

<PonNack> float
 Range: -10 to 10 dB
 Increment: 0.1
 *RST: 0 dB

Example:

BB:W3GP:MST1:DPCC:HS:MIMO:MODE ON
 enables MIMO mode for UE 1.
 BB:W3GP:MST1:DPCC:HS:MIMO:TTI2:HACK NNAC
 sets the HARQ-ACK to NACK/NACK.
 BB:W3GP:MST1:DPCC:HS:MIMO:PONN -3dB
 sets the power offset to -3dB.

Options:

R&S SMx/AMU-K59

[:SOURce<hw>]:BB:W3GPP:MSTation<st>:DPCCh:HS:MIMO:POCA <Poca>

(up to Release 7)

Sets the power offset $P_{\text{off_CQI Type A}}$ of the PCI/CQI slots in case a CQI Type A report is sent relative to the CQI Power P_{CQI} ([\[:SOURce<hw>\]:BB:W3GPP:MSTation<st>:DPCCh:HS:POWer](#)).

The power $P_{\text{CQI Type A}}$ used during the PCI/CQI slots is calculated as:

$$P_{\text{CQI Type A}} = P_{\text{CQI}} + P_{\text{off_CQI Type A}}$$

Since the CQI Type B reports are used in a single stream transmission, the power $P_{\text{CQI Type B}} = P_{\text{CQI}}$.

Parameters:

<Poca> float
 Range: -10 dB to 10 dB
 Increment: 0.1
 *RST: 0 dB

Example:

BB:W3GP:MST1:DPCC:HS:MIMO:MODE ON
 enables MIMO mode for UE 1.
 BB:W3GP:MST1:DPCC:HS:MIMO:MODE:TT2:CQIT TADT
 selects CQI Type A Dual TB report for TTI2.
 BB:W3GP:MST1:DPCC:HS:MIMO:POCA -4dB
 sets the power offset to -4dB.

Options:

R&S SMx/AMU-K59

[:SOURce<hw>]:BB:W3GPP:MSTation<st>:DPCCh:HS:MIMO:TTICount <TtiCount>

Selects the number of configurable TTI's.

Parameters:

<TtiCount> integer
 Range: 1 to 32
 *RST: 1

Example:

BB:W3GP:MST1:DPCC:HS:MIMO:MODE ON
 enables MIMO mode for UE 1.
 BB:W3GP:MST1:DPCC:HS:MIMO:TTIC 4
 sets the number of configurable TTI's to 4.

Options:

R&S SMx/AMU-K59

[:SOURCE<hw>]:BB:W3GPp:MSTation<st>:DPCCh:HS:MIMO:TTI<ch0>:HACK
 <Hack>

Selects the information transmitted during the HARQ-ACK slot of the corresponding TTI.

Suffix:

<ch0> 0..Number of TTI -1

Parameters:

<Hack> DTX | SACK | SNACK | AACK | ANACK | NACK | NNACK
 *RST: AACK (for TTI 1)

Example:

BB:W3GP:MST1:DPCC:HS:MIMO:MODE ON
 enables MIMO mode for UE 1.
 BB:W3GP:MST1:DPCC:HS:MIMO:TTI2:HACK SACK
 sets the HARQ-ACK to single ACK.

Options:

R&S SMx/AMU-K59

[:SOURCE<hw>]:BB:W3GPp:MSTation<st>:DPCCh:HS:MIMO:TTI<ch0>:PCI <Pci>

Selects the PCI value transmitted during the PCI/CQI slots of the corresponding TTI.

Suffix:

<ch0> 0..Number of TTI -1

Parameters:

<Pci> integer
 Range: 0 to 3
 *RST: 0

Example:

BB:W3GP:MST1:DPCC:HS:MIMO:MODE ON
 enables MIMO mode for UE 1.
 BB:W3GP:MST1:DPCC:HS:MIMO:TTI2:HACK SACK
 sets the HARQ-ACK to single ACK.
 BB:W3GP:MST1:DPCC:HS:MIMO:TTI2:PCI 2
 sets the PCI.

Options:

R&S SMx/AMU-K59

[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:HS:MIMO:TTI<ch0>:CQIType
<CqiType>

Selects the type of the CQI report.

Suffix:

<ch0> 0..Number of TTI -1

Parameters:

<CqiType> TAST | TADT | TB
 *RST: TADT

Example:

BB:W3GP:MST1:DPCC:HS:MIMO:MODE ON
 enables MIMO mode for UE 1.
 BB:W3GP:MST1:DPCC:HS:MIMO:TTI2:HACK SACK
 sets the HARQ-ACK to single ACK.
 BB:W3GP:MST1:DPCC:HS:MIMO:TTI2:CQIT TADT
 selects CQI Type A dual TB report for TTI2.

Options:

R&S SMx/AMU-K59

[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:HS:MIMO:TTI<ch0>:CQI<di>
<Cqi>

Selects the CQI report transmitted during the PCI/CQI slots of the corresponding TTI.

For single stream transmission (BB:W3GP:MST:DPCC:HS:MIMO:TTI:CQI1), this command set the CQI values of the following cases:

- The CQI (the value for CQI Type B report)
- The CQI_S (the CQI value in case a CQI Type A report when 1 transport block is preferred)

For dual stream transmission (BB:W3GP:MST:DPCC:HS:MIMO:TTI:CQI2), this command sets:

- The CQI₁, the first of the two CQI values of CQI Type A report when 2 transport blocks are preferred
- the CQI₂, the second of the two CQI values of CQI Type A report when 2 transport blocks are preferred. The CQI then is calculated as follow:
 $CQI = 15 * CQI_1 + CQI_2 + 31$

Suffix:

<ch0> 0..Number of TTI -1

<di> 1|2
 The suffix CQI<1 | 2> distinguishes between CQI₁ and CQI₂.

Parameters:

<Cqi> float
 Range: 0 to 30
 *RST: 0

- Example:** BB:W3GP:MST1:DPCC:HS:MIMO:MODE ON
enables MIMO mode for UE 1.
BB:W3GP:MST1:DPCC:HS:MIMO:TTI2:HACK SACK
sets the HARQ-ACK to single ACK.
BB:W3GP:MST1:DPCC:HS:MIMO:TTI2:CQIT TADT
selects CQI Type A dual TB report for TTI2.
BB:W3GP:MST1:DPCC:HS:MIMO:TTI2:CQI1 1.5
sets CQI1
BB:W3GP:MST1:DPCC:HS:MIMO:TTI2:CQI2 2
sets CQI2
- Example:** BB:W3GP:MST1:DPCC:HS:MIMO:TTI2:CQIT TAST
selects CQI Type A single TB report for TTI2.
BB:W3GP:MST1:DPCC:HS:MIMO:TTI2:CQI1 3
sets CQIS
- Example:** BB:W3GP:MST1:DPCC:HS:MIMO:TTI2:CQIT TB
selects CQI Type B
BB:W3GP:MST1:DPCC:HS:MIMO:TTI2:CQI1 0
sets CQI
- Options:** R&S SMx/AMU-K59

7.9.4.3 Release 8 and Later (RT) Settings

[SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:HS:MMODE.....	447
[SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:HS:SCActive.....	448
[SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:HS:ROWCount.....	448
[SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:HS:ROW<ch0>:HACK:FROM.....	448
[SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:HS:ROW<ch0>:HACK:TO.....	448
[SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:HS:ROW<ch0>:HACK.....	449
[SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:HS:ROW<ch0>:POHAck.....	451
[SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:HS:ROW<ch0>:PCQI:FROM.....	451
[SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:HS:ROW<ch0>:PCQI:TO.....	451
[SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:HS:ROW<ch0>:CQIType.....	451
[SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:HS:ROW<ch0>:CQI<di>.....	452
[SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:HS:ROW<ch0>:PCI.....	452
[SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:HS:ROW<ch0>:POPCqi.....	453
[SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:HS:HACK:REPeat.....	453
[SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:HS:PCQI:REPeat.....	453
[SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:HS:SLENgth.....	454
[SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:HS:SLENgth:ADJust.....	454

[SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:HS:MMODE <MMode>

(Release 8 and Later, Release 8 and Later (RT))

Enables/disables working in MIMO mode for the selected UE.

Parameters:

<MMode> ON | OFF
*RST: OFF

Example: BB:W3GP:MST1:DPCC:HS:MMOD ON
enables MIMO mode for UE 1.

Options: R&S SMx/AMU-K59

[:SOURCE<hw>]:BB:W3GPp:MSTation<st>:DPCCh:HS:SCActive <ScActive>

(Release 8 and Later)

Enables/disables working in dual cell HSDPA mode for the selected UE.

Parameters:

<ScActive> 0 | 1 | OFF | ON
*RST: 0

Example: BB:W3GP:MST1:DPCC:HS:SCA ON
enables dual cell HSDPA operation

Options: R&S SMx/AMU-K59

[:SOURCE<hw>]:BB:W3GPp:MSTation<st>:DPCCh:HS:ROWCount <RowCount>

(Release 8 and Later)

This parameter determines the number of the rows in the HS-DPCCH scheduling table. Each row represents one TTI interval, as configured with the command [:SOURCE<hw>]:BB:W3GPp:MSTation<st>:DPCCh:HS:TTIDistance.

Parameters:

<RowCount> integer
Range: 1 to 32
*RST: 1

Options: R&S SMx/AMU-K59

[:SOURCE<hw>]:BB:W3GPp:MSTation<st>:DPCCh:HS:ROW<ch0>:HACK:FROM <HackFrom>

[:SOURCE<hw>]:BB:W3GPp:MSTation<st>:DPCCh:HS:ROW<ch0>:HACK:TO <HackTo>

(Release 8 and Later)

Defines the beginning / end of the HARQ-ACK transmissions inside the HARQ-ACK cycle (specified by HARQ ACK Repeat After). The range is specified in multiples of intervals (Inter TTI distace).

Suffix:

<ch0> 0..<RowCount>

Parameters:

<HackTo> integer
Range: 0 to dynamic
*RST: row index

Options: R&S SMx/AMU-K59

[[:SOURce<hw>]:BB:W3GPP:MSTation<st>:DPCCh:HS:ROW<ch0>:HACK <Hack>

(Release 8 and Later)

Sets the information transmitted during the HARQ-ACK slots of the TTIs during the corresponding specified HARQ-ACK From/To range.

Suffix:

<ch0> 0..<RowCount>

[:SOURce<hw>]:BB:W3GPP:MSTation<st>:DPCCh:HS:ROW<ch0>:POHack
 <PoHack>

(Release 8 and Later)

Sets the power offset of a HARQ-ACK response relative to the [:SOURce<hw>]:BB:W3GPP:MSTation<st>:DPCCh:HS:POWER.

Suffix:

<ch0> 0..<RowCount>

Parameters:

<PoHack> float
 Range: -10 to 10
 Increment: 0.1
 *RST: 0

Options: R&S SMx/AMU-K59

[:SOURce<hw>]:BB:W3GPP:MSTation<st>:DPCCh:HS:ROW<ch0>:PCQI:FROM
 <PcqiFrom>

[:SOURce<hw>]:BB:W3GPP:MSTation<st>:DPCCh:HS:ROW<ch0>:PCQI:TO
 <PcqiTo>

(Release 8 and Later)

Defines the beginning / end of the PCI/CQI transmissions inside the PCI/CQI cycle (specified by PCI/CQI Repeat After). The range is specified in multiples of intervals (Inter TTI distace).

Suffix:

<ch0> 0..<RowCount>

Parameters:

<PcqiTo> integer
 Range: 0 to dynamic
 *RST: row index

Options: R&S SMx/AMU-K59

[:SOURce<hw>]:BB:W3GPP:MSTation<st>:DPCCh:HS:ROW<ch0>:CQIType
 <CqiType>

(Release 8 and Later)

Selects the type of the CQI report.

Suffix:

<ch0> 0..<RowCount>

Parameters:

<CqiType>

DTX | CQI | TAST | TADT | TB | CCQI

DTX

During that TTI no PCI/CQI feedback information is sent.

CQI

(MIMO Mode Off, Secondary Cell Active Off)

Selects CQI report for the normal operation.

TAST

(MIMO Mode On)

Selects CQI Type A report with information that 1 transport block is preferred

TADT

(MIMO Mode On)

Selects CQI Type A report with information that 2 transport blocks are preferred

TB

(MIMO Mode On)

Selects CQI Type B report

CCQI

(MIMO Mode Off, Secondary Cell Active On)

Selects a Composite CQI, constructed from the two individual reports CQI1 and CQI2 of the serving and secondary serving HS-DSCH cell

Options:

R&S SMx/AMU-K59

[:SOURCE<hw>]:BB:W3GPP:MSTation<st>:DPCCh:HS:ROW<ch0>:CQI<di> <Cqi>

(Release 8 and Later)

Sets the CQI report transmitted during the PCI/CQI slots of the TTIs during the corresponding specified PCI/CQI From/To range.

Suffix:

<ch0> 0..<RowCount>

<di> 1|2

Parameters:

<Cqi>

float

Range: 0 to 30

Options:

R&S SMx/AMU-K59

[:SOURCE<hw>]:BB:W3GPP:MSTation<st>:DPCCh:HS:ROW<ch0>:PCI <PCI>

(Release 8 and Later)

Selects the PCI value transmitted during the PCI/CQI slots of the TTIs during the corresponding specified PCI/CQI From/To range.

Suffix:
 <ch0> 0..<RowCount>

Parameters:
 <PCI> integer
 Range: 0 to 3
 *RST: 0

Options: R&S SMx/AMU-K59

[:SOURCE<hw>] : BB : W3GPP : MSTation<st> : DPCCh : HS : ROW<ch0> : POPCqi
 <PoPcqi>

(Release 8 and Later)

Sets the power offset $P_{\text{off_PCI/CQI}}$ of all PCI/CQI slots during the corresponding specified PCI/CQI From/To range relative to the [\[:SOURCE<hw> \] : BB : W3GPP : MSTation<st> : DPCCh : HS : POWER](#).

Suffix:
 <ch0> 0..<RowCount>

Parameters:
 <PoPcqi> float
 Range: -10 to 10
 Increment: 0.1
 *RST: 0

Options: R&S SMx/AMU-K59

[:SOURCE<hw>] : BB : W3GPP : MSTation<st> : DPCCh : HS : HACK : REPEAT <HackRep>

Defines the cycle length after that the information in the HS-DPCCH scheduling table is read out again from the beginning.

Parameters:
 <HackRep> integer
 Range: 1 to dynamic

[:SOURCE<hw>] : BB : W3GPP : MSTation<st> : DPCCh : HS : PCQI : REPEAT <PcqiRep>

(Release 8 and Later)

Defines the cycle length after that the information in the HS-DPCCH scheduling table is read out again from the beginning.

Parameters:
 <PcqiRep> integer
 Range: 1 to dynamic
 *RST: 1

[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:HS:SLENgth?

(Release 8 and Later)

Queries the suggested and current ARB sequence length.

The current ARB sequence length is adjusted with the command `[:SOURce<hw>] : BB:W3GPp:MSTation<st>:DPCCh:HS:SLENgth:ADJust` on page 454.

Return values:

<SLength> float

Example: `BB:W3GP:MST1:DPCC:HS:SLEN?`
queries the ARB sequence length

Usage: Query only

Options: R&S SMx/AMU-K59

[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPCCh:HS:SLENgth:ADJust

(Release 8 and Later)

Sets the current ARB sequence length to the suggested value.

Example: `BB:W3GP:MST1:DPCC:HS:SLEN:ADJ`
adjusts the ARB sequence length

Usage: Event

Options: R&S SMx/AMU-K59

7.9.5 DPDCH Settings

<code>[:SOURce<hw>]:BB:W3GPp:MSTation<st>:CHANnel<ch>:DPDCh:CCODE</code>	454
<code>[:SOURce<hw>]:BB:W3GPp:MSTation<st>:CHANnel<ch>:DPDCh:DATA</code>	455
<code>[:SOURce<hw>]:BB:W3GPp:MSTation<st>:CHANnel<ch>:DPDCh:DATA:DSElect</code>	455
<code>[:SOURce<hw>]:BB:W3GPp:MSTation<st>:CHANnel<ch>:DPDCh:DATA:PATtern</code>	456
<code>[:SOURce<hw>]:BB:W3GPp:MSTation<st>:CHANnel<ch>:DPDCh:SRATE</code>	456
<code>[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPDCh:FCIO</code>	456
<code>[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPDCh:ORATE</code>	457
<code>[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPDCh:POWER</code>	457
<code>[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPDCh:STATE</code>	457

[:SOURce<hw>]:BB:W3GPp:MSTation<st>:CHANnel<ch>:DPDCh:CCODE?

The command queries the channelization code of the specified channel. The value is fixed and depends on the overall symbol rate of the user equipment.

Return values:

<Ccode> float

Example: `BB:W3GP:MST1:CHAN:DPDC:CCOD?`
queries the channelization code for DPDCH 1 of user equipment 1.

Usage: Query only

[:SOURce<hw>] : BB : W3GPp : MSTation<st> : CHANnel<ch> : DPDCh : DATA <Data>

The command determines the data source for the selected DPDCH.

For the enhanced channels of user equipment 1 (UE1), this entry is valid when channel coding is deactivated. When channel coding is active, data sources are selected for the transport channels with the com-

mands `:BB:W3GPp:MST:CHANnel:DPDCh:DCCH:DATA`

and `:BB:W3GPp:MST:ENHanced:TCHannel:DATA`.

Parameters:

<Data> PN9 | PN11 | PN15 | PN16 | PN20 | PN21 | PN23 | DLISt | ZERO | ONE | PATtern

PNxx

The pseudo-random sequence generator is used as the data source. Different random sequence lengths can be selected.

DLISt

A data list is used. The data list is selected with the command

`[:SOURce<hw>] : BB : W3GPp : MSTation<st> : CHANnel<ch> : DPDCh : DATA : DSElect.`

ZERO | ONE

Internal 0 and 1 data is used.

PATtern

Internal data is used The bit pattern for the data is defined by the

command `[:SOURce<hw>] : BB : W3GPp : MSTation<st> : CHANnel<ch> : DPDCh : DATA : PATtern.`

*RST: PN9

Example: `BB:W3GP:MST1:CHAN:DPDC:DATA PN11`
selects internal PRBS data with period length $2^{11}-1$ as the data source.

[:SOURce<hw>] : BB : W3GPp : MSTation<st> : CHANnel<ch> : DPDCh : DATA : DSElect <Dselect>

The command selects the data list for the DLISt data source selection.

The files are stored with the fixed file extensions `*.dm_iqd` in a directory of the user's choice. The directory applicable to the commands is defined with the command `MMEMory:CDIR`. To access the files in this directory, you only have to give the file name, without the path and the file extension.

Parameters:

<Dselect> <data list name>

Example: BB:W3GP:MST1:CHAN1:DPDC:DATA DLIS
selects the Data Lists data source.
MME:CDIR '<root>\Lists\Dm\IQData'
selects the directory for the data lists.
BB:W3GP:MST1:CHAN1:DPDC:DATA:DSEL 'dpdch_13'
selects the file dpdch_13 as the data source.

**[:SOURCE<hw>]:BB:W3GPP:MSTation<st>:CHANNEL<ch>:DPDCh:DATA:PATTERN
<Pattern>**

The command enters the bit pattern for the PATTERN data source selection. The first parameter determines the bit pattern (choice of hexadecimal, octal or binary notation), the second specifies the number of bits to use.

Parameters:

<Pattern> 64 bit pattern
*RST: #H0,1

Example: BB:W3GP:MST1:CHAN1:DPDC:DATA PATT
selects the Pattern data source.
BB:W3GP:MST1:CHAN1:DPDC:DATA:PATT #H3F, 8
defines the bit pattern.

[:SOURCE<hw>]:BB:W3GPP:MSTation<st>:CHANNEL<ch>:DPDCh:SRATE?

The command queries the symbol rate of the DPDCH. The symbol rate depends on the overall symbol rate set and cannot be modified.

Return values:

<Srate> D15K | D30K | D60K | D120k | D240k | D480k | D960k

Example: BB:W3GP:MST4:CHAN2:DPDC:SRAT?
queries the symbol rate of DPDCH 2 of user equipment 4.
Response: 960
the symbol rate is 960 ksps.

Note:

DPDCH 2 is only active once the overall symbol rate is 2 x 960 ksps or more. When overall symbol rates are less, the error message "???" is returned.

Usage: Query only

[:SOURCE<hw>]:BB:W3GPP:MSTation<st>:DPDCh:FCIO <Fcio>

The command sets the channelization code to I/O. This mode can only be activated if the overall symbol rate is < 2 x 960 kbps.

Parameters:

<Fcio> ON | OFF
*RST: OFF

Example: `BB:W3GP:MST1:DPDC:FCIO ON`
sets the channelization code to I/O.

[[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPDCh:ORATe <Orate>

The command sets the overall symbol rate. The overall symbol rate determines the number of DPDCHs as well as their symbol rate and channelization codes.

Parameters:

<Orate> D15K | D30K | D60K | D120k | D240k | D480k | D960k | D1920k |
D2880k | D3840k | D4800k | D5760k

D15K ... D5760K

15 ksps ... 6 x 960 ksps

*RST: D60K

Example: `BB:W3GP:MST1:DPDC:ORAT D15K`
sets the overall symbol rate to 15 ksps. Only DPDCH1 is active, the symbol rate is 15 ksps and the channelization code is 64.

[[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPDCh:POWER <Power>

The command defines the channel power of the DPDCHs. The power entered is relative to the powers of the other channels. If "Adjust Total Power to 0 dB" is executed ([\[:SOURce<hw>\]:BB:W3GPp:POWER:ADJust](#)), the power is normalized to a total power for all channels of 0 dB. The power ratios of the individual channels remains unchanged.

Note: The uplink channels are not blanked in this mode (duty cycle 100%).

Parameters:

<Power> float
Range: -80 dB to 0 dB
Increment: 0.01 dB
*RST: 0 dB

Example: `BB:W3GP:MST4:DPDC:POW -60dB`
sets the channel power for DPDCH 2 of user equipment 4 to -60 dB. The channel power relates to the power of the other channels.
`BB:W3GP:POW:ADJ`
the channel power relates to 0 dB.

[[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPDCh:STATe <State>

The command activates or deactivates DPDCHs. This always activates or deactivates all the channels. The number of channels (1...6) is determined by the overall symbol rate.

Parameters:

<State> ON | OFF
*RST: OFF

Example: `BB:W3GP:MST1:DPDC:STAT ON`
activates all the DPDCHs.

7.9.6 PCPCH Settings

<code>[:SOURCE<hw>]:BB:W3GPp:MSTation<st>:PCPCh:CPOWER</code>	458
<code>[:SOURCE<hw>]:BB:W3GPp:MSTation<st>:PCPCh:CPSFormat</code>	458
<code>[:SOURCE<hw>]:BB:W3GPp:MSTation<st>:PCPCh:DATA</code>	459
<code>[:SOURCE<hw>]:BB:W3GPp:MSTation<st>:PCPCh:DATA:DSElect</code>	459
<code>[:SOURCE<hw>]:BB:W3GPp:MSTation<st>:PCPCh:DATA:PATtern</code>	460
<code>[:SOURCE<hw>]:BB:W3GPp:MSTation<st>:PCPCh:DPOWER</code>	460
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`[:SOURCE<hw>]:BB:W3GPp:MSTation<st>:PCPCh:CPOWER <Cpower>`

The command defines the power of the control component of the PCPCH.

