Supplement

Digital Standard CDMA2000

R&S® SMU-K46
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ROHDE&SCHWARZ
Test and Measurement Division

Dear Customer,

The Signal Generator includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit (http://www.openssl.org/).

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Trade names are trademarks of the owners.

Before putting the product into operation for the first time, make sure to read the following

Safety Instructions

All plants and locations of the Rohde & Schwarz group of companies make every effort to keep the safety standard of our products up to date and to offer our customers the highest possible degree of safety. Our products and the auxiliary equipment required for them are designed and tested in accordance with the relevant safety standards. Compliance with these standards is continuously monitored by our quality assurance system. The product described here has been designed and tested in accordance with the 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, 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 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 an 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 the product be used exclusively by skilled and specialized staff or thoroughly trained personnel with the required skills. If personal safety gear is required for using Rohde & Schwarz products, this will be indicated at the appropriate place in the product documentation.

Symbols and safety labels

Observe product documentation	Weight indication for units >18 kg	Danger of electric shock	Warning! Hot surface	PE terminal	Ground	Ground terminal	Attention! Electrostatic sensitive devices

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

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 putting the product into operation. It is also absolutely essential to observe the additional safety instructions on personal safety 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.

Tags and their meaning

DANGER	This tag indicates a definite hazard carrying a high risk of death or serious injury if not avoided.
WARNING	This tag indicates a possible hazard carrying a medium risk of death or (serious) injury if not avoided.
CAUTION	This tag indicates a hazard carrying a low risk of minor or moderate injury if not avoided.
ATTENTION	This tag indicates the possibility of incorrect use that can cause damage to the product.
NOTE	This tag indicates a situation where the user should pay special attention to operating the product but which does not lead to damage.

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 thus contribute to personal injury or material damage.

Basic safety instructions

1. The product may be operated only under the operating conditions and in the positions specified by the manufacturer. Its ventilation must not be obstructed during operation. Unless otherwise specified, the following requirements apply to Rohde & Schwarz products:
   prescribed operating position is always with the housing floor facing down, IP protection 2X, pollution severity 2, overvoltage category 2, use only in enclosed spaces, max. operation altitude 2000 m above sea level, max. transport altitude 4500 m above sea level.
   Unless specified otherwise in the data sheet, a tolerance of ±10% shall apply to the nominal voltage and of ±5% to the nominal frequency.
2. Applicable local or national safety regulations and rules for the prevention of accidents must be observed in all work performed. The product may be opened only by authorized, specially trained personnel. Prior to performing any work on the product or opening the product, the product must be disconnected from the supply network. Any adjustments, replacements of parts, maintenance or repair must be carried out only by technical personnel 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).
3. As with all industrially manufactured goods, the use of substances that induce an allergic reaction (allergens, e.g. nickel) such as aluminum cannot be generally excluded. If you develop an allergic reaction (such as a skin rash, frequent sneezing, red eyes or respiratory difficulties), consult a physician immediately to determine the cause.

4. If products/components are mechanically and/or thermically 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, e.g. for disposal purposes, by specially trained personnel. Improper disassembly may be hazardous to your health. National waste disposal regulations must be observed.
5. If handling the product yields 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.
6. Depending on the function, certain products such as RF radio equipment can produce an elevated level of electromagnetic radiation. Considering that unborn life requires increased protection, pregnant women should be protected by appropriate measures. Persons with pacemakers may also be endangered by electromagnetic radiation. The employer/operator is required to assess workplaces where there is a special risk of exposure to radiation and, if necessary, take measures to avert the danger.
7. Operating the products requires special training and intense concentration. Make certain that persons who use the products are physically, mentally and emotionally fit enough to handle operating the products; otherwise injuries or material damage may occur. It is the responsibility of the employer to select suitable personnel for operating the products.
8. Prior to switching on the product, it must be ensured 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.
9. In the case of products of safety class I with movable power cord and connector, operation is permitted only on sockets with earthing contact and protective earth connection.
10. 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.
11. If the product has no power switch for disconnection from the AC supply, the plug of the connecting cable is regarded as the disconnecting device. In such cases, it must be ensured 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. If products without power switches are integrated in racks or systems, a disconnecting device must be provided at the system level.
12. 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, ensure that the cable cannot be damaged and that no one can be hurt by e.g. tripping over the cable or suffering an electric shock.
13. 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).
14. Do not insert the plug into sockets that are dusty or dirty. Insert the plug firmly and all the way into the socket. Otherwise, this can result in sparks, fire and/or injuries.
15. Do not overload any sockets, extension cords or connector strips; doing so can cause fire or electric shocks.
16. For measurements in circuits with voltages V_{rms} > 30 V, suitable measures (e.g. appropriate measuring equipment, fusing, current limiting, electrical separation, insulation) should be taken to avoid any hazards.
17. Ensure that the connections with information technology equipment comply with IEC 950/EN 60950.
18. 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.

19. 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 license electrician.
20. 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 suitable protection is provided for users and products.
21. Do not insert any objects into the openings in the housing that are not designed for this purpose. Never pour any liquids onto or into the housing. This can cause short circuits inside the product and/or electric shocks, fire or injuries.
22. Use suitable overvoltage protection to ensure that no overvoltage (such as that caused by a thunderstorm) can reach the product. Otherwise the operating personnel will be endangered by electric shocks.
23. Rohde & Schwarz products are not protected against penetration of water, unless otherwise specified (see also safety instruction 1.). If this is not taken into account, there exists the danger of electric shock for the user or damage to the product, which can also lead to personal injury.
24. Never use the product under conditions in which condensation has formed or can form in or on the product, e.g. if the product was moved from a cold to a warm environment.
25. Do not close any slots or openings on the product, since they are necessary for ventilation and prevent the product from overheating. Do not place the product on soft surfaces such as sofas or rugs or inside a closed housing, unless this is well ventilated.
26. Do not place the product on heat-generating devices such as radiators or fan heaters. The temperature of the environment must not exceed the maximum temperature specified in the data sheet.
27. Batteries and storage batteries must not be exposed to high temperatures or fire. Keep batteries and storage batteries away from children. Do not short-circuit batteries and storage batteries.
    If batteries or storage batteries are improperly replaced, this can cause an explosion (warning: lithium cells). Replace the battery or storage battery only with the matching Rohde & Schwarz type (see spare parts list). Batteries and storage batteries must be recycled and kept separate from residual waste. Batteries and storage batteries that contain lead, mercury or cadmium are hazardous waste. Observe the national regulations regarding waste disposal and recycling.
28. Please be aware that in the event of a fire, toxic substances (gases, liquids etc.) that may be hazardous to your health may escape from the product.
29. The product can be very heavy. Be careful when moving it to avoid back or other physical injuries.
30. 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).
31. Handles on the products are designed exclusively for personnel to hold or carry the product. It is therefore not permissible to use handles for fastening the product to or on means of transport such as cranes, fork lifts, wagons, etc. The user is responsible for securely fastening the products to or on the means of transport and for observing the safety regulations of the manufacturer of the means of transport. Noncompliance can result in personal injury or material damage.
32. If you use the product in a vehicle, it is the sole responsibility of the driver to drive the vehicle safely. Adequately secure the product in the vehicle to prevent injuries or other damage in the event of an accident. Never use the product in a moving vehicle if doing so could distract the driver of the vehicle. The driver is always responsible for the safety of the vehicle. The manufacturer assumes no responsibility for accidents or collisions.
33. If a laser product (e.g. a CD/DVD drive) is integrated in a Rohde & Schwarz product, do not use any other settings or functions than those described in the product documentation. Otherwise this may be hazardous to your health, since the laser beam can cause irreversible damage to your eyes. Never try to take such products apart, and never look into the laser beam.

Por favor lea imprescindiblemente antes de la primera puesta en funcionamiento las siguientes

Informaciones de seguridad

El principio del grupo de empresas Rohde & Schwarz consiste en tener nuestros productos siempre al día con los estandards 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. Nuestra sección de gestión de la seguridad de calidad controla constantemente que sean cumplidas estas normas. El presente producto ha sido fabricado y examinado según el comprobante de conformidad adjunto según las normas de la CE y ha salido de nuestra planta en estado impecable según los estandards técnicos de seguridad. Para poder preservar este estado y garantizar un funcionamiento libre de peligros, el usuario deberá atenerse a todas las informaciones, 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 solamente fue elaborado para ser utilizado en la industria y el laboratorio o para fines de campo y de ninguna manera deberá ser utilizado de modo que alguna persona/cosa pueda ser dañada. El uso del producto fuera de sus fines definidos o despreciando las informaciones de seguridad 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.

Se parte del uso correcto del producto para los fines definidos si el producto es utilizado dentro de las instrucciones de la correspondiente documentación de 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 profundos y conocimientos parciales del idioma inglés. Por eso se deberá tener en cuenta de exclusivamente autorizar para el uso del producto a personas peritas o debidamente minuciosamente instruidas con los conocimientos citados. Si fuera necesaria indumentaria de seguridad para el uso de productos de R&S, encontrará la información debida en la documentación del producto en el capítulo correspondiente.

Símbolos y definiciones de seguridad

Ver documen-tación de producto	Informaciones para maquinaria con uns peso de > 18kg	Peligro de golpe de corriente	¡Advertencia! Superficie caliente	Conexión a conductor protector	Conexión a tierra	Conexión a masa conductora	¡Cuidado! Elementos de construcción con peligro de carga electroestática

potencia EN MARCHA/PARADA	Indicación Stand-by	Corriente continua DC	Corriente alterna AC	Corriente continua/alterna DC/AC	El aparato está protegido en su totalidad por un aislamiento de doble refuerzo

Tener en cuenta las informaciones de seguridad sirve para tratar de evitar daños y peligros de toda clase. Es necesario de que se lean las siguientes informaciones de seguridad concienzudamente y se tengan en cuenta debidamente antes de la puesta en funcionamiento del producto. También deberán ser tenidas en cuenta las informaciones para la protección de personas que encontrarán en el capítulo correspondiente de la documentación de producto y que también son obligatorias de seguir. En las informaciones de seguridad actuales hemos juntado todos los objetos vendidos por el grupo de empresas Rohde & Schwarz bajo la denominación de „producto“, entre ellos también aparatos, instalaciones así como toda clase de accesorios.

Palabras de señal y su significado

PELIGRO	Identifica un peligro directo con riesgo elevado de provocar muerte o lesiones de gravedad si no se toman las medidas oportunas.
ADVERTENCIA	Identifica un posible peligro con riesgo medio de provocar muerte o lesiones (de gravedad) si no se toman las medidas oportunas.
ATENCIÓN	Identifica un peligro con riesgo reducido de provocar lesiones de gravedad media o leve si no se toman las medidas oportunas.
CUIDADO	Indica la posibilidad de utilizar mal el producto y a consecuencia dañarlo.
INFORMACIÓN	Indica una situación en la que deberían seguirse las instrucciones en el uso del producto, pero que no consecuentemente deben de llevar a un daño del mismo.

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 de 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 malinterpretaciones y tener por consecuencia daños en personas u objetos.

Informaciones de seguridad elementales

1. El producto solamente debe ser utilizado según lo indicado por el fabricante referente a la situación y posición de funcionamiento sin que se obstruya la ventilación. Si no se convino de otra manera, es para los productos R&S válido lo que sigue:
   como posición de funcionamiento se define principialmente la posición con el suelo de la caja para abajo , modo de protección IP 2X, grado de suciedad 2, categoría de sobrecarga eléctrica 2, utilizar solamente en estancias interiores, utilización hasta 2000 m sobre el nivel del mar, transporte hasta 4.500 m sobre el nivel del mar.
   A menos que se especifique otra cosa en la hoja de datos, se aplicará una tolerancia de ±10% sobre el voltaje nominal y de ±5% sobre la frecuencia nominal.
2. En todos los trabajos deberán ser tenidas en cuenta las normas locales de seguridad de trabajo y de prevención de accidentes. El producto solamente debe de ser abierto por personal perito autorizado. Antes de efectuar trabajos en el producto o abrirlo deberá este ser desconectado de la corriente. El ajuste, el cambio de partes, la manutención y la reparación deberán ser solamente efectuadas por electricistas autorizados por R&S. Si se reponen partes con importancia para los aspectos de seguridad (por ejemplo el enchufe, los transformadores o los fusibles), solamente podrán ser sustituidos por partes originales. Despues de cada recambio de partes elementales para la seguridad deberá ser efectuado un control de seguridad (control a primera vista, control de conductor protector, medición de resistencia de aislamiento, medición de medición de la corriente conductora, control de funcionamiento).

3. Como en todo producto de fabricación industrial no puede ser excluido en general de que se produzcan al usarlo elementos que puedan generar alergias, los llamados elementos alergénicos (por ejemplo el níquel). Si se producieran en el trato con productos R&S reacciones alérgicas, como por ejemplo urticaria, estornudos frecuentes, irritación de la conjuntiva o dificultades al respirar, se deberá consultar inmediatamente a un médico para averigurar los motivos de estas reacciones.
4. Si productos / elementos de construcción son tratados fuera del funcionamiento definido de forma mecánica o térmica, pueden generarse elementos peligrosos (polvos de sustancia de metales pesados como por ejemplo plomo, berilio, níquel). La partición elemental del producto, como por ejemplo sucede en el tratamiento de materias residuales, debe de ser efectuada solamente por personal especializado para estos tratamientos. La partición elemental efectuada inadecuadamente puede generar daños para la salud. Se deben tener en cuenta las directivas nacionales referentes al tratamiento de materias residuales.
5. En el caso de que se produjeran agentes de peligro o combustibles en la aplicación del producto que debieran de ser transferidos a un tratamiento de materias residuales, como por ejemplo agentes refrigerantes que deben ser repuestos en periodos definidos, o aceites para motores, deberan ser tenidas en cuenta las prescripciones de seguridad del fabricante de estos agentes de peligro o combustibles y las regulaciones regionales para el tratamiento de materias residuales. Cuiden también de tener en cuenta en caso dado las prescripciones de seguridad especiales en la descripción del producto.
6. Ciertos productos, como por ejemplo las instalaciones de radiación HF, pueden a causa de su función natural, emitir una radiación electromagnética aumentada. En vista a la protección de la vida en desarrollo deberían ser protegidas personas embarazadas debidamente. También las personas con un bypass pueden correr peligro a causa de la radiación electromagnética. El empresario/usario está comprometido a valorar y señalar areas de trabajo en las que se corra un riesgo aumentado de exposición a radiaciones para evitar riesgos.
7. La utilización de los productos requiere instrucciones especiales y una alta concentración en el manejo. Debe de ponerse por seguro de que las personas que manejen los productos estén a la altura de los requerimientos necesarios referente a sus aptitudes físicas, psíquicas y emocionales, ya que de otra manera no se pueden excluir lesiones o daños de objetos. El empresario lleva la responsabilidad de seleccionar el personal usuario apto para el manejo de los productos.
8. Antes de la puesta en marcha del producto se deberá tener por seguro de que la tensión preseleccionada en el producto equivalga a la del la red de distribución. Si es necesario cambiar la preselección de la tensión también se deberán en caso dabo cambiar los fusibles correspondientes del prodcuto.
9. Productos de la clase de seguridad I con alimentación móvil y enchufe individual de producto solamente deberán ser conectados para el funcionamiento a tomas de corriente de contacto de seguridad y con conductor protector conectado.
10. Queda prohibida toda clase de interrupción intencionada del conductor protector, tanto en la toma de corriente como en el mismo producto. Puede tener como consecuencia el peligro de golpe de corriente por el producto. Si se utilizaran cables o enchufes de extensión se deberá poner al seguro, que es controlado su estado técnico de seguridad.
11. Si el producto no está equipado con un interruptor para desconectarlo de la red, se deberá considerar el enchufe del cable de distribución como interruptor. En estos casos deberá asegurar de que el enchufe sea de fácil acceso y nabejo (según la medida del cable de distribución, 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 construciones o instalaciones, se deberá instalar el interruptor al nivel de la instalación.

12. No utilice nunca el producto si está dañado el cable eléctrico. Compruebe regularmente el correcto estado de los cables de conexión a red. Asegure a través de las medidas de protección y de instalación adecuadas de que el cable de eléctrico no pueda ser dañado o de que nadie pueda ser dañado por él, por ejemplo al tropezar o por un golpe de corriente.
13. Solamente está permitido el funcionamiento en redes de distribución TN/TT aseguradas con fusibles de como máximo 16 A (utilización de fusibles de mayor amperaje sólo previa consulta con el grupo de empresas Rohde & Schwarz).
14. 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. Si no tiene en consideración estas indicaciones se arriesga a que se originen chispas, fuego y/o heridas.
15. No sobrecargue las tomas de corriente, los cables de extensión o los enchufes de extensión ya que esto pudiera causar fuego o golpes de corriente.
16. En las mediciones en circuitos de corriente con una tensión de entrada de U_{eff} > 30 V se deberá tomar las precauciones debidas para impedir cualquier peligro (por ejemplo medios de medición adecuados, seguros, limitación de tensión, corte protector, aislamiento etc.).
17. En caso de conexión con aparatos de la técnica informática se deberá tener en cuenta que estos cumplan los requisitos de la EC950/EN60950.
18. 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 heridas, fuego o daños en el producto.
19. Si un producto es instalado fijamente en un lugar, se deberá primero conectar el conductor protector fijo con el conductor protector del aparato antes de hacer cualquier otra conexión. La instalación y la conexión deberán ser efecutadas por un electricista especializado.
20. En caso de que los productos que son instalados fijamente en un lugar sean sin protector implementado, autointerruptor o similares objetos de protección, el circuito de suministro de corriente deberá estar protegido de manera que usuarios y productos estén suficientemente protegidos.
21. Por favor, no introduzca ningún objeto que no esté destinado a ello en los orificios de la caja del aparato. No vierta nunca ninguna clase de líquidos sobre o en la caja. Esto puede producir corto circuitos en el producto y/o puede causar golpes de corriente, fuego o heridas.
22. Asegúrese con la protección adecuada de que no pueda originarse en el producto una sobrecarga por ejemplo a causa de una tormenta. Si no se verá el personal que lo utilice expuesto al peligro de un golpe de corriente.
23. Los productos R&S no están protegidos contra el agua si no es que exista otra indicación, ver también punto 1. Si no se tiene en cuenta esto se arriesga el peligro de golpe de corriente para el usario o de daños en el producto lo cual también puede llevar al peligro de personas.
24. No utilice el producto bajo condiciones en las que pueda producirse y se hayan producido líquidos de condensación en o dentro del producto como por ejemplo cuando se desplaza el producto de un lugar frío a un lugar caliente.
25. Por favor no cierre ninguna ranura u orificio del producto, ya que estas son necesarias para la ventilación e impiden que el producto se caliente demasiado. No pongan el producto encima de materiales blandos como por ejemplo sofás o alfombras o dentro de una caja cerrada, si esta no está suficientemente ventilada.
26. No ponga el producto sobre aparatos que produzcan calor, como por ejemplo radiadores o calentadores. La temperatura ambiental no debe superar la temperatura máxima especificada en la hoja de datos.

27. Baterías y acumuladores no deben de ser expuestos a temperaturas altas o al fuego. Guardar baterías y acumuladores fuera del alcance de los niños. No cortocircuitar baterías ni acumuladores. Si las baterías o los acumuladores no son cambiados con la debida atención existirá peligro de explosión (atención celulas de Litio). Cambiar las baterías o los acumuladores solamente por los del tipo R&S correspondiente (ver lista de piezas de recambio). Las baterías y acumuladores deben reutilizarse y no deben acceder a los vertederos. Las baterías y acumuladores que contienen plomo, mercurio o cadmio deben tratarse como residuos especiales. Respete en esta relación las normas nacionales de evacuación y reciclaje.
28. Por favor tengan en cuenta que en caso de un incendio pueden desprenderse del producto agentes venenosos (gases, líquidos etc.) que pueden generar daños a la salud.
29. El producto puede poseer un peso elevado. Muévalo con cuidado para evitar lesiones en la espalda u otras partes corporales.
30. No sitúe el producto encima de superficies, vehículos, estantes o mesas, que por sus características de peso o de estabilidad no sean aptas para él. Siga siempre las instrucciones de instalación del fabricante cuando instale y asegure el producto en objetos o estructuras (por ejemplo paredes y estantes).
31. Las asas instaladas en los productos sirven solamente de ayuda para el manejo que solamente está previsto para personas. Por eso no está permitido utilizar las asas para la sujeción en o sobre medios de transporte como por ejemplo grúas, carretillas elevadoras de horquilla, carros etc. El usuario es responsable de que los productos sean sujetados de forma segura a los medios de transporte y de que las prescripciones de seguridad del fabricante de los medios de transporte sean tenidas en cuenta. En caso de que no se tengan en cuenta pueden causarse daños en personas y objetos.
32. Si llega a utilizar el producto dentro de un vehículo, queda en la responsabilidad absoluta del conductor que conducir el vehículo de manera segura. Asegure el producto dentro del vehículo debidamente para evitar en caso de un accidente las lesiones u otra clase de daños. No utilice nunca el producto dentro de un vehículo en movimiento si esto pudiera distraer al conductor. Siempre queda en la responsabilidad absoluta del conductor la seguridad del vehículo. El fabricante no asumirá ninguna clase de responsabilidad por accidentes o colisiones.
33. Dado el caso de que esté integrado un producto de laser en un producto R&S (por ejemplo CD/DVD-ROM) no utilice otras instalaciones o funciones que las descritas en la documentación de producto. De otra manera pondrá en peligro su salud, ya que el rayo laser puede dañar irreversiblemente sus ojos. Nunca trate de descomponer estos productos. Nunca mire dentro del rayo laser.

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Digital Standard CDMA2000

Introduction - Digital Standard CDMA2000

The R&S Signal Generator provides you with the ability to generate signals in accordance with the standard CDMA2000. CDMA2000 is the North American standard for the third mobile radio generation (3G). It is a further development of the North American mobile radio system of the second generation IS-95 (CDMA). The R&S Signal Generator supports the CDMA2000 standard 3GPP2 C.S0002-C, version 1.0, may 2002 (release C). CDMA2000® is a registered trademark of the Telecommunications Industry Association (TIA –USA).

The R&S Signal Generator generates the CDMA2000 signals with a chip rate of 1,2288 Mcps, corresponding to the so-called "Spreading Rate 1".

The CDMA2000 signals of the base station are generated in a combination of realtime mode (real time channels) and arbitrary waveform mode. Simulation of bit and block errors can be activated for the channels generated in realtime. In arbitrary waveform mode, the signal is first calculated and then output.

The CDMA2000 signals of mobile station 1 (MS1) are always generated in realtime mode, the signals of the three remaining mobile stations always in arbitrary waveform mode.

The R&S Signal Generator simulates CDMA2000 at the physical channel level. The following list gives an overview of the options provided by the R&S Signal Generator for generating a CDMA2000 signal:

- Configuration of up to 4 base stations or 4 mobile stations.
- Real time generation of one traffic channel and the SYNC channel on the downlink
- All special channels and up to 78 channels on the downlink (depending on the radio configuration)
- Packet channel according to 1xEV-DV on the downlink
- Operating modes "Traffic", "Access", "Enhanced Access" and "Common Control" on the uplink.
- "Misuse For Output Power Control" parameter for varying the original normal transmit power over time
- Simulation of up to 64 additional mobile stations
- Clipping for reducing the crest factor
- All channel coding modes included in IS-2000 (Frame Quality Indicator, Convolutional Encoder, Turbo Encoder, Symbol Puncture, Interleaver, etc)
- Feeding through of bit errors (to test a BER tester) and block errors (to test a BLER tester)

Table 1 Parameters of the modulation system CDMA2000

Parameter	**Value**
Spreading rate	1.2288 MHz
Channel types	Downlink : Forward Pilot (F-PICH) Sync (F-SYNC) Paging (F-PCH) Transmit Diversity Pilot (F-TDPICH) Auxiliary Pilot (F-APICH) Auxiliary Transmit Diversity Pilot (F-ATDPCH) Broadcast (F-BCH) Quick Paging (F-QPCH) Common Power Control (F-CPCCH) Common Assignment (F-CACH) Forward Common Control (F-CCCH) Packet Channels Forward Packet Data Control (F-PDCCH) Forward Packet Data (F-PDCH) Traffic Channels Forward Dedicated Control (F-DCCH) Forward Fundamental (F-FCH) Forward Supplemental (F-SCH) Uplink : Reverse Pilot (R-PICH) Access (R-ACH) Enhanced Access (R-EACH) Reverse Common Control (R-CCCH) Traffic Channel Reverse Dedicated Control (R-DCCH) Reverse Fundamental (R-FCH) Reverse Supplemental Code (R-SCCH) Reverse Supplemental (R-SCH)
Channel count	In downlink 4 base stations each with up to 78 code channels (depending on the radio configuration). In uplink 4 mobile stations with up to 8 code channels (depending on the radio configuration).
Radio configuration	RC 1 – RC 5 & RC10
Frame length	Radio frame: 5 ms, 10 ms, 20 ms, 40 ms, 80 ms, 160 ms (depending on the channel type and the radio configuration)
PN offset	0 ... 511
Quasi Orthogonal Walsh Set	Set 1 – set 3
Channel coding	All channel coding modes included in IS-2000 (Frame Quality Indicator, Convolutional Encoder, Turbo Encoder, Symbol Puncture, Interleaver, etc)
Long Code Mask	0 ... 3FF FFFF FFFF hex

Modulation System CDMA2000

The following simplified diagram is used to explain the system principle of CDMA200 in the forward (down) and reverse (up) link. The exact system configuration depends on parameters like link direction, spreading rate, mode, radio configuration and channel type. A detailed description cannot be given in this manual. For further information refer to the IS2000 standard.

Modulation System CDMA2000 in the Downlink (Forward)

The following block diagram shows the components of the CDMA2000 transmission system in the downlink.

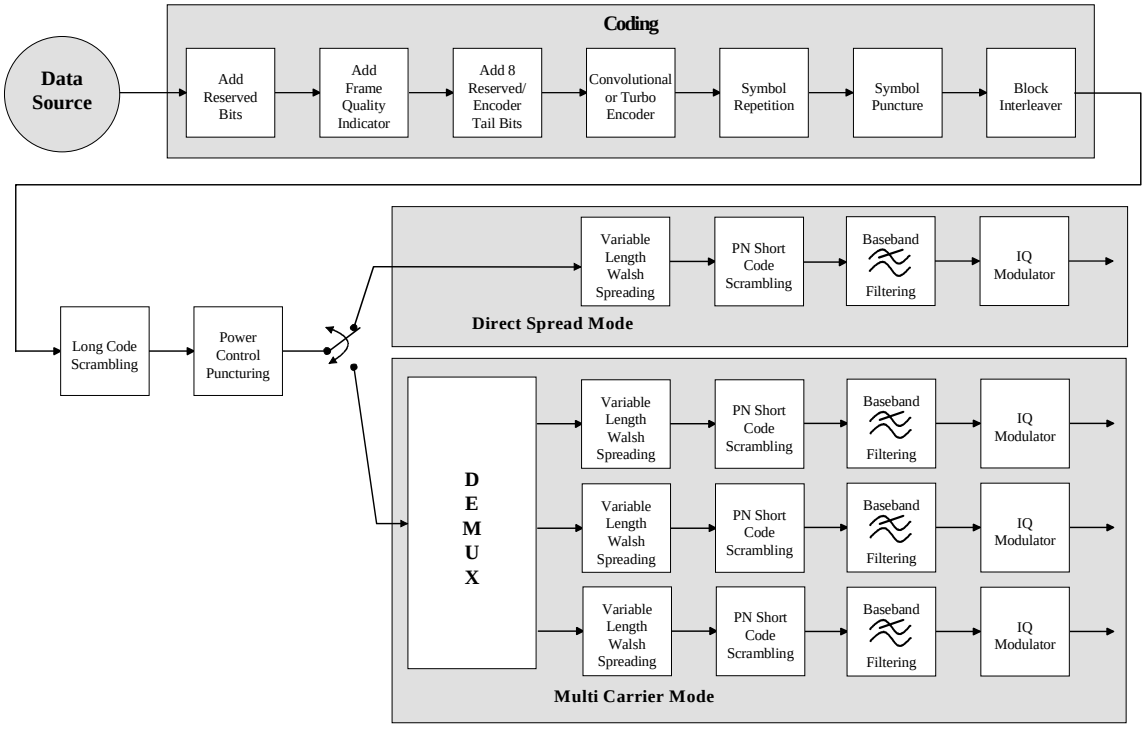


Fig. 1 Components of the CDMA2000 transmission system in the downlink (forward)

Modulation System CDMA2000 in the Uplink (Reverse)

The following block diagram shows the components of the CDMA2000 transmission system in the uplink.