Parameters:

<code><Cpower></code>	float
	Range: -80 dB to 0 dB
	Increment: 0.1 dB
	*RST: 0 dB

Example: `BB:W3GP:MST1:PCPC:CPOW -10 dB`
sets the power to -10 dB.

`[:SOURCE<hw>]:BB:W3GPp:MSTation<st>:PCPCh:CPSFormat <Cpsformat>`

The command defines the slot format of the control component of the PCPCH.

The slot format sets the associated FBI mode automatically:

- Slot format 0 = FBI OFF
- Slot format 1 = FBI 1 bit
- Slot format 2 = FBI 2 bits

Parameters:

<Cpsformat> 0 | 1 | 2
 *RST: 0

Example:

BB:W3GP:MST1:PCPC:CPSF 2
 sets slot format 2.

[:SOURce<hw>]:BB:W3GPp:MSTation<st>:PCPCh:DATA <Data>

The command determines the data source for the PCPCH.

Parameters:

<Data> ZERO | ONE | PATtern | PN9 | PN11 | PN15 | PN16 | PN20 |
 PN21 | PN23 | DLISt

PNxx

The pseudo-random sequence generator is used as the data source. Different random sequence lengths can be selected.

DLISt

A data list is used. The data list is selected with the command

SOURce:BB:W3GPp:MST:PCPCh:DATA:DSElect [:
 SOURce<hw>]:BB:W3GPp:MSTation<st>:PCPCh:DATA:
 DSElect.

ZERO | ONE

Internal 0 and 1 data is used.

PATtern

Internal data is used. The bit pattern for the data is defined by the command [:SOURce<hw>]:BB:W3GPp:MSTation<st>:
 PCPCh:DATA:PATtern.

*RST: PN9

Example:

BB:W3GP:MST1:PCPC:DATA PN11
 selects internal PRBS data with period length $2^{11}-1$ as the data source.

[:SOURce<hw>]:BB:W3GPp:MSTation<st>:PCPCh:DATA:DSElect <Dselect>

The command selects the data list for the DLISt data source.

The files are stored with the fixed file extensions *.dm_iqd in a directory of the user's choice. The directory applicable to the commands is defined with the command MMEMoRY:CDIR. To access the files in this directory, you only have to give the file name, without the path and the file extension.

Parameters:

<Dselect> string

Example: BB:W3GP:MST1:PCPC:DATA DLIS
selects data lists as the data source.
M MEM:CDIR '<root>\Lists\Dm\IQData'
selects the directory for the data lists.
BB:W3GP:MST1:PCPC:DATA:DSEL 'pcpch_data'
selects the data list pcpch_data.

[:SOURCE<hw>]:BB:W3GPp:MSTation<st>:PCPCh:DATA:PATTERN <Pattern>

The command determines the bit pattern for the data component when the PATTERN data source is selected. The first parameter determines the bit pattern (choice of hexadecimal, octal or binary notation), the second specifies the number of bits to use.

Parameters:

<Pattern> <bit pattern>
*RST: #H0, 1

Example: BB:W3GP:MST:PCPC:DATA:PATT #H3F,8
defines the bit pattern of the data for the DATA component.

[:SOURCE<hw>]:BB:W3GPp:MSTation<st>:PCPCh:DPOWER <Dpower>

The command defines the power of the data component of the PCPCH.

Parameters:

<Dpower> float
Range: -80 dB to 0 dB
Increment: 0.1 dB
*RST: 0 dB

Example: BB:W3GP:MST1:PCPC:DPOW -10 dB
sets the power to -10 dB.

[:SOURCE<hw>]:BB:W3GPp:MSTation<st>:PCPCh:FBI:MODE <Mode>

The command sets the number of bits (1 or 2) for the FBI field. With OFF, the field is not used.

The FBI pattern automatically sets the associated slot format:

- FBI OFF = Slot format 0
- FBI 1 bit = Slot format 1
- FBI 2 bits = Slot format 2

Parameters:

<Mode> OFF | D1B | D2B
*RST: OFF

Example: BB:W3GP:MST2:PCPC:FBI:MODE OFF
the FBI field is not used.

[[:SOURce<hw>]:BB:W3GPp:MSTation<st>:PCPCh:FBI:PATtern <Pattern>

The command determines the bit pattern for the FBI field when the PATtern data source is selected. The maximum length of the pattern is 32 bits. The first parameter determines the bit pattern (choice of hexadecimal, octal or binary notation), the second specifies the number of bits to use.

Parameters:

<Pattern> <32 bit pattern>
 *RST: #H0, 1

Example: BB:W3GP:MST1:PCPC:FBI:PATT #H3F, 8
 defines the bit pattern of the data for the FBI field.

[[:SOURce<hw>]:BB:W3GPp:MSTation<st>:PCPCh:MLENght <Mlength>

The command sets the length of the message component as a number of frames.

Parameters:

<Mlength> 1 | 2 Frames
 *RST: 1 Frame

Example: BB:W3GP:MST4:PCPC:MLEN 2
 the length of the message component is 2 frames.

[[:SOURce<hw>]:BB:W3GPp:MSTation<st>:PCPCh:PLENght <Plength>

The command defines the length of the power control preamble of the PCPCH as a number of slots.

Parameters:

<Plength> S0 | S8
 *RST: S8

Example: BB:W3GP:MST1:PCPC:PLEN S8
 sets a length of 8 slots for the power control preamble.

[[:SOURce<hw>]:BB:W3GPp:MSTation<st>:PCPCh:PPower <Ppower>

The command defines the power of the preamble component of the PCPCH. If the preamble is repeated and the power increased with each repetition, this setting specifies the power achieved during the last repetition.

Parameters:

<Ppower> float
 Range: -80 dB to 0 dB
 Increment: 0.1 dB
 *RST: 0 dB

Example: `BB:W3GP:MST1:PCPC:PPOW -10 dB`
sets the power to -10 dB.
`BB:W3GP:MST1:PCPC:PPOW:STEP 1 dB`
sets an increase in power of 1 dB per preamble repetition.
`BB:W3GP:MST1:PCPC:PREP 2`
sets a sequence of 2 preambles. The power of the first preamble is - 9 dB, the power of the second, -1 dB.

[:SOURce<hw>]:BB:W3GPp:MSTation<st>:PCPCh:PPOWER:STEP <Step>

The command defines the step width of the power increase, by which the preamble component of the PCPCH is increased from repetition to repetition. The power during the last repetition corresponds to the power defined by the command `[:SOURce<hw>]:BB:W3GPp:MSTation<st>:PCPCh:PPOWER`.

Parameters:

<Step> float
Range: 0 dB to 10 dB
Increment: 0.1 dB
*RST: 0 dB

Example: `BB:W3GP:MST1:PCPC:PPOW:STEP 2dB`
the power of the PCPCH preamble is increased by 2 dB with every repetition.

[:SOURce<hw>]:BB:W3GPp:MSTation<st>:PCPCh:PREPetition <Prepetition>

The command defines the number of PCPCH preamble components.

Parameters:

<Prepetition> float
Range: 1 to 10
*RST: 1

Example: `BB:W3GP:MST1:PCPC:PREP 3`
sets three preamble components.

[:SOURce<hw>]:BB:W3GPp:MSTation<st>:PCPCh:SIGNature <Signature>

The command selects the signature of the PCPCH (see Table 3 in 3GPP TS 25.213 Version 3.4.0 Release 1999).

Parameters:

<Signature> float
Range: 0 to 15
*RST: 0

Example: `BB:W3GP:MST1:PCPC:SIGN 5`
selects signature 5.

[[:SOURce<hw>]:BB:W3GPP:MSTation<st>:PCPCh:SRATe <Srate>

The command sets the symbol rate of the PCPCH.

User Equipment 1: When channel coding is active, the symbol rate is limited to the range between 15 and 120 ksps. Values above this limit are automatically set to 120 ksps.

Parameters:

<Srate> D15K | D30K | D60K | D120k | D240k | D480k | D960k
 *RST: D30K

Example:

BB:W3GP:MST1:PCPC:SRAT D15K
 sets the symbol rate of the PCPCH of user equipment 1 to 15 ksps.

[[:SOURce<hw>]:BB:W3GPP:MSTation<st>:PCPCh:TFCI <Tfci>

The command sets the value of the TFCI (Transport Format Combination Indicator) field. This value selects a combination of 30 bits, which are divided into two groups of 15 successive slots.

Parameters:

<Tfci> float
 Range: 0 to 1023
 *RST: 0

Example:

BB:W3GP:MST1:PCPC:TFCI 21
 sets the TFCI value to 21.

[[:SOURce<hw>]:BB:W3GPP:MSTation<st>:PCPCh:TIMing:DPOWER:MPART?

This command queries the level correction value for the message part. In case of one UE active, the power of the message part can be calculated by adding the set RF level.

Return values:

<Mpart> float

Example:

BB:W3GP:MST3:PCPC:TIM:DPOW:MPAR?
 queries the level correction value for the message part.
 Response: 1.2
 the correction value is 1.2 dB.
 POW?
 queries the RF level.
 Response: 2
 the RF output level is 2 dBm. The message part power is 3.2 dBm

Usage: Query only

[[:SOURce<hw>]:BB:W3GPP:MSTation<st>:PCPCh:TIMing:DPOWER:PREamble?

This command queries level correction value for the last AICH preamble before the message part. This value is identical to the correction value for the CD preamble. The level of the other preambles can be calculated by subtracting the set Preamble Power Step.

Return values:

<Preamble> float

Example:

BB:W3GP:MST3:PCPC:TIM:DPOW:PRE?

queries the level correction value for the last AICH preamble before the message part.

Usage:

Query only

[[:SOURce<hw>]:BB:W3GPp:MSTation<st>:PCPCh:TIMing:SOFFset <Soffset>

This command defines the start offset of the PCPCH in access slots. The starting time delay in timeslots is calculated according to: 2 x Start Offset.

Parameters:

<Soffset> float
Range: 1 to 14
*RST: 0

Example:

BB:W3GP:MST3:PCPC:TIM:SOFF 1

the start offset of the PCPCH of UE 3 is 2 access slots.

[[:SOURce<hw>]:BB:W3GPp:MSTation<st>:PCPCh:TIMing:SPERiod?

This command queries the sequence period.

Return values:

<Speriod> float

Example:

BB:W3GP:MST3:PCPC:TIM:SPER?

queries the sequence period.

Response: 14

the sequence period is 14 slots.

Usage:

Query only

[[:SOURce<hw>]:BB:W3GPp:MSTation<st>:PCPCh:TIMing:TIME:PREMp <Premp>

This command defines the AICH Transmission Timing. This parameter defines the time difference between the preamble and the message part. Two modes are defined in the standard. In mode 0, the preamble to message part difference is 3 access slots, in mode 1 it is 4 access slots.

Parameters:

<Premp> float
Range: 1 to 14
*RST: 3

Example:

BB:W3GP:MST3:PCPC:TIM:TIME:PREM 3

the difference between the preamble and the message part is 3 access slots.

[:SOURce<hw>]:BB:W3GPp:MSTation<st>:PCPCh:TIMing:TIME:PREPre <Prepre>

This command defines the time difference between two successive preambles in access slots.

Parameters:

<Prepre> float
 Range: 1 to 14
 *RST: 3

Example:

BB:W3GP:MST3:PCPC:TIM:TIME:PREP 3
 the time difference between two successive preambles is 3 access slots.

[:SOURce<hw>]:BB:W3GPp:MSTation<st>:PCPCh:TPC:DATA <Data>

The command determines the data source for the TPC field of the PCPCH.

Parameters:

<Data> ZERO | ONE | PATTErn | DLISt

DLISt

A data list is used. The data list is selected with the command
[\[:SOURce<hw>\]:BB:W3GPp:MSTation<st>:PCPCh:TPC:DATA:DSElect](#).

ZERO | ONE

Internal 0 and 1 data is used.

PATTErn

Internal data is used. The bit pattern for the data is defined by the command
[\[:SOURce<hw>\]:BB:W3GPp:MSTation<st>:PCPCh:TPC:DATA:PATTErn](#). The maximum length is 64 bits.

*RST: PATTErn

Example:

BB:W3GP:MST2:PCPC:TPC:DATA PATT
 selects as the data source for the TPC field of user equipment 2 the bit pattern defined with the following command.
 BB:W3GP:MST2:PCPC:TPC:DATA:PATTErn #H48D0,16
 defines the bit pattern.

[:SOURce<hw>]:BB:W3GPp:MSTation<st>:PCPCh:TPC:DATA:DSElect <Dselect>

The command selects the data list when the DLISt data source is selected for the TPC field of the PCPCH.

The files are stored with the fixed file extensions *.dm_iqd in a directory of the user's choice. The directory applicable to the commands is defined with the command
 MMEMoRY:CDIR. To access the files in this directory, you only have to give the file name, without the path and the file extension.

Parameters:

<Dselect> string

Example: BB:W3GP:MST1:PCPC:TPC:DATA DLIS
selects data lists as the data source.
M MEM:CDIR '<root>\Lists\Dm\IQData'
selects the directory for the data lists.
BB:W3GP:MST1:PCPC:TPC:DATA:DSEL 'dpcch_tpc_1'
selects the data list dpcch_tpc1.

[:SOURce<hw>]:BB:W3Gpp:MSTation<st>:PCPCh:TPC:DATA:PATtern <Pattern>

The command determines the bit pattern for the PATtern data source selection. The maximum length of the bit pattern is 64 bits.

Parameters:

<Pattern> <64 bit pattern>
*RST: #H0, 1

Example: BB:W3GP:MST1:PCPC:DATA:PATT #H3F, 8
defines the bit pattern of the data for the FBI field.

[:SOURce<hw>]:BB:W3Gpp:MSTation<st>:PCPCh:TPC:READ <Read>

The command sets the read out mode for the bit pattern of the TPC field of the PCPCH.

The bit pattern is selected with the command [\[:SOURce<hw> \]:BB:W3Gpp:MSTation<st>:PCPCh:TPC:DATA](#).

Parameters:

<Read> CONTinuous | S0A | S1A | S01A | S10A

CONTinuous

The bit pattern is used cyclically.

S0A

The bit pattern is used once, then the TPC sequence continues with 0 bits.

S1A

The bit pattern is used once, then the TPC sequence continues with 1 bits.

S01A

The bit pattern is used once and then the TPC sequence is continued with 0 and 1 bits alternately (in multiples, depending on by the symbol rate, for example, 00001111).

S10A

The bit pattern is used once and then the TPC sequence is continued with 1 and 0 bits alternately (in multiples, depending on by the symbol rate, for example, 11110000).

*RST: CONTinuous

Example: BB:W3GP:MST2:PCPC:TPC:READ CONT
the selected bit pattern is repeated continuously for the TPC sequence.

7.9.7 PRACH Settings

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[:SOURce<hw>]:BB:W3GPp:MSTation<st>:PRACH:SFOrmat.....	470
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[:SOURce<hw>]:BB:W3GPp:MSTation<st>:PRACH:ATTiming <Attiming>

This command defines which AICH Transmission Timing, time difference between the preamble and the message part or the time difference between two successive preambles in access slots, will be defined.

Parameters:

<Attiming> ATT0 | ATT1
 *RST: ATT0

Example:

BB:W3GP:MST3:PRAC:ATT ATT1
 selects the AICH Transmission Timing as the difference between the preamble and the message part.

[:SOURce<hw>]:BB:W3GPp:MSTation<st>:PRACH:CPOWer <Cpower>

The command defines the power of the control component of the PRACH.

Parameters:

<Cpower> float
 Range: -80 dB to 0 dB
 Increment: 0.1 dB
 *RST: 0 dB

Example:

BB:W3GP:MST1:PRAC:CPOW -10 dB
 sets the power to -10 dB.

[:SOURce<hw>] :BB:W3GPp:MSTation<st>:PRACH:DATA <Data>

The command determines the data source for the PRACH.

Parameters:

<Data> ZERO | ONE | PATtern | PN9 | PN11 | PN15 | PN16 | PN20 | PN21 | PN23 | DLISt

PNxx

The pseudo-random sequence generator is used as the data source. Different random sequence lengths can be selected.

DLISt

A data list is used. The data list is selected with the command

`[:SOURce<hw>] :BB:W3GPp:MSTation<st>:PRACH:DATA:DSElect.`

ZERO | ONE

Internal 0 and 1 data is used.

PATtern

Internal data is used. The bit pattern for the data is defined by the command `[:SOURce<hw>] :BB:W3GPp:MSTation<st>:PRACH:DATA:PATtern.`

*RST: PN9

Example:

`BB:W3GP:MST1:PRAC:DATA PN11`

selects internal PRBS data with period length $2^{11}-1$ as the data source.

[:SOURce<hw>] :BB:W3GPp:MSTation<st>:PRACH:DATA:DSElect <Dselect>

The command selects the data list for the DLISt data source.

The files are stored with the fixed file extensions `*.dm_iqd` in a directory of the user's choice. The directory applicable to the commands is defined with the command `MMEMory:CDIR`. To access the files in this directory, you only have to give the file name, without the path and the file extension.

Parameters:

<Dselect> string

Example:

`BB:W3GP:MST1:PRAC:DATA DLIS`

selects data lists as the data source.

`MMEM:CDIR '<root>\Lists\Dm\IQData'`

selects the directory for the data lists.

`BB:W3GP:MST1:PRAC:DATA:DSEL 'pcpch_data'`

selects the data list `pcpch_data`.

[:SOURce<hw>] :BB:W3GPp:MSTation<st>:PRACH:DATA:PATtern <Pattern>

The command determines the bit pattern for the data component when the PATtern data source is selected. The first parameter determines the bit pattern (choice of hexadecimal, octal or binary notation), the second specifies the number of bits to use.

Parameters:

<Pattern> <64 bit pattern>
 *RST: #H0, 1

Example:

BB:W3GP:MST1:PRAC:DATA:PATT #H3F, 8
 defines the bit pattern of the data for the DATA component.

[:SOURCE<hw>]:BB:W3GPp:MSTation<st>:PRACH:DPOWER <Dpower>

The command defines the power of the data component of the PRACH.

Parameters:

<Dpower> float
 Range: -80 dB to 0 dB
 Increment: 0.1 dB
 *RST: 0 dB

Example:

BB:W3GP:MST1:PRAC:DPOW -10 dB
 sets the power to -10 dB.

[:SOURCE<hw>]:BB:W3GPp:MSTation<st>:PRACH:MLENGTH <Mlength>

The command sets the length of the message component as a number of frames.

Parameters:

<Mlength> 1 | 2 Frames
 *RST: 1 Frame

Example:

BB:W3GP:MST4:PRAC:MLEN 2
 the length of the message component is 2 frames.

[:SOURCE<hw>]:BB:W3GPp:MSTation<st>:PRACH:PPOWER <Ppower>

The command defines the power of the preamble component of the PRACH. If the preamble is repeated and the power increased with each repetition, this setting specifies the power achieved during the last repetition.

Parameters:

<Ppower> float
 Range: -80 dB to 0 dB
 Increment: 0.1 dB
 *RST: 0 dB

Example:

BB:W3GP:MST1:PRAC:PPOW -10 dB
 sets the power to -10 dB.
 BB:W3GP:MST1:PRAC:PPOW:STEP 1 dB
 sets an increase in power of 1 dB per preamble repetition.
 BB:W3GP:MST1:PRAC:PREP 2
 sets a sequence of 2 preambles. The power of the first preamble is -9 dB, the power of the second, -1 dB.

[:SOURce<hw>]:BB:W3GPP:MSTation<st>:PRACH:PPOWer:STEP <Step>

The command defines the step width of the power increase, by which the preamble component of the PRACH is increased from repetition to repetition. The power defined during the last repetition corresponds to the power defined by the command [:

[SOURce<hw>\]:BB:W3GPP:MSTation<st>:PRACH:PPOWer.](#)

Parameters:

<Step> float
 Range: 0 dB to 10 dB
 Increment: 0.1 dB
 *RST: 0 dB

Example: BB:W3GP:MST1:PRAC:PPOW:STEP 2 dB
 the power of the PRACH preamble is increased by 2 dB with every repetition.

[:SOURce<hw>]:BB:W3GPP:MSTation<st>:PRACH:PREPetition <Prepetition>

The command defines the number of PRACH preamble components.

Parameters:

<Prepetition> float
 Range: 1 to 10
 *RST: 1

Example: BB:W3GP:MST1:PRAC:PREP 3
 sets three preamble components.

[:SOURce<hw>]:BB:W3GPP:MSTation<st>:PRACH:SFORmat <Sformat>

The command defines the slot format of the PRACH.

A change of slot format leads to an automatic change of symbol rate [:

[SOURce<hw>\]:BB:W3GPP:MSTation<st>:PRACH:SRATe](#)

When channel coding is active, the slot format is predetermined. So in this case, the command has no effect.

Parameters:

<Sformat> 0 | 1 | 2 | 3
 *RST: 0

Example: BB:W3GP:MST:PRAC:SFOR 2
 sets slot format 2.

[:SOURce<hw>]:BB:W3GPP:MSTation<st>:PRACH:SIGNature <Signature>

The command selects the signature of the PRACH (see Table 3 in 3GPP TS 25.213 Version 3.4.0 Release 1999).

Parameters:

<Signature> float
 Range: 0 to 15
 *RST: 0

Example:

BB:W3GP:MST1:PRAC:SIGN 5
 selects signature 5.

[:SOURCE<hw>]:BB:W3GPp:MSTation<st>:PRACH:SRATE <Srate>

The command sets the symbol rate of the PRACH.

A change of symbol rate leads to an automatic change of slot format [:
 SOURCE<hw>]:BB:W3GPp:MSTation<st>:PRACH:SFORmat.

Parameters:

<Srate> D15K | D30K | D60K | D120k
 *RST: D30K

Example:

BB:W3GP:MST1:PRAC:SRAT D15K
 sets the symbol rate of the PRACH of user equipment 1 to 15 kbps.

[:SOURCE<hw>]:BB:W3GPp:MSTation<st>:PRACH:TFCI <Tfci>

The command sets the value of the TFCI (Transport Format Combination Indicator) field. This value selects a combination of 30 bits, which are divided into two groups of 15 successive slots.

Parameters:

<Tfci> float
 Range: 0 to 1023
 *RST: 0

Example:

BB:W3GP:MST1:PRAC:TFCI 21
 sets the TFCI value to 21.

[:SOURCE<hw>]:BB:W3GPp:MSTation<st>:PRACH:TIMing:DPOWER:MPART?

This command queries the level correction value for the message part. In case of one UE active and "Level Reference" set to "RMS Power", the power of the message part can be calculated by adding the set RF level.

Return values:

<Mpart> float

Example: BB:W3GP:MST3:PRAC:TIM:DPOW:MPAR?
 queries the level correction value for the message part.
 Response: 1.2
 the correction value is 1.2 dB.
 POW?
 queries the RF level.
 Response: 2
 the RF output level is 2 dBm. The message part power is 3.2 dBm.

Usage: Query only

[:SOURCE<hw>]:BB:W3GPp:MSTation<st>:PRACH:TIMing:DPOWER:MPARt:CONTROL?

This command queries the level correction value for the message control part.

Return values:

<Control> float

Example: BB:W3GP:MST3:PRAC:TIM:DPOW:MPAR:CONT?
 queries the level correction value for the message control part.
 Response: -3.24
 the correction value is -3.24 dB.

Usage: Query only

[:SOURCE<hw>]:BB:W3GPp:MSTation<st>:PRACH:TIMing:DPOWER:MPARt:DATA?

This command queries the level correction value for the message data part.

Return values:

<Data> float

Example: BB:W3GP:MST3:PRAC:TIM:DPOW:MPAR:DATA?
 queries the level correction value for the message data part.
 Response: -3.24
 the correction value is -3.24 dB.

Usage: Query only

[:SOURCE<hw>]:BB:W3GPp:MSTation<st>:PRACH:TIMing:DPOWER:PREamble?

This command queries level correction value for the preamble before the message part. The level of the other preambles can be calculated by subtracting the set "Preamble Power Step".

Return values:

<Preamble> float

Example: BB:W3GP:MST3:PRAC:TIM:DPOW:PRE?
 queries the level correction value for the last preamble before the message part.

Usage: Query only

[:SOURCE<hw>]:BB:W3GPp:MSTation<st>:PRACH:TIMing:SOFFset <Soffset>

This command defines the start offset of the PRACH in access slots. The starting time delay in timeslots is calculated according to: 2 x Start Offset.

Parameters:

<Soffset> float
 Range: 1 to 50
 *RST: 0

Example: BB:W3GP:MST3:PRAC:TIM:SOFF 1
 the start offset of the PRACH of UE 3 is 2 access slots.

[:SOURCE<hw>]:BB:W3GPp:MSTation<st>:PRACH:TIMing:SPERiod?

This command queries the sequence period.

Return values:

<Speriod> float

Example: BB:W3GP:MST3:PRAC:TIM:SPER?
 queries the sequence period.
 Response: 14
 the sequence period is 14 slots.

Usage: Query only

[:SOURCE<hw>]:BB:W3GPp:MSTation<st>:PRACH:TIMing:TIME:PREMp <Premp>

This command defines the AICH Transmission Timing. This parameter defines the time difference between the preamble and the message part. Two modes are defined in the standard. In mode 0, the preamble to message part difference is 3 access slots, in mode 1 it is 4 access slots.

Parameters:

<Premp> float
 Range: 1 to 14
 *RST: 3

Example: BB:W3GP:MST3:PRAC:TIM.TIME:PREM 3
 the difference between the preamble and the message part is 3 access slots.

[:SOURCE<hw>]:BB:W3GPp:MSTation<st>:PRACH:TIMing:TIME:PREPre <Prepre>

This command defines the time difference between two successive preambles in access slots.

Parameters:

<Prepre> float
 Range: 1 to 14
 *RST: 3

Example:

BB:W3GP:MST3:PRAC:TIM.TIME:PREP 3
 the time difference between two successive preambles is 3 access slots.

7.9.8 HSUPA Settings

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[:SOURce<hw>]:BB:W3GPp:MSTation<st>[:HSUPa]:CHANnel<ch>:DPDCh:E: CCODE?

The command queries the channelization code and the modulation branch (I or Q) of the E-DPDCH channel.

The channelization code is dependent on the overall symbol rate set and cannot be modified.

Return values:

<ChannelCode> integer

Example:

BB:W3GP:MST4:HSUP:CHAN1:DPDC:E:CCOD?

queries the channelization code and the modulation branch (I or Q) of E-DPDCH 1 of user equipment 4.

Response: Q, 32

Usage: Query only

```
[ :SOURce<hw>]:BB:W3GPp:MSTation<st>[:HSUPa]:CHANnel<ch>:DPDCh:E:
  DATA <Data>
```

The command selects the data source for the E-DPDCH channel.

Parameters:

<Data>

ZERO | ONE | PATTErn | PN9 | PN11 | PN15 | PN16 | PN20 |
PN21 | PN23 | DLISt

PNxx

The pseudo-random sequence generator is used as the data source. Different random sequence lengths can be selected.

DLISt

A data list is used. The data list is selected with the command
SOURce: [:SOURce<hw>]:BB:W3GPp:MSTation<st>[:
HSUPa]:CHANnel<ch>:DPDCh:E:DATA:DSElect.

ZERO | ONE

Internal 0 and 1 data is used.

PATTErn

Internal data is used. The bit pattern for the data is defined by the
command [:SOURce<hw>]:BB:W3GPp:MSTation<st>[:
HSUPa]:CHANnel<ch>:DPDCh:E:DATA:PATTErn.

*RST: PN9

Example:

SOUR:BB:W3GP:MST1:HSUP:CHAN1:DPDC:E:DATA PN11
selects internal PRBS data with period length $2^{11}-1$ as the data
source.

```
[ :SOURce<hw>]:BB:W3GPp:MSTation<st>[:HSUPa]:CHANnel<ch>:DPDCh:E:
  DATA:DSElect <Dselect>
```

The command selects the data list for the DLISt data source.

The files are stored with the fixed file extensions *.dm_iqd in a directory of the user's choice. The directory applicable to the commands is defined with the command
MMEMory:CDIR. To access the files in this directory, you only have to give the file name, without the path and the file extension.

Parameters:

<Dselect>

string

Example:

SOUR:BB:W3GP:MST1:CHAN1:DPDC:E:DATA DLIS
selects data lists as the data source.
MMEM:CDIR '<root>\Lists\Dm\IQData'
selects the directory for the data lists.
BB:W3GP:MST1:CHAN1:DPDC:E:DATA:DSEL 'dp1'
selects the data list dp1.

[[:SOURce<hw>]:BB:W3GPp:MSTation<st>[:HSUPa]:CHANnel<ch>:DPDCh:E:DATA:PATtern <Pattern>

The command determines the bit pattern for the data component when the PATtern data source is selected. The first parameter determines the bit pattern (choice of hexadecimal, octal or binary notation), the second specifies the number of bits to use.

Parameters:

<Pattern> <bit pattern>
 *RST: #H0, 1

Example: SOUR:BB:W3GP:MST1:HSUP:CHAN1:DPDC:E:PATT #H3F, 8
 defines the bit pattern of the data for the DATA component.

[[:SOURce<hw>]:BB:W3GPp:MSTation<st>[:HSUPa]:CHANnel<ch>:DPDCh:E:POWER <Power>

The command sets the power of the selected E-DPDCH channel.

Parameters:

<Power> float
 Range: -80 dB to 0 dB
 *RST: 0 dB

Example: BB:W3GP:MST1:HSUP:CHAN1:DPDC:E:POW -2.5dB
 sets the power of E-DPDCH channel 1 to 2.5 dB.

[[:SOURce<hw>]:BB:W3GPp:MSTation<st>[:HSUPa]:CHANnel<ch>:DPDCh:E:SRATE?

The command queries the symbol rate and the state of the E-DPDCH channel.

The symbol rate and the state of the channels are dependent on the overall symbol rate set and cannot be modified.

Return values:

<Srate>

Example: BB:W3GP:MST4:HSUP:CHAN1:DPDC:E:SRAT?
 queries the symbol rate of E-DPDCH 1 of user equipment 4.
 Response: 960
 the symbol rate is 960 ksps.

Usage: Query only

[[:SOURce<hw>]:BB:W3GPp:MSTation<st>[:HSUPa]:DPCCh:E:FRC:CHANnel <Channel>

The command sets the FRC according to TS 25.141 Annex A.10.

Selection of FRC#8 is enabled only for instruments equipped with option SMx/AMU-K59.

Parameters:

<Channel> USER | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8
 *RST: 4

Example:

SOUR:BB:W3GP:MST1:HSUP:DPCC:E:FRC:CHAN 4
 sets the FRC to channel 4.

[:SOURce<hw>]:BB:W3GPp:MSTation<st>[:HSUPa]:DPCC:h:E:FRC:CRATe?

The command queries the relation between the information bits to binary channel bits.

Return values:

<Crate> float

Example:

SOUR1:BB:W3GP:MST1:HSUP:DPCC:E:FRC:CRAT?
 queries the coding rate.
 Response: 0.705
 the coding rate is 0.705.

Usage:

Query only

[:SOURce<hw>]:BB:W3GPp:MSTation<st>[:HSUPa]:DPCC:h:E:FRC:DATA <Data>

Selects the data source for the E-DCH channels, i.e. this paramter affects the corresponding paramter of the E-DPDCH.

Parameters:

<Data> PN9 | PN11 | PN15 | PN16 | PN20 | PN21 | PN23 | DLISt | ZERO | ONE | PATTErn

PNxx

The pseudo-random sequence generator is used as the data source. Different random sequence lengths can be selected.

DLISt

A data list is used. The data list is selected with the command
[\[:SOURce<hw>\]:BB:W3GPp:MSTation<st>\[:HSUPa\]:DPCC:h:E:FRC:DATA:DSElect.](#)

ZERO | ONE

Internal 0 and 1 data is used.

PATTErn

Internal data is used. The bit pattern for the data is defined by the command [\[:SOURce<hw>\]:BB:W3GPp:MSTation<st>\[:HSUPa\]:DPCC:h:E:FRC:DATA:PATTErn](#). The maximum length is 64 bits.

*RST: PN9

Example:

BB:W3GP:MST:HSUP:DPCC:E:FRC:DATA PATT
 selects as the data source
 BB:W3GP:MST:HSUP:DPCC:E:FRC:DATA:PATT #H48D0,16
 defines the bit pattern.

**[:SOURCE<hw>]:BB:W3GPp:MSTation<st>[:HSUPa]:DPCCh:E:FRC:DATA:
DSElect <Dselect>**

The command selects the data list when the DLIS data source is selected for E-DCH channels.

The files are stored with the fixed file extensions *.dm_iqd in a directory of the user's choice. The directory applicable to the commands is defined with the command MMEMoRY:CDIR. To access the files in this directory, you only have to give the file name, without the path and the file extension.

Parameters:

<Dselect> string

Example:

```
BB:W3GP:MST:HSUP:DPCC:E:FRC:DATA DLIS
selects the Data Lists data source.
MMEMoRY:CDIR '<root>\Lists\Dm\IQData'
selects the directory for the data lists.
BB:W3GP:MST:HSUP:DPCC:E:FRC:DATA:DSEL 'frc_1'
selects the data list frc_1.
```

**[:SOURCE<hw>]:BB:W3GPp:MSTation<st>[:HSUPa]:DPCCh:E:FRC:DATA:
PATTern <Pattern>**

The command determines the bit pattern for the PATTern data source selection. The maximum length of the bit pattern is 64 bits.

Parameters:

<Pattern> <64 bit pattern>
*RST: #H0, 1

Example:

```
BB:W3GP:MST:HSUP:DPCC:E:FRC:DATA:PATT
#B11110000,8
defines the bit pattern of the data for the E-DCH channels.
```

**[:SOURCE<hw>]:BB:W3GPp:MSTation<st>[:HSUPa]:DPCCh:E:FRC:DERRor:BIT:
LAYer <Layer>**

The command sets the layer in the coding process at which bit errors are inserted.

Parameters:

<Layer> TRANsport | PHYSical
*RST: PHYSical

Example:

```
SOUR:BB:W3GP:MST1:HSUP:DPCC:E:FRC:DERR:BIT:LAY
TRAN
sets the bit error insertion to the transport layer.
```

[[:SOURce<hw>]:BB:W3GPp:MSTation<st>[:HSUPa]:DPCC:h:E:FRC:DERRor:BIT:RATE <Rate>

The command sets the bit error rate.

Parameters:

<Rate> float
 Range: 5E-1 to 1E-7
 *RST: 1E-3

Example: SOUR:BB:W3GP:MST1:HSUP:DPCC:E:FRC:DERR:BIT:RATE
 1e-3
 sets the bit error rate to 1E-3.

[[:SOURce<hw>]:BB:W3GPp:MSTation<st>[:HSUPa]:DPCC:h:E:FRC:DERRor:BIT:STATE <State>

The command activates or deactivates bit error generation.

Parameters:

<State> ON | OFF
 *RST: OFF

Example: SOUR:BB:W3GP:MST1:HSUP:DPCC:E:FRC:DERR:BIT:STAT
 ON
 activates the bit error state.

[[:SOURce<hw>]:BB:W3GPp:MSTation<st>[:HSUPa]:DPCC:h:E:FRC:DERRor:BLOCK:RATE <Rate>

The command sets the block error rate.

Parameters:

<Rate> float
 Range: 1E-1 to 5E-4
 *RST: 1E-1

Example: SOUR:BB:W3GP:MST1:HSUP:DPCC:E:FRC:DERR:BLOC:
 RATE 1E-3
 sets the block error rate.

[[:SOURce<hw>]:BB:W3GPp:MSTation<st>[:HSUPa]:DPCC:h:E:FRC:DERRor:BLOCK:STATE <State>

The command activates or deactivates block error generation.

Parameters:

<State> ON | OFF
 *RST: OFF

Example: SOUR:BB:W3GP:MST1:HSUP:DPCC:E:FRC:DERR:BLOC:
STAT ON
activates the block error generation.

[:SOURce<hw>]:BB:W3GPp:MSTation<st>[:HSUPa]:DPCCh:E:FRC:DTX:PATtern
<Pattern>

The command sets the user-definable bit pattern for the DTX.

Parameters:

<Pattern> string
*RST: "1"

Example: SOUR:BB:W3GP:MST1:HSUP:DPCC:E:FRC:DTX:PATT
"11-1-"
sets the bit pattern for the DTX.

[:SOURce<hw>]:BB:W3GPp:MSTation<st>[:HSUPa]:DPCCh:E:FRC:DTX:STATe
<State>

The command activates or deactivates the DTX (Discontinuous Transmission) mode.

Parameters:

<State> ON | OFF
*RST: OFF

Example: SOUR:BB:W3GP:MST1:HSUP:DPCC:E:FRC:DTX:STAT ON
activates the DTX.

[:SOURce<hw>]:BB:W3GPp:MSTation<st>[:HSUPa]:DPCCh:E:FRC:HARQ:
SIMulation:CONNector <Connector>

Defines the connector used by the HARQ feedback line.

Parameters:

<Connector> LEVatt | USER1
*RST: LEVatt

[:SOURce<hw>]:BB:W3GPp:MSTation<st>[:HSUPa]:DPCCh:E:FRC:HARQ:
SIMulation:ADEFinition <Adefinition>

(not for R&S SMBV instruments)

Selects whether a high level (TTL) is interpreted as an ACK or a low level.

Parameters:

<Adefinition> HIGH | LOW
*RST: HIGH

Example: SOUR1:BB:W3GP:MST1:HSUP:DPCC:E:FRC:HARQ:SIM:
 ADEF HIGH
 a high level (TTL) is interpreted as an ACK.

**[:SOURCE<hw>]:BB:W3GP:MSTation<st>[:HSUPa]:DPCCh:E:FRC:HARQ:
 SIMulation:DELAy:AUSer <Auser>**

(not for R&S SMBV instruments)

Selects an additional delay to adjust the delay between the HARQ and the feedback.

Parameters:

<Auser> float
 Range: -50 to 60
 *RST: 0

Example: SOUR1:BB:W3GP:MST1:HSUP:DPCC:E:FRC:HARQ:SIM:
 DEL:AUS 20
 sets the additional user delay to 20.

**[:SOURCE<hw>]:BB:W3GP:MSTation<st>[:HSUPa]:DPCCh:E:FRC:HARQ:
 SIMulation:DELAy:FEEDback?**

(not for R&S SMBV instruments)

Queries the delay between the HARQ and the feedback.

Return values:

<Feedback> float
 Range: 0 to 600
 *RST: 378

Example: SOUR1:BB:W3GP:MST1:HSUP:DPCC:E:FRC:HARQ:SIM:
 DEL:FEED?
 queries the delay between HARQ and feedback.

Usage: Query only

**[:SOURCE<hw>]:BB:W3GP:MSTation<st>[:HSUPa]:DPCCh:E:FRC:HARQ:
 SIMulation:MODE <Mode>**

Selects the HARQ simulation mode.

Parameters:

<Mode> VHARq | HFEedback

VHARq

This mode simulates basestation feedback. For every HARQ process (either 4 or 8), a bit pattern can be defined to simulate ACKs and NACKs.

HFEedback

(not for R&S SMBV instruments)

This mode allows the user to dynamically control the transmission of the HSUPA fixed reference channels. An "ACK" from the base station leads to the transmission of a new packet while a "NACK" forces the instrument to retransmit the packet with a new channel coding configuration (i.e. new "redundancy version") of the concerned HARQ process.

*RST: HFE

Example:

```
SOUR1:BB:W3GP:MST1:HSUP:DPCC:E:FRC:HARQ:SIM:
MODE VHAR
sets simulation mode Virtual HARQ.
```

[[:SOURce<hw>]:BB:W3GPp:MSTation<st>[:HSUPa]:DPCC:h:E:FRC:HARQ:SIMulation:MRETransmissions <Mretransmissions>

(not for R&S SMBV instruments)

Sets the maximum number of retransmissions. After the expiration of this value, the next packet is send, regardless of the received feedback.

Parameters:

<Mretransmissions> float
 Range: 0 to 20
 *RST: 4

Example:

```
SOUR1:BB:W3GP:MST1:HSUP:DPCC:E:FRC:HARQ:SIM:
MRET 10
sets the maximum number of retransmissions to 10.
```

[[:SOURce<hw>]:BB:W3GPp:MSTation<st>[:HSUPa]:DPCC:h:E:FRC:HARQ:SIMulation:RVZero <Rvzero>

If activated, the same redundancy version is sent, that is, the redundancy version is not adjusted for the next retransmission in case of a received NACK.

Parameters:

<Rvzero> ON | OFF
 *RST: ON

Example:

```
SOUR1:BB:W3GP:MST1:HSUP:DPCC:E:FRC:HARQ:SIM:RVZ
ON
the same redundancy version is sent for the next retransmission.
```

[[:SOURce<hw>]:BB:W3GPp:MSTation<st>[:HSUPa]:DPCCh:E:FRC:HARQ:SIMulation[:STATE] <State>

Activates or deactivates the HARQ simulation mode.

Parameters:

<State> ON | OFF
*RST: OFF

Example: SOUR1:BB:W3GP:MST1:HSUP:DPCC:E:FRC:HARQ:SIM:STAT ON
activates the HARQ simulation mode.

[[:SOURce<hw>]:BB:W3GPp:MSTation<st>[:HSUPa]:DPCCh:E:FRC:HARQ[:SIMulation]:PATTern<ch> <Pattern>

Sets the HARQ Pattern. The maximum length of the pattern is 32 bits.

Parameters:

<Pattern> string

Example: SOUR1:BB:W3GP:MST1:HSUP:DPCC:E:FRC:HARQ:SIM:HARQ:PATT 1010
sets the HARQ simulation pattern.

[[:SOURce<hw>]:BB:W3GPp:MSTation<st>[:HSUPa]:DPCCh:E:FRC:HPROcesses?

The command queries the number of HARQ (Hybrid-ARQ Acknowledgement) process.

Return values:

<Hprocesses> float

Example: SOUR:BB:W3GP:MST1:HSUP:DPCC:E:FRC:HPRO?
queries the number of HARQ processes.
Response: 5

Usage: Query only

[[:SOURce<hw>]:BB:W3GPp:MSTation<st>[:HSUPa]:DPCCh:E:FRC:MIBRate?

The command queries the maximum information bit rate.

Return values:

<Mibrate> float

Example: SOUR:BB:W3GP:MST1:HSUP:DPCC:E:FRC:HPRO?
queries the maximum information bit rate.
Response: 1353.0

Usage: Query only

```
[:SOURCE<hw>]:BB:W3GPp:MSTation<st>[:HSUPa]:DPCCh:E:FRC:MODulation
<Modulation>
```

Sets the modulation used for the selected FRC.

Two modulation schemes are defined: BPSK for FRC 1 - 7 and 4PAM (4 Pulse-Amplitude Modulation) for FRC 8.

Parameters:

```
<Modulation>      BPSK | PAM4
*RST:              BPSK
```

Example:

```
BB:W3GP:MST1:HSUP:DPCC:E:FRC:CHAN 8
sets the FRC to channel 8.
BB:W3GP:MST1:HSUP:DPCC:E:FRC:MOD 4PAM
sets the modulation.
```

```
[:SOURCE<hw>]:BB:W3GPp:MSTation<st>[:HSUPa]:DPCCh:E:FRC:ORATe
<Orate>
```

Sets the overall symbol rate for the E-DCH channels, i.e. this parameter affects the corresponding parameter of the E-DPDCH.

Parameters:

```
<Orate>           D15K | D30K | D60K | D120k | D240k | D480k | D960k | D1920k |
D2X1920K | D2X960K2X1920K
```

Example:

```
BB:W3GP:MST1:HSUP:DPCC:E:FRC:ORAT D2X1920K
sets the overall symbol rate.
```

```
[:SOURCE<hw>]:BB:W3GPp:MSTation<st>[:HSUPa]:DPCCh:E:FRC:PAYBits?
```

The command queries the payload of the information bit. This value determines the number of transport layer bits sent in each HARQ process.

Return values:

```
<Paybits>         float
```

Example:

```
SOUR:BB:W3GP:MST1:HSUP:DPCC:E:FRC:PAYB?
queries the payload of the information bit.
Response: 2706
```

Usage:

```
Query only
```

```
[:SOURCE<hw>]:BB:W3GPp:MSTation<st>[:HSUPa]:DPCCh:E:FRC:STATe
<State>
```

The command activates or deactivates the FRC state for the E-DPCCH channels.

Parameters:

```
<State>           ON | OFF
*RST:              OFF
```

Example: SOUR:BB:W3GP:MST1:HSUP:DPCC:E:FRC:STAT ON
activates the FRC state for the E-DPCCH channels.

**[:SOURce<hw>]:BB:W3GPp:MSTation<st>[:HSUPa]:DPCCh:E:FRC:TBS:INDEX
<Index>**

Selects the Transport Block Size Index (E-TFCI) for the corresponding table, as described in in 3GPP TS 25.321, Annex B.

The value range of this parameter depends on the selected Transport Block Size Table ([:SOURce<hw>]:BB:W3GPp:MSTation<st>[:HSUPa]:DPCCh:E:FRC:TBS:TABLE).

Parameters:

<Index> float
Range: 0 to max
*RST: 41

Example: BB:W3GP:MST:HSUP:DPCC:E:FRC:TBS:TABLE TAB0TTI10
sets the transport block size table
BB:W3GP:MST:HSUP:DPCC:E:FRC:TBS:INX 127
sets the transport block size index.

**[:SOURce<hw>]:BB:W3GPp:MSTation<st>[:HSUPa]:DPCCh:E:FRC:TBS:TABLE
<Table>**

Selects the Transport Block Size Table from 3GPP TS 25.321, Annex B according to that the transport block size is configured.

The transport block size is determined also by the Transport Block Size Index ([:SOURce<hw>]:BB:W3GPp:MSTation<st>[:HSUPa]:DPCCh:E:FRC:TBS:INDEX).

The allowed values for this command depend on the selected E-DCH TTI ([:SOURce<hw>]:BB:W3GPp:MSTation<st>[:HSUPa]:DPCCh:E:FRC:TTIEdch) and modulation scheme ([:SOURce<hw>]:BB:W3GPp:MSTation<st>[:HSUPa]:DPCCh:E:FRC:MODulation).