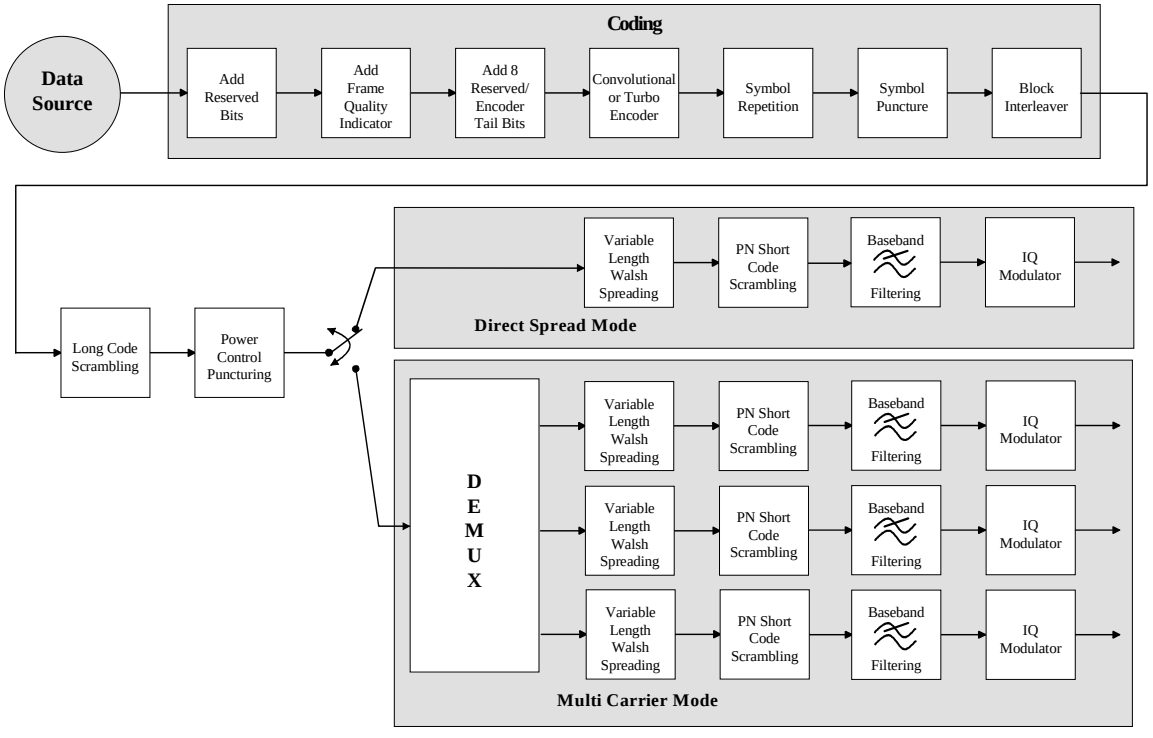


Fig. 2 Components of the CDMA2000 transmission system in the uplink (reverse)

Data Source - Uplink and Downlink

The data fields of all channels can be filled from all possible data sources of the R&S Signal Generator: pattern (all1, all0, user-defined up to 64 bits), PRBS data, data lists and external data.

Channel Coding - Uplink and Downlink

In contrast to 3GPP FDD, channel coding with CDMA2000 is part of the physical layer. The channel coding procedure may slightly vary depending on channel type, frame length and data rate. The basic coding procedure is illustrated by the coding block in the diagram above. Blocks like 'Add reserved bits' or 'Symbol puncture' are not used in all coding scenarios. For a more exact definition refer to the standard.

Add Reserved Bits:	filled with “0” bits
Add Frame Quality Indicator:	calculation and insertion of a CRC (cyclic redundancy code) checksum for error identification.
Add 8 Reserved/Encoder Tail Bits:	reserved, tail bits which set the subsequent coder to a defined final state.
Convolutional or Turbo Encoder:	error correction code, depending on data rate and other parameters either by convolutional coding or turbo codes.
Symbol Repetition:	symbol repetition is used together with bock symbol puncture for adapting the convolutional or turbo coder output data rate to the required input data rate of the interleaver.
Symbol Puncture:	symbol puncturing (elimination) is used together with bock symbol repetition for adapting the convolutional or turbo coder output data rate to the required input data rate of the interleaver.
Block Interleaver:	blockwise permutation of input data sequence of interleaver to reduce bit errors.

Long-Code Scrambling Generator - Downlink

The long-code generator is also referred to as scrambling code generator since it scrambles the chip sequence in a user-specific way (long-code mask).

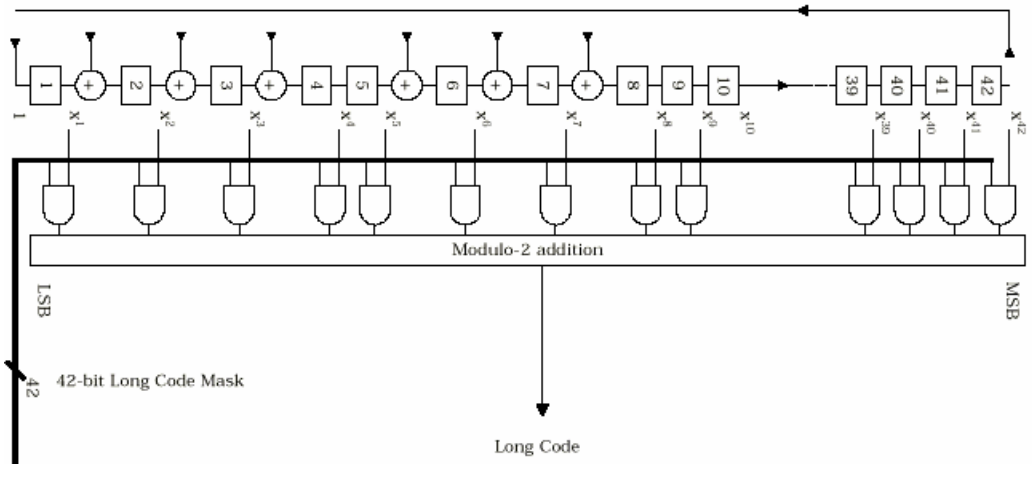


Fig. 3 Long-code generator CDMA2000

The long-code generator is a feedback 42-bit shift register with its status vector linked to a user-specific long-code mask to form the specific long-code sequence.

The generator polynomial of the shift-register section of the long-code generator is:

$$p(x) = x^{42}+x^{35}+x^{33}+x^{31}+x^{27}+x^{26}+x^{25}+x^{22}+x^{21}+x^{19}+x^{18}+x^{17}+x^{16}+x^{10}+x^{7}+x^{6}+x^{5}+x^{3}+x^{2}+x^{1}+1$$

A real long code is used in the forward link. In the reverse link a complex long code with I and Q component is required. The long code for the I component is derived directly from the 1X generator, that for the Q component corresponds to the I long code delayed by one chip.

Power Control Puncturing - Downlink

To control the output power of the mobile station, the base station sends power control bits in the traffic channel at an 800 Hz rate instead of the scrambled data bits. Depending on the power control bits, the mobile station increases or reduces its output power.

Variable-Length Walsh Spreading - Downlink

Spreading of the CDMA2000 signal is performed in this block. Walsh codes with a variable spreading factor are used. The spreading factor and the Walsh code depend on the spreading rate, channel type, frame length and data rate. To extend the base-station capacity, so-called 'quasi-orthogonal Walsh sets' can be used in addition to the Walsh codes. The input data stream of the spreading unit is already complex (I + jQ). If a standard Walsh code is used, spreading is performed by multiplying the input symbol (modulo 2 multiplication) with the real Walsh code. The quasi-orthogonal Walsh code results in complex spreading through an additional rotation of the output phase (the spreading code then consists of a real and an imaginary part).

PN Short-Code Scrambling - Downlink

The (complex) input data stream of the PN short-code scrambler is multiplied by a complex PN sequence (I_{PN} + j Q_{PN}). This is also called 'quadrature spreading'. With channels of the radio configurations 1 and 2, whose generation is comparable with that of IS-95 systems, this block splits up the input stream in I and Q components.

The base-station-specific parameter PN offset determines the start phase of these PN short-code sequences. This permits signals of different base stations to be distinguished.

Generator polynomial for I and Q components of the PN short code:

$$P_I(x) = x^{15}+x^{13}+x^9+x^8+x^7+x^5+1$$

$$P_Q(x) = X^{15}+x^{12}+x^{11}+x^{10}+x^6+x^5+x^4+x^3+1$$

The period of a PN short-code sequence is 26.666 ms.

Spreading - Uplink

Increasing the data rate or spreading in the reverse link is performed in different ways depending on the radio configuration and the channel type.

Variable Length Walsh Spreading

Walsh codes with a variable spread factor are used for spreading. The spreading factor and the Walsh code depend on the spreading rate, channel type, frame length and the data rate. Spreading is obtained by multiplication of the input symbol (modulo 2 multiplication) by the real Walsh code.

64-ary Orthogonal Modulator

Groups of 6 input bits are used for addressing a line of the Walsh code table with the spread code length of 64. This 'modulator' increases the data rate by a factor of 64/6. This type of rate increase comes from IS-95 and is mainly used in the radio configurations 1 and 2.

Scrambling - Uplink

In the scrambling block of the uplink system the spread data stream is scrambled by means of the long code and the PN short code. Different methods are used for the radio configurations 1, 2 and RC3 to RC5.

Scrambling for Radio Configuration 1 and 2

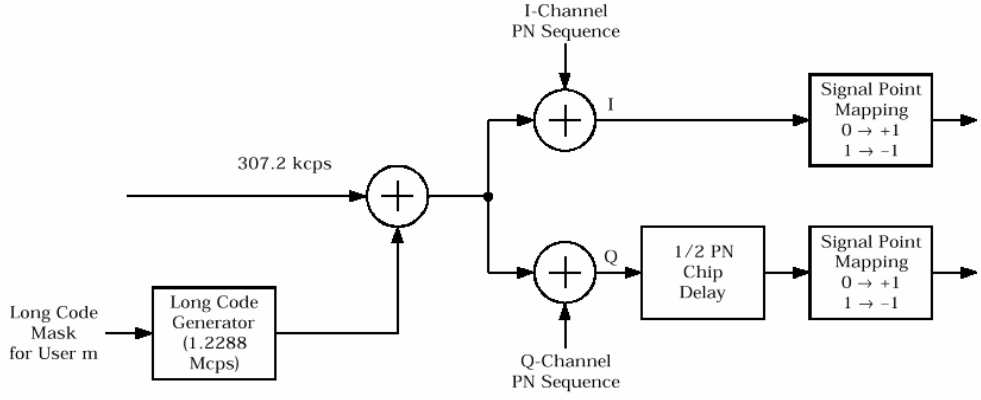


Fig. 4 Scrambling in the uplink RC 1 and RC2

The output data stream of the spreading block is scrambled with the **long code**. The rate is increased in addition by a factor of four. The long-code generator is also referred to as scrambling code generator since it scrambles the chip sequence in a user-specific way (long-code mask). This generator exactly corresponds to that described in section "*Long-Code Scrambling Generator - Downlink*" for the downlink.

The real input data stream of the **PN short-code** scrambler is multiplied by a complex PN sequence (IPN + j QPN). This procedure is also called 'quadrature spreading'. With channels of the radio configurations 1 and 2, whose generation is comparable with that of IS-95 systems, this block splits up the input stream in I and Q components.

In contrast to the downlink, no variable PN offset parameter is available for the PN short code in the reverse link. The PN offset is always 0.

Different generation rules are used for the PN short codes depending on the mode and spreading rate. The generator polynomials of the PN short codes correspond to those in the downlink (see section "*PN Short-Code Scrambling - Downlink*"). The I and Q data streams consisting of {0, 1} sequences are then mapped to {+1, -1} in the **signal point mapping** block.

Because of the delay of the Q component, offset QPSK constellation known from the reverse link of IS-95 is obtained from the QPSK constellation. Due to the Q delay, the transfer of the I and Q signal components from one chip to the next is never synchronous. For this reason there are no zero crossings in the transfer from one chip to the next. This behavior can be seen in the vector diagram below.

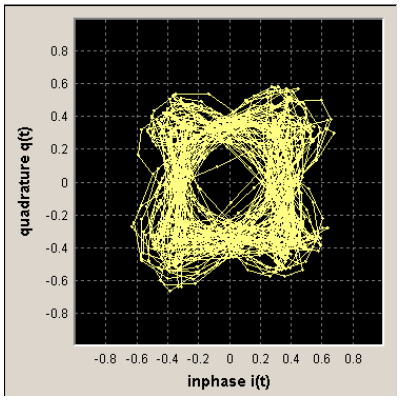


Fig. 5 Scrambling in the uplink RC 1 and RC2

Scrambling for Radio Configuration 3,4 and 5

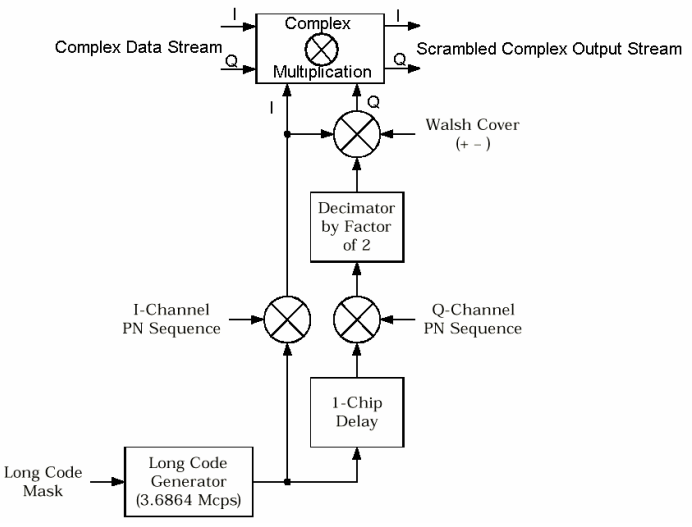


Fig. 6 Scrambling in the uplink RC3, RC4 and RC5

Here too, the long-code generator defined in section "*Long-Code Scrambling Generator - Downlink*" for the downlink is used. A complex long-code sequence is required. For this purpose, the output sequence of the generator is used as the I component and the sequence delayed by one chip as the Q component.

The I component of the long code is then multiplied by the I component of the PN short code, the Q component with the corresponding Q component of the PN short code. The definition of the PN short code is given in section "*PN Short-Code Scrambling - Downlink*").

The subsequent operations **decimation by factor of 2** and linking the Q component to the Walsh sequence (+-) and the I component serve for reducing the zero crossings of the I/Q signal at the end of the whole scrambling process. Thus a behavior similar to that in the uplink of 3GPP is obtained. It is also known as **HPSK** (hybrid phase shift keying).

The resulting I/Q output stream is obtained by complex multiplication (modulo 2) of the I/Q input sequence of the scrambler by the complex scramble sequence obtained from the long code and the PN short code. The constellation obtained is a combination of QPSK and offset QPSK.

In this mode, the traffic data streams of a channel are mapped either to the I or to the Q path of the complex data stream shown in the diagram above. With these so-called BPSK channels, the channel component at the scrambler input consists of a real or an imaginary component. As can be seen in the table below, the constellation after complex scrambling is again at the angle bisector.

Table 2 Output combinations with BPSK channels

d(n) \ S-Code(n)	**-1-j**	**-1+j**	**+1-j**	**+1+j**
-1	+1+j	+1-j	-1+j	-1-j
+1	-1-j	-1+j	+1-j	+1+j
-j	-1+j	+1+j	-1-j	+1-j
+j	+1-j	-1-j	+1+j	-1+j

Baseband Filtering - Uplink and Downlink

This block performs baseband filtering (pulse shaping and band limiting) of the I/Q signal. In addition to the filters specified in the standard, the signal generator also provides equalizer filters with a better adjacent-channel leakage ratio.

I/Q Modulator - Uplink and Downlink

The IQ modulator defined in the IS2000 standard differs from the definition in the R&S Signal Generator. The definition on which the R&S Signal Generator is based is used by virtually all digital communication standards (except IS95 and IS2000).

In the final step, the filtered IQ signal is modulated to the desired RF in a different way in the IQ modulator:

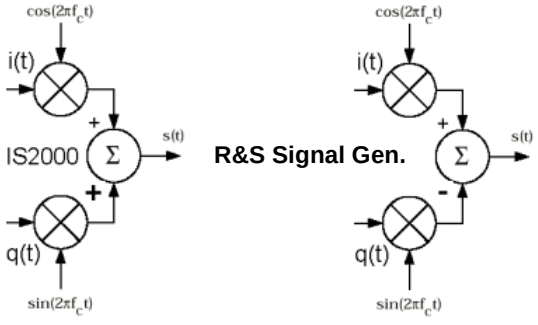


Fig. 7 Definition of IQ modulator in IS2000 and the R&S Signal Generator

According to IS2000, the RF signal s(t) is derived from the baseband I/Q signal as follows:

The R&S Signal Generator is based on the following definition:

The R&S Signal Generator enables baseband signals to be generated according to IS2000 (cdma2000 standard) by inverting the Q-part of the signal.

So that this baseband signal can be used to generate an RF signal which also conforms to the standard, the **I/Q Modulator** menu contains the **I/Q Swap** function for swapping the I/Q control of the I/Q modulator.

Constellation of I/Q Signals - Downlink

Depending on radio configuration and channel type, the signal components in the different channels create different sub-constellations.

BPSK channels

With some channel types (particularly in RC1 and 2 but always in the pilot channel, for instance) the data stream is split up in I and Q components in the **PN Short Code Scrambling** block. The input data stream of this block is a real +/-1 sequence similar to BPSK. The complex output data sequence is then as follows:

$\mathbf{S_{out}(n) = d_{in}(n)\,(PN_I(n) + j\,PN_Q(n))}$, with $\mathbf{d_{in}(n), PN_I(n), PN_Q(n) \in \{-1, +1\}}$.

This yields four different output combinations for S_{out}:

(-1 –j), (-1 +j), (+1 –j), (+1 +j),

ie. all points are on one of the two angle bisectors at the I/Q level.

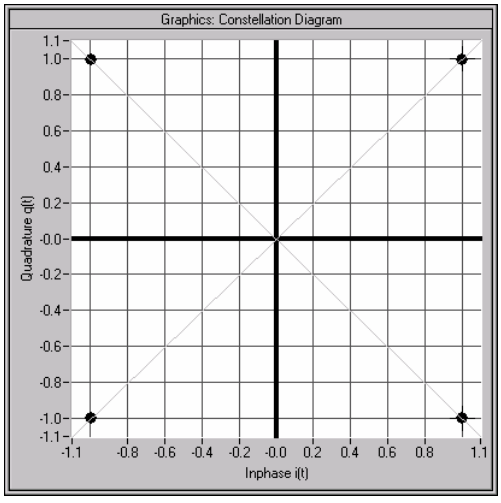


Fig.8 Constellation diagram of a BPSK channel with 0 dB power

QPSK channels

With other channel types, the input data stream of the **PN Short Code Scrambling** block is a complex ±1 ±j sequence similar to QPSK. The complex output data sequence is then as follows:

$S_{out}(n) = (d_I(n) + jd_Q(n))\ (PN_I(n) + j\ PN_Q(n))$, with **$d_I(n)$, $d_Q(n)$, $PN_I(n)$, $PN_Q(n) \in \{-1, +1\}$**.

Table 3 Output combinations with QPSK channels

PN(n) \ d(n)	**-1-j**	**-1+j**	**+1-j**	**+1+j**
-1-j	+2j	+2	-2	-2j
-1+j	+2	-2j	+2j	-2
+1-j	-2	+2j	-2j	+2
+1+j	-2j	-2	+2	+2j

This again yields four different output combinations for S_{out}:

-2j, 2j, -2, 2,

i.e. all points are on one of the two axes at the I/Q level.

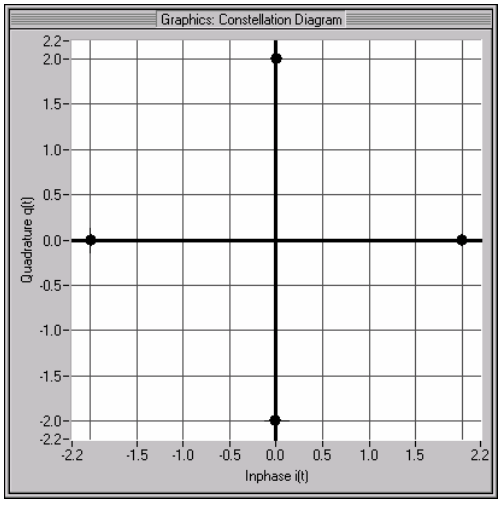


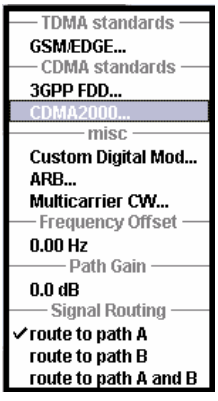
Fig.9 Constellation diagram of a QPSK channel with 0 dB power

Power Control - CDMA2000 - Downlink and Uplink

After spreading and scrambling, a channel-specific power factor *p* is applied to the signal. For example, a value of -6 dB therefore results in half the level (or ¼ power) and the following diagram:

CDMA2000 Menu

The menu for setting the CDMA2000 digital standard is either called from the baseband block or from the menu tree under Baseband.



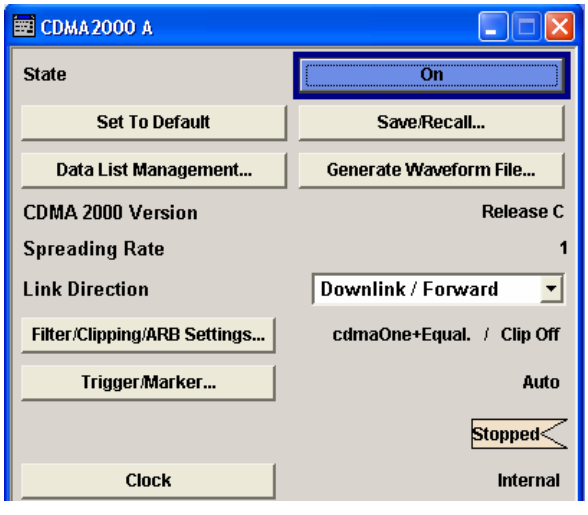
The menu is split into several sections for configuring the standard. The choice of transmission direction determines which displays and parameters are made available in the lower section.

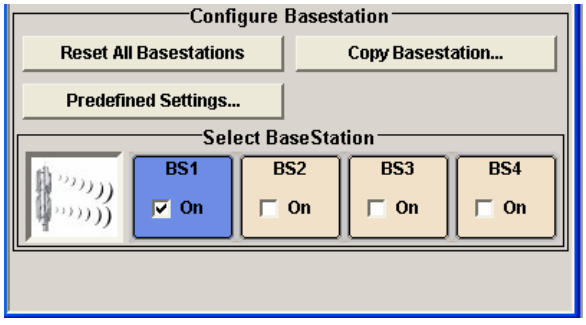
The upper section of the menu is where the CDMA2000 digital standard is enabled, the default settings are called and the transmission direction selected.

The valid CDMA2000 version and the spreading rate in use are displayed.

Many of the buttons lead to submenus for loading and saving the CDMA2000 configuration and for setting the filter, trigger and clock parameters.

The lower menu section is where either the base station signal or the mobile station signal is configured, depending on the transmission direction selected.





General Settings for CDMA2000 Signals

The upper menu section is where the CDMA2000 digital standard is enabled and reset and where all the settings valid for the signal in both transmission directions are made.

State - CDMA2000

Enables/disables the CDMA2000 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 CDMA2000 signal is generated by a combination of realtime mode (real time channels) and arbitrary waveform mode (all the other channels).

On the downlink, one traffic channel and the SYNC channel of base station 1 are generated in realtime. All the other channels are generated in arbitrary waveform mode and added.

In the uplink, all the channels of mobile station 1 are generated in realtime, the other mobile stations are generated in arbitrary waveform mode and added to the realtime signal.

Remote-control command:
`SOUR:BB:C2K:STAT ON`

Set to Default - CDMA2000

Calls the default 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.

Remote-control command:
`SOUR:BB:C2K:PRES`

Parameter	Value
State	Not affected by Set to default
Link Direction	Downlink
Filter	CdmaOne + Equalizer
Clipping	Off
Trigger	Auto
Clock	Internal
Base Station Configuration	
State	Off
Radio Configuration Traffic Channels 1 and 2	RC3
Radio Configuration other Traffic Channels	RC1
Time Delay	0 chips
PN Offset	0
Transmit Diversity	Off
Quasi Orthogonal Walsh Set	1

Parameter	Value
Mobile Station Configuration	
State	Off
Mode	Traffic
Radio Configuration	RC3
Channel Coding	Complete
LC Mask (hex)	0
State (all Channels)	Off
Power Control	Off

Save/Recall ... - CDMA2000 Calls the **Save/Recall** menu.

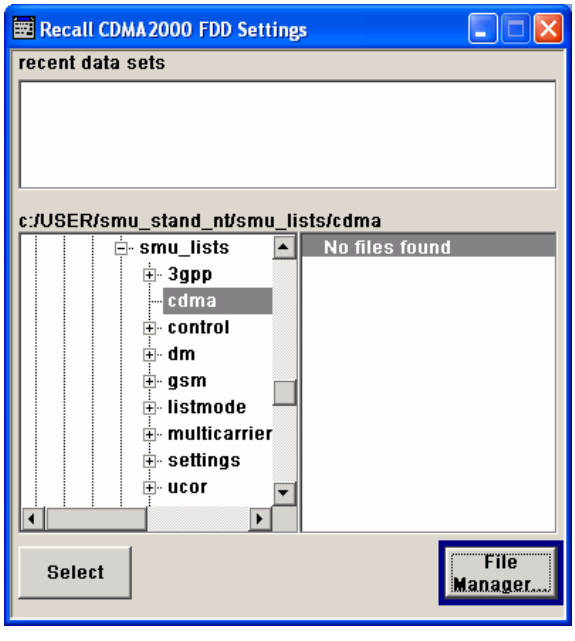
From the **Save/Recall** menu the **File Select** windows for saving and recalling CDMA2000 configurations and the **File Manager** can be called.

CDMA2000 configurations are stored as files with the predefined file extension ***.cdma2k**. The file name and the directory they are stored in are user-definable.

The complete settings in the **CDMA2000** menu are saved and recalled.

Recall CDMA2000 Setting Opens the File Select window for loading a saved CDMA2000 configuration.

The configuration of the selected (highlighted) file is loaded by pressing the **Select** button.



Remote-control command:

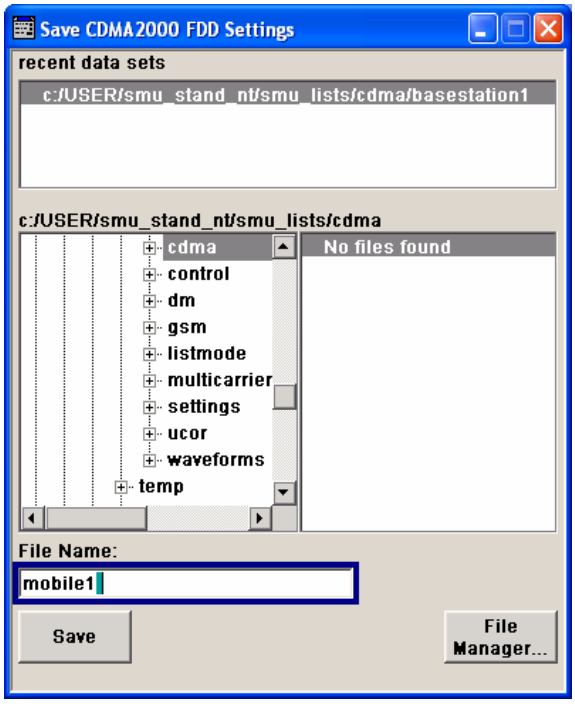
```
:MMEM:CDIR 'F:\gen_lists\cdma'

SOUR:BB:C2K:SETT:CAT?
Response:   'cdma2k_1',cdma2k_2'
SOUR:BB:C2K:SETT:LOAD "cdma2k_1"
```

Save CDMA2000 Setting

Opens the **File Select** window for saving the current CDMA2000 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.