E-DCH TTI	Modulation	Transport Block Size Table	SCPI Paramater	Transport Block Size Index (E-TFCI)
2ms	BPSK	Table 0	TAB0TTI2	0 .. 127
		Table 1	TAB1TTI2	0 .. 125
	4PAM	Table 2	TAB2TTI2	0 .. 127
		Table 3	TAB3TTI2	0 .. 124
10ms	-	Table 0	TAB0TTI10	0 .. 127
		Table 1	TAB1TTI10	0 .. 120

Parameters:

<Table> TAB0TTI2 | TAB1TTI2 | TAB2TTI2 | TAB3TTI2 | TAB0TTI10 |
TAB1TTI10
*RST: TAB0TTI10

Example:

BB:W3GP:MST:HSUP:DPCC:E:FRC:ORAT D1920
sets the overall symbol rate
BB:W3GP:MST:HSUP:DPCC:E:FRC:MOD BPSK
sets the modulation
BB:W3GP:MST:HSUP:DPCC:E:FRC:TTIE 2
sets the E-DCH TTI
BB:W3GP:MST:HSUP:DPCC:E:FRC:TBS:TABL TAB0TTI2
sets the transport block size table
BB:W3GP:MST:HSUP:DPCC:E:FRC:TBS:IND 25
sets the transport block size index

[:SOURCE<hw>]:BB:W3GPp:MSTation<st>[:HSUPa]:DPCCh:E:FRC:TTIBits?

The command queries the number of physical bits sent in each HARQ process.

Return values:

<Ttbits> float

Example:

BB:W3GP:MST1:HSUP:DPCC:E:FRC:TTIB?
queries the number of physical bits sent in each HARQ process.

Usage:

Query only

**[:SOURCE<hw>]:BB:W3GPp:MSTation<st>[:HSUPa]:DPCCh:E:FRC:TTIEdch
<Ttiedch>**

Sets the TTI size (Transmission Time Interval).

Parameters:

<Ttiedch> 2ms | 10ms
*RST: 2ms

Example:

BB:W3GP:MST1:HSUP:DPCC:E:FRC:TTIE 2ms
sets the TTI.

[:SOURCE<hw>]:BB:W3GPp:MSTation<st>[:HSUPa]:DPCCh:E:FRC:UECategory?

Queries the UE category that is minimum required for the selected FRC.

Return values:

<Uecategory> float

Example:

BB:W3GP:MST1:HSUP:DPCC:E:FRC:UEC?
queries the UE category.

Usage:

Query only

```
[:SOURCE<hw>]:BB:W3GPp:MSTation<st>[:HSUPa]:DPCCh:E:HBIT <Hbit>
```

The command activates the happy bit.

Parameters:

```
<Hbit>          ON | OFF
*RST:          ON
```

Example: `BB:W3GP:MST1:HSUP:DPCC:E:HBIT ON`
sets the happy bit.

```
[:SOURCE<hw>]:BB:W3GPp:MSTation<st>[:HSUPa]:DPCCh:E:POWER <Power>
```

The command sets the power of the E-DPCCH channel.

Parameters:

```
<Power>         float
Range:         -80 dB to 0 dB
*RST:         0 dB
```

Example: `BB:W3GP:MST1:HSUP:DPCC:E:POW -2.5dB`
sets the power of the E-DPCCH channel.

```
[:SOURCE<hw>]:BB:W3GPp:MSTation<st>[:HSUPa]:DPCCh:E:RSNumber <Rnumber>
```

The command sets the retransmission sequence number.

Parameters:

```
<Rnumber>       float
Range:         0 to 3
*RST:         0
```

Example: `BB:W3GP:MST1:HSUP:DPCC:E:RSN 0`
sets the retransmission sequence number.

```
[:SOURCE<hw>]:BB:W3GPp:MSTation<st>[:HSUPa]:DPCCh:E:STATE <State>
```

The command activates deactivates the E-DPCCH.

Parameters:

```
<State>         ON | OFF
*RST:         OFF
```

Example: `BB:W3GP:MST1:HSUP:DPCC:E:STAT ON`
activates the E-DPCCH.

```
[:SOURCE<hw>]:BB:W3GPp:MSTation<st>[:HSUPa]:DPCCh:E:TFCI <Tfci>
```

The command sets the value for the TFCI (Transport Format Combination Indicator) field.

Parameters:

<Tfci> float
 Range: 0 to 127
 *RST: 0

Example:

BB:W3GP:MST1:HSUP:DPCC:E:TFCI 0
 sets the value for the TFCI.

[:SOURce<hw>]:BB:W3GPP:MSTation<st>[:HSUPa]:DPDCh:E:FCIO <Fcio>

The command sets the channelization code to I/O.

Parameters:

<Fcio> ON | OFF
 *RST: OFF

Example:

BB:W3GP:MST1:HSUP:DPDC:E:FCIO ON
 sets the channelization code to I/O.

**[:SOURce<hw>]:BB:W3GPP:MSTation<st>[:HSUPa]:DPDCh:E:MODulation
 <Modulation>**

Sets the modulation of the E-DPDCH.

There are two possible modulation schemes specified for this channel, BPSK and 4PAM (4 Pulse-Amplitude Modulation). The latter one is available only for the following Overall Symbol Rates ([\[:SOURce<hw>\]:BB:W3GPP:MSTation<st>\[:HSUPa\]:DPDCh:E:ORATe](#)):

- 2x960 ksps
- 2x1920 ksps
- 2x960 + 2x1920 ksps
- 2x960 ksps, I or Q only
- 2x1920 ksps, I or Q only
- 2x960 + 2x1920 ksps, I or Q only

Parameters:

<Modulation> BPSK | PAM4
 *RST: BPSK

Example:

BB:W3GP:MST1:HSUP:DPDC:E:ORAT D2x960K2x1920K
 sets the overall symbol rate
 BB:W3GP:MST1:HSUP:DPDC:E:MOD 4PAM
 sets the modulation to 4PAM

Options:

Modulation scheme 4PAM requires the HSPA+ option R&S SMx/AMU-K59.

[:SOURce<hw>]:BB:W3GPP:MSTation<st>[:HSUPa]:DPDCh:E:ORATe <ORate>

The command sets the overall symbol rate of all the E-DPDCH channels.

Parameters:

<ORate> D15K | D30K | D60K | D120k | D240k | D480k | D960k | D1920k |
 D2X1920K | D2X960K2X1920K | D2x960KI | D2x960KQ |
 D2X1920KI | D2X1920KQ | D2X960K2X1920KI |
 D2X960K2X1920KQ
 *RST: D60K

Example:

BB:W3GP:MST1:HSUP:DPDC:E:ORAT D60K
 sets the overall symbol rate

[:SOURce<hw>]:BB:W3GPP:MSTation<st>[:HSUPa]:DPDCh:E:STATe <State>

The command activates or deactivates the E-DPDCHs. This always activates or deactivates all the channels.

Parameters:

<State> ON | OFF
 *RST: ON

Example:

BB:W3GP:MST1:HSUP:DPDC:E:STAT ON
 activates all the E-DPDCHs.

[:SOURce<hw>]:BB:W3GPP:MSTation<st>[:HSUPa]:EDCH:TTIEdch <Ttiedch>

Sets the value for the TTI size (Transmission Time Interval).

This command is a query only, if an UL-DTX is enabled (`[:SOURce<hw>]:BB:W3GPP:MSTation:UDTX:STATe ON`) or an FRC is activated (`[:SOURce<hw>]:BB:W3GPP:MSTation<st>[:HSUPa]:DPCCh:E:FRC:STATe ON`).

Parameters:

<Ttiedch> 2ms | 10ms
 *RST: 2ms

Example:

BB:W3GP:MST[:HSUPa]:EDCH:TTIE 10ms
 BB:W3GP:MST:UDTX:TTIE 2ms
 BB:W3GP:MST:UDTX:STAT ON
 BB:W3GP:MST[:HSUPa]:EDCH:TTIE?
 Response: 2ms

[:SOURce<hw>]:BB:W3GPP:MSTation<st>[:HSUPa]:EDCH:REPeat <Repeat>

Determine the number of TTIs after that the E-DCH scheduling is repeated.

Parameters:

<Repeat> integer
 Range: 1 to dynamic
 *RST: 1

Example:

`[:SOURce<hw>]:BB:W3GPP:MSTation<st>[:HSUPa]:EDCH:ROWCount` on page 491

```
[ :SOURce<hw>]:BB:W3GPp:MSTation<st>[:HSUPa]:EDCH:ROW<ch0>:FROM
<TtiFrom>
```

```
[ :SOURce<hw>]:BB:W3GPp:MSTation<st>[:HSUPa]:EDCH:ROW<ch0>:TO
<TtiTo>
```

Determines the start/end TTI of the corresponding E-DCH burst.

Suffix:

<ch0> 0 .. Number of Table Rows -1

Parameters:

<TtiTo> integer
 Range: 0 to dynamic
 *RST: row index

Example:

```
[ :SOURce<hw>]:BB:W3GPp:MSTation<st>[:HSUPa]:
EDCH:ROWCount on page 491
```

```
[ :SOURce<hw>]:BB:W3GPp:MSTation<st>[:HSUPa]:EDCH:ROWCount
<RowCount>
```

Sets the number of the rows in the scheduling table.

Parameters:

<RowCount> integer
 Range: 1 to 32
 *RST: 1

Example:

```
E-DCH scheduling example
BB:W3GP:MST[:HSUPa]:EDCH:TTIE 2ms
BB:W3GP:MST[:HSUPa]:EDCH:ROWC 2
BB:W3GP:MST[:HSUPa]:EDCH:REP 1000
BB:W3GP:MST[:HSUPa]:EDCH:ROW0:FROM 3
BB:W3GP:MST[:HSUPa]:EDCH:ROW0:TO 6
BB:W3GP:MST[:HSUPa]:EDCH:ROW1:FROM 128
BB:W3GP:MST[:HSUPa]:EDCH:ROW0:TO 156
```

7.9.9 UL-DTX Settings

```
[ :SOURce<hw>]:BB:W3GPp:MSTation:UDTX:STATE.....492
[ :SOURce<hw>]:BB:W3GPp:MSTation:UDTX:TTIEdch.....492
[ :SOURce<hw>]:BB:W3GPp:MSTation:UDTX:OFFSet.....492
[ :SOURce<hw>]:BB:W3GPp:MSTation:UDTX:ITHReshold.....492
[ :SOURce<hw>]:BB:W3GPp:MSTation:UDTX:LPLength.....493
[ :SOURce<hw>]:BB:W3GPp:MSTation:UDTX:CYCLE<ch>.....493
[ :SOURce<hw>]:BB:W3GPp:MSTation:UDTX:BURSt<ch>.....493
[ :SOURce<hw>]:BB:W3GPp:MSTation:UDTX:PREamble<ch>.....494
[ :SOURce<hw>]:BB:W3GPp:MSTation:UDTX:POSTamble<ch>.....494
```

[[:SOURce<hw>]:BB:W3GPp:MSTation:UDTX:STATe <State>

Enables/disables uplink discontinuous transmission (UL-DTX), i.e. uplink DPCCH gating.
Enabling the UL-DTX deactivates the DPDCH and the HSUPA FRC.

Parameters:

<State> 0 | 1 | OFF | ON
*RST: 0

Example:

BB:W3GP:MST1:UDTX:STAT ON
enables UL-DTX

Options:

R&S SMx/AMU-K45/K59

[[:SOURce<hw>]:BB:W3GPp:MSTation:UDTX:TTIEdch <EdchTti>

Sets the duration of a E-DCH TTI.

Parameters:

<EdchTti> 2ms | 10ms
*RST: 2ms

Example:

BB:W3GP:MST:UDTX:TTIE 10ms

Options:

R&S SMx/AMU-K45/K59

[[:SOURce<hw>]:BB:W3GPp:MSTation:UDTX:OFFSet <Offset>

Sets the parameter UE_DTX_DRX_Offset and determines the start offset in subframes of the first uplink DPCCH burst (after the preamble). The offset is applied only for bursts belonging to the DPCCH burst pattern; HS-DPCCH or E-DCH transmissions are not affected.

Parameters:

<Offset> integer
Range: 0 to 159
Increment: depends on E-DCH TTI parameter: for E-DCH TTI 10ms, the resolution is 5 and the max value is 155.
*RST: 0

Example:

BB:W3GP:MST:UDTX:TTIE 10ms
BB:W3GP:MST:UDTX:OFFS 15

Options:

R&S SMx/AMU-K45/K59

[[:SOURce<hw>]:BB:W3GPp:MSTation:UDTX:ITHReshold <Threshold>

Defines the number of consecutive E-DCH TTIs without an E-DCH transmission, after which the UE shall immediately move from UE-DTX cycle 1 to using UE-DTX cycle 2.

Parameters:

<Threshold> 1 | 4 | 8 | 16 | 32 | 64 | 128 | 256
 *RST: 16

Example:

BB:W3GP:MST:UDTX:ITHR 4

Options:

R&S SMx/AMU-K45/K59

[[:SOURce<hw>]:BB:W3GPp:MSTation:UDTX:LPLength <LongPreamble>

Determines the length in slots of the preamble associated with the UE-DTX cycle 2.

Parameters:

<LongPreamble> 2 | 4 | 15
 *RST: 2

Example:

BB:W3GP:MST:UDTX:LPL 15

Options:

R&S SMx/AMU-K45/K59

[[:SOURce<hw>]:BB:W3GPp:MSTation:UDTX:CYCLE<ch> <DtxCycle>

Sets the offset in subframe between two consecutive DPCCH bursts within the corresponding UE-DTX cycle, i.e. determines how often the DPCCH bursts are transmitted.

The UE-DTX cycle 2 is an integer multiple of the UE-DTX cycle 1, i.e. has less frequent DPCCH transmission instants.

Note: The allowed values depend on the selected E-DCH TTI.

Suffix:

<ch> 1|2
 UE-DTX cycle 1 or 2

Parameters:

<DtxCycle> 1 | 4 | 5 | 8 | 10 | 16 | 20 | 32 | 40 | 64 | 80 | 128 | 160
 *RST: 5

Example:

BB:W3GP:MST:UDTX:TTIE 2ms
 BB:W3GP:MST:UDTX:CYCL2 5

Options:

R&S SMx/AMU-K45/K59

[[:SOURce<hw>]:BB:W3GPp:MSTation:UDTX:BURSt<ch> <BurstLength>

Determines the uplink DPCCH burst length in subframes without the preamble and postamble, when the corresponding UE-DTX cycle is applied.

Suffix:

<ch> 1|2
 UE-DTX cycle 1 or 2

Parameters:

<BurstLength> 1 | 2 | 5
 *RST: 1

Example:

BB:W3GP:MST:UDTX:CYCL2 5
 BB:W3GP:MST:UDTX:BURS2 1

Options:

R&S SMx/AMU-K45/K59

[:SOURCE<hw>]:BB:W3GPP:MSTation:UDTX:PREamble<ch> <Preamble>

Queries the preamble length in slots, when the corresponding UE-DTX cycle is applied.

The preamble length is fixed to 2 slots.

Suffix:

<ch> 1|2
 UE-DTX cycle 1 or 2

Parameters:

<Preamble> integer
 *RST: 2

Example:

BB:W3GP:MST:UDTX:PRE2?

Options:

R&S SMx/AMU-K45/K59

[:SOURCE<hw>]:BB:W3GPP:MSTation:UDTX:POSTamble<ch>?

Queries the postamble length in slots, when the corresponding UE-DTX cycle is applied.

The postamble length is fixed to 1 slot.

Suffix:

<ch> 1|2
 UE-DTX cycle 1 or 2

Return values:

<PostAmble> integer
 *RST: 1

Example:

BB:W3GP:MST:UDTX:POST2?

Usage:

Query only

Options:

R&S SMx/AMU-K45/K59

7.9.10 Dynamic Power Control Settings

Example: Configuring the Dynamic Power Control Settings

The following is a simple programming example with the purpose to show **all** commands for this task. In real application, some of the commands may be omitted.

```

SOURCE:BB:W3GPp:MSTation:ENHanced:DPDCh:DPControl:DIRection UP
// selects direction up, a high level of the control signals leads to an increase of the chan
SOURCE:BB:W3GPp:MSTation:ENHanced:DPDCh:DPControl:STEP 1 dB
// selects a step width of 1 dB.
// A high level of the control signal leads to an increase of 1 dB of the channel power,
// a low level to a decrease of 1 dB.
SOURCE:BB:W3GPp:MSTation:ENHanced:DPDCh:DPControl:RANGE:DOWN 10 dB
// selects a dynamic range of 10 dB for ranging up the channel power
SOURCE:BB:W3GPp:MSTation:ENHanced:DPDCh:DPControl:RANGE:UP 50 dB
// selects a dynamic range of 50 dB for ranging up the channel power
// The overall increase and decrease of channel power, i.e. the dynamic range is limited to 6
SOURCE:BB:W3GPp:MSTation:ENHanced:DPDCh:DPControl:MODE TPC
// selects the source of the power control signal
SOURCE:BB:W3GPp:MSTation:ENHanced:DPDCh:DPControl:STATE ON
// activates Dynamic Power Control for the enhanced channels of UE1
SOURCE:BB:W3GPp:MSTation:ENHanced:DPDCh:DPControl:POWer?
// queries the deviation of the channel power (delta POW) from the set power start value of t

```

```

[:SOURCE<hw>]:BB:W3GPp:MSTation[:ENHanced:DPDCh]:DPControl:ASSignment.....495
[:SOURCE<hw>]:BB:W3GPp:MSTation[:ENHanced:DPDCh]:DPControl:DIRection.....496
[:SOURCE<hw>]:BB:W3GPp:MSTation[:ENHanced:DPDCh]:DPControl:MODE.....496
[:SOURCE<hw>]:BB:W3GPp:MSTation:ENHanced:DPDCh:DPControl[:POWer].....496
[:SOURCE<hw>]:BB:W3GPp:MSTation[:ENHanced:DPDCh]:DPControl:RANGE:DOWN.....496
[:SOURCE<hw>]:BB:W3GPp:MSTation[:ENHanced:DPDCh]:DPControl:RANGE:UP.....496
[:SOURCE<hw>]:BB:W3GPp:MSTation[:ENHanced:DPDCh]:DPControl:STATE.....497
[:SOURCE<hw>]:BB:W3GPp:MSTation[:ENHanced:DPDCh]:DPControl:STEP:MANual.....497
[:SOURCE<hw>]:BB:W3GPp:MSTation[:ENHanced:DPDCh]:DPControl:STEP[:EXTErnal]....497

```

[:SOURCE<hw>]:BB:W3GPp:MSTation[:ENHanced:DPDCh]:DPControl: ASSignment <ASSignment>

Enabled for UL-DTX mode only (`[:SOURCE<hw>]:BB:W3GPp:MSTation:UDTX:STATE ON`).

The power control recognizes the UL-DPCCH gaps according to 3GPP TS 25.214. Some of the TPC commands sent to the instrument over the external line (LEVATT connector) or by the TPC pattern are ignored, whereas others are summed up and applied later. The processing of the TPC commands depends only on whether the BS sends the TPC bits on the F-DPCH with slot format 0/ slot format 9 or not.

For more information, see "[Assignment Mode for UL-DTX](#)" on page 171.

Parameters:

<ASSignment> NORMAL | FDPCh
*RST: NORMAL

Example:

```

BB:W3GP:MST1:UDTX:STAT ON
BB:W3GP:MST:DPControl:ASS FDPCh

```

```
[ :SOURce<hw>]:BB:W3GPP:MSTation[:ENHanced:DPDCh]:DPCControl:DIRection
<Direction>
```

The command selects the Dynamic Power Control direction. The selected direction determines if the channel power is increased (UP) or decreased (DOWN) by control signal with high level.

Parameters:

```
<Direction>          UP | DOWN
*RST:                UP
```

Example: see [example "Configuring the Dynamic Power Control Settings"](#) on page 494

```
[ :SOURce<hw>]:BB:W3GPP:MSTation[:ENHanced:DPDCh]:DPCControl:MODE
<Mode>
```

The command selects the Dynamic Power Control mode. The mode determines the source of the control signal.

Note: R&S SMBV instruments do not support External Power Control.

Parameters:

```
<Mode>              TPC | MANual | EXTernal
*RST:               EXTernal
```

Example: see [example "Configuring the Dynamic Power Control Settings"](#) on page 494

```
[ :SOURce<hw>]:BB:W3GPP:MSTation:ENHanced:DPDCh:DPCControl[:POWER]?
```

The command queries the deviation of the channel power (delta POW) from the set power start value of the DPDCH.

Return values:

```
<Power>            float
                   Range:   -60 to 60
                   Increment: 0.01
                   *RST:    0
```

Example: see [example "Configuring the Dynamic Power Control Settings"](#) on page 494

Usage: Query only

```
[ :SOURce<hw>]:BB:W3GPP:MSTation[:ENHanced:DPDCh]:DPCControl:RANGE:
  DOWN <Down>
[ :SOURce<hw>]:BB:W3GPP:MSTation[:ENHanced:DPDCh]:DPCControl:RANGE:
  UP <Up>
```

The command selects the dynamic range for ranging up the channel power.

Parameters:

<Up> float
 Range: 0 to 60
 Increment: 0.01
 *RST: 10
 Default unit: dB

Example:

BB:W3GP:MST:ENH:DPDC:DPC:RANG:UP 20dB
 selects a dynamic range of 20 dB for ranging up the channel power.

[:SOURce<hw>]:BB:W3GPp:MSTation[:ENHanced:DPDCh]:DPCControl:STATE
 <State>

The command activates/deactivates Dynamic Power Control.

Parameters:

<State> 0 | 1 | OFF | ON
 *RST: 0

Example:

see [example "Configuring the Dynamic Power Control Settings"](#) on page 494

[:SOURce<hw>]:BB:W3GPp:MSTation[:ENHanced:DPDCh]:DPCControl:STEP:
MANual <Manual>

This command provides the control signal for manual mode of Dynamic Power Control.

Parameters:

<Manual> MAN0 | MAN1
 *RST: MAN0

Example:

BB:W3GP:MST:ENH:DPDC:DPC:MODE MAN
 selects manual power control.
 BB:W3GP:MST:ENH:DPDC:DPC:STAT ON
 activates Dynamic Power Control for the enhanced channels of UE1.
 BB:W3GP:MST:ENH:DPDC:DPC:STEP:MAN MAN0
 decreases the level by 0.5 dB.

[:SOURce<hw>]:BB:W3GPp:MSTation[:ENHanced:DPDCh]:DPCControl:STEP[:
EXTernal] <External>

This command sets step width by which – with Dynamic Power Control being switched on - the channel power of the enhanced channels is increased or decreased.

Parameters:

<External> float
 Range: 0.5 to 6
 Increment: 0.01
 *RST: 1
 Default unit: dB

Example:

see [example "Configuring the Dynamic Power Control Settings"](#) on page 494

7.10 Enhanced Channels of the User Equipment

The `SOURCE:BB:W3GPp:MSTation:ENHanced` subsystem contains the commands for setting the enhanced channels of user equipment 1 (UE1).

The commands of this system only take effect when the 3GPP FDD standard is activated, the uplink transmission direction is selected and user equipment 1 is enabled:

- `SOURCE:BB:W3GPp:STATE ON`
- `SOURCE:BB:W3GPp:LINK UP`
- `SOURCE:BB:W3GPp:MSTation1:STATE ON`

TCHannel<di>

The transport channel designations for remote control are `TCHannel0` for DCCH, `TCHannel1` to `TCHannel6` for DTCH1 to DTCH6.

<code>[SOURCE<hw>]:BB:W3GPp:MSTation:ENHanced:DPDCh:BPFRame</code>	499
<code>[SOURCE<hw>]:BB:W3GPp:MSTation:ENHanced:DPDCh:CCODing:STATE</code>	499
<code>[SOURCE<hw>]:BB:W3GPp:MSTation:ENHanced:DPDCh:CCODing:TYPE</code>	499
<code>[SOURCE<hw>]:BB:W3GPp:MSTation:ENHanced:DPDCh:CCODing:USER:CATalog</code>	500
<code>[SOURCE<hw>]:BB:W3GPp:MSTation:ENHanced:DPDCh:CCODing:USER:DELeTe</code>	501
<code>[SOURCE<hw>]:BB:W3GPp:MSTation:ENHanced:DPDCh:CCODing:USER:LOAD</code>	501
<code>[SOURCE<hw>]:BB:W3GPp:MSTation:ENHanced:DPDCh:CCODing:USER:STORe</code>	501
<code>[SOURCE<hw>]:BB:W3GPp:MSTation:ENHanced:DPDCh:DERRor:BIT:LAYer</code>	502
<code>[SOURCE<hw>]:BB:W3GPp:MSTation:ENHanced:DPDCh:DERRor:BIT:RATE</code>	502
<code>[SOURCE<hw>]:BB:W3GPp:MSTation:ENHanced:DPDCh:DERRor:BIT:STATE</code>	502
<code>[SOURCE<hw>]:BB:W3GPp:MSTation:ENHanced:DPDCh:DERRor:BLOCK:RATE</code>	503
<code>[SOURCE<hw>]:BB:W3GPp:MSTation:ENHanced:DPDCh:DERRor:BLOCK:STATE</code>	503
<code>[SOURCE<hw>]:BB:W3GPp:MSTation:ENHanced:DPDCh:INTerleaver2</code>	503
<code>[SOURCE<hw>]:BB:W3GPp:MSTation:ENHanced:DPDCh:ORATe</code>	504
<code>[SOURCE<hw>]:BB:W3GPp:MSTation:ENHanced:DPDCh:STATE</code>	504
<code>[SOURCE<hw>]:BB:W3GPp:MSTation:ENHanced:DPDCh:TCHannel<ch>:RMAtribute</code>	504
<code>[SOURCE<hw>]:BB:W3GPp:MSTation:ENHanced:DPDCh:TCHannel<ch>:STATE</code>	505
<code>[SOURCE<hw>]:BB:W3GPp:MSTation:ENHanced:DPDCh:TCHannel<ch>:TBCount</code>	505
<code>[SOURCE<hw>]:BB:W3GPp:MSTation:ENHanced:DPDCh:TCHannel<ch>:TBSize</code>	505
<code>[SOURCE<hw>]:BB:W3GPp:MSTation:ENHanced:DPDCh:TCHannel<ch>:TTINterval</code>	505
<code>[SOURCE<hw>]:BB:W3GPp:MSTation:ENHanced:DPDCh:TCHannel<di>:CRCSize</code>	506
<code>[SOURCE<hw>]:BB:W3GPp:MSTation:ENHanced:DPDCh:TCHannel<di>:DATA</code>	506

<code>[:SOURCE<hw>]:BB:W3GPP:MSTation:ENHanced:DPDCh:TCHannel<di>:DATA: DSElect.....</code>	506
<code>[:SOURCE<hw>]:BB:W3GPP:MSTation:ENHanced:DPDCh:TCHannel<di>:DATA: PATTern.....</code>	507
<code>[:SOURCE<hw>]:BB:W3GPP:MSTation:ENHanced:DPDCh:TCHannel<di>:EPRotectiOn.....</code>	507
<code>[:SOURCE<hw>]:BB:W3GPP:MSTation:ENHanced:DPDCh:TCHannel<di>:INTerleaver.....</code>	508
<code>[:SOURCE<hw>]:BB:W3GPP:MSTation:ENHanced:PCPCh:CCODing:STATe.....</code>	508
<code>[:SOURCE<hw>]:BB:W3GPP:MSTation:ENHanced:PCPCh:CCODing:TYPE.....</code>	508
<code>[:SOURCE<hw>]:BB:W3GPP:MSTation<st>:ENHanced:PRACH:CCODing:STATe.....</code>	509
<code>[:SOURCE<hw>]:BB:W3GPP:MSTation<st>:ENHanced:PRACH:CCODing:TYPE.....</code>	509

`[:SOURCE<hw>]:BB:W3GPP:MSTation:ENHanced:DPDCh:BPFRame?`

The command queries the number of data bits in the DPDCH component of the frame at the physical layer. The number of data bits depends on the overall symbol rate.

Return values:

`<Bpframe>` float

Example:

`BB:W3GP:MST:ENH:DPDC:BPFR?`

queries the number of data bits.

Response: 300

the number of data bits is 300.

Usage: Query only

`[:SOURCE<hw>]:BB:W3GPP:MSTation:ENHanced:DPDCh:CCODing:STATe <State>`

The command activates or deactivates channel coding for the enhanced channels.

When channel coding is activated, the overall symbol rate (`[:SOURCE<hw>]:BB:W3GPP:MSTation:ENHanced:DPDCh:ORATe`) is set to the value predetermined by the selected channel coding type (`[:SOURCE<hw>]:BB:W3GPP:MSTation:ENHanced:DPDCh:CCODing:TYPE`).

Parameters:

`<State>` 0 | 1 | OFF | ON

*RST: OFF

Example:

`BB:W3GP:MST:ENH:DPDC:CCOD:TYPE M12K2`

selects channel coding type RMC 12.2 kbps.

`BB:W3GP:MST:ENH:DPDC:CCOD:STAT ON`

activates channel coding.

`[:SOURCE<hw>]:BB:W3GPP:MSTation:ENHanced:DPDCh:CCODing:TYPE <Type>`

The command selects the channel coding scheme in accordance with the 3GPP specification. The channel coding scheme selected predetermines the overall symbol rate.

When channel coding is activated (`[:SOURCE<hw>] :BB:W3GPP:MSTation:ENHanced:DPDCh:CCODing:STATe`) the overall symbol rate (`[:SOURCE<hw>] :BB:W3GPP:MSTation:ENHanced:DPDCh:ORATe`) is set to the value predetermined by the selected channel coding type.

Parameters:

<Type>

M12K2 | M64K | M144k | M384k | AMR

M12K2

Measurement channel with an input data bit rate of 12.2 kbps.

M64K

Measurement channel with an input data bit rate of 64 kbps.

M144K

Measurement channel with an input data bit rate of 144 kbps.

M384K

Measurement channel with an input data bit rate of 384 kbps.

AMR

Channel coding for the AMR Coder (coding a voice channel).

USER

This parameter cannot be set. USER is returned whenever a user-defined channel coding is active, that is to say, after a channel coding parameter has been changed or a user coding file has been loaded. The file is loaded by the command `[:SOURCE<hw>] :BB:W3GPP:MSTation:ENHanced:DPDCh:CCODing:USER:LOAD`.

*RST: M12K2

Example:

```
BB:W3GP:MST:ENH:DPDC:CCOD:TYPE M144K
selects channel coding scheme RMC 144 kbps.
```

[:SOURCE<hw>] :BB:W3GPP:MSTation:ENHanced:DPDCh:CCODing:USER:CATalog?

The command queries existing files with stored user channel codings.

The files are stored with the fixed file extensions `*.3g_ccod_ul` in a directory of the user's choice. The directory applicable to the commands is defined with the command `MMEMoRY:CDIR`.

Return values:

<Catalog>

string

Example:

```
MMEM:CDIR '\Lists\Wcdma\CcodDpchUser'
selects the directory for the user channel coding files.
BB:W3GP:MST:ENH:DPDC:CCOD:USER:CAT?
queries the existing files with user coding.
Response: 'user_cc1'
there is one file with user coding.
```

Usage:

Query only

**[:SOURCE<hw>] : BB : W3GPp : MSTation : ENHanced : DPDCh : CCODing : USER :
DELeTe <Delete>**

The command deletes the specified files with stored user channel codings.

The files are stored with the fixed file extensions *.3g_ccod_ul in a directory of the user's choice. The directory applicable to the commands is defined with the command `MMEMoRY:CDIR`. To access the files in this directory, you only have to give the file name, without the path and the file extension.

The command triggers an event and therefore has no query form and no *RST value.

Setting parameters:

<Delete> string

Example:

`MMEM:CDIR '<root>\Lists\Wcdma\CcodDpchUser'`
selects the directory for the user channel coding files.
`BB:W3GP:MST:ENH:DPDC:CCOD:USER:DEL 'user_cc1'`
deletes the specified file with user coding.

Usage: Setting only

**[:SOURCE<hw>] : BB : W3GPp : MSTation : ENHanced : DPDCh : CCODing : USER :LOAD
<Load>**

The command loads the specified files with stored user channel codings.

The files are stored with the fixed file extensions *.3g_ccod_ul in a directory of the user's choice. The directory applicable to the commands is defined with the command `MMEMoRY:CDIR`. To access the files in this directory, you only have to give the file name, without the path and the file extension.

Setting parameters:

<Load> string

Example:

`MMEM:CDIR '<root>\Lists\Wcdma\CcodDpchUser'`
selects the directory for the user channel coding files.
`BB:W3GP:MST:ENH:DPDC:CCOD:USER:LOAD 'user_cc1'`
loads the specified file with user coding.

Usage: Setting only

**[:SOURCE<hw>] : BB : W3GPp : MSTation : ENHanced : DPDCh : CCODing : USER :
STORe <Store>**

The command saves the current settings for channel coding as user channel coding in the specified file.

The files are stored with the fixed file extensions *.3g_ccod_ul in a directory of the user's choice. The directory in which the file is stored is defined with the command `MMEMoRY:CDIR`. To store the files in this directory, you only have to give the file name, without the path and the file extension.

Setting parameters:**<Store>** string**Example:**

```
MMEM:CDIR '<root>\Lists\Wcdma\CcodDpchUser'
```

selects the directory for the user channel coding files.

```
BB:W3GP:MST:ENH:DPDC:CCOD:USER:STOR 'user_cc1'
```

saves the current channel coding setting in file `user_cc1` in directory `<root>\Lists\Wcdma\CcodDpchUser`.

Usage:

Setting only

[:SOURCE<hw>]:BB:W3GPp:MSTation:ENHanced:DPDCh:DERRor:BIT:LAYer
<Layer>

The command selects the layer at which bit errors are inserted.

Parameters:**<Layer>** TRANsport | PHYSical**TRANsport**

Transport Layer (Layer 2). This layer is only available when channel coding is active.

PHYSical

Physical layer (Layer 1)

*RST: PHYSical

Example:

```
BB:W3GP:MST:ENH:DPDC:DERR:BIT:LAY PHYS
```

selects layer 1 for entering bit errors.

[:SOURCE<hw>]:BB:W3GPp:MSTation:ENHanced:DPDCh:DERRor:BIT:RATE
<Rate>

The command sets the bit error rate.

Parameters:**<Rate>** float

Range: 1E-7 to 5E-1

*RST: 1E-3

Example:

```
BB:W3GP:MST:ENH:DPDC:DERR:BIT:RATE 1E-2
```

sets a bit error rate of 0.01.

[:SOURCE<hw>]:BB:W3GPp:MSTation:ENHanced:DPDCh:DERRor:BIT:STATE
<State>

The command activates or deactivates bit error generation.

Bit errors are inserted into the data fields of the enhanced channels. When channel coding is active, it is possible to select the layer in which the errors are inserted (physical or transport layer). When the data source is read out, individual bits are deliberately inverted at random points in the data bit stream at the specified error rate in order to simulate an invalid signal.

Parameters:

<State> 0 | 1 | OFF | ON
 *RST: OFF

Example:

BB:W3GP:MST:ENH:DPDC:DERR:BIT:RATE 1E-2
 sets a bit error rate of 0.01.
 BB:W3GP:MST:ENH:DPDC:DERR:BIT:LAY PHYS
 selects layer 1 for entering bit errors.
 BB:W3GP:MST:ENH:DPDC:DERR:BIT:STAT ON
 activates bit error generation.

[:SOURCE<hw>]:BB:W3GPP:MSTation:ENHanced:DPDCh:DERRor:BLOCK:RATE
 <Rate>

The command sets the block error rate.

Parameters:

<Rate> float
 Range: 1E-4 to 5E-1
 *RST: 1e-1

Example:

BB:W3GP:MST:ENH:DPDC:DERR:BLOC:RATE 1E-2
 sets the block error rate to 0.01.

[:SOURCE<hw>]:BB:W3GPP:MSTation:ENHanced:DPDCh:DERRor:BLOCK:
STATE <State>

The command activates or deactivates block error generation. Block error generation is only possible when channel coding is activated.

During block error generation, the CRC checksum is determined and then the last bit is inverted at the specified error probability in order to simulate a defective signal.

Parameters:

<State> ON | OFF
 *RST: OFF

Example:

BB:W3GP:MST:ENH:DPDC:CCOD:STAT ON
 activates channel coding.
 BB:W3GP:MST:ENH:DPDC:DERR:BLOC:RATE 10E-2
 sets the block error rate to 0.1.
 BB:W3GP:MST:ENH:DPDC:DERR:BLOC:STAT ON
 activates block error generation.

[:SOURCE<hw>]:BB:W3GPP:MSTation:ENHanced:DPDCh:INTERleaver2
 <Interleaver2>

The command activates or deactivates channel coding interleaver state 2 for all the transport channels.

Interleaver state 1 can be activated and deactivated for each channel individually (`[:SOURce<hw>]:BB:W3GPp:MSTation:ENHanced:DPDCh:TCHannel<di>:INTerleaver`).

Note: The interleaver states do not cause the symbol rate to change

Parameters:

<Interleaver2> 0 | 1 | OFF | ON
*RST: ON

Example:

BB:W3GP:MST:ENH:DPDC:INT2 OFF
deactivates channel coding interleaver state 2 for all the transport channels.

[:SOURce<hw>]:BB:W3GPp:MSTation:ENHanced:DPDCh:ORATe?

The command queries the overall symbol rate (Overall Symbol Rate) of the enhanced channels. The value is set with the command `[:SOURce<hw>]:BB:W3GPp:MSTation<st>:DPDCh:ORATe`. This setting also defines the number of active channels, their symbol rates and channelization codes.

Return values:

<Orate> D15K | D30K | D60K | D120k | D240k | D480k | D960k | D1920k | D2880k | D3840k | D4800k | D5760k

Example:

BB:W3GP:MST:ENH:DPDC:ORAT?
queries the overall symbol rate of the DPDCH of user equipment 1.

Usage: Query only

[:SOURce<hw>]:BB:W3GPp:MSTation:ENHanced:DPDCh:STATe? <State>

Queries the enhanced state of the station.

Parameters:

<State> 0 | 1 | OFF | ON
*RST: ON

Example:

BB:W3GP:MST1:ENH:DPDC:STAT?

Usage: Query only

[:SOURce<hw>]:BB:W3GPp:MSTation:ENHanced:DPDCh:TCHannel<ch>:RMATtribute <Rmattribute>

The command sets data rate matching (Rate Matching).

Parameters:

<Rmattribute> float
Range: 16 to 1024
*RST: 256

Example: BB:W3GP:MST:ENH:DPDC:TCH:RMAT 1024
sets rate matching to 1024 for DTCH1.

**[:SOURCE<hw>]:BB:W3GPP:MSTation:ENHanced:DPDCh:TCHannel<ch>:STATE
<State>**

The command activates/deactivates the selected transport channel.

Parameters:
<State> 0 | 1 | OFF | ON
*RST: OFF

Example: BB:W3GP:MST:ENH:DPDC:TCH1:STAT
activates DTCH1.

**[:SOURCE<hw>]:BB:W3GPP:MSTation:ENHanced:DPDCh:TCHannel<ch>:
TBCount <Tbcount>**

The command sets the transport block count.

Parameters:
<Tbcount> float
Range: 1 to 16
*RST: 1

Example: BB:W3GP:MST:ENH:DPDC:TCH2:TBC 4
activates 4 transport blocks for DTCH1.

**[:SOURCE<hw>]:BB:W3GPP:MSTation:ENHanced:DPDCh:TCHannel<ch>:TBSize
<Tbsize>**

The command sets the size of the data blocks.

Parameters:
<Tbsize> float
Range: 0 to 4096
*RST: 100

Example: BB:W3GP:MST:ENH:DPDC:TCH2:TBS 1024
sets the length of the transport blocks for DTCH2 to 1024.

**[:SOURCE<hw>]:BB:W3GPP:MSTation:ENHanced:DPDCh:TCHannel<ch>:
TTInterval <Ttinterval>**

The command sets the number of frames into which a TCH is divided. This setting also defines the interleaver depth.

Parameters:
<Ttinterval> 10MS | 20MS | 40MS
*RST: 10MS

Example: `BB:W3GP:MST:ENH:DPDC:TCH2:TTIN 20ms`
sets that the transport channel is divided into 2 frames.

[:SOURce<hw>]:BB:W3GPp:MSTation:ENHanced:DPDCh:TCHannel<di>:CRCSize <Crcsize>

The command defines the CRC length for the selected transport channel. It is also possible to deactivate checksum determination.

Parameters:

<Crcsize> NONE | 8 | 12 | 16 | 24
*RST: 12

Example: `BB:W3GP:MST:ENH:DPDC:TCH:CRCS NONE`
deactivates checksum determination for DTCH1.

[:SOURce<hw>]:BB:W3GPp:MSTation:ENHanced:DPDCh:TCHannel<di>:DATA <Data>

Selects the data source for the transport channel.

Parameters:

<Data> ZERO | ONE | PATtern | PN9 | PN11 | PN15 | PN16 | PN20 | PN21 | PN23 | DLISt

PNxx

The pseudo-random sequence generator is used as the data source. Different random sequence lengths can be selected.

DLISt

A data list is used. The data list is selected with the command

`[:SOURce<hw>]:BB:W3GPp:MSTation:ENHanced:DPDCh:TCHannel<di>:DATA:DSElect.`

ZERO | ONE

Internal 0 and 1 data is used.

PATtern

Internal data is used. The bit pattern for the data is defined by the

command `[:SOURce<hw>]:BB:W3GPp:MSTation:ENHanced:DPDCh:TCHannel<di>:DATA:PATtern.`

*RST: PN9

Example: `BB:W3GP:MST:ENH:DPDC:TCH2:DATA PATT`
selects as the data source for the data fields of DTCH2 of user equipment 1, the bit pattern defined with the following command.
`BB:W3GP:MST:ENH:DPDC:TCH2:DATA:PATT #H3F, 8`
defines the bit pattern.

[:SOURce<hw>]:BB:W3GPp:MSTation:ENHanced:DPDCh:TCHannel<di>:DATA:DSElect <Dselect>

The command selects the data list for the enhanced channels for the DLISt selection.

The files are stored with the fixed file extensions `*.dm_iqd` in a directory of the user's choice. The directory applicable to the commands is defined with the command `MMEMoRY:CDIR`. To access the files in this directory, you only have to give the file name, without the path and the file extension.

Parameters:

<Dselect> string

Example:

```
BB:W3GP:MST:ENH:DPDC:TCH1:DATA DLIS
selects the Data Lists data source.
MMEMoRY:CDIR '<root>\Lists\Dm\IQData'
selects the directory for the data lists.
BB:W3GP:MST:ENH:DPDC:TCH1:DATA:DSEL 'TCH1'
selects the file tch1 as the data source.
```

**[:SOURce<hw>]:BB:W3GPp:MSTation:ENHanced:DPDCh:TCHannel<di>:DATA:
PATtern <Pattern>**

The command determines the bit pattern for the `PATtern` data source selection for transport channels.

Parameters:

<Pattern> <bit pattern>
*RST: #H0, 1

Example:

```
BB:W3GP:MST:ENH:DPDC:TCH0:DATA:PATT #H3F, 8
defines the bit pattern for DCCH.
```

**[:SOURce<hw>]:BB:W3GPp:MSTation:ENHanced:DPDCh:TCHannel<di>:
EPRotectioN <Eprotection>**

The command determines the error protection.

Parameters:

<Eprotection> NONE | TURBo3 | CON2 | CON3

NONE
No error protection.

TURBo3
Turbo Coder of rate 1/3 in accordance with the 3GPP specifications.

CON2 | CON3
Convolution Coder of rate 1/2 or 1/3 with generator polynomials defined by 3GPP.

*RST: CON1/3

Example:

```
BB:W3GP:MST:ENH:DPDC:TCH1:EPR NONE
error protection is deactivated.
```

**[:SOURCE<hw>]:BB:W3GPp:MSTation:ENHanced:DPDCh:TCHannel<di>:
INTerleaver <INTerleaver>**

The command activates or deactivates channel coding interleaver state 1 for the selected channel. Interleaver state 1 can be activated and deactivated for each channel individually. The channel is selected via the suffix at TCHannel.

Interleaver state 2 can only be activated or deactivated for all the channels together ([\[:SOURCE<hw>\]:BB:W3GPp:MSTation:ENHanced:DPDCh:INTerleaver2](#)).

Parameters:

<INTerleaver> 0 | 1 | OFF | ON
*RST: ON

Example:

BB:W3GP:MST:ENH:DPDC:TCH5:INT1 OFF
deactivates channel coding interleaver state 1 for TCH 5.

**[:SOURCE<hw>]:BB:W3GPp:MSTation:ENHanced:PCPCh:CCODing:STATE
<State>**

The command activates or deactivates channel coding for the PCPCH.

When channel coding is active, the symbol rate is limited to the range between 15 and 120 ksps. Values above this limit are automatically set to 120 ksps.

Parameters:

<State> ON | OFF
*RST: OFF

Example:

BB:W3GP:MST:ENH:PCPC:CCOD:TYPE TB168
selects channel coding type CPCH RMC (TB size 168 bits).
BB:W3GP:MST:ENH:PCPC:CCOD:STAT ON
activates channel coding.

[:SOURCE<hw>]:BB:W3GPp:MSTation:ENHanced:PCPCh:CCODing:TYPE <Type>

The command selects the channel coding scheme in accordance with the 3GPP specification.

Parameters:

<Type> TB168 | TB360
TB168
CPCH RMC (TB size 168 bits)
TB360
CPCH RMC (TB size 360 bits)
*RST: TB168

Example:

BB:W3GP:MST:ENH:PCPC:CCOD:TYPE TB168
selects channel coding scheme RMC 168 bits.

```
[ :SOURce<hw>]:BB:W3GPp:MSTation<st>:ENHanced:PRACH:CCODing:STATe
<State>
```

The command activates or deactivates channel coding for the PRACH.

Parameters:

```
<State>          ON | OFF
*RST:           OFF
```

Example:

```
BB:W3GP:MST:ENH:PRAC:CCOD:TYPE TB168
selects channel coding type RACH RMC (TB size 168 bits).
BB:W3GP:MST:ENH:PRAC:CCOD:STAT ON
activates channel coding.
```

```
[ :SOURce<hw>]:BB:W3GPp:MSTation<st>:ENHanced:PRACH:CCODing:TYPE
<Type>
```

The command selects the channel coding scheme in accordance with the 3GPP specification.