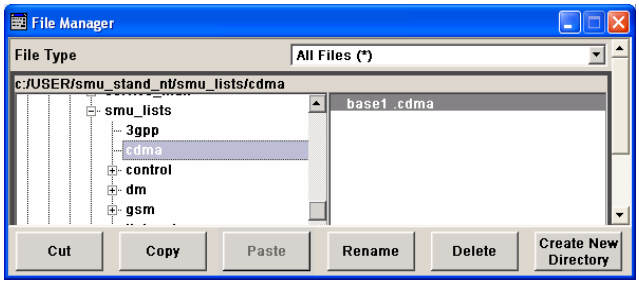
Remote-control command:
`:MMEM:CDIR 'F:\gen_lists\cdma'`

`SOUR:BB:C2K:SETT:STOR 'cdma2k_1'`

File Manager

Calls the **File Manager**.

The **File Manager** is used to copy, delete and rename files and to create new directories.

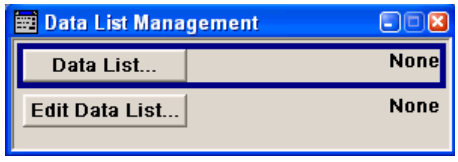


Remote-control commands:
`:MMEM:CDIR 'F:\gen_lists\cdma'`

`SOUR:BB:C2K:SETT:DEL 'cdma2k_1'`

Data List Management - CDMA2000

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.

Remote-control commands:

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.*

Creating and editing the data list:

```
:SOUR:BB:DM:DLIS:SEL "d_list1"
:SOUR:BB:DM:DLIS:DATA #B1111010101000001111....
:SOUR:BB:DM:DLIS:DATA:APP #B1111010101000001111....
```

Selecting the data list:

```
SOUR:BB:C2K:BST2:CGR3:COFF1:DATA DLIS
SOUR:BB:C2K:BST2:CGR3:COFF1:DATA:DSEL  "cdma_bs1"

SOUR:BB:C2K:BST2:CGR3:COFF1:TPC:DATA DLIS
SOUR:BB:C2K:BST2:CGR3:COFF1:TPC:DATA:DSEL "d_dwn1"

SOUR:BB:C2K:MST2:CHAN2:DATA DLIS
SOUR:BB:C2K:MST2:CHAN2:DSEL "d_up1"

SOUR:BB:C2K:MST2:TPC:DATA DLIS
SOUR:BB:C2K:MST2:TPC:DATA:DSEL "d_up1"
```

Generate Waveform File - CDMA2000

Opens the submenu for storing the current CDMA2000 signal as ARB signal in a waveform file. This file can be loaded in the ARB menu and processed as multicarrier or multisegment 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.

Remote-control commands:
```
SOUR:BB:C2K:WAV:CRE "c:\temp\cdma2k_wv"
```

CDMA 2000 Version - CDMA2000

Displays the current version of the CDMA2000 standard.

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

Remote-control command:
```
SOUR:BB:C2K:VERS?
```
Response: `Release C`

Spreading Rate - CDMA2000

Displays the spreading rate.

Mode Spreading Rate 1 (**Direct Spread 1X**) is used:

The **Chip Rate** parameter which determines the rate of the spread symbols as is used for signal output, can be varied in the Filter, Clipping, ARB Settings menu (see section "*Filtering, Clipping, ARB Settings - CDMA2000*", page 23).

Remote-control command:
`SOUR:BB:C2K:CRAT?`
Response: `R1M2`

Link Direction - CDMA2000

Selects the transmission direction.

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

Downlink/ Forward Link

The transmission direction selected is base station to mobile station. The signal corresponds to that of a base station.

Remote-control command:
`SOUR:BB:C2K:LINK DOWN`

Uplink/ Reverse Link

The transmission direction selected is mobile station to base station. The signal corresponds to that of a mobile station.

Remote-control command:
`SOUR:BB:C2K:LINK UP`

Filtering, Clipping, ARB Settings - CDMA2000

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 "*Filtering, Clipping, ARB Settings - CDMA2000*", page 23.

Remote-control command: n.a.

Trigger - Marker - CDMA2000

(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 Section "*Trigger-Marker-Clock - CDMA2000*", page 28).

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

Remote-control command: n.a.

Execute Trigger (Trigger Source Internal only)

(For 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.

Remote-control commands:
`SOUR:BB:C2K:TRIG:SOUR INT`
`SOUR:BB:C2K:SEQ RETR`
`SOUR:BB:C2K:TRIG:EXEC`

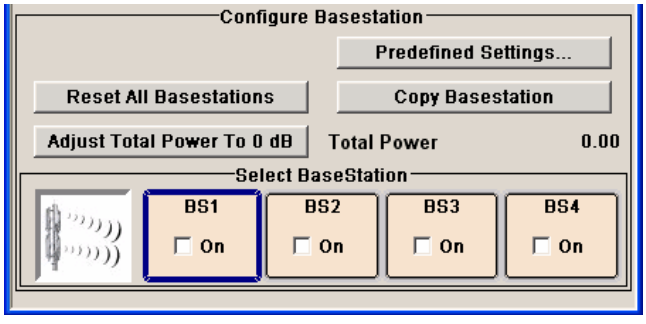
Clock - CDMA2000 **(Trigger for R&S SMx and R&S AMU instruments only)**

Calls the menu for selecting the clock source and for setting a delay (see Section "*Trigger-Marker-Clock - CDMA2000*", page 28).

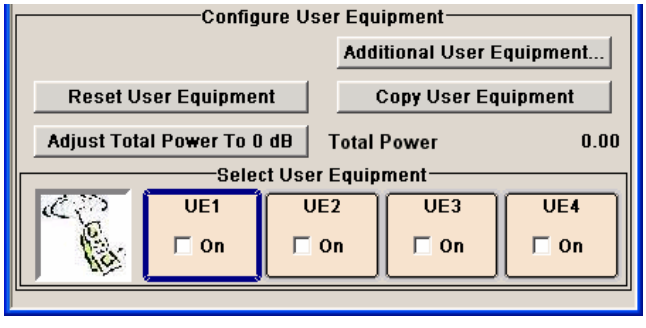
Remote-control command: -

Configure Base Station or Mobile Station - CDMA2000

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 Mobile Station** section (selection **Uplink/Reverse Link**).



Predefined Settings Downlink - CDMA2000

Calls menu for setting predefined configurations.

The menu is described in Section "*Predefined Settings - Downlink - CDMA2000*", Page36".

Remote-control command: -

Additional Mobile Station - CDMA2000

Calls menu for simulating up to 64 additional mobile stations.

The menu is described in Section "*Additional Mobile Station - Uplink - CDMA2000*", Page 39.

Remote-control command: -

Reset All Base Stations - CDMA2000

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.

Remote-control command:
SOUR:BB:C2K:BST:PRES

Parameter	Value
Base Station Configuration	
State	Off
Time Delay	0 chips
PN Offset	0
Transmit Diversity	Off
Quasi Orthogonal Walsh Set	1
State (all channels)	Off
Frame Length (0-5 / 0-7/ 0-10)	26.6 ms / 40 ms / 5 ms
Frame Length (all other channels)	20 ms
Data Rate (0-6,0-10,0-11,1-1,1-4,2-1,2-4)	9.6 kbps
Data Rate (0-7,0-9,1-2,1-3,2-2,2-3)	19.2 kbps
Data Rate (all other channels)	1.2 kbps
Walsh (0-2 / 0-5)	16 / 32
Walsh (1-1 / 1-2 / 1-3 / 2-1 / 2-2 / 2-3)	8 / 17 /18 /9 / 19 /20
Walsh (all other channels)	0
Power (0-1 / 0-6)	-7 dB / -6.62 dB
Power (0-5 , 1-1, 2-1 / 1-2, 1-3, 2-2, 2-3)	-12.72 dB / -9.72 dB
Power (all other channels)	0 dB
Data Source (0-1, 0-2, 0-3, 0-4)	All0
Data Source (all other channels)	PN9
Channel Coding (all Channels)	Complete

Reset All Mobile Stations - CDMA2000

Resets all mobile 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.

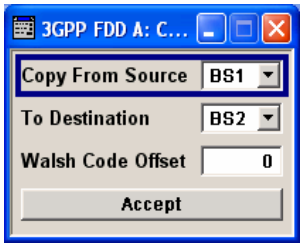
Remote-control command:
SOUR:BB:C2K:MST:PRES

Parameter	Value
Mobile Station Configuration	
State	Off
Mode	Traffic
Radio Configuration	3
Channel Coding	Complete
LC Mask (hex)	0
State (all Channels)	Off
Frame Length	20 ms
Data Rate (2 / 3,4,5)	9.6 kbps / 1.5 kbps
Walsh (0 / 8 / 4 / 2 /6)	0 / 8 / 4 / 2 / 6
Spread (2 / 3,4,5)	32 / 16
Power	0 dB
Data Source	PN9

Copy ... - CDMA2000

Copies the settings of a base or mobile station to a second base or mobile station. A window opens for creating the destination station.

Window for the **Downlink / Forward** transmission direction:



Window for the **Uplink / Reverse** transmission direction:

Copy from Source

Selects the base station or mobile station whose settings are to be copied.

Remote-control command:
`SOUR:BB:C2K:LINK UP`
`SOUR:BB:C2K:COPY:SOUR 1`

To Destination

Selects the base station or mobile station whose settings are to be overwritten.

Remote-control command:
`SOUR:BB:C2K:COPY:DEST 2`

Walsh Code Offset (Base Station only)

Enters the offset to be applied when copying the base station to the Walsh codes of the destination base station. The minimum value is 0 (Walsh codes are identical), the maximum value is 255.

Remote-control command:
`SOUR:BB:C2K:COPY:COFF 10`

Accept

Start the copy process.

Remote-control command:
`SOUR:BB:C2K:COPY:EXEC`

Adjust Total Power to 0dB - CDMA2000

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

Remote-control command:
`SOUR:BB:C2K:POW:ADJ`

Total Power - CDMA2000

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.

Remote-control command:
`SOUR:BB:C2K:POW?`
`'Response: 0dB`

Select ... - CDMA2000

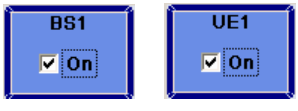
Selects the base or mobile station by pressing the accompanying button. This opens a menu for editing the selected base or mobile station.

The menus are described in Sections "*Base Station Configuration - CDMA2000*", Page 40 and "*Mobile Station Configuration (MS)- CDMA2000*", Page 63.

Remote-control command: -
(the base station or mobile station is selected by the keyword index
`BSTation<i> or MSTation<i> .)`

Base Station or Mobile Station On - CDMA2000

Activates or deactivates the base or mobile station.

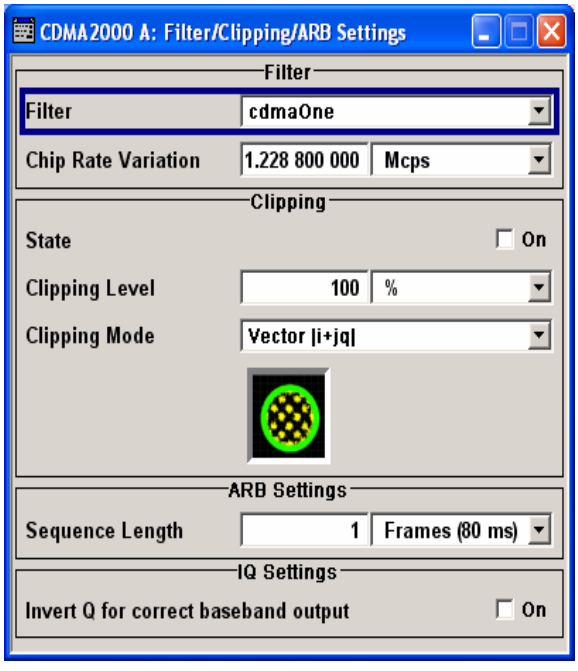


Remote-control command:
`SOUR:BB:C2K:BST1:STAT ON | OFF`
`SOUR:BB:C2K:MST2:STAT ON | OFF`

Filtering, Clipping, ARB Settings - CDMA2000

The **Filtering, Clipping, ARB Settings** menu is reached via the **CDMA2000** 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. Generation of baseband signals according to IS2000 (cdma2000 standard) by inverting the Q-part of the signal is enabled in the **I/Q Settings** section.



Filter - CDMA2000

Selects baseband filter.

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

The filter types are described in Section "*Baseband Filter - Custom Digital Mod*".

CdmaOne

Uplink filter according to standard.

Remote-control command:
`SOUR:BB:C2K:FILT:TYPE CONE`

CdmaOne+ Equalizer

Downlink filter according to standard.

Remote-control command:
`SOUR:BB:C2K:FILT:TYPE COEQ`

CdmaOne 705kHz

Non-standard filter for the uplink. This filter achieves better adjacent-channel leakage ratio.

Remote-control command:
`SOUR:BB:C2K:FILT:TYPE COF705`

CdmaOne 705kHz+ Equalizer

Non-standard filter for the downlink. This filter achieves better adjacent-channel leakage ratio.

Remote-control command:
`SOUR:BB:C2K:FILT:TYPE COF`

Roll Off Factor or BxT - CDMA2000

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.

Remote-control commands
```
SOUR:BB:C2K:FILT:PAR:APCO25 0.2
SOUR:BB:C2K:FILT:PAR:COS 0.35
SOUR:BB:C2K:FILT:PAR:GAUS 0.5
SOUR:BB:C2K:FILT:PAR:PGA 0.5
SOUR:BB:C2K:FILT:PAR:RCOS 0.35
SOUR:BB:C2K:FILT:PAR:SPH 2
```

Cut Off Frequency Factor - CDMA2000

(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 can be adjusted to reach spectrum mask requirements.

Remote-control command:
```
SOUR:BB:C2K:FILT:PAR:LPAS 0.5
```

Chip Rate Variation - CDMA2000

Enters the chip rate.

The chip rate entry changes the output clock and the modulation bandwidth.

Remote-control command:
```
SOUR:BB:C2K:CRAT:VAR 1228800
```

Impulse Length - CDMA2000

(For R&S 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.

Remote-control command:
```
SOUR:BB:C2K:FILT:ILEN:AUTO ON
SOUR:BB:C2K:FILT:ILEN 120
```

Oversampling - CDMA2000

(For R&S 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.

Remote-control command:
```
SOUR:BB:C2K:FILT:OSAM:AUTO ON
SOUR:BB:C2K:FILT:OSAM 20
```

Clipping State - CDMA2000 Switches baseband clipping on and off.

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

CDMA signals may have very high crest factors particularly with many channels and long sequences. 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.

Remote-control command:
`SOUR:BB:C2K:CLIP:STAT ON`

The following pictures demonstrate the affect of clipping with vector mode (|i+q|), using a signal configuration with 2 active channels.

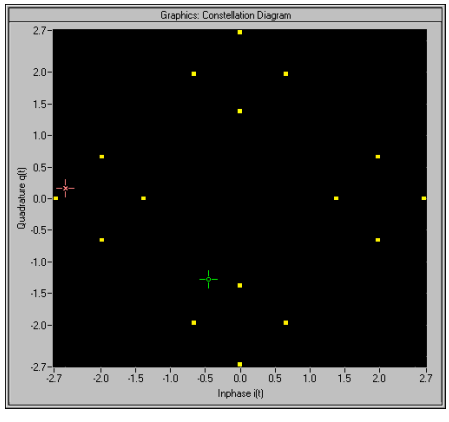


Fig.10 Constellation diagram of the signal without clipping, shows the level mapping

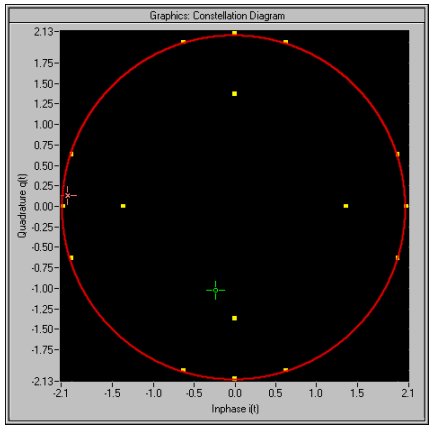


Fig.11 Constellation diagram with clipping level 80 %, vector mode (|i+q|) The circle emphasizes the changed constellation points.

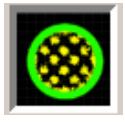
Clipping Level- CDMA2000 Sets the limit for clipping.

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.

Remote-control command:
`SOUR:BB:C2K:CLIP:LEV 50`

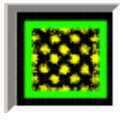
Clipping Mode - CDMA2000 Selects the clipping method. A graphic illustration of the way in which these two methods work is given in the menu.

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 also figures above, Clipping State).



Remote-control command:
`SOUR:BB:C2K:CLIP:MODE VECT`

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.

Remote-control command:
`SOUR:BB:C2K:CLIP:MODE SCAL`

Sequence Length ARB - CDMA2000 Changes the sequence length of the arbitrary waveform component of the CDMA 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.

The number of chips is determined from this sequence length (1 Frame = 80 ms) and the chip rate. At 1.2288 MChips/s a frame equals 98.304 chips.

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

Note:
Unlike with 3GPP, in the case of CDMA2000 the length of a frame is not uniformly defined. A frame length of 80 ms is used in the R&S Signal Generator. This is the same frame length that the WinIQSIMsoftware uses for cdma2000 frames. Division into 80 ms frames was chosen because in this time grid the frame lengths for both the SYNC channel, with its cycle duration of 26.67 ms, and all other channels work out to 5 ms, 10 ms, 20 ms or 80 ms.
The F-BCH has a frame length of 160 ms. In order to use this channel, an even number of 80 ms frames has to be set.

Remote-control command:
`SOUR:BB:C2K:SLEN 20`

Invert Q for Correct Baseband Output - CDMA2000

Inverts Q-part of the baseband signal. (see also Section "*I/Q Modulator*", Page 11)

ON

The signal on the baseband outputs meets the cdma2000 standard. In order to generate an RF signal that conforms to the standard, the I/Q Swap function in the I/Q Modulator menu must be enabled (On).

Remote-control command:
`SOUR:BB:C2K:IQSW:STAT ON`

OFF

The signal on the baseband outputs does not meet the cdma2000 standard. It can however be mixed with other signals from the second baseband without any problem. In order to generate the RF signal, the I/Q Swap function in the I/Q Modulator menu must be disabled (Off).

Remote-control command:
`SOUR:BB:C2K:IQSW:STAT OFF`

Trigger-Marker-Clock - CDMA2000

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

The **Trigger/Marker/Clock** menu can be reached via the **CDMA2000** main menu.

The **Trigger In** section is where the trigger for the CDMA2000 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.

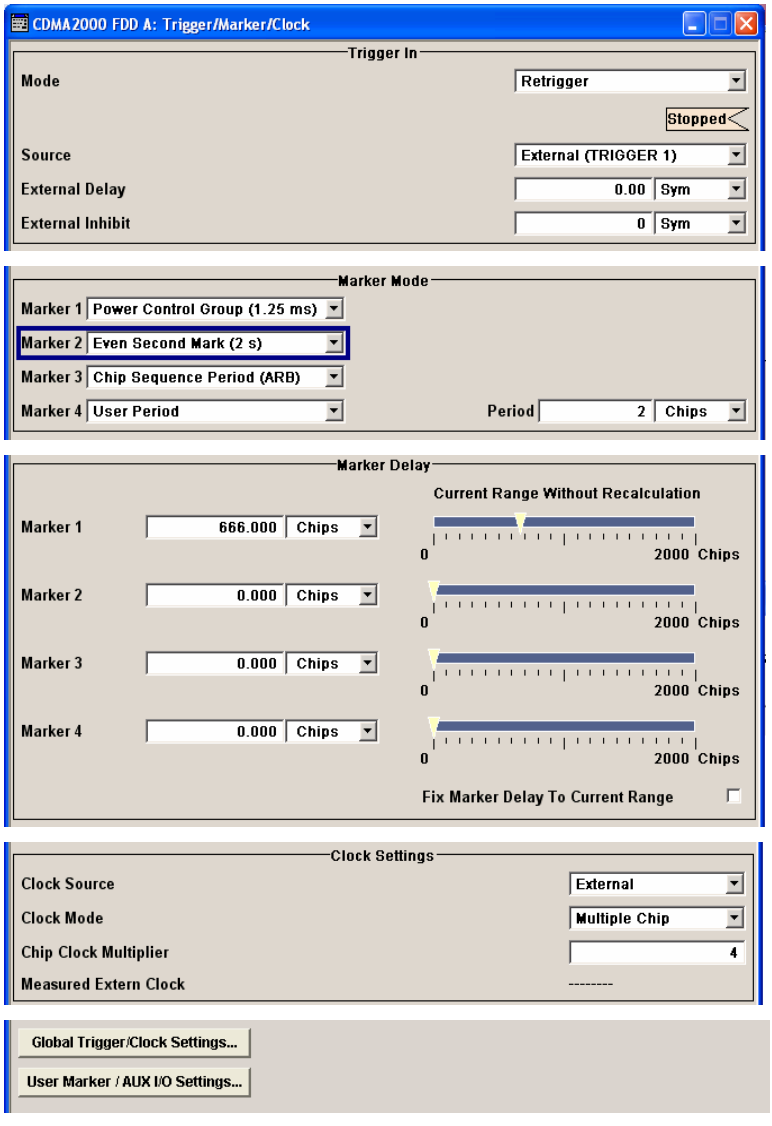
The **Marker Mode** section is where the marker signals at the MARKER output connectors are configured.

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 **Global Trigger/Clock Settings** button leads to a submenu for general trigger and clock settings.

The **UserMarker/AUX I/O** menu leads to a submenu for mapping configurations



Trigger Mode - CDMA2000 (**R&S SMx and R&S AMU instruments only)**

Selects trigger mode.

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

Auto The CDMA2000 signal is generated continuously.

Remote-control command:
`SOUR:BB:C2K:SEQ AUTO`

Retrigger The CDMA2000 signal is generated continuously. A trigger event (internal or external) causes a restart.

Remote-control command:
`SOUR:BB:C2K:SEQ RETR`

Armed_Auto The CDMA2000-Signal 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.

Remote-control command:
`SOUR:BB:C2K:SEQ AAUT`

Armed_Retrigger The CDMA2000-Signal 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.

Remote-control command:
`SOUR:BB:C2K:SEQ ARET`

Single The CDMA2000 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.

Remote-control command:
`SOUR:BB:C2K:SEQ SING`

Signal Duration Unit - CDMA2000 **(R&S SMx and R&S AMU instruments only)**

Defines the unit for the entry of the length of the signal sequence to be output in the **Single** trigger mode. Available units are chip sequence length (CLS), chips or frames.

Remote-control commands:
`SOUR:BB:C2K:TRIG:SLUN CHIP`

Signal Duration - CDMA2000

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

Defines the length of the signal sequence to be output in the **Single** trigger mode. The unit of the entry is defined unter **Signal Duration Unit**. 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.

Remote-control commands:
`SOUR:BB:C2K:TRIG:SLEN 2000`

Running - Stopped - CDMA2000

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

Displays the status of signal generation for all trigger modes. This display appears only when CDMA2000 is enabled (**State On**).

Remote-control command:
`SOUR:BB:C2K:TRIG:RMOD?`
Response: `RUN`

Running The CDMA2000 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).

Arm - CDMA2000

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

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).

Remote-control command:
`SOUR:BB:C2K:TRIG:ARM:EXEC`

Execute Trigger - CDMA2000

(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.

Remote-control commands:
`SOUR:BB:C2K:TRIG:SOUR INT`
`SOUR:BB:C2K:SEQ RETR`
`SOUR:BB:C2K:TRIG:EXEC`

Trigger Source - CDMA2000 **(R&S SMx and R&S AMU instruments only)**

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.

Remote-control command:
`SOUR:BB:C2K:TRIG:SOUR INT`

Internal (Baseband A/B) The trigger event is executed by the trigger signal from the second path (two-path instruments only).

Remote-control command:
`SOUR:BB:C2K:TRIG:SOUR OBAS`

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 1 or TRIGGER 2 connector.

The polarity, the trigger threshold and the input impedance of the TRIGGER input can be set in the Global Trigger/ Clock Settings menu.

Remote-control command:
`SOUR:BB:C2K:TRIG:SOUR EXT | BEXT`

Trigger Delay - CDMA2000 **(R&S SMx and R&S AMU instruments only)**

Sets the trigger signal delay in chips on external triggering (or on internal triggering via the second path for two-path instruments)

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

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

Remote-control command::
`SOUR:BB:C2K:TRIG:EXT:DEL 3`
`SOUR:BB:C2K:TRIG:OBAS:DEL 3`

Trigger Inhibit - CDMA2000 **(R&S SMx and R&S AMU instruments only)**

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

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

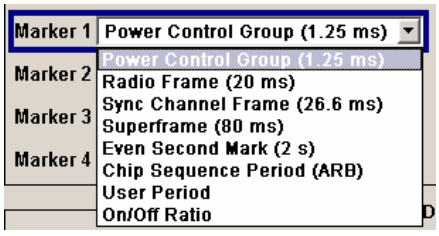
This parameter is only available on external triggering (or on internal triggering via the second path for two-path instruments).

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

Remote-control command:
`SOUR:BB:C2K:TRIG:EXT:INH 1000`
`SOUR:BB:C2K:TRIG:OBAS:INH 1000`

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

Marker Mode - CDMA2000 Selects a marker signal for the associated MARKER output.



Power Control Group (1.25 ms) A marker signal is generated at the start of each Power Control Group (every 1,25 ms).

Remote-control command:
`SOUR:BB:C2K:TRIG:OUTP1:MODE PCGR`

Radio Frame (20 ms) A marker signal is generated every 20 ms (traffic channel frame clock).

Remote-control command:
`SOUR:BB:C2K:TRIG:OUTP1:MODE RFR`

Sync Channel Frame (26.6 ms) A marker signal is generated at the beginning of each Sync Channel Frame (every 26,6 ms).

Remote-control command:
`SOUR:BB:C2K:TRIG:OUTP1:MODE SCFR`

Superframe (80 ms) A marker signal is generated every 80 ms (super frame clock).

Remote-control command:
`SOUR:BB:C2K:TRIG:OUTP1:MODE SFR`

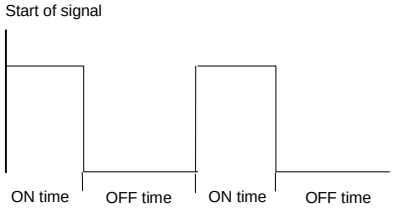
Even Second Mark (2 s) A marker signal is generated every 2 seconds.

Remote-control command:
`SOUR:BB:C2K:TRIG:OUTP1:MODE ESEC`

Chip Sequence Period (ARB) A marker signal is generated at the beginning of every Arbitrary Waveform sequence (depending on the set sequence length). The marker signal is generated regardless of whether or not an ARB component is actually used.

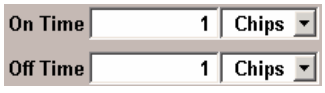
Remote-control command:
`SOUR:BB:C2K:TRIG:OUTP1:MODE CSP`

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.



Remote-control commands:
```
SOUR:BB:C2K:TRIG:OUTP1:MODE RAT
SOUR:BB:C2K:TRIG:OUTP1:OFFT 200
SOUR:BB:C2K:TRIG:OUTP1:ONT  200
```

User Period

A marker signal is generated at the beginning of every user-defined period. The period is defined in **Period**.

Remote-control command:
```
SOUR:BB:C2K:TRIG:OUTP1:MODE USER
SOUR:BB:C2K:TRIG:OUTP1:PER 614400
```

The **Marker Delay** section can be used to set a delay for the markers.

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

Marker x Delay - CDMA2000

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

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

The input is expressed as a number of chips.

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.