Parameters:

```
<Type>          TB168 | TB360
TB168
RACH RMC (TB size 168 bits)
TB360
RACH RMC (TB size 360 bits)
*RST:           TB168
```

Example:

```
BB:W3GP:MST:ENH:PRAC:CCOD:TYPE TB168
selects channel coding scheme RMC 168 bits.
```

7.11 Setting up Test Cases according to TS 25.141

The signal generator gives you the opportunity to generate predefined settings which enable tests on base stations in conformance with the 3G Standard 3GPP-FDD. It offers a selection of predefined settings according to Test Cases in TS 25.141. The settings take effect only after execution of command

```
[SOURce:]BB:W3GPp:TS25141:TCASe:EXECute.
```

The test setups and equipment requirements for each Test Case are described in [chapter 6.1, "Introduction"](#), on page 256.

Unlike most of the other commands of the `SOURce:BB:W3GPp` Subsystem, key word `SOURce` is without Suffix. Signal routing is possible only for Test Cases that do not use diversity and is performed via command `:SOURce:BB:W3GPp:TS25141:ROUTE.`

[:SOURce]:BB:W3GPP:TS25141:AWGN:CNRatio <Cnratio>

This command sets the carrier/noise ratio in mode "User definable" (:SOURce:BB:W3GPP:TS25141:EMODE USER). It is query only in mode "According to Standard" (:SOURce:BB:W3GPP:TS25141:EMODE STANdard).

Sets command :SOURce1|2:AWGN:CNR after execution
of :SOURce:BB:W3GP:TS25141:TCASe:EXECute

Parameters:

<Cnratio> float
Range: -40 dB to 40 dB
Increment: 0.01 dB
*RST: -16.8 dB

Example:

BB:W3GP:TS25141:TCAS TC73
selects test case 7.3.
BB:W3GP:TS25141:EMOD STAN
selects mode "According to Standard". Only settings in compliance with the standard can be made.
BB:W3GP:TS25141:AWGN:CNR?
queries the signal/noise ratio of the interfering signal.
Response: -16.80
the signal/noise ratio of the interfering signal is -16.8 dB.

Options: Test Cases 7.3, 8.x (not 8.6); minimum requirement: Options B13, B10/B11, K42 and K62; For additionally required options see selected test case.

[:SOURce]:BB:W3GPP:TS25141:AWGN:ENRatio <Enratio>

This command sets the ratio of bit energy to noise power density in mode "User definable" (:SOURce:BB:W3GPP:TS25141:EMODE USER). It is query only in mode "According to Standard" (:SOURce:BB:W3GPP:TS25141:EMODE STANdard).

Sets command :SOURce1|2:AWGN:ENR after execution
of :SOURce:BB:W3GP:TS25141:TCASe:EXECute

Parameters:

<Enratio> float
Range: -80 dB to 80 dB
Increment: 0.01 dB
*RST: 8.7 dB

- Example:** `BB:W3GP:TS25141:TCAS TC821`
selects test case 8.2.1.
`BB:W3GP:TS25141:EMOD STAN`
selects mode "According to Standard". Only settings in compliance with the standard can be made.
`BB:W3GP:TS25141:AWGN:ENR?`
queries the ratio of bit energy to noise power density of the interfering signal.
Response: 8.70
the E/N ratio of the interfering signal is 8.7 dB.
- Options:** Test Cases 8.x (not 8.6); minimum requirement: Options B13, B10/B11, K42 and K62; For additionally required options see selected test case

[:SOURce]:BB:W3GPP:TS25141:AWGN:POWer:NOISe?

This command sets the noise level in mode "User definable" (:SOURce:BB:W3GPP:TS25141:EMODE USER). It is query only in mode "According to Standard" (:SOURce:BB:W3GPP:TS25141:EMODE STANdard).

Sets command :SOURce1|2:AWGN:POW:NOISe after execution
of :SOURce:BB:W3GP:TS25141:TCASe:EXECute

Return values:

<Noise> float
Increment: 0.1 dB
*RST: Depending on the selected test case

- Example:** `BB:W3GP:TS25141:TCAS TC73`
selects test case 7.3.
`BB:W3GP:TS25141:EMOD STAN`
selects mode "According to Standard". Only settings in compliance with the standard can be made.
`BB:W3GP:TS25141:AWGN:POW:NOIS?`
queries the noise level of the interfering signal.
Response: -73
the noise level of the interfering signal is -73 dB.

- Usage:** Query only
- Options:** Test Cases 7.3, 8.x (not 8.6); minimum requirement: Options B13, B10/B11, K42 and K62; For additionally required options see selected test case

[:SOURce]:BB:W3GPP:TS25141:AWGN:RBLock:RATE <Rate>

This command sets the required block error rate in edit mode "According to Standard" (:SOURce:BB:W3GPP:TS25141:EMODE STANdard). The possible selection depends on the set fading configuration.

Parameters:

<Rate> B0 | B01 | B001 | B0001
 *RST: B001

Example:

BB:W3GP:TS25141:TCAS TC893
 selects test case 8.9.3.
 BB:W3GP:TS25141:EMOD STAN
 selects mode "According to Standard". Only settings in compliance with the standard can be made.
 BB:W3GP:TS25141:AWGN:RBL:RATE B01
 sets the required block error rate to < 0.01.

Options:

Test Cases 8.x (not 8.6, 8.8.1, 8.8.2, 8.9.1, 8.9.2); minimum requirement: Options B13, B10/B11, K42 and K62; For additionally required options see selected test case
 Test Cases 8.x (not 8.6, 8.8.1, 8.9.1); minimum requirement: Options B13, B10/B11, K42 and K62; For additionally required options see selected test case

[:SOURce]:BB:W3GPP:TS25141:AWGN:RPDeTection:RATE <Rate>

This command sets the required probability of detection of preamble (Pd) in edit mode "According to Standard" (:SOURce:BB:W3GPP:TS25141:EMODE STANdard). The selection determines the ratio E_b/N_0 .

Parameters:

<Rate> PD099 | PD0999
 *RST: PD099

Example:

BB:W3GP:TS25141:TCAS TC892
 selects test case 8.9.2.
 BB:W3GP:TS25141:EMOD STAN
 selects mode "According to Standard". Only settings in compliance with the standard can be made.
 BB:W3GP:TS25141:AWGN:RPD:RATE PD099
 sets the required probability of detection of preamble to > 0.99. The E/N ratio of the interfering signal is -8.8 dB.

Options:

Test Cases 8.8.1, 8.8.2, 8.9.1, 8.9.2; minimum requirement: Options B13, B10/B11, K42 and K62; For additionally required options see selected test case

[:SOURce]:BB:W3GPP:TS25141:AWGN:STATe <State>

This command enables/disables the generation of the AWGN signal in mode "User Definable". In mode "According to Standard" the state is fixed to "ON".

Sets command :SOURce1 | 2:AWGN:STATe after execution
 of :SOURce:BB:W3GP:TS25141:TCASe:EXECute.

Setting up Test Cases according to TS 25.141

Parameters:

<State> 0 | 1 | OFF | ON
 *RST: ON

Example:

BB:W3GP:TS25141:TCAS TC892
 selects test case 8.9.2.
 BB:W3GP:TS25141:EMOD USER
 selects mode "User definable". Also settings that are not in compliance with the standard can be made.
 BB:W3GP:TS25141:AWGN:STAT OFF
 disables the generation of the AWGN signal.

Options:

Test Cases 7.3, 8.x (not 8.6); minimum requirement: Options B13, B10/B11, K42 and K62; For additionally required options see selected test case.

[:SOURCE]:BB:W3GPP:TS25141:BSPClass <Bspclass>

This command enters the base station power class in mode A"ccording to Standard" (:SOURCE:BB:W3GPP:TS25141:EMODE STANDard). The selected power class determines the output level of the signal generator. For edit mode "User Definable" (:SOURCE:BB:W3GPP:TS25141:EMODE USER), the output level can be set with command :SOURCE:BB:W3GPP:TS25141:WSIGNAL:POWER.

Sets the power commands associated with the selected test case (e.g. :SOURCE1|2:POWER) after execution of :SOURCE:BB:W3GP:TS25141:TCASE:EXECute

Parameters:

<Bspclass> WIDE | MEDIUM | LOCAL
 *RST: WIDE

Example:

BB:W3GP:TS25141:BSPC WIDE
 the base station under test is a wide area base station.

Options:

All test cases except for 6.6; minimum requirement: Options B13, B10/B11 and K42; For additionally required options see selected test case.

[:SOURCE]:BB:W3GPP:TS25141:BSSIGNAL:FREQUENCY <Frequency>

This command enters the RF frequency of the base station.

Parameters:

<Frequency> float
 Range: 100 kHz to 6 GHz
 *RST: 1.0 GHz

Example:

BB:W3GP:TS25141:BSS:FREQ 1GHz
 the frequency of the base station under test is 1 GHz.

Options:

Test case 6.6; Options B13, B10/B11 and K42

[[:SOURce]:BB:W3GPP:TS25141:BSSignal:POWer <Power>

This command enters the RF power of the base station.

Parameters:

<Power> float
 Range: -145 dBm to 20 dBm
 Increment: 0.1 dBm
 *RST: -30.0 dBm

Example:

BB:W3GP:TS25141:TCAS TC66
 selects test case 6.6.
 BB:W3GP:TS25141:BSS:POW -30
 the power of the base station under test is -30 dBm.

Options: Test case 6.6; Options B13, B10/B11 and K42.

[[:SOURce]:BB:W3GPP:TS25141:EMODe <Emode>

This command selects the edit mode for the configuration of the test cases.

Parameters:

<Emode> STANdard | USER
STANdard
 Edit mode "According to Standard". Only settings in compliance with TS 25.141 are possible. All other parameters are preset.
USER
 Edit mode "User definable". A wider range of settings is possible
 *RST: STAN

Example:

BB:W3GP:TS25141:EMOD USER
 selects edit mode "User definable".

Options: All test cases; minimum requirement: Options B13, B10/B11 and K42; For additionally required options see selected test case.

[[:SOURce]:BB:W3GPP:TS25141:FSIMulator:STATe?

This command queries the state of the Fading Simulator. For test cases using static propagation conditions this parameter is set to OFF.

For test cases using multipath fading, moving propagation or birth/death propagation conditions, this parameter is set to ON.

Return values:

<State> 0 | 1 | OFF | ON

Example:	<pre>BB:W3GP:TS25141:TCAS TC892 selects test case 8.9.2. BB:W3GP:TS25141:FSIM:STAT? queries the state of the fading simulator. Response: 0 the fading simulator is disabled.</pre>
Usage:	Query only
Options:	Test Cases 8.x (not 8.6); minimum requirement Options B13, B10/B11, B14, B15, K42, K62 and K71; For additionally required options see selected test case.

[:SOURCE]:BB:W3GPP:TS25141:IFSignal:BWIDth <Bwidth>

This command selects the interferer scenario.

Parameters:

<Bwidth> WIDE | NARRow

WIDE

A 3GPP FDD uplink interfering signal is generated for path B. In "According to Standard" mode, the 3GPP FDD uplink interfering signal is superimposed by a CW interfering signal with a frequency of 10 MHz and a level of -48 dB.

NARROW

A GMSK interfering signal (3.84 MHz bandwidth, root cosine filter 0.22, PRBS9 data source) is generated for path B. In "According to Standard" mode, the GMSK interfering signal is superimposed by a CW interfering signal with a frequency of 3.5 MHz and a level of -47 dB

*RST: WIDE

Example:	<pre>BB:W3GP:TS25141:TCAS TC76 selects test case 7.6. BB:W3GP:TS25141:IFS:BWID WIDE selects a 3GPP FDD uplink interfering signal 1</pre>
-----------------	--

Options:	Test Case 7.6; Option K62 and B20x, two options B13, B10/B11, and K42 each.
-----------------	---

[:SOURCE]:BB:W3GPP:TS25141:IFSignal:CNRatio <Cnratio>

This command sets the power ratio of wanted signal to interfering signal for test case 7.4 in mode "User definable" (:SOURCE:BB:W3GPP:TS25141:EMODE USER). It is query only in mode "According to Standard" (:SOURCE:BB:W3GPP:TS25141:EMODE STANdard).

This command sets the power ratio of interfering signal to wanted signal for test case 6.6 in mode "User definable" (:SOURCE:BB:W3GPP:TS25141:EMODE USER). It is query only in mode "According to Standard" (:SOURCE:BB:W3GPP:TS25141:EMODE STANdard).

Sets command : `SOURce2:POWer` after execution
of : `SOURce:BB:W3GP:TS25141:TCAS:EXECute`.

Parameters:

<Cnratio> float
Range: -80 dB to 80 dB
Increment: 0.01 dB
*RST: -63 dB

Example:

`BB:W3GP:TS25141:TCAS TC74`
selects test case 7.4.
`BB:W3GP:TS25141:EMOD STAN`
selects mode "According to Standard". Only settings in compliance with the standard can be made.
`BB:W3GP:TS25141:IFS:CNr?`
queries the power ratio.
Response: -63.0
the signal/noise ratio of the interfering signal is -63 dB.

Options:

Test case 6.6; Options B13, B10/B11 and K42 Test case 7.4;
Options B13, B10/B11, B20x , and two options K42.

[:SOURce]:BB:W3GPP:TS25141:IFSignal:CW:FOFFset <Foffset>

This command sets frequency offset of the CW interfering signal versus the wanted signal RF frequency. In mode "According to Standard"

(`:SOURce:BB:W3GPP:TS25141:EMODE STANdard`) the frequency offset value is fixed to a value determined by the selected "Interferer Bandwidth"

(`:SOURce:BB:W3GPP:TS25141:IFS:BWIDth`).

Sets commands : `SOURce2:FREQ`, `:SOURce2:BB:FOFF`

and `:SOURce2:AWGN:FREQ:TARGet` after execution

of `:SOURce:BB:W3GP:TS25141:TCAS:EXEC`

Parameters:

<Foffset> float
Range: -40 MHz to 40 MHz
Increment: 0.01 Hz
*RST: 10 MHz

Example:

`BB:W3GP:TS25141:TCAS TC76`
selects test case 7.6.
`BB:W3GP:TS25141:EMOD STAN`
selects mode "According to Standard". Only settings in compliance with the standard can be made.
`BB:W3GP:TS25141:IFS:IFS:BWID WIDE`
selects interferer scenario wideband.
`BB:W3GP:TS25141:IFS:CW:FOFF?`
queries the frequency offset of the CW interferer.
Response: 10000000
the frequency offset is 10 MHz.

Options: Test Case 7.6; Options B20x and K62, second option B10/B11 and B13 each, two options K42.

[:SOURCE]:BB:W3GPP:TS25141:IFSignal:CW:POWER <Power>

This command sets the RF level of the CW interfering signal. In mode "According to Standard" (:SOURCE:BB:W3GPP:TS25141:EMODE STANdard) the RF level value is fixed to a value determined by the selected "Interferer Bandwidth" (:SOURCE:BB:W3GPP:TS25141:IFS:BWIDth).

Sets commands :SOURCE2:AWGN:CNRatio and :SOURCE2:AWGN:POWER:NOISE after execution of :SOURCE:BB:W3GP:TS25141:TCAS:EXEC

Parameters:

<Power> float
 Range: -145 dBm to 20 dBm
 Increment: 0.01 dBm
 *RST: -48 dBm

Example:

```
BB:W3GP:TS25141:TCAS TC76
selects test case 7.6.
BB:W3GP:TS25141:EMOD STAN
selects mode "According to Standard". Only settings in compli-
ance with the standard can be made.
BB:W3GP:TS25141:IFS:BWID NARR
selects interferer scenario narrowband.
BB:W3GP:TS25141:IFS:CW:POW?
queries the RF level of the CW interferer.
Response: -47
the RF level is -47.00 dBm.
```

Options: Test Case 7.6; Options B20x and K62, two options B10/B11, B13, two options and K42 each.

[:SOURCE]:BB:W3GPP:TS25141:IFSignal:CW:STATE <State>

This command enable/disables the CW interfering signal. In mode "According to Standard" (:SOURCE:BB:W3GPP:TS25141:EMODE STANdard) the value is fixed to ON.

Sets commands :SOURCE2:AWGN:CNRatio and :SOURCE2:AWGN:POWER:NOISE after execution of :SOURCE:BB:W3GP:TS25141:TCAS:EXEC

Parameters:

<State> 0 | 1 | OFF | ON
 *RST: ON

- Example:** BB:W3GP:TS25141:TCAS TC76
selects test case 7.6.
BB:W3GP:TS25141:EMOD STAN
selects mode According to Standard. Only settings in compliance with the standard can be made.
BB:W3GP:TS25141:IFS:BWID NARR
selects interferer scenario narrowband.
BB:W3GP:TS25141:IFS:CW:STAT?
queries the state of the CW interferer.
Response: 1
the CW interferer is enabled.
- Options:** Test Case 7.6; Options B20x and K62, second option B10/B11 and B13 each, two options K42.

[:SOURCE]:BB:W3GPP:TS25141:IFSignal:FOFFset <Foffset>

This command sets frequency offset of the interfering signal versus the wanted signal RF frequency. For test case 7.4, the choice is limited to +/- 5 MHz in mode "According to Standard" (:SOURCE:BB:W3GPP:TS25141:EMODE STANdard).

Sets commands :SOURCE2:FREQ after execution
of :SOURCE:BB:W3GP:TS25141:TCAS:EXEC

Parameters:

<Foffset> float
Range: -40 MHz to 40 MHz
Increment: 0.01 Hz
*RST: 1 MHz

- Example:** BB:W3GP:TS25141:TCAS TC74
selects test case 7.4.
BB:W3GP:TS25141:EMOD STAN
selects mode "According to Standard". Only settings in compliance with the standard can be made.
BB:W3GP:TS25141:IFS:FOFF 0.5 MHz
sets the frequency offset of the interferer to 5 MHz.

- Options:** Test cases 7.4 / 7.5; Option B20x, two options B10/B11, B13 and K42 each.

[:SOURCE]:BB:W3GPP:TS25141:IFSignal:MODulated:FOFFset <Foffset>

This command sets frequency offset of the modulated interfering signal versus the wanted signal RF frequency. In mode "According to Standard" (:SOURCE:BB:W3GPP:TS25141:EMODE STANdard) the frequency offset value is fixed to a value determined by the selected "Interferer Bandwidth" (:SOURCE:BB:W3GPP:TS25141:IFS:BWIDth).

Sets commands :SOURCE2:FREQ and :SOURCE2:BB:FOFF after execution
of :SOURCE:BB:W3GP:TS25141: TCAS:EXEC

Parameters:

<Foffset> float
 Range: -40 MHz to 40 MHz
 Increment: 0.01 Hz
 *RST: 20 MHz

Example:

BB:W3GP:TS25141:TCAS TC76
 selects test case 7.6.
 BB:W3GP:TS25141:EMOD STAN
 selects mode According to Standard. Only settings in compliance with the standard can be made.
 BB:W3GP:TS25141:IFS:BWID WIDE
 selects interferer scenario wideband.
 BB:W3GP:TS25141:IFS:MOD:FOFF?
 queries the frequency offset of the modulated interferer.
 Response: 20000000
 the frequency offset is 20 MHz.

Options:

Test Case 7.6; Options B20x and K62, second option B10/B11 and B13 each, two options K42.

[:SOURce]:BB:W3GP:TS25141:IFSignal:MODulated:POWER <Power>

This command sets the RF level of the modulated interfering signal. In mode "According to Standard" (:SOURce:BB:W3GP:TS25141:EMODE STANdard) the RF level value is fixed to a value determined by the selected "Interferer Bandwidth" (:SOURce:BB:W3GP:TS25141:IFS: BWIDth).

Sets command :SOURce2:POWER after execution
 of :SOURce:BB:W3GP:TS25141:TCAS:EXEC

Parameters:

<Power> float
 Range: -145 dBm to 20 dBm
 Increment: 0.01 dBm
 *RST: -48 dBm

Example:

BB:W3GP:TS25141:TCAS TC76
 selects test case 7.6.
 BB:W3GP:TS25141:EMOD STAN
 selects mode "According to Standard". Only settings in compliance with the standard can be made.
 BB:W3GP:TS25141:IFS:BWID NARR
 selects interferer scenario narrowband.
 BB:W3GP:TS25141:IFS:MOD:POW?
 queries the RF level of the modulated interferer.
 Response: -47
 the RF level is 47.00 dBm.

Options:

Test Case 7.6; Options B20x and K62, second option B10/B11 and B13 each, two options K42.

[:SOURCE]:BB:W3GPP:TS25141:IFSignal:MODulated:STATE <State>

This command enable/disables the modulated interfering signal. In mode "According to Standard" (:SOURCE:BB:W3GPP:TS25141:EMODE STANDARD) the value is fixed to ON.

Sets command :SOURCE2:W3GP:STAT (Bandwidth Type Wideband)
 or :SOURCE2:DM:STATE (Bandwidth Type Narrowband) after execution
 of :SOURCE:BB:W3GP:TS25141:TCASE:EXEC

Parameters:

<State> 0 | 1 | OFF | ON
 *RST: ON

Example:

```
BB:W3GP:TS25141:TCAS TC76
selects test case 7.6.
BB:W3GP:TS25141:EMOD STAN
selects mode "According to Standard". Only settings in compli-
ance with the standard can be made.
BB:W3GP:TS25141:IFS:BWID NARR
selects interferer scenario narrowband.
BB:W3GP:TS25141:IFS:MOD:STAT?
queries the state of the modulated interferer.
Response: 1
the modulated interferer is enabled.
```

Options: Test Case 7.6; Options B20x and K62, second option B10/B11 and B13 each, two options K42.

[:SOURCE]:BB:W3GPP:TS25141:IFSignal:MODulated:TYPE <Type>

This command selects the type of modulation for the interfering uplink signal in the second path. In mode "According to Standard" (:SOURCE:BB:W3GPP:TS25141:EMODE STANDARD) the modulation type is fixed to "WCDMA" for interferer scenario wideband and to "GMSK" for interferer scenario narrowband (:BB:W3GPP:TS25141:IFSignal:BWIDth WIDE|NARROW).

Sets commands of subsystem :SOURCE2:W3GPP:... (WCDMA)
 or :SOURCE2:DM:... (QPSK and GMSK) after execution
 of :SOURCE:BB:W3GP:TS25141:TCASE:EXEC

Parameters:

<Type> WCDMA | CW | GMSK | QPSK
 *RST: WCDMA

Example: BB:W3GP:TS25141:TCAS TC76
selects test case 7.6.
BB:W3GP:TS25141:EMOD STAN
selects mode "According to Standard". Only settings in compliance with the standard can be made.
BB:W3GP:TS25141:IFS:BWID NARR
selects interferer scenario narrowband.
BB:W3GP:TS25141:IFS:MOD:TYPE?
queries the type of the modulated interferer.
Response: GMSK
the modulation type is GMSK.

Options: Test case 7.6 Options; B20x and K62, second option B10/B11 and B13 each, two options K42.

[:SOURce]:BB:W3GP:TS25141:IFSignal:POWer <Power>

This command sets the RF level of the interfering signal. In mode "According to Standard" (:SOURce:BB:W3GP:TS25141:EMODE STANdard) the RF level value is fixed to a value determined by the selected "Blocking Scenario" (:SOURce:BB:W3GP:TS25141:WSIGnal: BTYPE).

Sets command :SOURce2:POWer after execution
of :SOUR:BB:W3GP:TS25141:TCASe:EXEC

Parameters:

<Power> float
Range: -145 dBm to 20 dBm
Increment: 0.01 dBm
*RST: -15 dBm

Example: BB:W3GP:TS25141:TCAS TC75
selects test case 7.6.
BB:W3GP:TS25141:EMOD STAN
selects mode "According to Standard". Only settings in compliance with the standard can be made.
BB:W3GP:TS25141:WSIG:BTYP NARR
selects blocking scenario narrowband.
BB:W3GP:TS25141:IFS:POW?
queries the RF level of the CW interferer.
Response: -47
the RF level is -47.00 dBm.

Options: Test case 7.5; Option B20x, second option B10/B11 and B13 each, two options K42.

[:SOURCE]:BB:W3GPP:TS25141:IFSignal:SETTING:TMODEL:BSTation <Bstation>

This command selects the interfering signal from a list of test models in accordance with TS 25.141. All test models refer to the predefined downlink configurations. In edit mode "According to Standard" (:SOURCE:BB:W3GPP:TS25141:EMODE STANdard) Test Model 1, 64 DPCHs is fixed.

Sets commands of subsystem :SOURCE1:W3GPP: . . . after execution
of :SOURCE:BB:W3GP:TS25141:TCASE:EXEC

Parameters:

<Bstation> TM164 | TM116 | TM132 | TM2 | TM316 | TM332 | TM4 | TM538 |
TM528 | TM58
*RST: TM164

Example:

```
BB:W3GP:TS25141:TCAS TC66
selects test case 6.6.
BB:W3GP:TS25141:EMOD USER
selects mode "User Definable".
BB:W3GP:TS25141:IFS:SETT:TMOD:BST TM116
the interfering signal is generated according to test model Test
Model 1; 16 Channels.
```

Options: Test case 6.6; Options B13, B10/B11 and K42.

[:SOURCE]:BB:W3GPP:TS25141:IFSignal:STATe <State>

This command enable/disables the modulated interfering signal. In mode "According to Standard" (:SOURCE:BB:W3GPP:TS25141:EMODE STANdard) the value is fixed to ON.

Parameters:

<State> 0 | 1 | OFF | ON
*RST: ON

Example:

```
BB:W3GP:TS25141:TCAS TC75
selects test case 7.5.
BB:W3GP:TS25141:EMOD STAN
selects mode "According to Standard". Only settings in compli-
ance with the standard can be made.
BB:W3GP:TS25141:IFS:STAT?
queries the state of the interferer.
Response: 1
the interferer is enabled.
```

Options: Test cases 7.4 / 7.5; Options B13, B10/B11, B20x , and two K42

[:SOURCE]:BB:W3GPP:TS25141:IFSignal:TYPE <Type>

This command selects the type of modulation for the interfering signal. In mode "According to Standard" (:SOURCE:BB:W3GPP:TS25141:EMODE STANdard) the modulation type is fixed to "WCDMA" for test case 7.4 and to "GMSK" for test case 7.5.

Parameters:

<Type> WCDMa | CW | GMSK | QPSK
 *RST: WCDMa

Example:

BB:W3GP:TS25141:TCAS TC75

selects test case 7.5.

BB:W3GP:TS25141:EMOD STAN

selects mode According to Standard. Only settings in compliance with the standard can be made.

BB:W3GP:TS25141:IFS:TYPE?

queries the type of the interferer.

Response: CW

the modulation type is CW interferer.

Options:

Test cases 7.4 / 7.5; Options B13, B10/B11, B20x , and two K42.

[:SOURCE]:BB:W3GPP:TS25141:ROUTE <Route>

The command selects the signal routing for baseband A signal which in most test cases represents the wanted signal (exception test case 6.6). The command is only available for two-path-instruments and only for test cases that do not use both paths anyway.

Parameters:

<Route> A | B

A

The baseband signal A is routed to RF output A.

B

The baseband signal A is routed to RF output B.

*RST: A

Example:

BB:W3GP:TS25141:ROUTE B

the baseband signal of path A is introduced into path B.

Options:

All test cases; minimum requirement: Option B20x, B10/B11, K42 and two options B13.

[:SOURCE]:BB:W3GPP:TS25141:RXDiversity <Rxdiversity>

The command sets the signal generator according to the base station diversity processing capability. The command is only available for two-path-instruments and only for test cases that do not use both paths anyway.

Sets the power commands associated with the selected test case

(e.g. :SOURCE1|2:POWER) after execution of

SOUR:BB:W3GP:TS25141:TCAS:EXECUTE

Parameters:

<Rxdiversity> 0 | 1 | OFF | ON

OFF

The baseband signal A is routed to either to RF output A or B.

ON

The baseband signal A is routed to RF output A and B.

*RST: OFF

Example:

BB:W3GP:TS25141:RXD ON

the baseband signal of path A is introduced into both paths.

Options:

Test cases 8.x; Options B20x, B14, B15, K71, and K62, two options B10/B11 and B13 each.

[[:SOURce]:BB:W3GP:TS25141:SCODE <Scode>

The command sets the scrambling code. The value range depends on whether the generator is used in uplink or downlink direction (test case 6.6) according to the selected test case.

Sets command :SOURce:BB:W3GP:BST:SCODE (test case 6.6)

or :SOURce:BB:W3GP:MST:SCODE after execution of

SOUR:BB:W3GP:TS25141:TCASe:EXECute

Sets command :SOURce:BB:W3GP:BST:SCODE (test case 6.6)

or :SOURce:BB:W3GP:MST:SCODE after execution of

SOUR:BB:W3GP:TS25141:TCASe:EXECute

Parameters:

<Scode> integer

*RST: #H0

Example:

BB:W3GP:TS25141:SCOD #H5FFF

sets scrambling code #H5FFF.

Options:

All test cases; minimum requirement: Options B13, B10/B11 and K42. For additionally required options see selected test case

[[:SOURce]:BB:W3GP:TS25141:SCODE:MODE <Mode>

The command sets the type for the scrambling code for the uplink direction. The scrambling code generator can also be deactivated. In downlink direction (test case 6.6), the scrambling generator can be switched on and off.

Sets command :SOUR:BB:W3GP:BST:SCOD:STAT (test case 6.6)

or :SOUR:BB:W3GP:MST:SCOD:MODE after execution of

SOUR:BB:W3GP:TS25141:TCASe:EXECute

Parameters:

<Mode> OFF | ON | LONG | SHORT

*RST: LONG | ON

Setting up Test Cases according to TS 25.141

Example: `BB:W3GP:TS25141:SCOD:MODE OFF`
deactivates the scrambling code generator.

Options: All test cases; minimum requirement: Options B13, B10/B11 and K42. For additionally required options see selected test case.

[[:SOURce]:BB:W3GPp:TS25141:TCASe <Tcase>

The command selects a test case defined by the standard. The signal generator is preset according to the selected standard. The selected edit mode (`SOURce:BB:W3GP:TS25141:EMODE`) determines the range of parameters that can be adjusted.

Depending on the selected test case the parameters of the TS25141 commands are preset. For most test cases also the parameters of one or more of the subsystems `SOURce:AWGN`, `SOURce:W3GPp`, `SOURce:DM` and `SOURce:FSIM` are preset. The pre-set parameters are activated with command `:BB:W3GP:TS25141:TCAS:EXEC`

Parameters:

<Tcase> TC642 | TC66 | TC72 | TC73 | TC74 | TC75 | TC76 | TC78 | TC821 |
TC831 | TC832 | TC833 | TC834 | TC84 | TC85 | TC86 | TC881 |
TC882 | TC883 | TC884 | TC891 | TC892 | TC893 | TC894
*RST: TC642

Example: `BB:W3GP:TS25141:TCAS TC73`
selects the test case 7.3, Dynamic Range.

Options: Minimum requirement: Options B13, B10/B11 and K42 .

[[:SOURce]:BB:W3GPp:TS25141:TCASe:EXECute

The command activates the current settings of the test case wizard. Signal generation is started at the first trigger received by the generator. The RF output is not activated / deactivated by this command, so care has to be taken that "RF State" is "On" (`OUTPut:STATE ON`) at the beginning of the measurement.

The command activates the preset parameters of the TS25141 commands and - for most test cases - also the parameters of one or more of the subsystems `SOURce:AWGN`, `SOURce:W3GPp`, `SOURce:DM` and `SOURce:FSIM`.

- Example:**
- ```
BB:W3GP:TS25141:TCAS TC73
selects the settings for test case 7.3, Dynamic Range.
BB:W3GP:TS25141:BSPC MED
sets the base station power class Medium Range BS.
BB:W3GP:TS25141:SCOD #H000FFF
sets the uplink scrambling code 'H000FFF'.
BB:W3GP:TS25141:WSIG:FREQ 1710MHz
sets the wanted signal frequency.
BB:W3GP:TS25141:TCAS:EXEC
activates the settings for test case 7.3, Dynamic Range. For all
other parameters the preset values are used.
OUTP ON
activates RF output A.
```
- Options:** Minimum requirement: Options B13, B10/B11 and K42. For additionally required options see selected test case.

---

**[:SOURce]:BB:W3Gpp:TS25141:TRIGger <Trigger>**

The command selects the trigger mode. The trigger is used to synchronize the signal generator to the other equipment.

When `AUTO` is selected, all commands concerning the baseband trigger settings are adjusted to the requirements of the selected test case after execution of `SOUR:BB:W3GP:TS25141:TCAS:EXECute`.

**Parameters:**

<Trigger>

AUTO | PRESet | SINGLE

**AUTO**

The trigger settings are customized for the selected test case. In most cases trigger setting "Armed Auto" with external trigger source "External Trigger 1" is used. Unless otherwise noted the trigger delay is set equal to zero.

**PRESet**

The current trigger settings of the signal generator are kept.

\*RST: AUTO

**Example:**

```
BB:W3GP:TS25141:TRIG AUTO
```

selects customization of trigger mode for the selected test case

**Options:**

All test cases; Minimum requirement: Options B13, B10/B11 and K42. For additionally required options see selected test case.

---

**[:SOURce]:BB:W3Gpp:TS25141:TRIGger:OUTPut <Output>**

The command defines the signal for the selected marker output.

When "AUTO" is selected, all commands of the `W3Gpp` Subsystem concerning the marker settings are adjusted to the selected test case after execution of `SOUR:BB:W3GP:TS25141:TCAS:EXEC`

**Parameters:**

&lt;Output&gt; AUTO | PRESet

**AUTO**

The marker settings are customized for the selected test case.

**PRESet**

The current marker settings of the signal generator are kept.

\*RST: AUTO

**Example:**

BB:W3GP:TS25141:TRIG:OUTP PRES

selects that the current marker setting are kept independently of the selected test case.

**Options:**

All test cases; Minimum requirement: Options B13, B10/B11 and K42. For additionally required options see selected test case.

**[[:SOURce]:BB:W3GPP:TS25141:WSIGnal:BTYPe <Btype>**

The command selects the type of blocking scenario in edit mode "According to Standard" (SOURce:BB:W3GP:TS25141:EMODE STAN). The selected blocking scenario determines the type of interfering signal and its level.

Determines the settings of subsystems :SOUR:BB:W3GP:...

(WIDE), :SOUR:BB:DM:... (NARRow) or :SOUR:FREQ:... and OUTPut:... (COLocated and WIDE) after execution

of :SOURce:BB:W3GP:TS25141:TCASe:EXECute

**Parameters:**

&lt;Btype&gt; WIDE | COLocated | NARRow

**WIDE**

The interferer signal for wide band blocking depends on the set "Operating Band" and "RF Frequency":

As long as the interferer "RF frequency" lies within the selected "Operating Band", a 3GPP FDD uplink signal with a power level of -40 dB is generated for path B.

When the interferer "RF Frequency" lies outside the selected "Operating Band", a CW carrier interfering signal with a power level of -15 dB is generated for path B.

**COLocated**

A CW carrier interfering signal with a power level of -15 dB is generated for path B.

**NARRow**

A GMSK (270.833 kHz) interfering signal with a power level of -47 dB is generated for path B.

\*RST: WIDE

**Example:**

BB:W3GP:TS25141:TCAS TC75

selects the settings for test case 7.5, Blocking Characteristics.

BB:W3GP:TS25141:WSIG:BTYP NARR

selects the GMSK (270.833 kHz) interfering signal

Setting up Test Cases according to TS 25.141

**Options:** Test case 7.5; Option B20x, two options B10/B11, B13 and K42 each.

---

**[:SOURCE]:BB:W3GPP:TS25141:WSIGNAL:DCRATIO <Dcratio>**

The command sets channel power ratio of DPCCH to DPDCH.

Sets commands :SOUR:BB:W3GP:MST1:DPCC:POW  
and :SOUR:BB:W3GP:MST1:DPDC:POW after execution of  
SOUR:BB:W3GP:TS25141:TCAS:EXEC

**Parameters:**

<Dcratio> float  
Range: -80 dB to 80 dB  
Increment: 0.01 dB  
\*RST: 0 dB

**Example:** BB:W3GP:TS25141:TCAS TC642  
selects the settings for test case 6.4.2, Power Control Steps.  
BB:W3GP:TS25141:WSIG:DCR -3 dB  
sets a ratio of -3 dB for DPCCH power/DPDCH power

**Options:** Test case 6.4.2; Options B13, B10/B11 and K42

---

**[:SOURCE]:BB:W3GPP:TS25141:WSIGNAL:DPCCH:SFORMAT <Sformat>**

The command sets the slot format for the DPCCH. The slot format defines the FBI mode and the TFCI status.

Sets command :SOUR:BB:W3GP:MST1:DPCC:SFOR after execution of  
SOUR:BB:W3GP:TS25141:TCAS:EXEC

**Parameters:**

<Sformat> float  
Range: 0 to 5  
\*RST: 0

**Example:** BB:W3GP:TS25141:TCAS TC642  
selects the settings for test case 6.4.2, Power Control Steps.  
BB:W3GP:TS25141:WSIG:DPCC:SFOR 3  
selects slot format 3 for the DPCCH

**Options:** Test case 6.4.2; Options B13, B10/B11 and K42

---

**[:SOURCE]:BB:W3GPP:TS25141:WSIGNAL:DPCCH:TPC:RDATa <Rdata>**

The command sets the TPC repeat pattern for verification of the base stations power control steps.

Sets command : `SOUR:BB:W3GP:MST1:DPCC:TPC:DATA` to `DLIST` and activates a predefined data list for TPC pattern (command : `SOUR:BB:W3GP:MST1:DPCC:TPC:DATA:DSEL`) The commands are set only after execution of : `SOURCE:BB:W3GP:TS25141:TCASe:EXECute`

**Parameters:**

&lt;Rdata&gt;

SINGLE | AGGRegated | ONE | ZERO | PATtern | DLISt

**AGGRegated**

A 000000000111111111 pattern is sent periodically for measurement of the transmitter aggregated power control step range after 10 consecutive equal commands.

**DLISt**

The TPC repeat pattern is taken from a data list. The data list is selected with the command

```
SOURCE:BB:W3GP:TS25141:DPDCh:TPC:RDAT:DSElect.
```

**ONE**

A all 1 pattern is sent continuously. The base station is forced to maximum power. This selection is only available in edit mode 'User Definable' (`SOURCE:BB:W3GP:TS25141:EMODE USER`).

**PATtern**

Internal data is used. The bit pattern for the data is defined by

```
SOURCE:BB:W3GP:TS25141:DPDCh:TPC:RDAT:PATtern.
```

The maximum length is 64 bits. This selection is only available in edit mode "User Definable"

```
(SOURCE:BB:W3GP:TS25141:EMODE USER).
```

**SINGLE**

A 01 pattern is sent periodically for measurement of the transmitter power control step tolerance.

**ZERO**

A all 0 pattern is sent continuously. The base station is forced to minimum power. This selection is only available in edit mode "User Definable" (`SOURCE:BB:W3GP:TS25141:EMODE USER`).

```
*RST: SINGLE
```

**Example:**

```
BB:W3GP:TS25141:TCAS TC642
```

selects the settings for test case 6.4.2, Power Control Steps.

```
BB:W3GP:TS25141:WSIG:DPCC:TPC:RDAT SING
```

selects the 01 pattern

**Options:**

Test case 6.4.2; Options B13, B10/B11 and K42

---

```
[:SOURCE]:BB:W3GPp:TS25141:WSIGnal:DPCCCh:TPC:RDATa:DSElect <Dselect>
```

The command selects the data list when the "DLISt" data source is selected for the "TPC" repeat pattern of the "DPCCH".

The files are stored with the fixed file extensions \*.dm\_iqd in a directory of the user's choice. The directory applicable to the commands is defined with the command `MMEMoRY:CDIR`. To access the files in this directory, only the file name has to be given, without the path and the file extension.

Determines contents of the predefined data list used with command `:SOUR:BB:W3GP:MST1:DPCC:TPC:DTA:DSEL` after execution of `SOUR:BB:W3GP:TS25141:TCAS:EXEC`

**Parameters:**

<Dselect>                    <data\_list\_name>

**Example:**

```
BB:W3GP:TS25141:TCAS TC642
selects the settings for test case 6.4.2, Power Control Steps.
BB:W3GP:TS25141:WSIG:DPCC:TPC:RDAT DLIS
selects the data source DLIS
MME:CDIR 'D:\Lists\Dm\IQData'
selects the directory for the data lists.
BB:W3GP:TS25141:WSIG:DPCC:TPC:RDAT:DSEL
'dpcch_tpc_1'
selects the data list dpcch_tpc1.
```

**Options:**                    Test case 6.4.2; Options B13, B10/B11 and K42

**[:SOURce]:BB:W3GP:TS25141:WSIGnal:DPCCCh:TPC:RDATa:PATtern** <Pattern>

The command determines the bit pattern for the "PATtern" data source selection. The maximum length of the bit pattern is 64 bits. This command is only available in edit mode "User Definable" (`SOURce:BB:W3GP:TS25141:EMODE USER`).

Determines the contents of the predefined data list used with command `:SOUR:BB:W3GP:MST1:DPCC:TPC:DTA:DSEL` after execution of `SOUR:BB:W3GP:TS25141:TCAS:EXEC`

**Parameters:**

<Pattern>                    integer  
\*RST:                    #H0, 1

**Example:**

```
BB:W3GP:TS25141:TCAS TC642
selects the settings for test case 6.4.2, Power Control Steps.
BB:W3GP:TS25141:WSIG:DPCC:TPC:RDAT PATT
selects the data source pattern
BB:W3GP:TS25141:WSIG:DPCC:TPC:RDAT:PATT
#HF0C20,19
defines the TPC pattern
```

**Options:**                    Test case 6.4.2; Options B13, B10/B11 and K42



---

**[:SOURCE]:BB:W3GPP:TS25141:WSIGNAL:DPCCh:TPC:SDATa <Sdata>**

The command sets the TPC pattern for initialization of the base stations power level in edit mode "User Definable" (SOURCE:BB:W3GP:TS25141:EMODE USER). In edit mode "According to Standard" (SOURCE:BB:W3GP:TS25141:EMODE STAN) the pattern is fixed to "Maximum Power Less n Steps" (PMAXlessnsteps). The TPC start pattern is sent before the TPC repeat pattern to set the base station to a defined initial state for the measurement.

Sets command : SOUR:BB:W3GP:MST1:DPCC:TPC:DATA to DLIST and activates a predefined data list

**Parameters:**

<Sdata>

PMAX | DLIST

**PMAXlessnsteps**

A sequence of power up steps (TPC bits "1") is followed by a number of power down steps (TPC bits "0"). The TPC bits "1" ('power up' commands) force the base station to maximum transmit power. By the n 'power down' commands the base station is set to a defined number of n power steps (e.g. 1 dB or 0.5 dB) below its maximum transmit power at the beginning of the measurement.

**DLIST**

The TPC start pattern is taken from a data list. The data list is selected with the command

SOURCE:BB:W3GP:TS25141:DPDCh:TPC:SDAT:DSElect.

This selection is only available in edit mode "User Definable" (SOURCE:BB:W3GP:TS25141:EMODE USER).

\*RST: PMAX

**Example:**

BB:W3GP:TS25141:TCAS TC642

selects the settings for test case 6.4.2, Power Control Steps.

BB:W3GP:TS25141:WSIG:DPCC:TPC:SDAT PMAX

selects the 01 pattern

**Options:**

Test case 6.4.2; Options B13, B10/B11 and K42

---

**[:SOURCE]:BB:W3GPP:TS25141:WSIGNAL:DPCCh:TPC:SDATa:DSElect <Dselect>**

The command selects the data list when the DLIST data source is selected for the "TPC" start pattern of the "DPCCH".

The files are stored with the fixed file extensions \*.dm\_iqd in a directory of the user's choice. The directory applicable to the commands is defined with the command MMEMORY:CDIR. To access the files in this directory, only the file name has to be given, without the path and the file extension.

Determines contents of the predefined data list used with com-

mand : SOUR:BB:W3GP:MST1:DPCC:TPC:DTA:DSEL after execution of

SOUR:BB:W3GP:TS25141:TCAS:EXEC

**Parameters:****<Dselect>** <data\_list\_name>**Example:**

BB:W3GP:TS25141:TCAS TC642

selects the settings for test case 6.4.2, Power Control Steps.

BB:W3GP:TS25141:WSIG:DPCC:TPC:SDAT DLIS

selects the data source DLIS for TPC start pattern.

MMEM:CDIR 'D:\Lists\Dm\IQData'

selects the directory for the data lists.

BB:W3GP:TS25141:WSIG:DPCC:TPC:SDAT:DSEL

'dpcch\_tpc\_s'

selects the data list dpcch\_tpcs.

**Options:**

Test case 6.4.2; Options B13, B10/B11 and K42

---

**[:SOURce]:BB:W3GP:TS25141:WSIG:DPCC:TPC:SDAT:PDSTeps**  
 <Pdsteps>

The command sets the number of power down bits in the "TPC" start pattern. The total TPC start pattern length is the number of 'power up' ('1') bits plus the number of n 'power down' ('0') bits. This parameter is only available for TPC Start Pattern = Max. Pow. Less N Steps (:BB:W3GP:TS25141:WSIG:DPCC:TPC:SDAT PMAXlessnsteps).

Determines contents of the predefined data list used with command :SOUR:BB:W3GP:MST1:DPCC:TPC:DTA:DSEL after execution of SOUR:BB:W3GP:TS25141:TCAS:EXEC

**Parameters:****<Pdsteps>** float

Range: 1 to 1000

\*RST: 1

**Example:**

BB:W3GP:TS25141:TCAS TC642

selects the settings for test case 6.4.2, Power Control Steps.

BB:W3GP:TS25141:WSIG:DPCC:TPC:SDAT PMAX

selects the pattern Max. Pow. Less N Steps

BB:W3GP:TS25141:WSIG:DPCC:TPC:SDAT:PUST 100

defines 100 power up steps. Presumably the base station is set to to maximum transmit power.

BB:W3GP:TS25141:WSIG:DPCC:TPC:SDAT:PDST 10

defines 10 power down steps. The base station is set to two power steps below its maximum transmit power.

**Options:**

Test case 6.4.2; Options B13, B10/B11 and K42

---

**[:SOURce]:BB:W3Gp:TS25141:WSIGnal:DPCC:TPC:SDATa:PUSteps**  
<Pusteps>

The command sets the number of power up bits in the TPC start pattern. The total TPC start pattern length is the number of 'power up' ('1') bits plus the number of n 'power down' ('0') bits. This parameter is only available for TPC Start Pattern = "Max. Pow. Less N Steps" (:BB:W3GP:TS25141:WSIG:DPCC:TPC:SDAT PMAXlessnsteps).