Remote-control command:
```
SOUR:BB:C2K:TRIG:OUTP2:DEL 2
```

Current Range without Calculation- CDMA2000

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

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

Remote-control command:
```
SOUR:BB:C2K:TRIG:OUTP2:DEL:MAX?
SOUR:BB:C2K:TRIG:OUTP2:DEL:MIN?
```

Fix marker to dynamic range - CDMA2000

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

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

Remote-control command:
```
SOUR:BB:C2K:TRIG:OUTP:DEL:FIX ON
```

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

Clock Source - CDMA2000 **(R&S SMx and R&S AMU instruments only)**

Selects the clock source.

Intern **The internal clock reference is used to generate the chip clock.**

Remote-control command:
`SOUR:BB:C2K:CLOC:SOUR INT`

Extern 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.

Remote-control command:
`SOUR:BB:C2K:CLOC:SOUR EXT`

Clock Mode - CDMA2000 **(R&S SMx and R&S AMU instruments only)**

Enters the type of externally supplied clock.

Chip A chip clock is supplied via the CLOCK connector.

Remote-control command:
`SOUR:BB:C2K:CLOC:MODE CHIP`

Multiple 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.

Remote-control command:
`SOUR:C2K:CLOC:MODE MCH`

Chip Clock Multiplier - CDMA2000 **(R&S SMx and R&S AMU instruments only)**

Enters the multiplication factor for clock type **Multiple**.

Remote-control command:
`SOUR:BB:C2K:CLOC:MULT 4`

Measured External Clock - CDMA2000 **(R&S SMx and R&S AMU instruments only)**

Displays 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.

Remote-control command:
`:CLOC:INP:FREQ?`

Global Trigger/Clock Settings - CDMA2000

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

Calls the **Global Trigger/Clock/Input Settings** menu. This menu is used among other things for setting the trigger threshold, the input impedance and the polarity of the trigger inputs TRIGGER 1/2.

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 the section "*Global Trigger/Clock/Input Settings – Setup -Environment*".

User Marker/AUX I/O Settings – CDMA2000

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

Calls the **UserMarker/AUX I/O** menu. This menu is used for mapping configuration.

The parameters in this menu affect all digital modulations and standards, and are described in the section "*Global Trigger/Clock/Input Settings – Setup -Environment*".

Predefined Settings - Downlink - CDMA2000

The **Predefined Settings** can be reached via the **CDMA2000** 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.

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.

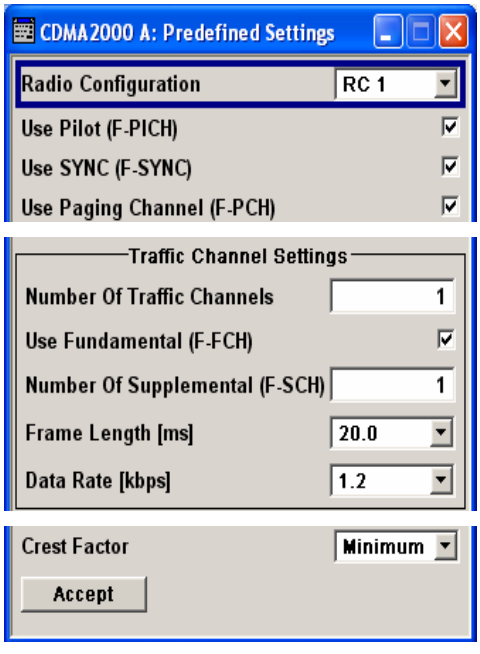
In the top section of the menu, the radio configuration of the test scenario and the used special channels are selected.

A separate set of settings of all predefined parameters is provided for each radio configuration. If the radio configuration is changed, the set of traffic channel settings belonging to this RC is automatically indicated.

In the **Traffic Channel Settings** section, the number and the structure of the traffic channels used in the test scenario is set. The selected structure is valid for all activated traffic channels.

The indicated parameters depend on the radio configuration. Their settings are specific for the selected radio configuration.

In the bottom section of the menu, the desired range for the crest factor is selected. Button **Accept** presets the channel table of base station 1 with the predefined parameters.



In the top section of the menu, the radio configuration of the test scenario and the used special channels are selected.

Radio Configuration - Predefined Settings - CDMA2000

Selects the radio configuration (RC).

The R&S Signal Generator provides a separate set of settings of all predefined traffic channel parameters for each radio configuration. If the radio configuration is changed, the set of traffic channel table values belonging to this RC is automatically activated.

Remote-control command:
`SOUR:BB:C2K:PPAR:RCON 1`

Use Pilot (F-PICH) - Predefined Settings - CDMA2000

Selects if pilot channel F-PICH is used in the scenario or not.

Remote-control command:
`SOUR:BB:C2K:PPAR:PICH ON`

Use Sync (F-Sync) - Predefined Settings - CDMA2000

Selects if sync channel F-SYNC is used in the scenario or not.

Remote-control command:
`SOUR:BB:C2K:PPAR:SCH ON`

Use Paging Channel (F-PCH) - Predefined Settings - CDMA2000

Selects if paging channel F-PCH is used in the scenario or not.

Remote-control command:
`SOUR:BB:C2K:PPAR:PCH ON`

In the **Traffic Channel Settings** section, the number and the structure of the traffic channels used in the test scenario is set. The selected structure is valid for all activated traffic channels.

Number of Traffic Channels - Predefined Settings - CDMA2000

Sets the number of activated traffic channels. Channels F-DCCH, F-FCH, and F-SCH form a traffic channel.

Remote-control command:
`SOUR:BB:C2K:PPAR:TCH:COUN 6`

Use Dedicated Control (F-DCCH) - Predefined Settings - CDMA2000

Selects if the dedicated control channel F-DCCH is activated for the traffic channel or not. PN9 is used as data source for F-DCCH.

The set state is specific for the selected radio configuration.

F-DCCH cannot be activated for radio configuration RC1 and RC2.

Remote-control command:
`SOUR:BB:C2K:PPAR:TCH:DCCH ON`

Use Fundamental (F-FCH) - Predefined Settings - CDMA2000

Selects if the fundamental channel F-FCH is activated for the traffic channel or not. PN9 is used as data source for F-FCH. The set value is specific for the selected radio configuration.

Remote-control command:
`SOUR:BB:C2K:PPAR:TCH:FCH ON`

Number of Supplemental (F-SCH) - Predefined Settings - CDMA2000

Sets the number of activated supplemental channels F-SCH. PN9 is used as data source for F-SCH. The set value is specific for the selected radio configuration.

The maximum number depends on the selected radio configuration:

RC1 and RC2: 0 ... 7
RC3, RC4, and RC5: 0 ... 2

Remote-control command:
`SOUR:BB:C2K:PPAR:TCH:SCH:COUN 3`

Frame Length - Predefined Settings - CDMA2000

Sets the frame length of the traffic channel. The set value is specific for the selected radio configuration.

The value range for the frame length depends on the selected radio configuration:

RC1 and RC2: 20 ms

RC3 to RC5: 5, 20, 40 and 80 ms

Remote-control command:
`SOUR:BB:C2K:PPAR:TCH:FLEN 20ms`

Data Rate - Predefined Settings - CDMA2000

Sets the data rate for F-FCH and all F-SCH. The set value is specific for the selected radio configuration.

The value range depends on the set frame length.

Remote-control command:
`SOUR:BB:C2K:PPAR:TCH:DATA:RATE D7K5`

In the bottom section of the menu, the desired range for the crest factor is selected. Button **Accept** presets the channel table of base station 1 with the predefined parameters.

Crest Factor - Predefined Settings - CDMA2000

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 Walsh Code Numbers.

Minimum The crest factor is minimized by assigning Walsh codes which are chosen as close as possible.

Remote-control command:
`SOUR:BB:C2K:PPAR:CRES MIN`

Average An average crest factor is set. The Walsh codes are distributed uniformly over the code domain.

Remote-control command:
`SOUR:BB:C2K:PPAR:CRES AVER`

Worst The crest factor is set to an unfavorable value (i.e. maximum) by assigning Walsh codes which are separated as widely as possible.

Remote-control command:
`SOUR:BB:C2K:PPAR:CRES WORS`

Accept - Predefined Settings - CDMA2000

Presets the channel table of base station 1 with the parameters defined in the **Predefined Settings** menu. Base station one is switched on, the other base stations are switched off.

Remote-control command:
`SOUR:BB:C2K:PPAR:EXEC`

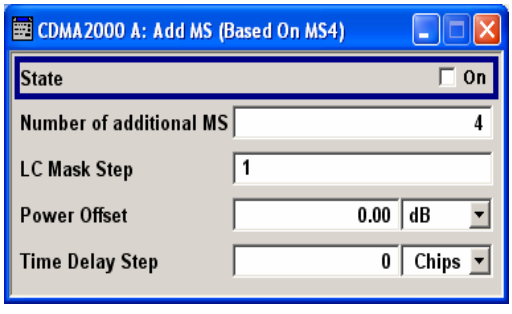
Additional Mobile Station - Uplink - CDMA2000

Submenu **Additional User Equipment** can be reached via the **CDMA2000** main menu. It is only available when the Uplink transmission direction is selected.

The menu makes it possible to simulate up to 64 additional mobile stations and thus to generate a signal that corresponds to the received signal for a base station with high capacity utilization.

The fourth mobile station (MS4) serves as a template for all other stations. The following parameters are the only ones modified for the additional mobile stations:

- LC Mask Step (different for all stations)
- Power (different to MS4, but identical among themselves)



State - Additional MS - CDMA2000

Activates additional mobile stations. At **State Off**, all the additional mobile stations are switched off.

Remote-control command:
`SOUR:BB:C2K:MST:ADD:STAT ON`

Number of Additional MS - CDMA2000

Sets the number of additional mobile stations. As many as 64 additional mobile stations can be simulated.

Remote-control command:
`SOUR:BB:C2K:MST:ADD:COUN 64`

LC Mask Step - Additional MS - CDMA2000

Enters the step width for increasing the LC mask of the additional mobile stations. The start value is the scrambling code of MS4.

The Long Code generator mask serves for channel-specific and user-specific scrambling of the code channel.

Remote-control command
`SOUR:BB:C2K:MST:ADD:LCM:STEP 5`

Power Offset - Additional MS - CDMA2000

Sets the power offset of the active channels of the additional mobile stations to the power outputs of the active channels of MS4.

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

Remote-control command:
`SOUR:BB:C2K:MST:ADD:POW:OFFS -3`

Time Delay Step - Additional MS - CDMA2000

Enters the step width for the time delay of the additional mobile stations to one another. The start value returns the time delay of MS4. Entry is made in chips and can be a maximum of 1 frame.

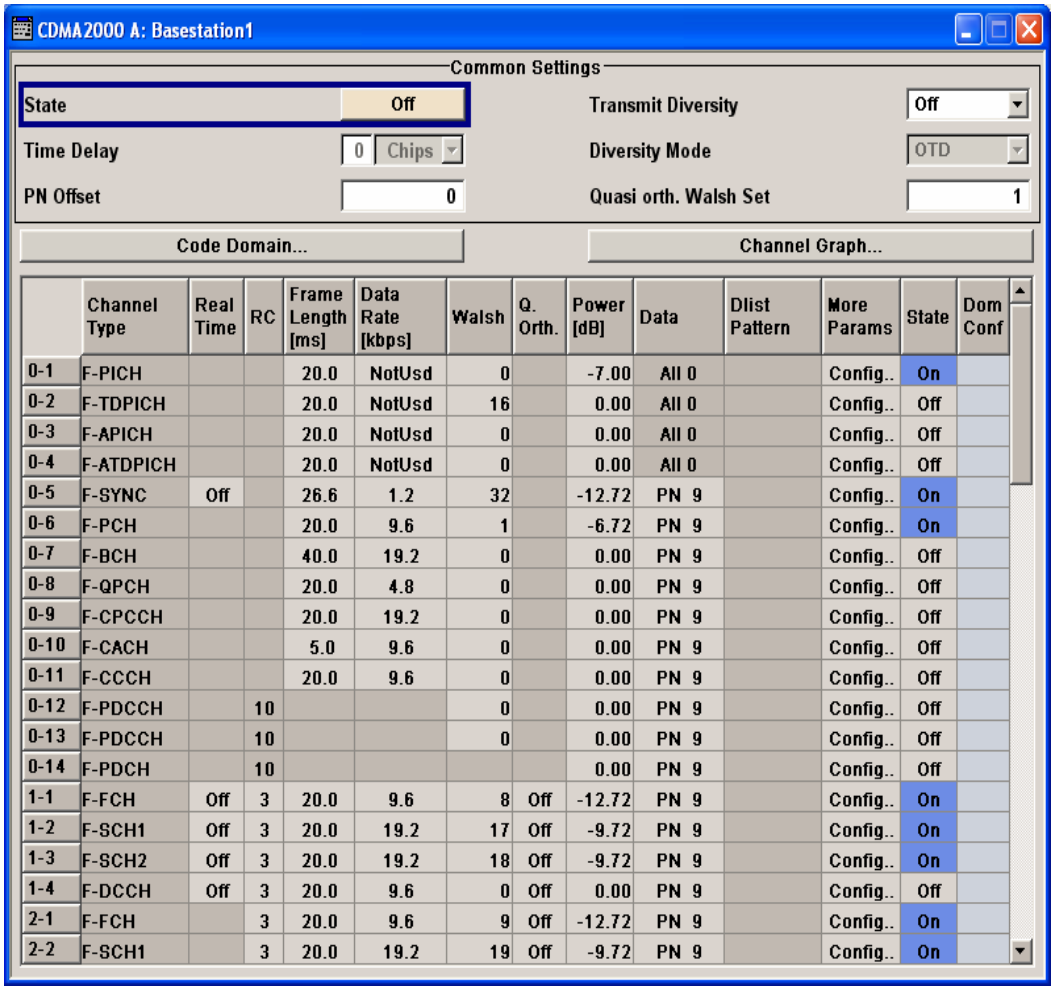
The time delay allows mobile stations to be simulated even if the arrival of their signals is not synchronized at the base station.

Remote-control command:
`SOUR:BB:C2K:MST:ADD:TDEL:STEP 256`

Base Station Configuration - CDMA2000

The **Base Station Configuration** menu is called by selecting base station **BS1** ... **BS4** in the **CDMA2000** menu. Base stations can be configured independently of one another. Base station 1 (BS1) also includes real time channels.

The menu comprises the **Common Settings** section, in which the general parameters of the base station are set, a row containing the buttons **Code Domain...** and **Channel Graph...**, which call the appropriate graphics and the most important part, the channel table.



	Channel Type	Real Time	RC	Frame Length [ms]	Data Rate [kbps]	Walsh	Q. Orth.	Power [dB]	Data	Dlist Pattern	More Params	State	Dom Conf
0-1	F-PICH			20.0	NotUsd	0		-7.00	All 0		Config..	On	
0-2	F-TDPICH			20.0	NotUsd	16		0.00	All 0		Config..	Off	
0-3	F-APICH			20.0	NotUsd	0		0.00	All 0		Config..	Off	
0-4	F-ATDPICH			20.0	NotUsd	0		0.00	All 0		Config..	Off	
0-5	F-SYNC	Off		26.6	1.2	32		-12.72	PN 9		Config..	On	
0-6	F-PCH			20.0	9.6	1		-6.72	PN 9		Config..	On	
0-7	F-BCH			40.0	19.2	0		0.00	PN 9		Config..	Off	
0-8	F-QPCH			20.0	4.8	0		0.00	PN 9		Config..	Off	
0-9	F-CPCCH			20.0	19.2	0		0.00	PN 9		Config..	Off	
0-10	F-CACH			5.0	9.6	0		0.00	PN 9		Config..	Off	
0-11	F-CCCH			20.0	9.6	0		0.00	PN 9		Config..	Off	
0-12	F-PDCCH		10			0		0.00	PN 9		Config..	Off	
0-13	F-PDCCH		10			0		0.00	PN 9		Config..	Off	
0-14	F-PDCH		10					0.00	PN 9		Config..	Off	
1-1	F-FCH	Off	3	20.0	9.6	8	Off	-12.72	PN 9		Config..	On	
1-2	F-SCH1	Off	3	20.0	19.2	17	Off	-9.72	PN 9		Config..	On	
1-3	F-SCH2	Off	3	20.0	19.2	18	Off	-9.72	PN 9		Config..	On	
1-4	F-DCCH	Off	3	20.0	9.6	0	Off	0.00	PN 9		Config..	Off	
2-1	F-FCH		3	20.0	9.6	9	Off	-12.72	PN 9		Config..	On	
2-2	F-SCH1		3	20.0	19.2	19	Off	-9.72	PN 9		Config..	On	

State - BS - CDMA2000

Activates or deactivates the selected base station.

Remote-control command:
`SOUR:BB:C2K:BST1:STAT ON`

Transmit Diversity - BS - CDMA2000

Switches transmit diversity on and off.

The signal can be sent simultaneously on several antennas. Various forms of transmit diversity are described in the CDMA2000 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 interference. The R&S Signal Generator can simulate the signal of one of the two antennas.

To activate transmit diversity, the antennas whose signals are to be simulated must be specified. The signal is generated differently depending on the selected antenna.

Two diversity schemes for the calculation of the signals are available for selection at **Diversity Mode**.

Off No transmit diversity

Remote-control command:
`SOUR:BB:C2K:BST1:TDIV OFF`

Antenna 1 Calculate and apply the output signal for antenna 1. The diversity scheme is selected at **Diversity Mode**.

Remote-control command:
`SOUR:BB:C2K:BST1:TDIV ANT1`

Antenna 2 Calculate and apply the output signal for antenna 2. The diversity scheme is selected at **Diversity Mode**.

Remote-control command:
`SOUR:BB:C2K:BST1:TDIV ANT2`

Diversity Mode - BS - CDMA2000

Selects the diversity scheme for **Transmit Diversity**.

The diversity scheme defines the calculation mode of the signal for the selected antenna (at Transmit Diversity).

OTD Orthogonal Transmit Diversity Mode. A forward link transmission method which distributes forward link channel symbols among multiple antennas and spreads the symbols with a unique Walsh or quasi-orthogonal function associated with each antenna.

Remote-control command:
`SOUR:BB:C2K:BST1:TDIV:MODE OTD`

STS Space Time Spreading Mode. A forward link transmission method which transmits all forward link channel symbols on multiple antennas and spreads the symbols with complementary Walsh or quasi-orthogonal functions.

Remote-control command:
`SOUR:BB:C2K:BST1:TDIV:MODE STS`

Time Delay- BS - CDMA2000

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

Note:
For base station 1, this value is always 0 and read-only.

Remote-control command:
`SOUR:BB:C2K:BST2:TDEL 256`

PN Offset - BS - CDMA2000

Enters the PN offset (short code).

The PN offset determines the start phase of these PN short-code sequences (see "*PN Short-Code Scrambling - Downlink*, Page 8").

This permits signals of different base stations to be distinguished.

Remote-control command:
`SOUR:BB:C2K:BST3:PNOF 4`

Quasi orth Walsh Set - BS - CDMA2000

Selects the Quasi Qrthogonalen Walsh Set. The standard defines three different sets.

The so-called 'quasi-orthogonal Walsh sets' can be used in addition to the Walsh codes. They increase the number of possible channels and thus extend the base-station capacity. When the quasi-orthogonal Walsh code is used, spreading the data stream results in complex spreading also through an additional rotation of the output phase (the spreading code then consists of a real and an imaginary part).

In the channel table, a decision can be made for each channel whether the Walsh code of the standard set or of the quasi-orthogonal set should be used. The quasi-orthogonal Walsh codes are used if **On** is activated in column **Q. Orth**.

Remote-control command:
`SOUR:BB:C2K:BST1:QWS 2`

The button **Code Domain ...** above the channel table calls a graphical display of the assigned code domain.

Code Domain Graph - BS - CDMA2000

Opens the code domain display to visually check the signal

Remote-control command: `n.a.`

The Walsh codes of variable length used by CDMA2000 are the so-called Hadamard codes.

The structure of these codes is explained below. The code matrix of the order N+1 is obtained from the matrix N by extending the latter to the right and downwards through copying and downwards to the right by copying and inversion.

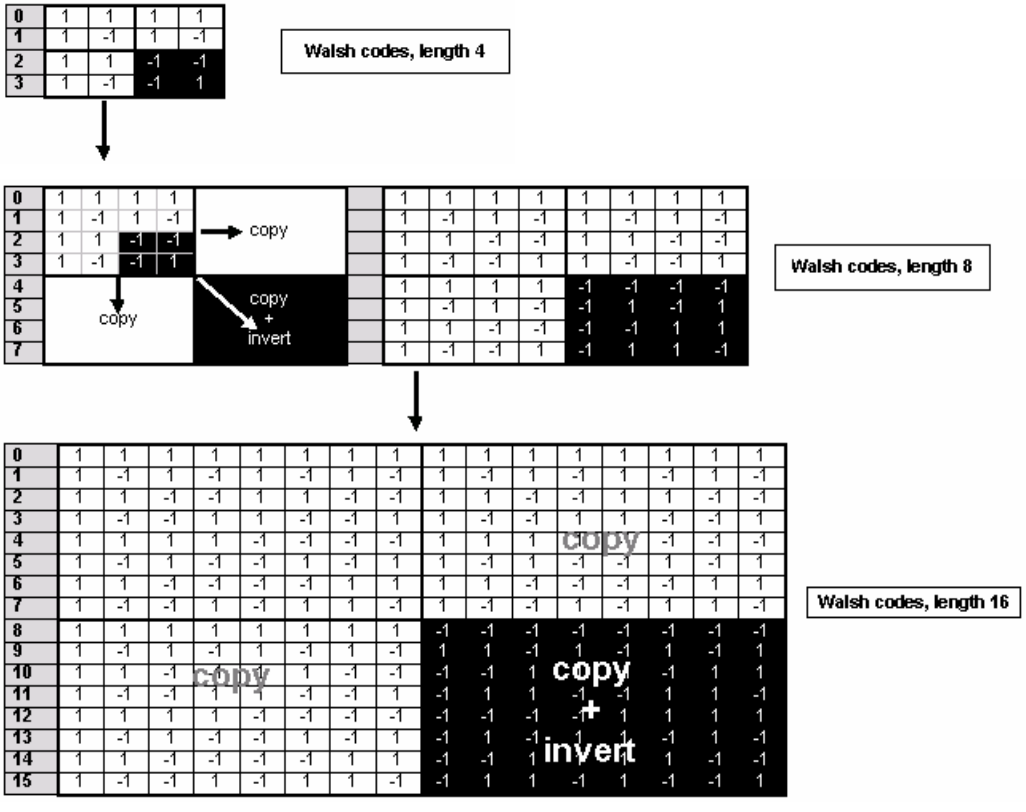


Fig. 12 Generation scheme of Walsh code

Walsh codes of the lengths 4, 8, 16, 32, 64, and 128 are used in CDMA2000 with spreading rate 1. The greater the spreading factor / Walsh code length, the smaller the useful symbol rate prior to spreading and vice versa.

In contrast to the spreading codes of 3GPP, Walsh codes of short lengths (low spreading factor) do not occupy a block area in a Walsh matrix of larger spreading factor. Several lines (ratio of the two spreading factors) are occupied in the matrix with a higher spreading factor, distributed over the whole matrix. This behavior is illustrated in the diagram below. This results from the structuring scheme of the Walsh codes that are obtained by copying and inverting the next smaller matrix.

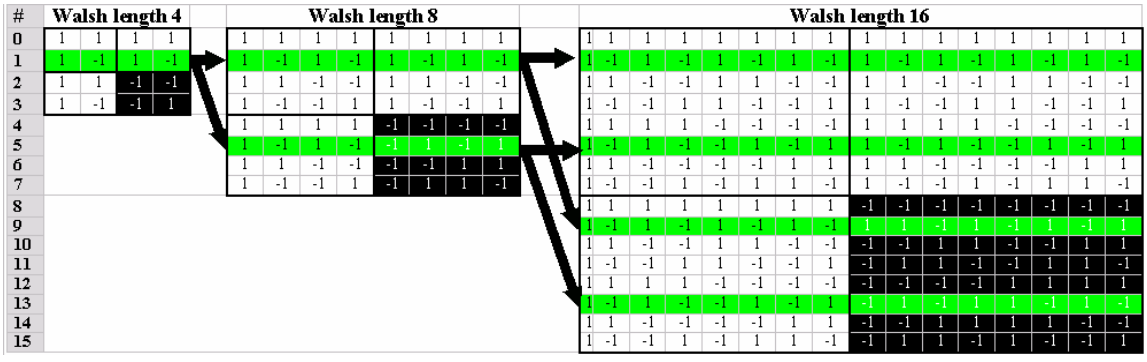


Fig. 14 Walsh code tree

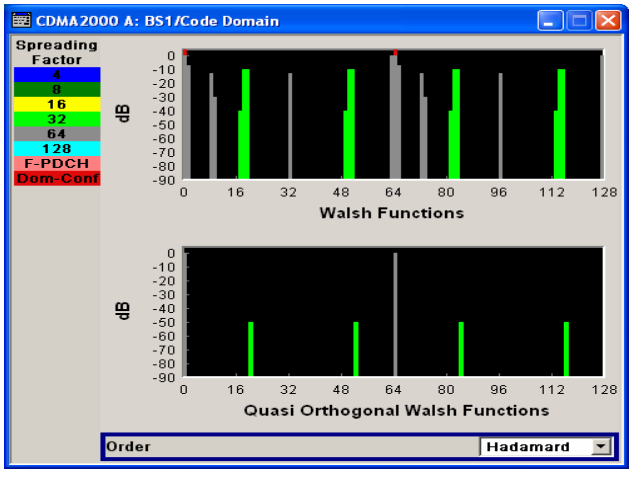
If a Walsh code with the length 4 and index 1 is used, codes 1 and 5 are disabled at the length 8, and codes 1, 5, 9 and 13 at the length 16 because codes of greater length contain the output code of shorter length (or its inversion).

When using such conflicting Walsh codes simultaneously, the signals of the associated code channels are mixed so that they can no longer be separated in the receiver. Orthogonality will then be lost.

The matrix range with the highest spreading factor (i.e. 128), which is based on the spreading code selected in the code tree, is then defined as **domain** of a specific Walsh spreading code. Using a spreading code means that its entire domain is used.

The **Code Domain** graphic shows the assignment of active code channels in the code domain. The upper part shows the code domain of the standard Walsh set, the lower part the code domain of quasi-orthogonal Walsh sets.

The code numbers are plotted on the X axes, the colored bars show the code channels. The legend at the left of the graph indicates the assignment of colors to the spreading factors. An additional color is reserved for the packet channel F-PDCH because this channel may be assigned to more than one code channel. The height of the bars indicates the power of the code channel.



In this display assignment of the domains can be seen at a glance. Compared to 3GPP it is however much more difficult to see whether the code domains of different channels overlap, i.e. whether there is a domain conflict. This is due to the structure of the Walsh codes described above. The reason is that no block areas are occupied in the domain but several areas of minimum width are distributed over the whole domain. Therefore, the occurrence of a domain conflict is indicated by a red dot marking the involved channels.

In addition, in the channel table, a code domain conflict with an is indicated in column **Do Conf** on the far right of the graph by a red dot and the orange-colored column.

	Channel Type	Real Time	RC	Frame Length [ms]	Data Rate [kbps]	Walsh	Q. Orth.	Power [dB]	Data	Dlist Pattern	More Params	State	Dom Conf
14	F-PDCH		10					0.00	PN 9		Config..	Off	
31	F-FCH	Off	4	20.0	9.6	0	Off	0.00	PN 9		Config..	Off	
32	F-SCH31	Off	4	20.0	9.6	0	On	0.00	PN 9		Config..	On	●
33	F-SCH32	Off	4	20.0	9.6	1	Off	0.00	PN 9		Config..	On	●
34	F-DCCH	Off	4	20.0	9.6	2	Off	0.00	PN 9		Config..	On	
41	F-FCH		5	20.0	14.4	3	Off	0.00	PN 9		Config..	On	

Note:

The graph is calculated from the settings that have been made. A change in the settings results at once in a chance of the graphical display.

Order - Code Domain BS - CDMA2000

Switches the order of the spreading codes.

Hadamard

The code channels are displayed in the order determined by the Hadamard matrix. The codes are numbered as Walsh codes according to the standard.

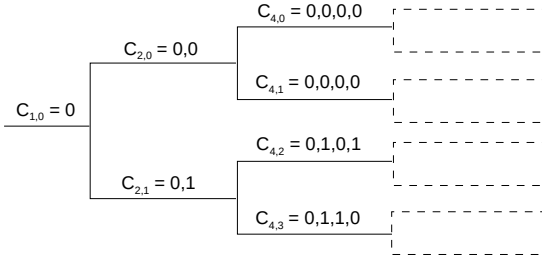
Remote-control command:
`SOUR:BB:C2K:BST1:DCON:MODE HAD`

Bit reversed

The code channels are displayed in the order defined by the Orthogonal Variable Spreading Factor (OVSF) code tree (3GPP code).

The Walsh codes and their generation scheme are closely related to the spreading codes of 3GPP. Basically, the same spreading sequences are used, only the order in the respective code trees is different.

According to 3GPP TS 25.213 the following code tree is used:



To find a 3GPP code that corresponds to a CDMA2000 code, the bit-inverted line (line index) has to be selected in the 3GPP matrix of identical spreading factor.

Example:
The 3GPP spreading code matching line 10 of the 16-bit Walsh code matrix is searched for. The binary form of the line index 10 (with 4 bits, because of Walsh length 16 = 2^4) is 1010. The bit-inverted index is 0101, i.e. 5 in decimal notation. This means that the Walsh code No. 10 with the length 16 corresponds to the 3GPP spreading code 5 of the same length (spreading factor).

Remote-control command:
`SOUR:BB:C2K:BST1:DCON:MODE BREV`

The button **Channel Graph..** above the channel table calls a graphical display of the activated channels.

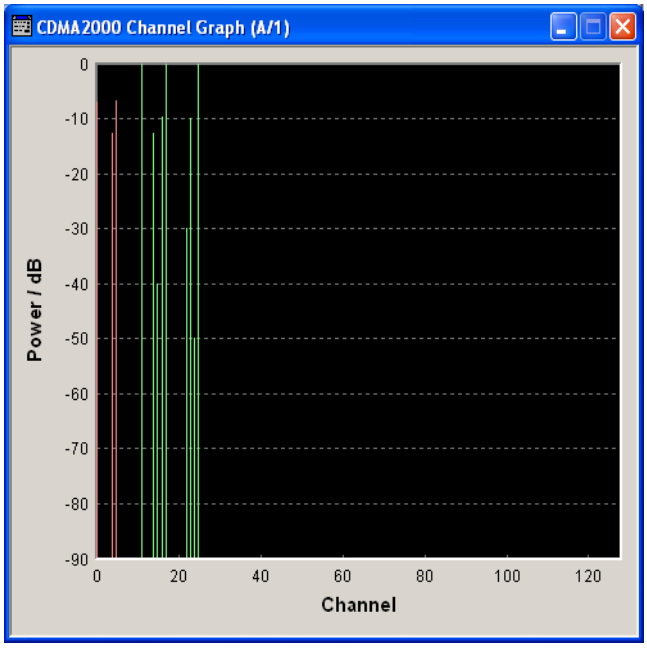
Channel Graph - Base Station - CDMA2000

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

Remote-control command: `n.a.`

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, the green bars the traffic channels. The channel index is plotted on the X-axes. The height of the bars shows the relative power of the channel.

The graph is calculated from the settings that have been made.



Channel Table - BS - CDMA2000

The **channel table** is located in the lower part of the menu. The channel table is where the individual channel parameters are set.

Up to 78 channels are available for each base station. Channels 0-1 to 0-11 are assigned to the special channels which are responsible for the correct communication between base station and mobile station. The packet channels (0-12 to 0-14) and the traffic channels (1-0 and above) transmit the data.

A traffic channel is used for transmitting the radio link information, i.e. for communication with the addressee. The traffic channels consists of a dedicated channel, a fundamental channel and, depending on the radio configuration of up to 7 supplemental channels.

The packet data channel and the packet data control channels are used for transmitting data packets (packet data service) usually at higher data rates than is the case with purely circuit-mode traffic channels. The radio configuration of these channels is defined as 10 in accordance with the cdma2000 standard.

The number of sub channels and the sub channel types of a traffic channel depend on the selected radio configuration. The radio configuration can be set separately for each traffic channel and is the same for all sub channels of this traffic channel. It determines among other things the channel coding types, the frame lengths and the data rates that can be used and the settings of fixed parameter , e.g. CRC length. The R&S Signal Generator provides a separate set of settings of all channel table parameters for each radio configuration. Thus, when the radio configuration is changed, the current set of settings is internally stored for the old radio configuration and the complete set of settings belonging to the new radio configuration is activated and indicated in the channel table.

Channel 0-5 (F-SYNC) and the first traffic channel can be generated in real time.

	Channel Type	Real Time	RC	Frame Length [ms]	Data Rate [kbps]	Walsh	Q. Orth.	Power [dB]	Data	Dlist Pattern	More Params	State	Dom Conf
1	F-PICH			20.0	1.2	0	Off	0	PN 9		Config..	On	
2	F-TDPICH			20.0	1.2	0	Off	0	PN 9		Config..	On	
3	F-APICH			20.0	1.2	0	Off	0	PN 9		Config..	On	
4	F-ATDPICH			20.0	1.2	0	Off	0	PN 9		Config..	On	
5	F-SYNC	On		20.0	2.4	0	Off	0	PN 9		Config..	On	
6	F-PCH			20.0	9.6	0	Off	0	PN 9		Config..	On	
7	F-BCH			20.0	9.6	0	Off	0	All 1		Config..	On	
8	F-QPCH			20.0	1.2	0	Off	0	PN 9		Config..	On	
9	F-CPCCH			20.0	1.2	0	Off	0	PN 9		Config..	On	
10	F-CACH			20.0	1.2	0	Off	0	PN 9		Config..	On	
11	F-CCCH			20.0	1.2	0	Off	0	PN 9		Config..	On	
12	F-PDCCH		10			0	Off	0	PN 9		Config..	Off	
13	F-PDCCH		10			0	Off	0	PN 9		Config..	On	

Channel Number - BS - CDMA2000

Displays the channel numbers.

The channel number is made up of 2 numbers. If the first number is 0 it identifies the special channels, i.e. the control channels and packet channels. A first number of 1 to 8 designates the traffic channels. The second number refers consecutively to the special channels or the sub-channels of a traffic channel.

All available channels are always displayed, even those that are inactive. The number of sub-channels per traffic channel 1 (four or eight) depends on the chosen radio configuration.

Each channel is switched on and off by the **On/Off** button in the **State** column.

Remote-control command: n.a.

During remote control the channel is selected via the suffix to the keywords CGRoup<n>:COFFset<n>. Then CGRoup0 selects the special channels group, CGRoup1 to 8 the traffic channel. COFFset1 to 14 selects either the special channel or the code channel of a traffic channel. E.g. CGRoup0:COFFset14 selects the packet channel F-PDCH, CGRoup3:COFFset1 selects the F-FCH of traffic channel 3.

Channel Type - BS - CDMA2000

Indication of the channel type (see following table).

Remote-control command:
SOUR:BB:C2K:BST4:CGR1:COFF1:TYPE?
Response: "F-FCH"

Table 4 List of supported channel types and their sequence in the CDMA2000 channel table

Index	Shortform	Name	Function
0-1	F-PICH	Forward Pilot Channel	The base station continuously transmits the pilot channel. This channel provides capabilities for soft *handoff* and coherent detection. Handoff is a procedure where a mobile with an on-going call changes channel and/or base station under the supervision of the network. The Walsh code is 0.
0-2	F-TDPICH	Forward Transmit Diversity Pilot Channel	The base station continuously transmits this pilot channel from the secondary antenna when transmit diversity is enabled.
0-3	F-APICH	Forward Auxiliary Pilot Channel	This pilot channel transmits the base station as an option.
0-4	F-ATDPICH	Forward Auxiliary Transmit Diversity Pilot Channel	The base station optionally transmits this pilot channel from the secondary antenna when transmit diversity is enabled.
0-5	F-SYNC	Forward Synchronisation Channel	The synchronization channel enables the mobile station to synchronize with the base station. It contains the PN offset, the system time and the long code status, information about the paging channel, together with the system ID and the network ID. The Walsh code is 32.
0-6	F-PCH	Forward Paging Channel	The paging channel carries control information specific to a mobile station when the network does not know where the mobile station is located.
0-7	F-BCCH	Forward Broadcast Channel	The broadcast channel is used to broadcast system- and cell-specific information. The F-BCH is always transmitted over the entire cell and has a single transport format.
0-8	F-QPCH	Forward Quick Paging Channel	The paging channel contains short form information for the mobile station, particularly if the latter is not transmitting.
0-9	F-CPCCH	Forward Common Power Control Channel	
0-10	F-CACH	Forward Common Assignment Channel	
0-11	F-CCCH	Forward Common Control Channel	General channel for transmitting control information. It also provides a mean for paging functions but it supports different data rates. It provides capability for short burst data communications.
0-12/13	F-PDCCH	Forward Packet Data Control Channel	The Forward Packet Data Control Channel carries the control information for the Forward Packet Data Channel.
0-14	F-PDCH	Forward Packet Data Channel	Packet oriented data channel, supports high data rates
1-1	F-FCH	Forward Fundamental Channel	Subchannel of a traffic channel. Contains control data and user data.
1-2	F-SCCH1	Forward Supplemental Code Channel	Subchannel of a traffic channel. Enables higher data rates for control and user data.
1-2	F-SCH1	Forward Supplemental Channel	Subchannel of a traffic channel. Enables higher data rates for control and user data.
...			
1-4	F-DCCH	Forward Dedicated Control Channel (RC3, RC4 and RC5)	Subchannel of a traffic channel. It transports specific control information.

Real Time - BS1 - CDMA2000

Activates realtime generation of the channel. This option is only available for the sync channel F-SYNC and the first traffic channel.

The channel state, Real Time On or Off, is displayed in different colors. The set state for the first traffic channel is specific for the selected radio configuration.

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).

Remote-control command:
`SOUR:BB:C2K:BST:CGR1:COFF1:REAL:STAT ON`

Radio Configuration (RC) - BS - CDMA2000

Select radio configuration of the traffic channel.

The radio configuration determines the channel types, the frame lengths, the channel coding types and the data rates that can be used.

The radio configuration is the same for all sub channels of a traffic channel. If the radio configuration is modified for one of the sub channels the new value is then automatically used by all other sub-channels of this traffic channel.

The radio configuration for the packet channels F-PDCCH and F-PDCH is fixed to RC10.

The R&S Signal Generator provides a separate set of settings of all channel table parameters for each radio configuration. Changing the radio configuration causes the settings belonging to the new RC value to be activated in the channel table (the settings belonging to the old RC value are stored).

The radio configuration determines the permissible frame lengths. The frame length defines the permitted data rate and channel coding type which in turn determine the permitted Walsh codes.

This gives rise to a hierarchy within the following parameters:

Frame Length -> Data Rate + Channel Coding Type -> Walsh Code

Changing one of the parameters in this hierarchy automatically causes the lower-level settings to be changed if they are no longer permitted following the change to the higher-level parameter.

Remote-control command:
`SOUR:BB:C2K:BST4:CGR2:RCON 1`

Frame Length- BS - CDMA2000

Enters the frame length of the channel. The set value is specific for the selected radio configuration.

The value range depends on the channel type and radio configuration. The frame length of the F-SCH is fixed to 26.6.ms. The maximum frame length is 160 ms, the minimum frame length is 5 ms.

The frame length affects the data rates and the channel coding types that are possible within a channel. Changing the frame length may lead to a change of data rate and/or the channel coding type and this in turn may bring about a change of Walsh code.

Remote-control command:
`SOUR:BB:C2K:BST4:CGR1:COFF3:FLEN 20ms`

Data Rate - BS - CDMA2000

Enters the data rate of the channel. The set value is specific for the selected radio configuration.

The R&S Signal Generator supports all data rates between 1.2 kbps and 1,036.8 kbps defined in the standard.

The value range depends on the frame length. If the frame length is changed so that the set data rate becomes invalid, the next permissible value is automatically set.

The data rate affects the Walsh code (spreading factor) that are possible within a channel. If a data rate is changed so that the selected Walsh code becomes invalid, the next permissible value is automatically set.

Remote-control command:
`SOUR:BB:C2K:BST4:CGR1:COFF1:DATA:RATE DR3K6`

Walsh Code - BS - CDMA2000

Assigns the Walsh Code to the channel (see Section "*Variable-Length Walsh Spreading - Downlink*", Page 8, and see Section "*Code Domain Graph - BS - CDMA2000*", Page 42). The set value is specific for the selected radio configuration.

The code channel is spread with the set Walsh code (spreading code).

The value range of the Walsh code depends on the frame length, the channel coding type and the data rate.

If one of these parameters is changed so that the set Walsh code gets invalid, the next permissible value is automatically set.

The standard assigns a fixed Walsh code to some channels (F-PICH, for example, always uses Walsh code 0). Generally, the Walsh code can only be varied within the range specified by the standard.

Remote-control command:
`SOUR:BB:C2K:BST4:CGR1:COFF1:WCOD 63`

Quasi Orthogonal Walsh Code State - BS - CDMA2000

Activates/deactivates the use of the quasi orthogonal Walsh codes for the channel. The set state is specific for the selected radio configuration.

Depending on the channel type and other parameters, the standard does not allow the use of quasi-orthogonal codes. In this case the selection field is dimmed.

The quasi orthogonal Walsh Code set is selected for all channels of the base station in the upper area of the CDMA200 menu.

Remote-control command:
`SOUR:BB:C2K:BST4:CGR1:COFF1:QWC:STAT ON`

Power - BS - CDMA2000

Sets the channel power in dB. The set value is specific for the selected radio configuration.

The power entered is relative to the powers outputs of the other channels. If **Adjust Total Power to 0 dB** is executed (top level of the CDMA menu), all the power data is relative to 0 dB.

The set **Power** value is also the start power of the channel for **Misuse For Output Power Control**.

***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).

Remote-control command:
`SOUR:BB:C2K:BST4:CGR1:COFF1:POW -20`

Data - BS - CDMA2000

Selects data source. The set value is specific for the selected radio configuration.

All 0
All 1

0 data or 1 data is internally generated.

Remote-control command:
`SOUR:BB:C2K:BST3:CGR2:COFF1:DATA ZERO|ONE`

PN xx

PRBS data in accordance with the IUT-T with period lengths between 2^9-1 and 2^{23}-1 are internally generated.

Remote-control commands:
`SOUR:BB:C2K:BST3:CGR2:COFF1:DATA PN9|PN11|PN15|PN16|PN20|PN21|PN23`

Pattern
Pattern

A user-definable bit pattern with a maximum length of 64 bits is internally generated.

The bit pattern is defined in the Pattern input box.

Remote-control command:
`SOUR:BB:C2K:BST3:CGR2:COFF1:DATA PATT`
`SOUR:BB:C2K:BST3:CGR2:COFF1:DATA:PATT #H3F,8`

Data List
Select Data List

Data lists will be used. Data lists can be generated internally in the data editor or externally.

Data lists are selected in the Select Data List field.

Remote-control command:
`SOUR:BB:C2K:BST3:CGR2:COFF1:DATA DLIS`
`SOUR:BB:C2K:BST3:CGR2:COFF1:DATA:DSEL "BS_CDMA"`

More Params - BS - CDMA2000

Calls the menu for setting additional parameters of the selected channel (see Section "*More Parameters - BS Channel Table CDMA2000*", Page 51).

`Remote-control command: -`

Channel State - BS - CDMA2000

Activates or deactivates the channel. The set state is specific for the selected radio configuration.

Remote-control command:
`SOUR:BB:C2K:BST3:CGR2:COFF1:STAT ON`

Domain Conflict - BS - CDMA2000

Displays whether the channel has a code domain conflict with one of the other channel. 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 indicated value is specific for the selected radio configuration.

To call the graphical display of code domain occupancy by all the active code channels, use the **Code Domain** button (also see "*Code Domain Graph - BS - CDMA2000*", Page 42).

Remote-control command:
`SOUR:BB:C2K:BST3:DCON:STAT?`
Response: 1

`SOUR:BB:C2K:BST3:DCON:RES`

More Parameters - BS Channel Table CDMA2000

The **More Parameters** menu can be called in the BS channel table in column **More Params** with button **Config...**. The indicated values and the settings are specific for the selected radio configuration.

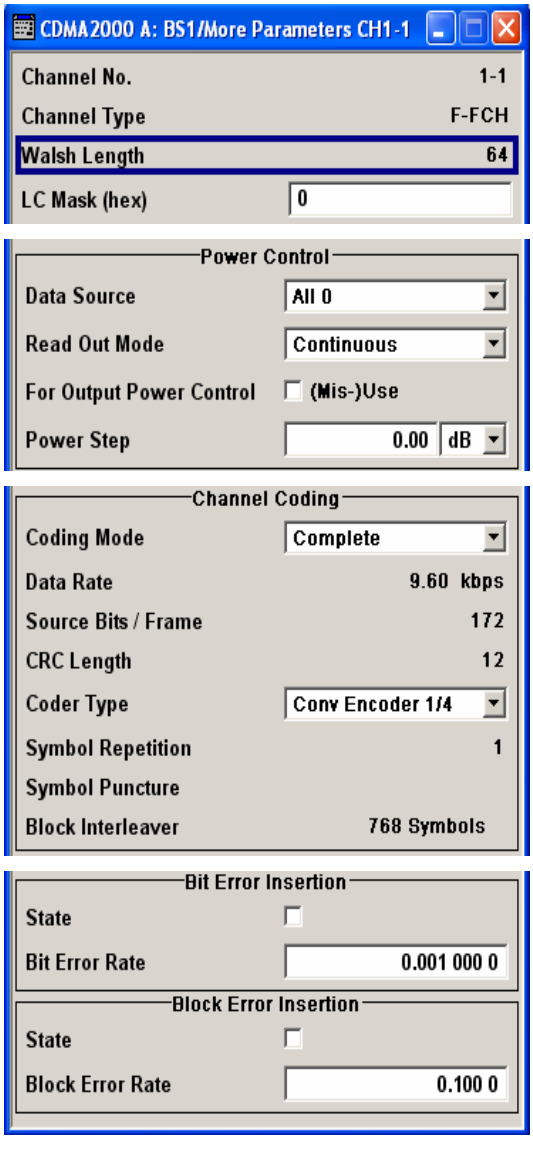
The settings for the packet channel F-PDCH channel and all other channels are different (see Section "*More Parameters for F-PDCH - BS - CDMA2000*", Page *58*). The menu for the special channels and the traffic channels is described below.

The upper section is where the channel number, channel type and Walsh length of the selected channel is displayed.The **Power Control** section is where the settings for the power control bits are made.

This section is only available for the traffic sub channels F-FCH and F-DCCH. The **Channel Coding** section is where the channel coding settings are made.

The **Bit/Block Error Insertion** section is where the bit/block error simulation is configured and activated.

This section is only available for the real time channels.



Channel No - More Parameters BS - CDMA2000

Displays the channel number of the channel being configured.

Remote-control command: `n.a.`

Channel Type - More Parameters BS - CDMA2000

Displays the type of the channel being configured.

`Remote-control command: n.a.`

Walsh Length - More Parameters BS - CDMA2000

Displays the Walsh code of the channel being configured. The indicated value is specific for the selected radio configuration.

Remote-control command:
`SOUR:BB:C2K:BST4:CGR2:COFF1:WLEN?`
`Response: 64`

LC Mask - More Parameters BS - CDMA2000

(hex) Enters the mask of the long-code generator in hexadecimal form. The set value is specific for the selected radio configuration.

The long-code mask is a 42-bit value. The mask serves for channel-specific and user-specific scrambling of the code channel. The value range is 0 to 3FF FFFF FFFF.

The LC Mask is the same for all sub channels of a traffic channel. If the mask is modified for one of the sub channels the new value is then automatically used by all other sub-channels of this traffic channel.

Remote-control command:
`SOUR:BB:C2K:BST4:CGR2:COFF1:LCM #H0`

Power Control - More Parameters BS - CDMA2000

The **Power Control** section is where the settings for the power control bits are made. These bits are used to control the transmit power.

This section is only available for the traffic sub channels F-FCH and F-DCCH.

Data Source - Power Control - BS - CDMA2000

Defines the data source for the power control bits of the channel. The set value is specific for the selected radio configuration.

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.

Remote-control command:
`SOUR:BB:C2K:BST2:CGR3:COFF1:TPC:DATA ZERO | ONE`

`SOUR:BB:C2K:BST2:CGR3:COFF1:TPC:DATA PATT`
`SOUR:BB:C2K:BST2:CGR3:COFF1:TPC:DATA:PATT #H3F,8`

`SOUR:BB:C2K:BST2:CGR3:COFF1:TPC:DATA DLIS`
`SOUR:BB:C2K:BST2:CGR3:COFF1:TPC:DATA:DSEL "tpc_bts"`

Read Out Mode (Power Control) - BS - CDMA2000

Defines power control bits usage. The set value is specific for the selected radio configuration.

With CDMA, the power control bits are used to signal the increase or reduction in transmit power to the called station.

The base station sends power control bits in the traffic channel at an 800 Hz rate instead of the scrambled data bits. The mobile station increases or decrease its output power depending on these power control bits. One to four data bits (depending on the data rate) are replaced a corresponding number of power control bits („0...0“ or „1...1“).

With all read out modes, one bit is taken from the power control, multiplied and entered into the bit stream. The difference between the modes lies in the usage of the power control 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 for output power control (see below), Read Out Mode can also be used to generate various output power profiles.

Continuous The power control bits are used cyclically.

Remote-control command:
`SOUR:BB:C2K:BST2:CGR3:COFF1:TPC:READ CONT`

Single + All 0 The power control bits are used once, and then the power control sequence is continued with 0 bits.

Remote-control command:
`SOUR:BB:C2K:BST2:CGR3:COFF1:TPC:READ S0A`

Single + All 1 The power control bits are used once, and then the power control sequence is continued with 1 bits.

Remote-control command:
`SOUR:BB:C2K:BST2:CGR3:COFF1:TPC:READ S1A`

Single + alt. 01 The power control bits are used once and then the power control sequence is continued with 0 and 1 bits alternately (in multiples, depending on by the data rate, for example, 00001111).

Remote-control command:
`SOUR:BB:C2K:BST2:CGR3:COFF1:TPC:READ S01A`

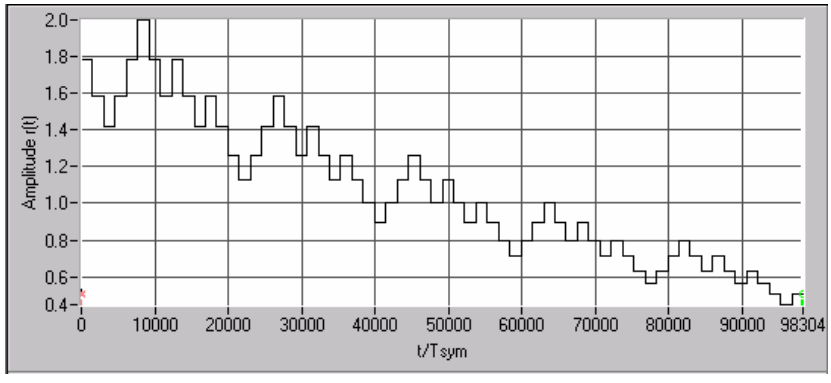
Single + alt. 10 The power control bits are used once and then the Power control bit sequence is continued with 1 and 0 bits alternately (in multiples, depending on by the data rate, for example, 11110000).

Remote-control command:
`SOUR:BB:C2K:BST2:CGR3:COFF1:TPC:READ S10A`

Misuse for Output Power Control - BS - CDMA2000

Activates "mis-" use of the power control data. The set value is specific for the selected radio configuration.

With CDMA, the power control bits are used to signal the increase or reduction in transmit power to the called station. If **(Mis-) use for output power control** is activated, the specified pattern is misused, in order to vary the intrinsic transmit power over time. Every 1.25 ms (800 Hz) a bit of this pattern is removed 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 -80 dB. The following envelope is produced at a channel power of 0 dB, power step 1.0 dB and pattern "001110100000011" and Pattern ReadOut Mode **Continuous:**



Dynamic change of channel power (continuous)

***Note**:*
The first bit is assigned to the first power control section. In this first section the start power specified in the channel table is always used, i.e. only in the next power control section (with the second power control bit) will the defined power change be effective.

Remote-control command:
`SOUR:BB:C2K:BST2:CGR3:COFF1:TPC:MIS ON`

Power Step (DPCCH) - BS - CDMA2000

Sets the step width of the power change in dB for **(Mis-) use for output power control**. The set value is specific for the selected radio configuration.

Remote-control command:
`SOUR:BB:C2K:BST2:CGR3:COFF1:TPC:PST 1.0`

Channel Coding - More Parameters BS - CDMA2000

The **Channel Coding** section or menu **More Parameters** is where the channel coding settings are made. The indicated values and the settings are specific for the selected radio configuration.

In contrast to 3GPP FDD, channel coding with CDMA2000 is part of the physical layer. The channel coding procedure may slightly vary depending on channel type, frame length and data rate.

Channel Coding Mode - More Params BS - CDMA2000

Activates or deactivates channel coding. The set state is specific for the selected radio configuration.

Off Channel coding is deactivated.

Channel coding is not performed. The data sources of the individual channels apply their data stream directly to the long-code scrambler. The data source supplies the traffic data with the data rate that would be available at the long-code scrambler after coding is switched on. This effective data rate, which is used for reading off from the data source, is displayed under Effective Data Rate. The Data Rate parameter displayed in the channel table continues to affect the Effective Data Rate, but no longer agrees with it.

Remote-control command:
`SOUR:BB:C2K:BST2:CGR3:COFF1:CCOD:MODE OFF`

Complete The complete channel coding is performed. The channel coding procedure may slightly vary depending on channel type, frame length and data rate.

Remote-control command:
`SOUR:BB:C2K:BST2:CGR3:COFF1:CCOD:MODE COMP`

Without Interleaving Except for the block interleaver, the whole channel coding procedure is carried out. In this mode the frame structure and the convolutional coder of an receiver can be tested.

Remote-control command:
`SOUR:BB:C2K:BST2:CGR3:COFF1:CCOD:MODE NOIN`

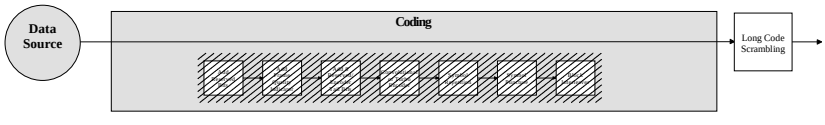
Interleaving Only In this mode only block interleaver is used for coding. This allows the deinterleaver in the receiver to be tested independently of the remaining (de-)coding process.

Remote-control command:
`SOUR:BB:C2K:BST2:CGR3:COFF1:CCOD:MODE OINT`

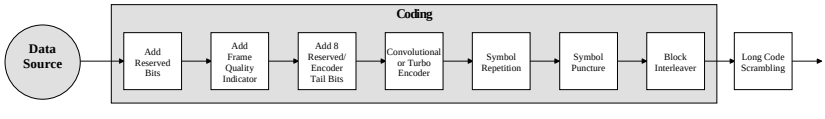
Effective Data Rate - More Params BS - CDMA2000

Indication of the effective data rate. The indicated value is specific for the selected radio configuration.

For coding modes **Interleaving Only** and **Coding Off** the effective data rate differs from the set data rate, since no increase in the data rate is brought about by the convolution coder. The data rate set in the channel table is therefore not correct.



For coding modes **Without Interleaving** and **Complete** the data rate in the channel table agrees with the effective data rate, since there is an increase in the data rate due to the convolution coder.



Remote-control command:
`SOUR:BB:C2K:BST4:CGR3:COFF1:CCOD:DATA:RATE?`

Source Bits / Frame - More Params BS - CDMA2000

Indication of the number of input bits per frame for the channel coder. The indicated value is specific for the selected radio configuration.

Remote-control command:
`SOUR:BB:C2K:BST4:CGR3:COFF1:CCOD:BITF?`

CRC Length - More Params BS - CDMA2000

Indication of the CRC (cyclic redundancy code) type (length) for error identification. The indicated value is specific for the selected radio configuration.

Remote-control command:
`SOUR:BB:C2K:BST4:CHAN108:CCOD:CRC?`

Channel Coder Type - More Params BS - CDMA2000

Selects error protection. The set value is specific for the selected radio configuration.