Determines contents of the predefined data list used with command :SOUR:BB:W3GP:MST1:DPCC:TPC:DTA:DSEL after execution of SOUR:BB:W3GP:TS25141:TCAS:EXEC

**Parameters:**

<Pusteps> float  
Range: 1 to 1000  
\*RST: 1

**Example:**

BB:W3GP:TS25141:TCAS TC642  
selects the settings for test case 6.4.2, Power Control Steps.  
BB:W3GP:TS25141:WSIG:DPCC:TPC:SDAT PMAX  
selects the pattern "Max. Pow. Less N Steps"  
BB:W3GP:TS25141:WSIG:DPCC:TPC:SDAT:PUST 100  
defines 100 power up bits. The base station is (presumably) set to maximum transmit power.  
BB:W3GP:TS25141:WSIG:DPCC:TPC:SDAT:PDST 10  
defines 10 power down bits. The base station is set to two power steps below its maximum transmit power. The TPC start patten is 110 bits long.

**Options:** Test case 6.4.2; Options B13, B10/B11 and K42

---

**[:SOURce]:BB:W3Gp:TS25141:WSIGnal:DPDCh:CCODing:TYPE** <Type>

The command selects the channel coding scheme in accordance with the 3GPP specification. The channel coding scheme selected predetermines the overall symbol rate. In mode "According to Standard" (SOURce:BB:W3GP:TS25141:EMODE STAN), RMC 12.2 kbps (M12K2) is selected.

Sets command :BB:W3GP:MST:ENH:DPDC:CCOD:TYPE  
and :BB:W3GP:MST:DPDC:ORAT after execution  
of :SOURce:BB:W3GP:TS25141:TCASe:EXECute

**Parameters:**

&lt;Type&gt;

M12K2 | M64K | M144k | M384k | AMR

**M12K2**

Measurement channel with an input data bit rate of 12.2 ksps

**M64K**

Measurement channel with an input data bit rate of 64 ksps

**M144K**

Measurement channel with an input data bit rate of 144 ksps

**M384K**

Measurement channel with an input data bit rate of 384 ksps

**AMR**

Channel coding for the AMR Coder (coding a voice channel)

\*RST: M12K2

**Example:**

```
BB:W3GP:TS25141:WSIG:DPDC:CCOD:TYPE M144K
selects channel coding scheme RMC 144 kbps.
```

**Options:**

Test cases 7.3, 8.x; minimum requirement: Options B13, B10/B11, K42 and K62; For additionally required options see selected test case

**[:SOURCE]:BB:W3GP:TS25141:WSIG:DPDC:DERR:BIT:RATE <Rate>**

The command sets the bit error rate. For test case 7.8 in mode "According to Standard" (SOURCE:BB:W3GP:TS25141:EMODE STAN), only values 0.00 (no bit errors are inserted) and 0.01 (1 percent bit errors are inserted) are available. For test case 8.6 this command is only available for mode "User Definable"

(SOURCE:BB:W3GP:TS25141:EMODE USER).

Sets command : SOUR:BB:W3GP:MST1:DPDC:ENH:DERR:BIT:RATE after execution of SOUR:BB:W3GP:TS25141:TCASE:EXECUTE.

**Parameters:**

&lt;Rate&gt;

float

Range: 0 to 0.1

Increment: 0.001

\*RST: 0

**Example:**

```
BB:W3GP:TS25141:WSIG:DPDC:DERR:BIT:RATE 1E-2
sets a bit error rate of 0.01.
```

**Options:**

Test cases 7.8, 8.6; minimum requirement: Options B13, B10/B11, K42 and K62. For additionally required options see selected test case

**[[:SOURce]:BB:W3GPP:TS25141:WSIGnal:DPDCh:DERRor:BLOCk:RATE <Rate>**

The command sets the block error rate. For test case 8.6 in mode "According to Standard" (SOURce:BB:W3GP:TS25141:EMODE STAN), only values 0.00 (no block errors are inserted) and 0.01 (1 percent block errors are inserted) are available. For test case 7.8 this command is only available for mode "User Definable" (SOURce:BB:W3GP:TS25141:EMODE USER).

Sets command : SOUR:BB:W3GP:MST1:DPDC:ENH:DERR:BLOC:RATE after execution of SOUR:BB:W3GP:TS25141:TCAS:EXECute

**Parameters:**

<Rate> float  
 Range: 0 to 0.1  
 Increment: 0.001  
 \*RST: 0

**Example:** BB:W3GP:TS25141:WSIG:DPDC:DERR:BLOC:RATE 1E-2  
 sets a bit error rate of 0.01.

**Options:** Test cases 7.8, 8.6; minimum requirement: Options B13, B10/B11 and K42. For additionally required options see selected test case

**[[:SOURce]:BB:W3GPP:TS25141:WSIGnal:DPDCh:ORATe <Orate>**

The command sets the overall symbol rate. The structure of the "DPDCH" channel table depends on this parameter. The overall symbol rate determines which "DPDCHs" are active, which symbol rate they have and which channelization codes they use.

Sets commands : BB:W3GP:MST:DPDCh:ORATe after execution of SOUR:BB:W3GP:TS25141:TCAS:EXECute

**Parameters:**

<Orate> D15K | D30K | D60K | D120k | D240k | D480k | D960k | D1920k | D2880k | D3840k | D4800k | D5760k  
**D15K ... D5760K**  
 15 ksps ... 6 x 960 ksps  
 \*RST: D60K

**Example:** BB:W3GP:TS25141:TCAS TC642  
 selects the settings for test case 6.4.2, Power Control Steps.  
 BB:W3GP:TS25141:WSIG:DPDC:ORAT D15K  
 sets the overall symbol rate to 15 ksps. Only "DPDCH1" is active, the symbol rate is 15 ksps and the channelization code is 64.

**Options:** Test case 6.4.2; Options B13, B10/B11, and K42

**[[:SOURce]:BB:W3GPP:TS25141:WSIGnal:FREQuency <Frequency>**

The command sets the RF frequency of the wanted signal.

Setting up Test Cases according to TS 25.141

Sets command : `SOUR:FREQ` after execution of  
`SOUR:BB:W3GP:TS25141:TCAS:EXECute`

**Parameters:**

<Frequency> float  
 Increment: 0.01 Hz  
 \*RST: 1 GHz

**Example:**

`BB:W3GP:TS25141:WSIG:FREQ 2.5GHz`  
 sets a frequency of 2.5 GHz for the wanted signal.

**Options:**

All test cases except for 6.6; minimum requirement: Options B13, B10/B11 and K42. For additionally required options see selected test case

**[:SOURce]:BB:W3GP:TS25141:WSIGnal:OBAND** <Oband>

The command selects the operating band of the base station for "Wideband Blocking". The operating band is required for calculation of power levels and interferer modulation.

Sets command : `BB:W3GP:TS25141:IFS:TYPE`

**Parameters:**

<Oband> I | II | III | IV | V | VI  
**I**  
 Operating band I: (1920 – 1980 MHz)  
**II**  
 Operating band II: (1850 – 1910 MHz)  
**III**  
 Operating band III: (1710 – 1785 MHz)  
**IV**  
 Operating band IV: (1710 – 1755 MHz)  
**V**  
 Operating band V: (824 – 849 MHz)  
**VI**  
 Operating band VI: (830 – 840 MHz)  
 Increment: 0.01 Hz  
 \*RST: 1 GHz

**Example:**

`BB:W3GP:TS25141:TCAS TC75`  
 selects the settings for test case 7.5, Blocking Characteristics.  
`BB:W3GP:TS25141:EMOD STAN`  
 selects mode "According to Standard". Only settings in compliance with the standard can be made.  
`BB:W3GP:TS25141:WSIG:BTYP WIDE`  
 selects blocking scenario wideband.  
`BB:W3GP:TS25141:WSIG:OBAN III`  
 selects operating band III.

**Options:**

Test case 7.5; Option B20x, two options B10/B11, B13 and K42 each.

---

**[:SOURCE]:BB:W3GPP:TS25141:WSIGNAL:PCPCh:CCODing:TYPE <Type>**

The command selects the Transport Block Size.

Sets commands :BB:W3GP:MST:ENH:PCPC:CCOD:TYPE

**Parameters:**

<Type> TB168 | TB360

**TB168**  
transport block size 168 bits

**TB360**  
transport block size 360 bits

\*RST: TB168

**Example:**

BB:W3GP:TS25141:TCAS TC893  
selects the settings for test case 8.9.3, Demodulation of CPCH Message in Static Propagation Conditions.

BB:W3GP:TS25141:WSIG:PCPC:CCOD:TYPE TB168  
selects transport block size 168 bits.

**Options:**

Test case 8.9.3; Option B20xs, and two option B13, B10/B11, and K42 each

---

**[:SOURCE]:BB:W3GPP:TS25141:WSIGNAL:POWer <Power>**

The command sets the RF level of the wanted signal in mode "User Definable" (SOURCE:BB:W3GP:TS25141:EMODE USER). In edit mode "According to Standard" (SOURCE:BB:W3GP:TS25141:EMODE STAN) the RF level is determined by the selected "Power Class" (SOURCE:BB:W3GP:TS25141:BSPC).

Sets command :SOURCE:POWer

**Parameters:**

<Power> float

Range: -145 dBm to 20 dBm

Increment: 0.01 dBm

\*RST: -120.3 dBm

**Example:**

BB:W3GP:TS25141:WSIG:POW?  
queries the RF level of the wanted signal.

Response:103.1  
the RF level is -103.1 dBm

**Options:**

Test cases 7.x, 8.x, 6.4.2; minimum requirement: Options B13, B10/B11 and K42. For additionally required options see selected test case

---

**[:SOURCE]:BB:W3GPP:TS25141:WSIGNAL:PRACH:CCODing:TYPE <Type>**

The command selects the Transport Block Size.

Sets commands :BB:W3GP:MST:ENH:PRAC:CCOD:TYPE

Setting up Test Cases according to TS 25.141

**Parameters:**

<Type> TB168 | TB360

**TB168**  
transport block size 168 bits

**TB360**  
transport block size 360 bits

\*RST: TB168

**Example:**

BB:W3GP:TS25141:TCAS TC883  
selects the settings for test case 8.8.3, Demodulation of RACH Message in Static Propagation Conditions.

BB:W3GP:TS25141:WSIG:PRAC:CCOD:TYPE TB168  
selects transport block size 168 bits.

**Options:**

Test case 8.8.3; Option B20x, and two options B13, B10/B11, and K42 each

**[[:SOURce]:BB:W3Gpp:TS25141:WSIGnal:STATe <State>**

This command enables/disables the generation of the wanted signal in mode "User Definable". In mode "According to Standard" the state is fixed to "ON."

Sets command :BB:W3GP:STATe after execution of

SOUR:BB:W3GP:TS25141:TCASe:EXECute.

**Parameters:**

<State> 0 | 1 | OFF | ON

\*RST: ON

**Example:**

BB:W3GP:TS25141:TCAS TC892  
selects test case 8.9.2, CPCH Access Preamble and Collision Detection in Multipath Fading Case 3.

BB:W3GP:TS25141:EMOD USER  
selects mode "User definable". Also settings that are not in compliance with the standard can be made.

BB:W3GP:TS25141:WSIG:STAT OFF  
disables the generation of the wanted signal.

**Options:**

Test cases 6.4.2, 7.3, 8.x; minimum requirement: Options B13, B10/B11, K62 and K42. For additionally required options see selected test case

**[[:SOURce]:BB:W3Gpp:TS25141:WSIGnal:TRIGger[:EXTernal<ch>]:DELay <Delay>**

The command sets an additional propagation delay besides the fixed DL-UL timing offset of 1024 chip periods.

The additional propagation delay is obtained by charging the start trigger impulse with the respective delay.



Setting up Test Cases according to TS 25.141

Sets command :BB:W3GP:TRIGger:EXTeRnal:DELay after execution of  
SOUR:BB:W3GP:TS25141:TCASe:EXEC

**Parameters:**

<Delay> float  
Range: 0 chips to 65535 chips  
\*RST: 0 chips

**Example:**

BB:W3GP:TS25141:TCAS TC642  
selects the settings for test case 6.4.2, Power Control Steps.  
BB:W3GP:TS25141:WSIG:TRIG:EXT:DEL 14  
sets a additional propagation delay of 14 chips.

**Options:**

Test case 6.4.2. Options B13, B10/B11, and K42

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| [:SOURCE<hw>]:BB:W3Gpp:MSTation:UDTX:OFFSet.....                        | 492 |
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| [:SOURCE<hw>]:BB:W3Gpp:MSTation<st>:CHANnel<ch>:DPDCh:DATA.....         | 455 |
| [:SOURCE<hw>]:BB:W3Gpp:MSTation<st>:CHANnel<ch>:DPDCh:DATA:DSElect..... | 455 |
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| [:SOURCE<hw>]:BB:W3Gpp:MSTation<st>:CMODE:PATtern<ch>:TGL<di>.....      | 429 |
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| [:SOURCE<hw>]:BB:W3Gpp:MSTation<st>:DPCCh:FBI:MODE.....                 | 431 |
| [:SOURCE<hw>]:BB:W3Gpp:MSTation<st>:DPCCh:FBI:PATtern.....              | 432 |
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| [:SOURCE<hw>]:BB:W3Gpp:MSTation<st>:DPCCh:HS:HAPattern.....             | 440 |
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| [:SOURCE<hw>]:BB:W3Gpp:MSTation<st>:DPCCh:HS:MIMO:POCA.....             | 444 |
| [:SOURCE<hw>]:BB:W3Gpp:MSTation<st>:DPCCh:HS:MIMO:PONAck.....           | 443 |
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| [:SOURCE<hw>]:BB:W3Gpp:MSTation<st>:DPCCh:HS:MIMO:TTI<ch0>:PCI.....     | 445 |
| [:SOURCE<hw>]:BB:W3Gpp:MSTation<st>:DPCCh:HS:MIMO:TTICount.....         | 444 |
| [:SOURCE<hw>]:BB:W3Gpp:MSTation<st>:DPCCh:HS:MIMO[:MODE].....           | 441 |
| [:SOURCE<hw>]:BB:W3Gpp:MSTation<st>:DPCCh:HS:MMODE.....                 | 447 |
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| [:SOURCE<hw>]:BB:W3Gpp:MSTation<st>:DPCCh:HS:POACK.....                 | 439 |
| [:SOURCE<hw>]:BB:W3Gpp:MSTation<st>:DPCCh:HS:PONAck.....                | 440 |
| [:SOURCE<hw>]:BB:W3Gpp:MSTation<st>:DPCCh:HS:POWer.....                 | 438 |
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| [:SOURCE<hw>]:BB:W3Gpp:MSTation<st>:DPCCh:HS:ROW<ch0>:HACK:FROM.....    | 448 |
| [:SOURCE<hw>]:BB:W3Gpp:MSTation<st>:DPCCh:HS:ROW<ch0>:HACK:TO.....      | 448 |
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| [:SOURCE<hw>]:BB:W3Gpp:MSTation<st>:DPCCh:HS:ROW<ch0>:PCQI:TO.....    | 451 |
| [:SOURCE<hw>]:BB:W3Gpp:MSTation<st>:DPCCh:HS:ROW<ch0>:POHAck.....     | 451 |
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| [:SOURCE<hw>]:BB:W3Gpp:MSTation<st>:DPCCh:HS:SCActive.....            | 448 |
| [:SOURCE<hw>]:BB:W3Gpp:MSTation<st>:DPCCh:HS:SDElay.....              | 438 |
| [:SOURCE<hw>]:BB:W3Gpp:MSTation<st>:DPCCh:HS:SLEngth.....             | 454 |
| [:SOURCE<hw>]:BB:W3Gpp:MSTation<st>:DPCCh:HS:SLEngth:ADJust.....      | 454 |
| [:SOURCE<hw>]:BB:W3Gpp:MSTation<st>:DPCCh:HS:STATe.....               | 437 |
| [:SOURCE<hw>]:BB:W3Gpp:MSTation<st>:DPCCh:HS:TTIDistance.....         | 439 |
| [:SOURCE<hw>]:BB:W3Gpp:MSTation<st>:DPCCh:POWer.....                  | 432 |
| [:SOURCE<hw>]:BB:W3Gpp:MSTation<st>:DPCCh:SFORmat.....                | 432 |
| [:SOURCE<hw>]:BB:W3Gpp:MSTation<st>:DPCCh:TFCI.....                   | 433 |
| [:SOURCE<hw>]:BB:W3Gpp:MSTation<st>:DPCCh:TFCI:STATe.....             | 433 |
| [:SOURCE<hw>]:BB:W3Gpp:MSTation<st>:DPCCh:TOFFset.....                | 433 |
| [:SOURCE<hw>]:BB:W3Gpp:MSTation<st>:DPCCh:TPC:DATA.....               | 434 |
| [:SOURCE<hw>]:BB:W3Gpp:MSTation<st>:DPCCh:TPC:DATA:DSElect.....       | 434 |
| [:SOURCE<hw>]:BB:W3Gpp:MSTation<st>:DPCCh:TPC:DATA:PATtern.....       | 434 |
| [:SOURCE<hw>]:BB:W3Gpp:MSTation<st>:DPCCh:TPC:MISuse.....             | 435 |
| [:SOURCE<hw>]:BB:W3Gpp:MSTation<st>:DPCCh:TPC:MODE.....               | 435 |
| [:SOURCE<hw>]:BB:W3Gpp:MSTation<st>:DPCCh:TPC:PSTep.....              | 436 |
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| [:SOURCE<hw>]:BB:W3Gpp:MSTation<st>:DPDCh:POWer.....                  | 457 |
| [:SOURCE<hw>]:BB:W3Gpp:MSTation<st>:DPDCh:STATe.....                  | 457 |
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| [:SOURCE<hw>]:BB:W3Gpp:MSTation<st>:PCPCh:DATA.....                   | 459 |
| [:SOURCE<hw>]:BB:W3Gpp:MSTation<st>:PCPCh:DATA:DSElect.....           | 459 |
| [:SOURCE<hw>]:BB:W3Gpp:MSTation<st>:PCPCh:DATA:PATtern.....           | 460 |
| [:SOURCE<hw>]:BB:W3Gpp:MSTation<st>:PCPCh:DPOWer.....                 | 460 |
| [:SOURCE<hw>]:BB:W3Gpp:MSTation<st>:PCPCh:FBI:MODE.....               | 460 |
| [:SOURCE<hw>]:BB:W3Gpp:MSTation<st>:PCPCh:FBI:PATtern.....            | 461 |
| [:SOURCE<hw>]:BB:W3Gpp:MSTation<st>:PCPCh:MLEngth.....                | 461 |
| [:SOURCE<hw>]:BB:W3Gpp:MSTation<st>:PCPCh:PLEngth.....                | 461 |
| [:SOURCE<hw>]:BB:W3Gpp:MSTation<st>:PCPCh:PPOWer.....                 | 461 |
| [:SOURCE<hw>]:BB:W3Gpp:MSTation<st>:PCPCh:PPOWer:STEP.....            | 462 |
| [:SOURCE<hw>]:BB:W3Gpp:MSTation<st>:PCPCh:PREPetition.....            | 462 |
| [:SOURCE<hw>]:BB:W3Gpp:MSTation<st>:PCPCh:SIGNature.....              | 462 |
| [:SOURCE<hw>]:BB:W3Gpp:MSTation<st>:PCPCh:SRATe.....                  | 463 |
| [:SOURCE<hw>]:BB:W3Gpp:MSTation<st>:PCPCh:TFCI.....                   | 463 |
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| [:SOURCE<hw>]:BB:W3GPP:MSTation<st>:PCPCh:TIMing:SPERiod.....                     | 464 |
| [:SOURCE<hw>]:BB:W3GPP:MSTation<st>:PCPCh:TIMing:TIME:PREMp.....                  | 464 |
| [:SOURCE<hw>]:BB:W3GPP:MSTation<st>:PCPCh:TIMing:TIME:PREPre.....                 | 465 |
| [:SOURCE<hw>]:BB:W3GPP:MSTation<st>:PCPCh:TPC:DATA.....                           | 465 |
| [:SOURCE<hw>]:BB:W3GPP:MSTation<st>:PCPCh:TPC:DATA:DSElect.....                   | 465 |
| [:SOURCE<hw>]:BB:W3GPP:MSTation<st>:PCPCh:TPC:DATA:PATtern.....                   | 466 |
| [:SOURCE<hw>]:BB:W3GPP:MSTation<st>:PCPCh:TPC:READ.....                           | 466 |
| [:SOURCE<hw>]:BB:W3GPP:MSTation<st>:PRACH:ATTiming.....                           | 467 |
| [:SOURCE<hw>]:BB:W3GPP:MSTation<st>:PRACH:CPOwer.....                             | 467 |
| [:SOURCE<hw>]:BB:W3GPP:MSTation<st>:PRACH:DATA.....                               | 468 |
| [:SOURCE<hw>]:BB:W3GPP:MSTation<st>:PRACH:DATA:DSElect.....                       | 468 |
| [:SOURCE<hw>]:BB:W3GPP:MSTation<st>:PRACH:DATA:PATtern.....                       | 468 |
| [:SOURCE<hw>]:BB:W3GPP:MSTation<st>:PRACH:DPOwer.....                             | 469 |
| [:SOURCE<hw>]:BB:W3GPP:MSTation<st>:PRACH:MLENght.....                            | 469 |
| [:SOURCE<hw>]:BB:W3GPP:MSTation<st>:PRACH:PPOwer.....                             | 469 |
| [:SOURCE<hw>]:BB:W3GPP:MSTation<st>:PRACH:PPOwer:STEP.....                        | 470 |
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| [:SOURCE<hw>]:BB:W3GPP:MSTation<st>:PRACH:SFOrmat.....                            | 470 |
| [:SOURCE<hw>]:BB:W3GPP:MSTation<st>:PRACH:SIGNature.....                          | 470 |
| [:SOURCE<hw>]:BB:W3GPP:MSTation<st>:PRACH:SRATe.....                              | 471 |
| [:SOURCE<hw>]:BB:W3GPP:MSTation<st>:PRACH:TFCI.....                               | 471 |
| [:SOURCE<hw>]:BB:W3GPP:MSTation<st>:PRACH:TIMing:DPOwer:MPARt.....                | 471 |
| [:SOURCE<hw>]:BB:W3GPP:MSTation<st>:PRACH:TIMing:DPOwer:MPARt:CONTRol.....        | 472 |
| [:SOURCE<hw>]:BB:W3GPP:MSTation<st>:PRACH:TIMing:DPOwer:MPARt:DATA.....           | 472 |
| [:SOURCE<hw>]:BB:W3GPP:MSTation<st>:PRACH:TIMing:DPOwer:PREAmble.....             | 472 |
| [:SOURCE<hw>]:BB:W3GPP:MSTation<st>:PRACH:TIMing:SOFFset.....                     | 473 |
| [:SOURCE<hw>]:BB:W3GPP:MSTation<st>:PRACH:TIMing:SPERiod.....                     | 473 |
| [:SOURCE<hw>]:BB:W3GPP:MSTation<st>:PRACH:TIMing:TIME:PREMp.....                  | 473 |
| [:SOURCE<hw>]:BB:W3GPP:MSTation<st>:PRACH:TIMing:TIME:PREPre.....                 | 473 |
| [:SOURCE<hw>]:BB:W3GPP:MSTation<st>:SCODE.....                                    | 427 |
| [:SOURCE<hw>]:BB:W3GPP:MSTation<st>:SCODE:MODE.....                               | 427 |
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