Which coder types are available depends on the channel type and other channel settings such as frame length, etc.

If one of these parameters is changed so that the set channel coding type gets invalid, the next permissible value is automatically set.

Off No error protection. This selection is available for the pilot channels only.

Remote-control command:
`SOUR:BB:C2K:BST:CGR3:COFF1:CCOD:TYPE OFF`

Conv Encoder Convolution Coder with generator polynomials defined by CDMA. The numeric value defines the rate of the convolution coder.

Remote-control command:
`SOUR:BB:C2K:BST:CGR3:COFF1:CCOD:TYPE CON2 | CON3 | CON4 | CON6`

Turbo Encoder Turbo Coder of rate 1/3 in accordance with the CDMA specifications. The numeric value defines the rate of the turbo coder.

Remote-control command:
`SOUR:BB:C2K:BST:CGR3:COFF1:CCOD:TYPE TURB3 | TURB4 | TURB5`

Symbol Repetition - More Params BS - CDMA2000

Indication of the symbol repetition rate. The indicated value is specific for the selected radio configuration.

Symbol repetition is used together with block symbol puncture for adapting the convolutional or turbo coder output data rate to the required input data rate of the interleaver.

Remote-control command:
`SOUR:BB:C2K:BST4:CGR3:COFF1:CCOD:SREP?`

Symbol Puncture - More Params BS - CDMA2000

Indication of the symbol puncture rate. The indicated value is specific for the selected radio configuration.

Symbol puncturing (elimination) is used together with block symbol repetition for adapting the convolutional or turbo coder output data rate to the required input data rate of the interleaver.

Remote-control command:
`SOUR:BB:C2K:BST4:CGR3:COFF1:CCOD:SPUN?`

Block Interleaver - More Params BS - CDMA2000

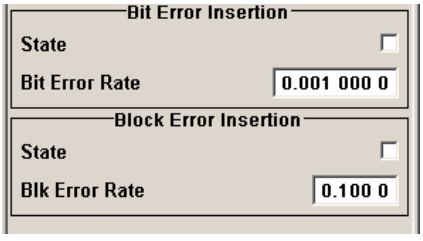
Displays the number of symbols that the interleaver processes per block. The indicated value is specific for the selected radio configuration.

Remote-control command:
`SOUR:BB:C2K:BST4:CGR3:COFF1:CCOD:BINT?`

Error Insertion - More Params BS - CDMA2000

In the **Bit Error Insertion** and **Block Error Insertion** sections of the **More Params** menu, 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.

These functions are available for realtime channels only.



Bit Error State - More Params BS - CDMA2000

Activates or deactivates bit error generation.

Bit errors are inserted into the data fields of the realtime channels.

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.

Remote-control command:
`SOUR:BB:C2K:BST:CGR1:COFF4:DERR:BIT:STAT ON`

Bit Error Rate - More Params BS - CDMA2000

Sets the bit error rate.

Remote-control command:
`SOUR:BB:C2K:BST:CGR1:COFF4:DERR:BIT:RATE 1E-3`

Block Error State - More Params BS - CDMA2000

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 possible with channel coding enabled.

Remote-control command:
`SOUR:BB:C2K:BST:CGR1:COFF4:DERR:BLOC:STAT ON`

Block Error Rate - More Params BS - CDMA2000

Sets block error rate.

Remote-control command:
`SOUR:BB:C2K:BST:CGR1:COFF4:DERR:BLOC:RATE 1E-3`

More Parameters for F-PDCH - BS - CDMA2000

The **More Parameters** menu for packet channel F-PDCH can be called in the BS channel table in column **More Params** with button **Config...**.

The settings for the packet channel F-PDCH channel and all other channels are different (see Section "*More Parameters - BS Channel Table CDMA2000*", Page 51). The menu for the special channels and the traffic channels is described below.

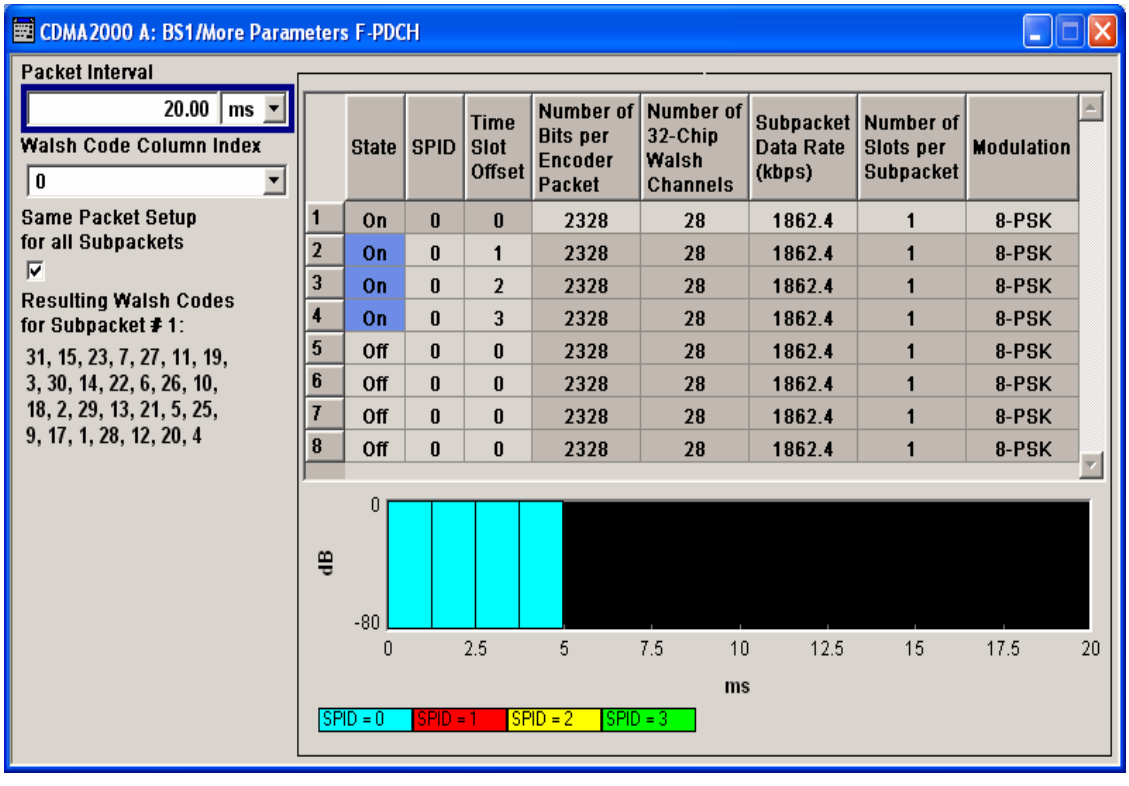
The channel coding for the F-PDCHs is always carried out in full (see 3GPP2 C.S0002-C figure 3.1.3.1.1.1-19).

The parameters of both F-PDCCHs (such as Number of Slots per Subpacket, Subpacket Position, etc.) are implicitly defined by the F-PDCH settings, since both these channels are always transmitted simultaneously with the F-PDCH. The **More Parameters** menu for these F-PDCCHs is therefore mostly for display, it only enables the selection of channel coding mode.

The left part is used to enter the general settings for the packet channel.

The right, upper part contains a table for setting the parameters of the subpackets. Up to 8 subpackets can be transmitted for each regular packet.

The right, lower part displays the current configuration of the packet channel in graphical form.



Packet Interval - More Params F-PDCHs BS - CDMA2000

Select the interval at which new data packets arrive.

New F-PDCH packets are generated in this interval. Within an interval, up to 8 subpackets of a data packet can be transmitted with any required time offset.

The value range is dependent on the set sequence length (ARB settings). The values 80 ms, 40 ms, 20 ms, 10 ms and 5 ms can always be set, and the maximum value is 2000 ms. All intermediate values must satisfy the condition.

*Sequence Length * 80ms/2^n*

where n is a whole number.

Example:

Sequence length = one 80 ms frame.
The possible values for the packet interval are 80 ms, 40 ms, 20 ms, 10 ms and 5 ms.

Sequence length = three 80 ms frames.
The possible values for the packet interval are 240 ms, 120 ms, 80 ms, 40 ms, 20 ms, 10 ms and 5 ms.

Remote-control command: -
`SOUR:BB:C2K:BST2:PDCH:PINT 40 ms`

Walsh Code Column Index - More Params F-PDCHs BS - CDMA2000

Selects the standard-compliant set of available Walsh codes for the F_PDCH (see 3GPP2 C.S0003-C, table 2-35).

Remote-control command: -
`SOUR:BB:C2K:BST2:PDCH:WIND 3`

Same Packet Setup... - More Params F-PDCHs BS - CDMA2000

Sets whether or not all subpackets are to be generated with the same settings.

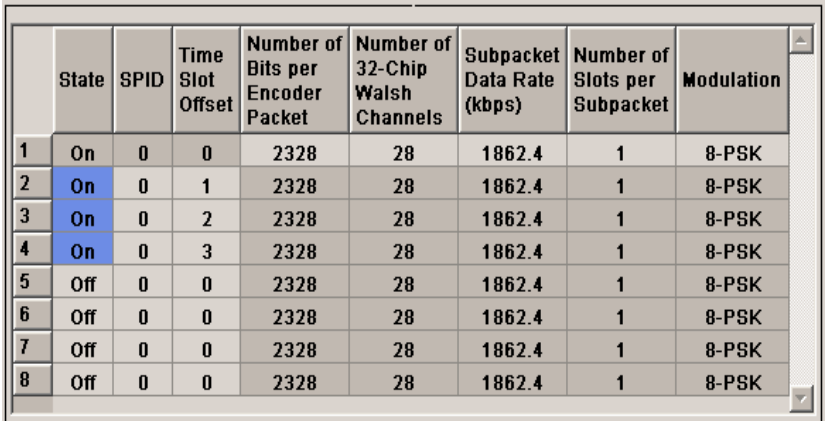
In the case of the On setting the packet parameters (Number of Bits etc., see below) can only be changed for subpacket 1. All other subpackets receive the same parameters.

The **Off** setting allows individual settings for each subpacket.

Remote-control command:
`SOUR:BB:C2K:BST2:PDCH:PSET ON`

Subpacket Table- More Params F-PDCHs BS - CDMA2000

The middle part contains a table for setting the parameters of the subpackets. Up to 8 subpackets can be transmitted for each regular packet (Encoder Packet).



	State	SPID	Time Slot Offset	Number of Bits per Encoder Packet	Number of 32-Chip Walsh Channels	Subpacket Data Rate (kbps)	Number of Slots per Subpacket	Modulation
1	On	0	0	2328	28	1862.4	1	8-PSK
2	On	0	1	2328	28	1862.4	1	8-PSK
3	On	0	2	2328	28	1862.4	1	8-PSK
4	On	0	3	2328	28	1862.4	1	8-PSK
5	Off	0	0	2328	28	1862.4	1	8-PSK
6	Off	0	0	2328	28	1862.4	1	8-PSK
7	Off	0	0	2328	28	1862.4	1	8-PSK
8	Off	0	0	2328	28	1862.4	1	8-PSK

Subpacket Number - More Params F-PDCHs BS - CDMA2000

Index number of the subpackets in the selected channel. Each packet can include up to eight subpackets.

`Remote-control command: -`
The subpacket is selected by the suffix to SUBPacket in remote control.

Subpacket State - More Params F-PDCHs BS - CDMA2000

Status of the subpacket.

Subpacket 1 is always active. The rest can be turned on and off.

Remote-control command:
`SOUR:BB:C2K:BST2:PDCH:SUBP3:STAT ON`

Subpacket ID - More Params F-PDCHs BS - CDMA2000

Selects the subpacket ID.

The subpacket ID controls the subpacket symbol selection and adopts one of four possible subpackets from the encoder packet.

The ID of the first subpacket is fixed at 0. The ID can be chosen for each of the rest.

Remote-control command:
`SOUR:BB:C2K:BST2:PDCH:SUBP3:ID 1`

Time Slot Offset - More Params F-PDCHs BS - CDMA2000

Sets the starting time of the subpacket relative to the starting time of the packet interval.

The first subpacket always has an offset of 0, which cannot be changed.

The value range for the individual subpackets depends on the settings of the other subpackets:

The time slot offsets of the remaining subpackets must be entered in ascending order. Also it is not permitted to transmit two packets simultaneously.

Example:

Subpacket 2 is transmitted in time slot 5 and is 4 slots long. Subpacket 3 can only be transmitted in time slot 9 and no sooner.

In total the value range is 0 to (Packet Interval/1.25 ms -Number of Slots per Subpacket).

Example:

Packet Interval = 20 ms, Number of Slots per Subpacket = 2. The value range is 0 to 14.

The entry for **Number of Slots per Subpacket** defines the length of a packet.

Remote-control command:
`SOUR:BB:C2K:BST2:PDCH:SUBP3:TOFF 3`

Number of Bits per Encoder Packet - More Params F-PDCHs BS - CDMA2000

Sets the number of bits per encoder packet.

Only certain combinations of this parameter with the parameters of the following four table columns are possible. These combinations are shown in the selection list in the form of a table for all five parameters.

Number of Bits per Encoder Packet	Number of 32-Chip Walsh Channels	Subpacket Data Rate (kbps)	Number of Slots per Subpacket	Modulation
2328	28	1862.4	1	8-PSK
3864	27	1545.6	2	QPSK
3096	26	2476.8	1	16-QAM
3864	26	3091.2	1	16-QAM
1560	25	1248.0	1	QPSK
2328	25	1862.4	1	8-PSK
3096	25	1238.4	2	QPSK
3864	25	1545.6	2	8-PSK
2328	23	931.2	2	QPSK
2328	23	1862.4	1	16-QAM

The **Number of Bits per Encoder Packet** defines the number of data bits that can be read from the data source for an encoder packet. Due to the channel coding this number is multiplied by a factor of about 5. The subsequent subpacket symbol selection then divides these bits into four different subpackets which can be selected via the SPID parameter.

The **Number of Bits per Encoder Packet** can only be changed for subpacket 1. This value must be identical for the remaining subpackets, since they are all part of a single encoder packet.

Remote-control command:
`SOUR:BB:C2K:BST2:PDCH:SUBP1:PAR 63`

Number of 32-Chip Walsh Channels - More Params F-PDCHs BS - CDMA2000

Selects the number of 32-chip Walsh channels.

Remote-control command:
(a fixed combination of the five parameters is selected using command `SOUR:BB:C2K:BST:PDCH:SUBP:PAR`)

Subpacket Data Rate (kbps) - More Params F-PDCHs BS - CDMA2000

Selects the data rate of the subpacket.

The data rate is the result of the **Number of Bits per Encoder Packet** divided by the duration of the subpacket (= **Number of Slots per Subpacket**). Therefore only specified combinations of the **Subpacket Data Rate** with the **Number of Slots per Subpacket** at a specified **Number of Bits per Encoder Packet** are possible.

Remote-control command:
(a fixed combination of the five parameters is selected using command `SOUR:BB:C2K:BST:PDCH:SUBP:PAR`)

Number of Slots per Subpacket - More Params F-PDCHs BS - CDMA2000

Selects the number of slots per subpacket. This parameter defines the duration of the subpacket. A slot equals 1.25 ms.

The **Number of Slots per Subpacket** is the result of the **Number of Bits per Encoder Packet** divided by the data rate. Therefore only specified combinations of the **Subpacket Data Rate** with the **Number of Slots per Subpacket** at a specified **Number of Bits per Encoder Packet** are possible.

Remote-control command:
(a fixed combination of the five parameters in the table is selected via command
`SOUR:BB:C2K:BST:PDCH:SUBP:PAR`)

Modulation - More Params F-PDCHs BS - CDMA2000

Indication of the modulation type.

The modulation type is fix for each combination of the above parameters.

Remote-control command:
(a fixed combination of the five parameters is selected using command `SOUR:BB:C2K:BST:PDCH:SUBP:PAR`)

Resulting Walsh Codes for Subpacket - More Params F-PDCHs BS - CDMA2000

Indication of the resulting Walsh codes for the sub packet.

Remote-control command:
`SOUR:BB:C2K:BST2:PDCH:SUBP3:RES:WCOD?`

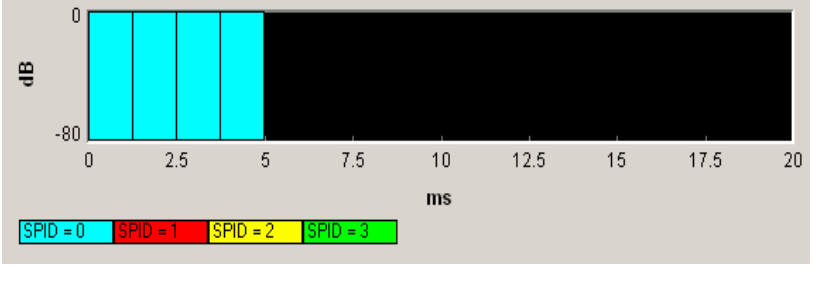
Subpacket Graph - More Params F-PDCHs BS - CDMA2000

The current configuration of the packet channel and its active subpackets is displayed in graphical form below the table.

The X axis is the length of the set packet interval in ms, i.e. the duration of the transmission of an encoder packet.

The relative power of the subpackets is represented on the Y axis. The subpackets are shown as bars and are 1, 2 or 4 time slots wide according to the configuration. The position on the X axis corresponds to the selected time slot offset.

The color of the bar depends on the sub packet ID (SPID). The assignment of colors to SPIDs is shown below the graph.



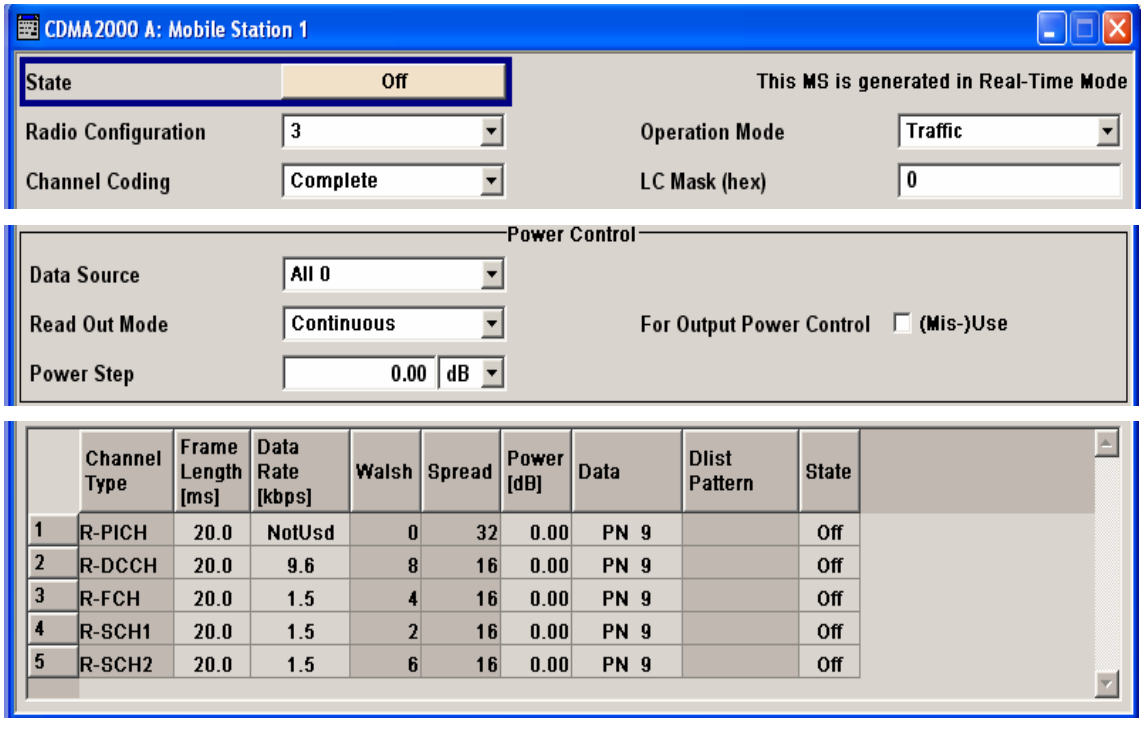
Mobile Station Configuration (MS)- CDMA2000

The **Mobile Station Configuration** menu is called by selecting mobile station **MS1 ... MS4** in the CDMA2000 menu.

Mobile station 1 (MS1) generates all the channels in realtime, the other mobile stations generate the channels in arbitrary waveform mode.

The menu is divided into the sections **Common Settings**, **Power Control** and **Channel Table**.

The structure of the channel table depends on the selected operating mode and - for the traffic channel - on the selected radio configuration.



Common Settings - MS - CDMA2000

The **Common Settings** section is where the general settings for the selected mobile station are made.

State - MS - CDMA2000

Activates or deactivates the selected mobile station. The number of the selected mobile station is specified in the menu header.

Remote-control command:
`SOUR:BB:C2K:MST1:STAT ON`

Operating Mode - MS - CDMA2000

Selects the mode in which the mobile station is to work.

The operating mode defines the generated channel types. The lower part of the menu will change in accordance with the mode. The following modes are available:

Traffic

In this mode the instrument generates a single traffic channel. A traffic channel consists of up to 8 sub channels depending on the selected radio configuration.

This mode corresponds to the standard mode of a mobile station during voice and data transmission.

Remote-control command:
`SOUR:BB:C2K:MST2:MODE TRAF`

Access

In this mode, the instrument generates an access channel (R-ACH). This channel is needed to set up the connection between the mobile station and the base station.

Remote-control command:
`SOUR:BB:C2K:MST2:MODE ACC`

Enhanced Access

In this mode, the instrument generates an enhanced access channel (R-ACH) and a pilot channel (R-PICH). These channels are used to set up the connection between the mobile station and the base station.

Remote-control command:
`SOUR:BB:C2K:MST2:MODE EACC`

Common Control

In this mode, the instrument generates a common control channel (R-ACH) and a pilot channel (R-PICH).

Remote-control command:
`SOUR:BB:C2K:MST2:MODE CCON`

Radio Configuration - MS - CDMA2000

Selects the radio configuration for the traffic channel.

In the reverse link, the channel scenario with the spreading codes of the individual channels is predefined by selecting the radio configuration. For this reason the channel table does not contain selection parameters for the Walsh code.

A separate set of settings of all channel table parameters is provided for each radio configuration. Changing the radio configuration causes the settings belonging to the new RC value to be activated in the channel table (the settings belonging to the old RC value are not lost).

The radio configuration determines the permissible frame lengths and the frame length defines the permitted data rate.

Changing the frame length automatically causes the data rate to be changed if it is no longer permitted.

Remote-control command:
`SOUR:BB:C2K:MST:RCON 2`

Channel Coding - MS - CDMA2000

Activates or deactivates channel coding.

Off Channel coding is deactivated.

Remote-control command:
`SOUR:BB:C2K:MST2:CCOD OFF`

Complete The complete channel coding is performed. The channel coding procedure may slightly vary depending on channel type, frame length and data rate.

Remote-control command:
`SOUR:BB:C2K:MST2:CCOD COMP`

Without Interleaving Except for the block interleaver, the whole channel coding procedure is carried out.

Remote-control command:
`SOUR:BB:C2K:MST2:CCOD NOIN`

Interleaving Only In this mode only block interleaver is used for coding.

Remote-control command:
`SOUR:BB:C2K:MST2:CCOD OINT`

LC Mask (hex) - MS - CDMA2000

Enters the mask of the long-code generator in hexadecimal form.

The long-code mask is a 42-bit value. The mask serves for channel-specific and user-specific scrambling of the code channel. The value range is 0 to 3FF FFFF FFFF.

Remote-control command:
`SOUR:BB:C2K:MST4:LCM #H5`

Power Control - MS - CDMA2000

The **Power Control** section is where the settings for the power control bits are made. In the uplink, these bits are used exclusively for controlling the mobile station output power by activating the **Mis(use) Power Control** function. Power control puncturing of the data bits of the traffic channels for controlling the base station power is not performed.

This section is only available for the traffic channel.

Data Source (Power Control) - MS - CDMA2000

Defines the data source for the power control bits of the channel.

When **Pattern** is selected, an entry field appears for the bit pattern. The maximum bit pattern length is 64 bits.

When **DataList** is selected, a button appears for calling the **File Select** window.

Remote-control command:
`SOUR:BB:C2K:MST2:TPC:DATA ZERO | ONE`

`SOUR:BB:C2K:MST2:TPC:DATA PATT`
`SOUR:BB:C2K:MST2:TPC:DATA:PATT #H3F,8`

`SOUR:BB:C2K:MST2:TPC:DATA DLIS`
`SOUR:BB:C2K:MST2:TPC:DATA:DSEL "tpc_bts"`

Read Out Mode (Power Control) - MS - CDMA2000

Defines read-out mode of power control bits.
Together with the option (Mis-)Use for output power control (see below), Read Out Mode can also be used to generate various output power profiles.

Continuous The power control bits are used cyclically.

Remote-control command:
`SOUR:BB:C2K:MST2:TPC:READ CONT`

Single + All 0 The power control bits are used once, and then the power control sequence is continued with 0 bits.

Remote-control command:
`SOUR:BB:C2K:MST2:TPC:READ S0A`

Single + All 1 The power control bits are used once, and then the power control sequence is continued with 1 bits.

Remote-control command:
`SOUR:BB:C2K:MST2:TPC:READ S1A`

Single + alt. 01 The power control bits are used once and then the power control sequence is continued with 0 and 1 bits alternately.

Remote-control command:
`SOUR:BB:C2K:MST2:TPC:READ S01A`

Single + alt. 10 The power control bits are used once and then the power control sequence is continued with 1 and 0 bits alternately.

Remote-control command:
`SOUR:BB:C2K:MST2:TPC:READ S10A`

Misuse for Output Power Control - MS - CDMA2000

Activates "mis-" use of the power control data.

In the uplink, the power control bits are used exclusively for controlling the mobile station output power. Power control puncturing is not defined for controlling the base station power

If **(Mis-) use for output power control** is activated, the specified pattern is used to vary the intrinsic transmit power over time. Every 1.25 ms (800 Hz) a bit of this pattern is removed 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 -80 dB. The following envelope is produced at a channel power of 0 dB, power step 1.0 dB and pattern "001110100000011" and Pattern ReadOut Mode **Continuous:**

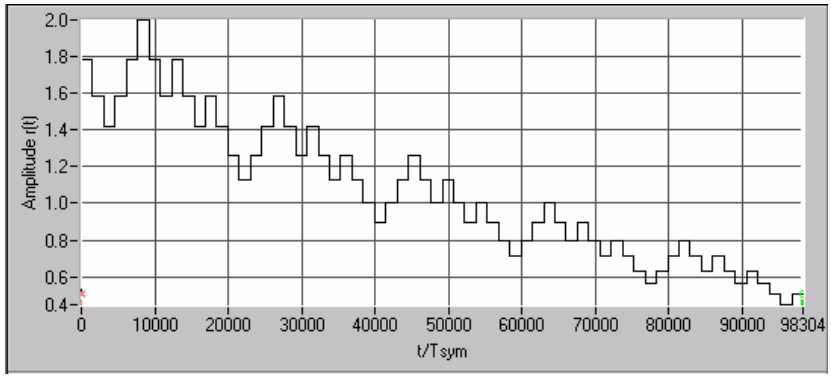


Fig. 17 Dynamic change of channel power (continuous)

***Note**:*
The first bit is assigned to the first power control section. In this first section the start power specified in the channel table is always used, i.e. only in the next power control section (with the second power control bit) will the defined power change be effective.

Remote-control command:
`SOUR:BB:C2K:MST2:TPC:MIS ON`

Power Step - MS - CDMA2000

Sets the step width of the power change in dB for **(Mis-) use for output power control**.

Remote-control command:
`SOUR:BB:C2K:MST2:TPC:PST 1.0`

Channel Table - MS - CDMA2000

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 table depends on the selected operating mode and - for the traffic channel - on the selected radio configuration. Also, for the traffic channels, the indicated values and the settings are specific for the selected radio configuration.

In uplink, the employed Walsh code are determined by the radio configuration cannot be chosen.

The following combinations between the operating modes of the four mobile stations are allowed:

	Traffic,RC1 & RC 2	**Traffic, RC3 & RC 4**	**Access**	**Enhanced Access**	**Common Control**
Traffic, RC1 & RC 2	X		X		
Traffic, RC3 & RC 4		X		X	X
Access	X		X		
Enhanced Access		X		X	X
Common Control		X		X	X

Channel Number- MS - CDMA2000

Displays the channel number.

All channels of the selected operating mode are listed. The channels are switched on and off with the **On/Off** button in the **State** column.

Remote-control command: -
(the channel is selected by the suffix at keyword CHANnel<n>)

Channel Type - MS - CDMA2000

Indication of the channel type (see following table). The possible channel types depend on the selected operating mode of the mobile station.

Remote-control command:
`SOUR:BB:C2K:MST4:CHAN1:TYPE?`
Response: `"R-FCH"`

Table 5 List of supported channel types

Shortform	**Name**	**Function**
Traffic		
R-PICH	Reverse Pilot Channel	The Reverse Pilot Channel provides the capabilities for coherent detection.
R-DCCH	Reverse Dedicated Control Channel	The Reverse Dedicated Control Channel transports mobile-specific control information.
R-FCH	Reverse Fundamental Channel	The Reverse Fundamental Channel is similar to F-FCH; designed to transport dedicated data.
R-SCH	Reverse Supplemental Channel (RC 3 ...5)	The Reverse Supplemental Channels are allocated dynamically to meet a required data rate.
R-SCCH	Reverse Supplemental Code Channel (RC 1 / 2)	The Reverse Supplemental Code Channels are allocated dynamically to meet a required data rate.
Access		
R-ACH	Reverse Access Channel	The Access channel is needed to set up the connection between the mobile station and the base station.
Enhanced Access		
R-EACH	Reverse Enhanced Access Channel	The Reverse Enhanced Access Channel is needed to set up the connection between the mobile station and the base station

Shortform	Name	Function
R-PICH	Reverse Pilot Channel	The Reverse Pilot Channel provides the capabilities for coherent detection.
Common Control		
R-CCCH	Reverse Common Control Channel	The Reverse Fundamental Channel is similar to R-ACH but it is meant to transport control information.

Frame Length- MS - CDMA2000

Enters the frame length of the channel. For the traffic channels, the indicated value is specific for the selected radio configuration.

The value range depends on the channel type and the selected radio configuration. The frame length of some channels is fixed. The maximum frame length is 80 ms, the minimum frame length is 5 ms.

The frame length affects the data rates that are possible within a channel. If a frame length is changed so that the set data rate becomes invalid, the next permissible value is automatically set.

Remote-control command:
`SOUR:BB:C2K:MST4:CHAN1:FLEN 5ms`

Data Rate- MS - CDMA2000

Enters the data rate of the channel. For the traffic channels, the indicated value is specific for the selected radio configuration.

The R&S Signal Generator supports all data rates between 1.2 kbps and 1,036.8 kbps defined in the standard.

The value range depends on the frame length. If one of these parameters is changed so that the set data rate becomes invalid, the next permissible value is automatically set.

Remote-control command:
`SOUR:BB:C2K:MST4:CHAN1:DATA:RATE DR3K6`

Walsh - MS - CDMA2000

Assigns the Walsh Code to the channel (see Section "*Spreading - Uplink*", Page 8). For the traffic channels, the indicated value is specific for the selected radio configuration.

The code channel is spread with the set Walsh code (spreading code). The Walsh codes to be used are specified by the standard and cannot be chosen.

Remote-control command:
`SOUR:BB:C2K:MST4:CHAN4:WCOD?`

Spread- MS - CDMA2000

Indication of the spreading factor of the channel. For the traffic channels, the indicated value is specific for the selected radio configuration.

The spreading factor corresponds to the length of the employed Walsh code. The Walsh codes to be used are specified by the standard and cannot be chosen.

Remote-control command:
`SOUR:BB:C2K:MST4:CHAN1:SPR?`

Power - MS - CDMA2000

Enters the channel power in dB. For the traffic channels, the set value is specific for the selected radio configuration.

The power entered is relative to the powers outputs of the other channels. If **Adjust Total Power to 0 dB** is executed (top level of the CDMA2000 menu), all the power data is relative to 0 dB.

The set **Power** value is also the start power of the channel for **Misuse For Output Power Control**.

***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).

Remote-control command:
`SOUR:BB:C2K:MST4:CHAN1:POW -20`

Data- MS - CDMA2000

Selects data source. For the traffic channels, the set value is specific for the selected radio configuration.

All 0
All 1

0 data or 1 data is internally generated.

Remote-control command:
`SOUR:BB:C2K:MST3:CHAN3:DATA ZERO | ONE`

PN xx

PRBS data in accordance with the IUT-T with period lengths between 2^9-1 and 2^{23}-1 are internally generated.

Remote-control command:
`SOUR:BB:C2K:MST3:CHAN3:DATA PN9|PN11|PN15|PN16|PN20|PN21|PN23`

Pattern
Pattern

A user-definable bit pattern with a maximum length of 64 bits is internally generated.

The bit pattern is defined in the Pattern input box.

Remote-control command:
`SOUR:BB:C2K:MST3:CHAN3:DATA PATT`
`SOUR:BB:C2K:MST3:CHAN3:DATA:PATT #H3F,8`

Data List
Select Data List

Data lists will be used. Data lists can be generated internally in the data editor or externally.

Data lists are selected in the Select Data List field.

Remote-control command:
`SOUR:BB:C2K:MST3:CHAN3:DATA DLIS`
`SOUR:BB:C2K:MST3:CHAN3:DATA:DSEL "MST"`

Channel State- MS - CDMA2000

Activates/deactivates the channel. For the traffic channels, the indicated value is specific for the selected radio configuration.

Remote-control command:
`SOUR:BB:C2K:MST3:CHAN3:STAT ON`

SOURce:BB:C2K-Subsystem- Remote-control commands

The commands in the Source:BB:C2K subsystem are described in three sections, separated into general remote commands, commands for base station settings and commands for mobile station settings.

SOURce:BB:C2K - General Remote-Control Commands

This subsystem contains commands for the primary and general settings of the CDMA2000 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 mobile station are described in separate sections. The commands are divided up in this way to make the extremely comprehensive `SOURce:BB:C2K` subsystem clearer.

The numerical suffix at SOURce distinguishes between path A and path B for two-path instruments:

SOURce<1> = path A

SOURce2 = path B

For two-path instruments, the keyword SOURce is optional with commands for path A and can be omitted. For path B, the command must include the keyword with the suffix 2.

For one-path instruments, the keyword SOURce is optional and can be omitted.

SOURce:BB:C2K - Command Table

Command	Parameter	Default Unit	Comments
[SOURce<[1]|2>:]BB:C2K:CLIPping:LEVel	1...100	PCT	
[SOURce<[1]|2>:]BB:C2K:CLIPping:MODE	VECTor | SCALar		
[SOURce<[1]|2>:]BB:C2K:CLIPping:STATe	ON | OFF		
[SOURce<[1]|2>:]BB:C2K:CLOCk:MODE	CHIP | MCHip		
[SOURce<[1]|2>:]BB:C2K:CLOCk:MULTiplier	1... 64		
[SOURce<[1]|2>:]BB:C2K:CLOCk:SOURce	EXTernal | INTernal		
[SOURce<[1]|2>:]BB:C2K:COPY:COFFset	0...255		
[SOURce<[1]|2>:]BB:C2K:COPY:DESTination	1...4		
[SOURce<[1]|2>:]BB:C2K:COPY:EXECute	-		
[SOURce<[1]|2>:]BB:C2K:COPY:SOURce	1...4		
[SOURce<[1]|2>:]BB:C2K:CRATe?			Query only
[SOURce<[1]|2>:]BB:C2K:CRATe:VARiation	1 MHz ... 5 MHz	Hz (c/s)	
[SOURce<[1]|2>:]BB:C2K:FILTer:ILENgth	1...128		
[SOURce<[1]|2>:]BB:C2K:FILTer:ILENgth:AUTO	ON | OFF		
[SOURce<[1]|2>:]BB:C2K:FILTer:OSAMpling	1...32		
[SOURce<[1]|2>:]BB:C2K:FILTer:OSAMpling:AUTO	ON | OFF		
[SOURce<[1]|2>:]BB:C2K:FILTer:PARameter:APCO25	0.15 ... 2.5		
[SOURce<[1]|2>:]BB:C2K:FILTer:PARameter:COSine	0.00 ... 0.99		

Command	Parameter	Default Unit	Comments
[SOURce<[1]|2>:]BB:C2K:FILTer:PARameter:GAUSs	0.15 ... 2.50		
[SOURce<[1]|2>:]BB:C2K:FILTer:PARameter:LPASs	0.05...2.0		
[SOURce<[1]|2>:]BB:C2K:FILTer:PARameter:PGAus	0.15 ... 2.5		
[SOURce<[1]|2>:]BB:C2K:FILTer:PARameter:RCOSine	0.00 ... 0.99		
[SOURce<[1]|2>:]BB:C2K:FILTer:PARameter:SPHase	0.15 ... 2.5		
[SOURce<[1]|2>:]BB:C2K:FILTer:TYPE	RCOSine | COSine | GAUSs | LGAuss | PGAuss | CONE | COF705 | COEQualizer | COFequalizer | C2K3x | APCO25 | SPHase | RECTangle | LPAS		
[SOURce<[1]|2>:]BB:C2K:IQSWap:STATe	ON | OFF		
[SOURce<[1]|2>:]BB:C2K:LINK	FORWard | REVerse (Alias DOWN | UP)		
[SOURce<[1]|2>:]BB:C2K:POWer:ADJust	-		No query
[SOURce<[1]|2>:]BB:C2K:POWer[:TOTal]?			Query only
[SOURce<[1]|2>:]BB:C2K:PRESet			No query
[SOURce<[1]|2>:]BB:C2K:SEQuence	AUTO | RETRigger | AAUTo | ARETrigger | SINGle		
[SOURce<[1]|2>:]BB:C2K:SETTing:CATalog?			Query only
[SOURce<[1]|2>:]BB:C2K:SETTing:DELete	<file_name>		
[SOURce<[1]|2>:]BB:C2K:SETTing:LOAD	<file_name>		
[SOURce<[1]|2>:]BB:C2K:SETTing:STORe	<file_name>		
[SOURce<[1]|2>:]BB:C2K:SLENgth	1 ... 511 frames		
[SOURce<[1]|2>:]BB:C2K:STATe	ON | OFF		
[SOURce<[1]|2>:]BB:C2K:TRIGger:ARM:EXECute			No query
[SOURce<[1]|2>:]BB:C2K:TRIGger:EXECute			No query
[SOURce<[1]|2>:]BB:C2K:TRIGger[:EXTernal<[1]|2>]:DELay	0 ...65 535 chips		
[SOURce<[1]|2>:]BB:C2K:TRIGger[:EXTernal<[1]|2>]:INHibit	0 ... (2^26 - 1) chips		
[SOURce<[1]|2>:]BB:C2K:TRIGger:OBASeband:DELay	0 ...65 535 chips		
[SOURce<[1]|2>:]BB:C2K:TRIGger:OBASeband:INHibit	0 ... (2^26 - 1) chips		
[SOURce<[1]|2>:]BB:C2K:TRIGger:OUTPut<[1]...4>:DELay	0 ... (2^24 - 1) chips		
[SOURce<[1]|2>:]BB:C2K:TRIGger:OUTPut:DELay:FIXed	ON | OFF		
[SOURce<[1]|2>:]BB:C2K:TRIGger:OUTPut<[1]...4>:DELay:MAXimum?			Query only
[SOURce<[1]|2>:]BB:C2K:TRIGger:OUTPut<[1]...4>:DELay:MINimum?			Query only
[SOURce<[1]|2>:]BB:C2K:TRIGger:OUTPut<[1]...4>:MODE	PCGRoup | RFRame | SCFRame | SFRame | ESECond | CSPeriod | USER | RATio		
[SOURce<[1]|2>:]BB:C2K:TRIGger:OUTPut<[1]...4>:OFFTime	0 ...(2^24 - 1) chips		
[SOURce<[1]|2>:]BB:C2K:TRIGger:OUTPut<[1]...4>:ONTime	0 ...(2^24 - 1) chips		
[SOURce<[1]|2>:]BB:C2K:TRIGger:OUTPut<[1]...4>:PERiod	2 ... (2^32 - 1) chips		
[SOURce<[1]|2>:]BB:C2K:TRIGger:RMODe			Query only
[SOURce<[1]|2>:]BB:C2K:TRIGger:SLENgth	0 ...(2^32 - 1) chips		
[SOURce<[1]|2>:]BB:C2K:TRIGger:SLUNit	FRAMe | CHIP | SEQuence		
[SOURce<[1]|2>:]BB:C2K:TRIGger:SOURce	EXTernal | INTernal | BEXTernal | OBASeband		
[SOURce<[1]|2>:]BB:C2K:VERSion?			Query only
[SOURce<[1]|2>:]BB:C2K:WAVeform:CREate			No query

SOURce:BB:C2K - Primary Commands

[SOURce<[1]|2>:]BB:C2K:CLIPping:LEVel 0 ... 100 PCT

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:C2K:CLIP:STAT ON`

Example: `"BB:C2K:CLIP:LEV 80PCT"`
'sets the limit for level clipping to 80% of the maximum level.

`"BB:C2K:CLIP:STAT ON"`
'activates level clipping.

*RST value	Resolution	SCPI
100 PCT	1	Device-specific

[SOURce<[1]|2>:]BB:C2K:CLIPping:MODE VECTor | SCALar

The command sets the method for level clipping (Clipping).

Parameters:

VECTor
The reference level is the amplitude | i+jq |

SCALar
The reference level is the absolute maximum of the I and Q values.

Example: `"BB:C2K:CLIP:MODE SCAL"`
'selects the absolute maximum of all the I and Q values as the reference level.

`"BB:C2K:CLIP:LEV 80PCT"`
'sets the limit for level clipping to 80% of this maximum level.

`"BB:C2K:CLIP:STAT ON"`
'activates level clipping.

*RST value	Resolution	SCPI
VECTor	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:CLIPping:STATe ON | OFF

The command activates level clipping (Clipping). The value is defined with the command `BB:C2K:CLIPping:LEVel`, the mode of calculation with the command `BB:C2K:CLIPping:MODE`.

Example: `"BB:C2K:CLIP:STAT ON"`
'activates level clipping.

*RST value	Resolution	SCPI
OFF		Device-specific

[SOURce<[1]|2>:]BB:C2K:CLOCk:MODE CHIP | MCHip

Note:
This command is available for R&S SMx and R&S AMU instruments only.

The command enters the type of externally supplied clock (`:C2K: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:C2K: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.

Example: `"BB:C2K:CLOC:MODE CHIP"`
'selects clock type **Chip**, i.e. the supplied clock is a chip clock.

*RST value	Resolution	SCPI
CHIP	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:CLOCk:MULTiplier 1 ... 64

Note:
This command is available for R&S SMx and R&S AMU instruments only.

The command specifies the multiplier for clock type **Multiplied** (`:BB:C2K: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.

Example: `"BB:C2K:CLOC:SOUR EXT"`
'selects the external clock source. The clock is supplied via the CLOCK connector.

`"BB:C2K:CLOC:MODE MCH"`
'selects clock type **Multiplied**, i.e. the supplied clock has a rate which is a multiple of the chip rate.

`"BB:C2K:CLOC:MULT 12"`
'the multiplier for the external clock rate is 12.

*RST value	Resolution	SCPI
4	1	Device-specific

[SOURce<[1]|2>:]BB:C2K:CLOCk:SOURce INTernal | EXTernal

Note: *This command is available for R&S SMx and R&S AMU instruments only.*

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.

Parameters:

INTernal The internal clock reference is used.

EXTernal The external clock reference is supplied to the CLOCK connector. Commands `:BB:C2K:CLOCk:MODE` and `:MULTiplier` are used to enter the type of the external clock.

Example:

```
:BB:C2K:CLOC:SOUR EXT"
```
'selects the external clock source. The clock is supplied via the CLOCK connector.

```
"BB:C2K:CLOC:MODE MCH"
```
'selects clock type **Multiplied**, i.e. the supplied clock has a rate which is a multiple of the chip rate.

```
"BB:C2K:CLOC:MULT 12"
```
'the multiplier for the external clock rate is 12.

*RST value	Resolution	SCPI
INTernal	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:COPY:COFFset 0 ... 255

The command sets the offset for the Walsh code in the destination base station. The minimum value is 0 (Walsh codes are identical), the maximum value is 255.

This command is only available in the downlink (`SOUR:BB:C2K:LINK FORW/DOWN`).

Example:

```
"BB:C2K:COPY:COFF 10"
```
'the Walsh code is shifted by 10 when the source base station is copied to the destination base station.

*RST value	Resolution	SCPI
0	1	Device-specific

[SOURce<[1]|2>:]BB:C2K:COPY:DESTination 1 ...4

The command selects the station to which data is to be copied. Whether the data is copied to a base station or a mobile station depends on which transmission direction is selected (command `C2K:LINK UP | DOWN`).

Example:

```
"BB:C2K:LINK DOWN"
```
'selects the downlink transmit direction (base station to mobile station).

```
"BB:C2K:COPY:SOUR 1"
```
'selects base station 1 as the source.

```
"BB:C2K:COPY:DEST 4"
```
'selects base station 4 as the destination.

```
"BB:C2K:COPY:EXEC"
```
'starts copying the parameter set of base station 1 to base station 4.

*RST value	Resolution	SCPI
2	-	Device-specific

[SOURce<[1]|2>:]BB:C2K: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 mobile station depends on which transmission direction is selected (command `:BB:C2K:LINK UP | DOWN`).

This command triggers an event and therefore has no *RST value and no query form.

Example: `"BB:C2K:COPY:EXEC"`
'starts copying the parameter set of the selected source station to the selected destination station.

*RST value	Resolution	SCPI
-	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:COPY:SOURce 1 ...4

The command selects the station that has data to be copied. Whether the station copied is a base or mobile station depends on which transmission direction is selected (command `C2K:LINK UP | DOWN`).

Example: `"BB:C2K:LINK UP"`
'selects the uplink transmit direction (mobile station to base station).

`"BB:C2K:COPY:SOUR 1"`
'selects mobile station 1 as the source.

`"BB:C2K:COPY:DEST 4"`
'selects mobile station 4 as the destination.

`"BB:C2K:COPY:EXEC"`
'starts copying the parameter set of mobile station 1 to mobile station 4.

*RST value	Resolution	SCPI
1	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:CRATe?

The command queries the spreading rate. The output chip rate which determines the rate of the spread symbols as is used for signal output can be set with the commandSOUR`:BB:C2K:CRAT:VAR`.

The command is a query command and therefore does not have an *RST value.

Example: `"BB:C2K:CRAT?"`
'queries the system chip rate.

Response: `"R1M2"`
'the system chip rate is 1.2288 Mcps.

*RST value	Resolution	SCPI
-	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:CRATe:VARiation 1 Mcps ... 5 Mcps

The command enters the output chip rate.

The output chip rate 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.

Example: `"BB:C2K:CRAT:VAR 4086001"`
'sets the chip rate to 4.08 Mcps.

*RST value	Resolution	SCPI
1.2288	1 Hz	Device-specific

[SOURce<[1]|2>:]BB:C2K:FILTer:ILENgth 1...128

Note: This command is available for R&S WinIQSIM2 only.

The command sets the impulse length (number of filter tabs).

Example: `"BB:C2K:FILT:ILEN 10"`
'sets the number of filter tabs to 10.

*RST value	Resolution	SCPI
10	1	Device-specific

[SOURce<[1]|2>:]BB:C2K:FILTer:ILENgth:AUTO ON | OFF

Note: This command is available for R&S WinIQSIM2 only.

The command acivates/deactivates the impulse length state. If activated, the most sensible parameter values are selected. The value depends on the coherence check.

Example: `"BB:C2K:FILT:ILEN:AUTO ON"`
'the most sensible parameters are selected automatically.

*RST value	Resolution	SCPI
ON	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:FILTer:OSAMpling 1...32

Note: This command is available for R&S WinIQSIM2 only.

The command sets the upsampling factor.

Example: `"BB:C2K:FILT:OSAM 32"`
'sets the upsampling factor to 32.

*RST value	Resolution	SCPI
32	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:FILTer:OSAMpling:AUTO ON | OFF

Note: This command is available for R&S WinIQSIM2 only.

The command acivates/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.

Example: `"BB:C2K:FILT:OSAM:AUTO ON"`
'the most sensible parameters are selected automatically.

*RST value	Resolution	SCPI
ON	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:FILTer:PARameter:APCO25 0.05 ... 0.99

The command sets the roll-off factor for filter type APCO25.

Example: `"BB:C2K:FILT:PAR:APCO25 0.2"`
'sets the roll-off factor to 0.2 for filter type APCO25.

*RST value	Resolution	SCPI
0.20	0.01	Device-specific

[SOURce<[1]|2>:]BB:C2K:FILTer:PARameter:COSine 0.00 ... 0.99

The command sets the roll-off factor for the Cosine filter type.

Example: `"BB:C2K:FILT:PAR:COS 0.35"`
'sets the roll-off factor to 0.35 for filter type Cosine.

*RST value	Resolution	SCPI
0.35	0.01	Device-specific

[SOURce<[1]|2>:]BB:C2K:FILTer:PARameter:GAUSs 0.15 ... 2.5

The command sets the roll-off factor for the Gauss filter type.

Example: `"BB:C2K:FILT:PAR:GAUS 0.5"`
'sets B x T to 0.5 for the Gauss filter type.

*RST value	Resolution	SCPI
0.5	0.01	Device-specific

[SOURce<[1]|2>:]BB:C2K:FILTer:PARameter:LPASs 0.05...2.0

The command sets the cut off frequency factor for the Lowpass filter type.

Example: "BB:C2K:FILT:PAR:LPAS 0.5"
'the cut of frequency factor is set to 0.5.

*RST value	Resolution	SCPI
0.50		Device-specific

[SOURce<[1]|2>:]BB:C2K:FILTer:PARameter:PGAuss 0.15 ... 2.5

The command sets the roll-off factor for the Pure Gauss filter type.

Example: "BB:C2K:FILT:PAR:GAUS 0.5"
'sets B x T to 0.5 for the Pure Gauss filter type.

*RST value	Resolution	SCPI
0.5	0.01	Device-specific

[SOURce<[1]|2>:]BB:C2K:FILTer:PARameter:RCOSine 0.00 ... 0.99

The command sets the roll-off factor for the Root Cosine filter type.

Example: "BB:C2K:FILT:PAR:RCOS 0.22"
'sets the roll-off factor to 0. 22 for filter type Root Cosine.

*RST value	Resolution	SCPI
0.22	0.01	Device-specific

[SOURce<[1]|2>:]BB:C2K:FILTer:PARameter:SPHase 0.15 ... 2.5

The command sets B x T for the Split Phase filter type.

Example: "BB:C2K:FILT:PAR:SPH 0.5"
'sets B x T to 0.5 for the Split Phase filter type.

*RST value	Resolution	SCPI
2.00	0.01	Device-specific

[SOURce<[1]|2>:]BB:C2K:FILTer:TYPE **RCOSine | COSine | GAUSs | LGAuss | PGAuss | CONE | COF705 | COEQualizer | COFequalizer | C2K3x | APCO25 | SPHase | RECTangle | LPASs**

The command selects the filter type. The filter types are described in Chapter 4, Section "*Baseband Filter - Custom Digital Mod*".

Example: "BB:C2K:FILT:TYPE CONE"
'sets the filter type CdmaOne. This filter type is defined by the standard for the uplink.

*RST value	Resolution	SCPI
Downlink:COEF Uplink: CONE	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:IQSWap:STATe ON | OFF

This command inverts the Q-part of the baseband signal if set to ON. The signal on the baseband outputs meets the cdma2000 standard. In order to generate an RF signal that conforms to the standard, the **I/Q Swap** function in the **I/Q Modulator** menu must be enabled (**On**) (`SOURce:IQ:SWAP ON`).

Example: `"BB:C2K:IQSW:STAT ON"`
'inverts the Q-part of the baseband signal.

*RST value	Resolution	SCPI
OFF	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:LINK FORWard|DOWN | REVerse|UP

The command defines the transmission direction. The signal either corresponds to that of a base station (FORWard | DOWN) or that of a mobile station (REVerse | UP).

Example: `"BB:C2K:LINK DOWN"`
'the transmission direction selected is base station to mobile station. The signal corresponds to that of a base station.

*RST value	Resolution	SCPI
FORWard|DOWN	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:POWer[:TOTal]?

The command queries the total power of the active channels. After **Power Adjust**, this power corresponds to 0 dB.

The command is a query command and therefore does not have an *RST value.

Example: `"BB:C2K:POW?"`
'queries the total power of the active channels.

Response: `"-22.5"`
'the total power is -25 dB.

*RST value	Resolution	SCPI
-	-	Device-specific

[SOURce<[1]|2>:]BB:C2K: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.

The command triggers an action and therefore has no *RST value and no query form.

Example: `"BB:C2K:POW:ADJ"`
'the total power of the active channels is set to 0 dB, the power ratio among the individual channels is unchanged.

*RST value	Resolution	SCPI
-	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:PRESet

The command produces a standardized default for the CDMA2000 standard. The settings correspond to the *RST values specified for the commands.

This command triggers an action and therefore has no *RST value and no query form.

Example: "BB:C2K:PRES"
'resets all the CDMA2000 settings to default values.

*RST value	Resolution	Dependencies	SCPI
-	-	All CDMA2000 settings are preset. An overview is provided by Table in Chapter 4, Section "Set to Default"	Device-specific

[SOURce<[1]|2>:]BB:C2K:SEQuence AUTO | RETRigger | AAUTo | ARETrigger | SINGle

Note:
This command is available for R&S SMx and R&S AMU instruments only.

The command selects the trigger mode.

Parameters:

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:C2K: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:C2K:TRIG:ARM:EXEC and started again when a trigger event occurs.

SINGle
The modulation signal is generated only when a trigger) event occurs. After the trigger event the signal is generated once to the set sequence length (SOUR:BB:C2K:TRIG:SLEN). Every subsequent trigger event causes a restart.

Example: "BB:C2K: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.

*RST value	Resolution	SCPI
AUTO	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:SETTing:CATalog?

This command reads out the files with CDMA2000 settings in the default directory. The default 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 files with the file extension ***.cdma2k** will be listed.

The command is a query command and therefore has no *RST value.

Example: `"MMEM:CDIR 'D:\user\cdma"`
'sets the default directory to D:\user\cdma.

`"BB:C2K:SETT:CAT?"`
'reads out all the files with CDMA2000 settings in the default directory.

Response: `"'CDMA_UP','CDMA_DN'"`
'the files `'CDMA_UP'` and `'CDMA_DN'` are available.

*RST value	Resolution	SCPI
-	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:SETTing:DELete <file_name>

This command deletes the selected file with CDMA2000 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 ***.cdma2k** will be deleted.

This command triggers an event and therefore has no *RST value and no query form.

Example: `"BB:C2K:SETT:DEL 'CDMA_UP"`
'deletes file 'CDMA_UP'.

*RST value	Resolution	SCPI
-	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:SETTing:LOAD <file_name>

This command loads the selected file with CDMA2000 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 ***.cdma2k** will be loaded.

This command triggers an event and therefore has no *RST value and no query form.

Example: `"BB:C2K:SETT:LOAD 'CDMA_UP'"`
'loads file 'CDMA_UP'.

*RST value	Resolution	SCPI
-	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:SETTing:STORe <file_name>

This command stores the current CDMA2000 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. CDMA2000 settings are stored as files with the specific file extensions ***.cdma2k**.

This command triggers an event and therefore has no *RST value and no query form.

Example: `"BB:C2K:SETT:STOR 'CDMA_UP'"`
'stores the current CDMA2000 settings into file '`CDMA_UP`'.

*RST value	Resolution	SCPI
-	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:SLENgth 1 ... 511 frames

The command sets the sequence length of the arbitrary waveform component of the CDMA2000 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.

Example: `"BB:C2K:SLEN 10"`
'sets the sequence length to 10 frames.

*RST value	Resolution	SCPI
1	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:STATe ON | OFF

The command activates modulation in accordance with the CDMA2000 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).

Example: `"BB:C2K:STAT ON"`
'activates modulation in accordance with the CDMA2000 standard.

*RST value	Resolution	Dependenciesen	SCPI
OFF	-	`BB:C2K:STAT ON` deactivates the other standards and digital modulation.	Device-specific

[SOURce<[1]|2>:]BB:C2K:TRIGger:ARM:EXECute

Note:
This command is available for R&S SMx and R&S AMU instruments only.

The command stops signal generation for trigger modes Armed_Auto and Armed_Retrigger. A subsequent internal or external trigger event restart signal generation.

This command triggers an event and therefore has no *RST value and no query form.

Example:
`"BB:C2K:TRIG:SOUR INT"`
'sets internal triggering.

`"BB:C2K:TRIG:SEQ ARET"`
'sets Armed_Retrigger mode, i.e. every trigger event causes signal generation to restart.

`"BB:C2K:TRIG:EXEC"`
'executes a trigger, signal generation is started.

`"BB:C2K:TRIG:ARM:EXEC"`
'signal generation is stopped.

`"BB:C2K:TRIG:EXEC"`
'executes a trigger, signal generation is started again.

*RST value	Resolution	SCPI
-	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:TRIGger:EXECute

Note:
This command is available for R&S SMx and R&S AMU instruments only.

The command executes a trigger. The internal trigger source must be selected using the command `:BB:C2K:TRIG:SOUR INT` and a trigger mode other than `AUTO` must be selected using the command `:BB:C2K:TRIG:SEQ`.

This command triggers an event and therefore has no *RST value and no query form.

Example:
`"BB:C2K:TRIG:SOUR INT"`
'sets internal triggering.

`"BB:C2K:TRIG:SEQ RETR"`
'sets Retrigger mode, i.e. every trigger event causes signal generation to restart.

`"BB:C2K:TRIG:EXEC"`
'executes a trigger.

*RST value	Resolution	SCPI
-	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:TRIGger[:EXTernal<[1]|2>]:DELay 0 ... 65 535 chips

Note:
This command is available for R&S SMx and R&S AMU instruments only.

The command specifies the trigger delay (expressed as a number of chips)for external triggering. The numeric suffix to EXTernal distinguishes between the external trigger via the TRIGGER 1 (suffix 1) and TRIGGER 2 (suffix 2) connector.

Example:
```
"BB:C2K:TRIG:SOUR EXT"
```
'sets an external trigger via the TRIGGER 1 connector.
```
"BB:C2K:TRIG:DEL 50"
```
'sets a delay of 50 symbols for the trigger.

*RST value	Resolution	SCPI
0 chips	1 chip	Device-specific

[SOURce<[1]|2>:]BB:C2K:TRIGger[:EXTernal<[1]|2>]:INHibit 0 ...67 108 863 chips

Note:
This command is available for R&S SMx and R&S AMU instruments only.

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. The numeric suffix to EXTernal distinguishes between the external trigger via the TRIGGER 1 (suffix 1) and TRIGGER 2 (suffix 2) connector.

Example:
```
"BB:C2K:TRIG:SOUR EXT"
```
'selects an external trigger via the TRIGGER 1 connector.
```
"BB:C2K:TRIG:INH 200"
```
'sets a restart inhibit for 200 chips following a trigger event.

*RST value	Resolution	SCPI
0 chips	1 chip	Device-specific

SOURce<[1]|2>:]BB:C2K:TRIGger:OBASeband:DELay 0 ... 65 535 chips

Note:
This command is available for R&S SMx and R&S AMU two-path instruments only.

The command specifies the trigger delay (expressed as a number of chips) for triggering by the trigger signal from the second path (two-path instruments only).

Example:
```
"BB:C2K:TRIG:SOUR OBAS"
```
'sets for path A the internal trigger executed by the trigger signal from the second path (path B).
```
"BB:C2K:TRIG:OBAS:DEL 50"
```
'sets a delay of 50 symbols for the trigger.

*RST value	Resolution	SCPI
0 chips	1 chip	Device-specific

SOURce<[1]|2>:]BB:C2K:TRIGger:OBASband:INHibit 0 ...67 108 863 chips

Note:
This command is available for R&S SMx and R&S AMU two-path instruments only.

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.

Example: `"BB:C2K:TRIG:SOUR OBAS"`
'sets for path A the internal trigger executed by the trigger signal from the second path (path B).

`"BB:C2K:TRIG:INH 200"`
'sets a restart inhibit for 200 chips following a trigger event.

*RST value	Resolution	SCPI
0 chips	1 chip	Device-specific

[SOURce<[1]|2>:]BB:C2K:TRIGger:OUTPut<[1]...4>:DELay 0 .. (2^24 - 1) chips

Note:
This command is available for R&S SMx and R&S AMU instruments only.

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:C2K: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.

Example: `"BB:C2K:TRIG:OUTP2:DEL 16000"`
'sets a delay of 16000 chips for the signal on connector MARKER 2.

*RST value	Resolution	SCPI
0	1 Chip	Device-specific

[SOURce<[1]|2>:]BB:C2K:TRIGger:OUTPut:DELay:FIXed ON | OFF

Note:
This command is available for R&S SMx and R&S AMU instruments only.

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.

Example: `"BB:C2K:TRIG:OUTP:DEL:FIX ON"`
'restricts the marker signal delay setting range to the dynamic range.

*RST value	Resolution	SCPI
OFF	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:TRIGger:OUTPut<[1]...4>:DELay:MAXimum?

Note:
This command is available for R&S SMx and R&S AMU instruments only.

The command queries the maximum marker delay for setting `:BB:C2K:TRIG:OUTP:DEL:FIX ON`.

The command is a query only and therefore has no *RST value.

Example: `"BB:C2K:TRIG:OUTP:DEL:FIX ON"`
'restricts the marker signal delay setting range to the dynamic range.

`"BB:C2K:TRIG:OUTP:DEL:MAX"`
'queries the maximum of the dynamic range.

Response: `"20000"`
'the maximum for the marker delay setting is 20000 chips.

*RST value	Resolution	SCPI
-	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:TRIGger:OUTPut<[1]...4>:DELay:MINimum?

Note: *This command is available for R&S SMx and R&S AMU instruments only.*

The command queries the minimum marker delay for setting `:BB:C2K:TRIGger:OUTPut:DELay:FIXed ON`.

The command is a query only and therefore has no *RST value.

Example: `"BB:C2K:TRIG:OUTP:DEL:FIX ON"`
'restricts the marker signal delay setting range to the dynamic range.

`"BB:C2K:TRIG:OUTP:DEL:MIN"`
'queries the minimum of the dynamic range.

Response: `"0"`
'the minimum for the marker delay setting is 0 symbols.

*RST value	Resolution	SCPI
-	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:TRIGger:OUTPut<[1]...4>:MODE PCGRoup | RFRame | SCFRame | SFRame | ESECond | CSPeriod | USER | RATio

The command defines the signal for the selected marker output

Parameters:

PCGRoup A marker signal is generated at the start of each power control group (every 1.25 ms).

RFRame A marker signal is generated every 20 ms (traffic channel clock).

SCFRame A marker signal is generated at the start of each sync channel frame (every 26,6 ms).

SFRame A marker signal is generated every 80 ms (super frame clock).

ESECond A marker signal is generated every 2 s (even second mark).

CSPeriod A marker signal is generated at the start of each arbitrary waveform sequence (depending on the set sequence length). The marker signal is also generated if the signal contains no ARB.

RATio A regular marker signal corresponding to the Time Off / Time On specifications in the commands
`SOURce:BB:C2K:TRIGger:OUTPut:OFFTime` and
`SOURce:BB:C2K:TRIGger:OUTPut:ONTime` is generated.

USER A marker signal is generated at the beginning of every user-defined period. The period is defined with command
`SOUR:BB:C2K:TRIG:OUTP:PERiod`.

Example: `"BB:C2K:TRIG:OUTP2:MODE RFR"`
'selects the traffic channel clock on output MARKER 2.

*RST value	Resolution	SCPI
RFRame	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:TRIGger:OUTPut<[1]...4>:OFFTime 1 ... 2^24 - 1 (16 777 215) chips

The command sets the number of chips in a period (ON time + OFF time) during which the marker signal in setting `SOURce:BB:C2K:TRIGger:OUTPut:MODE RATio` on the marker outputs is OFF.

Example: `"BB:C2K:TRIG:OUTP2:OFFT 2000"`
'sets an OFF time of 2000 chips for marker signal 2 on path A.

`"BB:C2K:TRIG:OUTP2:OFFT 2000"`
'sets an OFF time of 2000 chips for marker signal 2.

`"BB:C2K:TRIG:OUTP2:OFFT 2000"`
'sets an OFF time of 2000 chips for marker signal 2.

*RST value	Resolution	SCPI
1 chip	1	Device-specific

[SOURce<[1]|2>:]BB:C2K:TRIGger:OUTPut<[1]...4>:ONTime 1 ... 2^24 - 1 (16 777 215) chips

The command sets the number of chip in a period (ON time + OFF time) during which the marker signal in setting `SOURce:BB:C2K:TRIGger:OUTPut:MODE RATio` on the marker outputs is ON.

Example: `"BB:C2K:TRIG:OUTP2:ONT 2000"`
'sets an ON time of 2000 chips for marker 2.

*RST value	Resolution	SCPI
1 chip	1	Device-specific

[SOURce<[1]|2>:]BB:C2K:TRIGger:OUTPut<[1]...4>:PERiod 2 ... (2^32-1) chips

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 :BB:C2K:TRIG:OUTP:MODE.

Example: "BB:C2K:TRIG:OUTP2:MODE USER"
'selects the user marker for the signal on connector MARKER 2.

"BB:C2K:TRIG:OUTP2:PER 1600"
'sets a period of 1600 chips, i.e. the marker signal is repeated every 1600th chip.

*RST value	Resolution	SCPI
1 Frame (38400 chips)	1 chip	Device-specific

[SOURce<[1]|2>:]BB:C2K:TRIGger:RMODe

Note:
This command is available for R&S SMx and R&S AMU instruments only.

The command queries the current status of signal generation for all trigger modes with CDMA2000 modulation on.

The command is a query command and therefore has no *RST value.

Parameter:
RUN
the signal is generated. A trigger event occurred in the triggered mode.

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:C2K:TRIG:ARM:EXECute (armed trigger modes only).

Example: "SOUR2:BB:C2K:TRIG:SOUR EXT"
'sets external triggering via the TRIGGER 1 connector for path B of a two-path instrument.

"BB:C2K:TRIG:MODE ARET"
'selects the Armed_Retrigger mode.

"BB:C2K:TRIG:RMOD?"
'queries the current status of signal generation.

Response: "RUN"
'the signal is generated, an external trigger was executed.

*RST value	Resolution	SCPI
-	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:TRIGger:SLENgth 1 … 2^32-1 (4 294 967 295) chips

Note:
This command is available for R&S SMx and R&S AMU instruments only.

The command defines the length of the signal sequence to be output in the **Single** trigger mode (`SOUR:BB:C2K:SEQ SING`). The unit is defined with command `SOUR:BB:C2K:TRIG:SLUNit`. It is then possible to output deliberately just part of the frame, an exact sequence of the frame, or a defined number of repetitions of the frame.

Example:
```
"BB:C2K:SEQ SING"
```
'sets trigger mode Single.
```
"BB:C2K:TRIG:SLUN CHIP"
```
'sets unit chips for the entry of sequence length.
```
"BB:C2K: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.

*RST value	Resolution	SCPI
1 frame length	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:TRIGger:SLUNit FRAMe | CHIP | SEQuence

Note:
This command is available for R&S SMx and R&S AMU instruments only.

The command defines the unit for the entry of the length of the signal sequence (`SOUR:BB:C2K:TRIG:SLEN`) to be output in the **Single** trigger mode (`SOUR:BB:C2K:SEQ SING`).

Example:
```
"BB:C2K:SEQ SING"
```
'sets trigger mode Single.
```
"BB:C2K:TRIG:SLUN FRAM"
```
'sets unit frames for the entry of sequence length.
```
"BB:C2K:TRIG:SLEN 2"
```
'sets a sequence length of 2 frames. The current frame will be output twice after the next trigger event.

*RST value	Resolution	SCPI
SEQuence	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:TRIGger:SOURce INTernal | EXTernal | BEXTernal | OBASeband

Note:
This command is available for R&S SMx and R&S AMU instruments only.

The command selects the trigger source.

Parameter:

INTernal
Triggering is executed by means of the Trigger command `BB:C2K: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.

BEXTernal
Triggering is executed by means of the signal on the TRIGGER 2 connector.

OBASeband
Triggering is executed by means of the trigger signal from the second path (two-path instruments only).

Example: `"BB:C2K:TRIG:SOUR EXT"`
'sets external triggering via the TRIGGER 1 connector.

*RST value	Resolution	SCPI
INTernal	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:VERSion?

The command queries the version of the CDMA standard underlying the definitions.

The command is a query command and therefore does not have an *RST value. The numerical suffix at SOURce has no significance for this command and should not be specified.

Example: `"BB:C2K:VERS?"` 'queries the CDMA version.

Response: `"Release C"` 'CDMA Release 5

*RST value	Resolution	SCPI
-	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:WAVeform:CREate <file_name>

This command creates a waveform using the current settings of the **CDMA2000** menu. The file name is entered with the command. The file is stored with the predefined file extension ***.wv**. The file name and the directory it is stored in are user-definable.

This command triggers an event and therefore has no *RST value and no query form.

Example: `"MMEM:CDIR 'D:\user\waveform"`
'sets the default directory to D:\user\waveform.

`"BB:C2K:WAV:CRE 'cdma_bs'"`
'creates the waveform file `cdma_bs.wv` in the default directory.

*RST value	Resolution	SCPI
-	-	device-specific

SOURce:BB:C2K - Predefined Settings

The R&S Signal Generator gives you the opportunity to generate predefined test settings for base station 1: These predefined settings 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:C2K:PPARameter:EXECute`.

Command	Parameter	Default Unit	Comments
[SOURce<[1]|2>:]BB:C2K:PPARameter:CRESt	MINimum | AVERage | WORSt		
[SOURce<[1]|2>:]BB:C2K:PPARameter:EXECute			No query
[SOURce<[1]|2>:]BB:C2K:PPARameter:PCHannel[:STATe]	ON | OFF		
[SOURce<[1]|2>:]BB:C2K:PPARameter:PICHannel[:STATe]	ON | OFF		
[SOURce<[1]|2>:]BB:C2K:PPARameter:RCONfiguration	1 ... 5		
[SOURce<[1]|2>:]BB:C2K:PPARameter:SCHannels[:STATe]	ON | OFF		
[SOURce<[1]|2>:]BB:C2K:PPARameter:TCHannel:COUNt	0 ... 8		
[SOURce<[1]|2>:]BB:C2K:PPARameter:TCHannel:DATA:RATE	DR1K2 | DR1K3 | DR1K5 | DR1K8 | DR2K4 | DR2K7 | DR3K6 | DR4K8 | DR7K2 | DR9K6 | DR14K4 | DR19K2 | DR28K8 | DR38K4 | DR57K6 | DR76K8 | DR115K2 | DR153K6 | DR230K4 | DR259K2 | DR307K2 | DR460K8 | DR518K4 | DR614K4 | DR1036K8 | NUSed		
[SOURce<[1]|2>:]BB:C2K:PPARameter:TCHannel:DCCHannel[:STATe]	ON | OFF		
[SOURce<[1]|2>:]BB:C2K:PPARameter:TCHannel:FCHannel[:STATe]	ON | OFF		
[SOURce<[1]|2>:]BB:C2K:PPARameter:TCHannel:FLENgth	20 ms | 40 ms | 80 ms	s	
[SOURce<[1]|2>:]BB:C2K:PPARameter:TCHannel:SCHannel:COUNt	1 ... 7		

[SOURce<[1]|2>:]BB:C2K:PPARameter:CRESt MINimum | AVERage | WORSt

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 Walsh codes and timing offsets.
The setting takes effect only after execution of command `:SOURce:BB:C2K:PPARameter:EXEC`.

Parameter:

MINimum
The crest factor is minimized. The Walsh codes are spaced as closely as possible.

AVERage
An average crest factor is set. The Walsh codes are distributed uniformly over the code domain.

WORSt
The crest factor is set to an unfavorable value (i.e. maximum). The Walsh codes are as wildly spaced as possible.

Example: `"BB:C2K:PPAR:CRES WORS"`
'sets the crest factor to an unfavorable value.

*RST value	Dependencies	SCPI
MINimum	The setting of command `BB:C2K::BST:CGR:COFF:WCOD` is adjusted according to the selection	Device-specific

[SOURce<[1]|2>:]BB:C2K:PPARameter:EXECute

This command presets the channel table of base station 1 with the parameters defined by the `PPARameter` commands.

The command triggers an event and therefore has no query form and no *RST value.

Example: `"BB:C2K:PPAR:EXEC"`
'configures the signal sequence as defined by the `:BB:C2K:PPARameter` commands.

*RST value	Resolution	SCPI
-	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:PPARameter:PCHannel[:STATe] ON | OFF

The command activates/deactivates the paging channel.

The setting takes effect only after execution of command `:SOURce:BB:C2K:PPARameter:EXEC`.

Example: `"BB:C2K:PPAR:PCH ON"`
'activates F-PCH.

*RST value	Resolution	SCPI
ON	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:PPARameter:PICHannel[:STATe] ON | OFF

The command activates/deactivates the pilot channel.

The setting takes effect only after execution of command `:SOURce:BB:C2K:PPARameter:EXEC`.

Example: `"BB:C2K:PPAR:PICH ON"`
'activates F-PICH.

*RST value	Resolution	SCPI
ON	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:PPARameter:RCONfiguration 1 | 2 | 3 | 4 | 5

The command selects the radio configuration for the traffic channel.

The setting takes effect only after execution of command `:SOURce:BB:C2K:PPARameter:EXEC`.

Example: `"BB:C2K:PPAR:RCON 1"`
'selects radio configuration 1.

*RST value	Resolution	Dependencies	SCPI
1	-	The R&S Signal Generator provides a separate set of settings of all channel table parameters for each radio configuration. If the radio configuration is changed, the set of channel table values belonging to this RC is automatically activated.	Device-specific

[SOURce<[1]|2>:]BB:C2K:PPARameter:SCHannel[:STATe] ON | OFF

The command activates/deactivates the F-SYNC

The setting takes effect only after execution of command `SOUR:BB:C2K:PPARameter:EXEC.`

Example: `"BB:C2K:PPAR:SCH ON"`
'activates the F-SYNC.

*RST value	Resolution	SCPI
ON	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:PPARameter:TCHannel:COUNt 0 ... 8

This command sets the number of activated traffic channels.

The setting takes effect only after execution of command `:SOURce:BB:C2K:PPARameter:EXEC`.

Example: `"BB:C2K:PPAR:TCH:COUN 2"`
'the predefined signal contains 2 traffic channels.

*RST value	Resolution	SCPI
1	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:PPARameter:TCHannel:DATA:RATE
DR1K2 | DR1K3 | DR1K5 | DR1K8 | DR2K4 | DR2K7 | DR3K6 | DR4K8 | DR7K2 | DR9K6 | DR14K4 | DR19K2 | DR28K8 | DR38K4 | DR57K6 | DR76K8 | DR115K2 | DR153K6 | DR230K4 | DR259K2 | DR307K2 | DR460K8 | DR518K4 | DR614K4 | DR1036K8

This command sets the data rate of F-FCH and F-SCH. The set value is specific for the selected radio configuration.

The setting takes effect only after execution of command `:SOURce:BB:C2K:PPARameter:EXEC`.It is specific for the selected radio configuration.

Example: `"BB:C2K:PPAR:TCH:DATA:RATE D240K"`
'sets the data rate of F-FCH and F-SCH to 240 ksps.

*RST value	Resolution	Dependencies	SCPI
DR1K2	-	The value range depends on the frame length. If the frame length is changed so that the set data rate becomes invalid, the next permissible value is automatically set. The data rate affects the Walsh code (spreading factor) that are possible within a channel. If a data rate is changed so that the selected Walsh code becomes invalid, the next permissible value is automatically set.	Device-specific

[SOURce<[1]|2>:]BB:C2K:PPARameter:TCHannel:DCCHannel[:STATe] ON | OFF

The command activates/deactivates the dedicated control channel. F-DCCH can not be selected for RC1 and RC2.

The setting takes effect only after execution of command `:SOURce:BB:C2K:PPARameter:EXEC`. It is specific for the selected radio configuration.

Example: `"BB:C2K:PPAR:TCH:DCCH ON"`
'activates F-DCCH.

*RST value	Resolution	SCPI
ON	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:PPARameter:TCHannel:FCHannel[:STATe] ON | OFF

The command activates/deactivates the fundamental channel.

The setting takes effect only after execution of command `:SOURce:BB:C2K:PPARameter:EXEC`. It is specific for the selected radio configuration.

Example: `"BB:C2K:PPAR:TCH:FCH ON"`
'activates F-FCH.

*RST value	Resolution	SCPI
ON	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:PPARameter:TCHannel:FLENgth 20 ms | 40 ms | 80 ms

The command sets the frame length of the code channels. The set value is specific for the selected radio configuration.

The setting takes effect only after execution of command `:SOURce:BB:C2K:PPARameter:EXEC`.It is specific for the selected radio configuration.

Example: `"BB:C2K:PPAR:TCH:FLEN 20 ms"`
'sets the frame length of the code channels to 20 ms.

*RST value	Resolution	Dependencies	SCPI
20 ms	-	The frame length affects the data rates that are possible within a channel. Changing the frame length may lead to a change of data rate and this in turn may bring about a change of Walsh code.	Device-specific

[SOURce<[1]|2>:]BB:C2K:PPARameter:TCHannel:SCHannel:COUNt 1 ... 7

The command defines the number of supplemental channels. The maximum number of supplemental channels depends on the selected radio configuration.

The setting takes effect only after execution of command `SOUR:BB:C2K:PPARameter:EXEC`. It is specific for the selected radio configuration.

Example: `"BB:C2K:PPAR:TCH:SCH:COUN 2"`
'selects two F-SCHs.

*RST value	Resolution	SCPI
1	-	Device-specific

SOURce:BB:C2K - Setting Base Stations

The SOURce:BB:C2K:BSTation system contains commands for setting base stations. The commands of this system only take effect if the CDMA2000 standard is activated, the DOWN transmission direction is selected and the particular base station is enabled:

```
SOURce:BB:C2K:STATe ON

SOURce:BB:C2K:LINK DOWN

SOURce:BB:C2K:BSTation2:STATe ON
```

Note:

The channel table for the base station is configured from fourteen special channels and up to eight traffic channels. Each traffic channel consists of four to eight code channels. The type and number of code channels depends on the radio configuration chosen for the traffic channel.

The individual channels are selected in SCPI via the suffixes to keywords CGRoup and COFFset.

The special channel have the suffix 0 to CGRoup and 1 to 14 to COFFset corresponding to the channel index 0-1 to 0-14 in the channel table.

The code channels of a traffic channel are addressed by means of suffixes 1 to 8 for the traffic channel and 1 to 8 to COFFset for the sub channels of the selected traffic channel. Thus CGRoup2:COFFset1 is the code channel F-FCH of the traffic channel 2 and equates to the channel index 2-1 in the channel table.

Table 7 Structure of the traffic channel for different radio configurations.

	Radio Configuration 1, 2	Radio Configuration 3,4,5
1-1 (CGRoup1:COFFset1)	F-FCH	F-FCH
1-2 (CGRoup1:COFFset2)	F-SCH1	F-SCH1
1-3 (CGRoup1:COFFset3)	F-SCH2	F-SCH2
1-4 (CGRoup1:COFFset4)	F-SCH3	F-DCCH
1-5 (CGRoup1:COFFset5)	F-SCH4	-
1-6 (CGRoup1:COFFset6)	F-SCH5	-
1-7 (CGRoup1:COFFset7)	F-SCH6	-
1-8 (CGRoup1:COFFset8)	F-SCH7	-

Regardless of the radio configuration, in all traffic channels the COFFset1 corresponds to the F-FCH, and the COFFset2 and COFFset3 correspond to the F-SCH1 and F-SCH2, respectively. In radio configurations 1 and 2 the COFFset4 corresponds to the F-SCH3, and in radio configurations 3, 4, 5 to the F-DCCH. COFFset5, COFFset6,COFFset7 and COFFset8 exist only in radio configurations 1 and 2, where they correspond to the F-SCH4 to F-SCH7.

Note:

For the code channels of a traffic channels, the settings of the channel table parameters are specific for the selected radio configuration. I.e. a complete set of settings exists for each of the five possible radio configurations.

Command	Parameter	Default Unit	Comments
[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:CGRoup<0|[1]...8>:COFFset<[1]...13>:CCODing:BINTerleaver			Query only
[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:CGRoup<0|[1]...8>:COFFset<[1]...13>:CCODing:BITFrame			Query only
[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:CGRoup<0|[1]...8>:COFFset<[1]...13>:CCODing:CRC			Query only
[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:CGRoup<0|[1]...8>:COFFset<[1]...13>:CCODing:DATA:RATE			Query only
[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:CGRoup<0|[1]...8>:COFFset<[1]...13>:CCODing:MODE	OFF | COMPlete | OINTerleaving | NOINterleaving		
[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:CGRoup<0|[1]...8>:COFFset<[1]...13>:CCODing:SPUNcture			Query only
[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:CGRoup<0|[1]...8>:COFFset<[1]...13>:CCODing:SREPetition			Query only
[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:CGRoup<0|[1]...8>:COFFset<[1]...13>:CCODing:TYPE	CON2 | CON3 | CON4 | CON6 | TUR2 | TUR3 | TUR4 | TUR5 | OFF | DEFault		
[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:CGRoup<0|[1]...8>:COFFset<[1]...14>:DATA	PN9 | PN11 | PN15 | PN16 | PN20 | PN21 | PN23 | DLISt | ZERO | ONE | PATTern		
[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:CGRoup<0|[1]...8>:COFFset<[1]...14>:DATA:DSELect	<dlist_name>		
[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:CGRoup<0|[1]...8>:COFFset<[1]...14>:DATA:PATTern	#B0...B111..1, 1...64		
[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:CGRoup<0|[1]...8>:COFFset<[1]...11>:DATA:RATE	DR1K2 | DR1K3 | DR1K5 | DR1K8 | DR2K4 | DR2K7 | DR3K6 | DR4K8 | DR7K2 | DR9K6 | DR14K4 | DR19K2 | DR28K8 | DR38K4 | DR57K6 | DR76K8 | DR115K2 | DR153K6 | DR230K4 | DR259K2 | DR307K2 | DR460K8 | DR518K4 | DR614K4 | DR1036K8 | NUSed		
[SOURce<[1]|2>:]BB:C2K:BSTation[1]:CGRoup<0|1>:COFFset<[1]...7>:DERRor:BIT:RATE	1E-7...10E-1		
[SOURce<[1]|2>:]BB:C2K:BSTation[1]:CGRoup<0|1>:COFFset<[1]...7>:DERRor:BIT:STATe	ON | OFF		
[SOURce<[1]|2>:]BB:C2K:BSTation[1]:CGRoup<0|1>:COFFset<[1]...7>:DERRor:BLOCk:RATE	1E-4....10E-1		
[SOURce<[1]|2>:]BB:C2K:BSTation[1]:CGRoup<0|1>:COFFset<[1]...7>:DERRor:BLOCk:STATe	ON | OFF		
[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:CGRoup<0|[1]...8>:COFFset<[1]...11>:FLENgth	5ms | 10ms | 20ms | 26ms | 40ms | 80ms | 160ms	s	

Command	Parameter	Default Unit	Comments
[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:CGRoup<[1]...8>:COFFset<[1]...8>:LCMask	#H0 .. #H3FF FFFF FFFF		
[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:CGRoup<0|[1]...8>:COFFset<[1]...14>:POWer	-80 dB ... 0 dB	dB	
[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:CGRoup<0|[1]...8>:COFFset<[1]...13>:QWCode:STATe	ON | OFF		
[SOURce<[1]|2>:]BB:C2K:BSTation[1]:CGRoup<0|1>:COFFset<[1]...7>:REALtime:STATe	ON | OFF		
[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:CGRoup<0|[1]...8>:COFFset<[1]...14>:STATe	ON | OFF		
[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:CGRoup<[1]...8>:COFFset<[1]|4>:TPC:DATA	DLISt | ZERO | ONE | PATTern		
[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:CGRoup<[1]...8>:COFFset<[1]|4>:TPC:DATA:DSELect	<list_name>		
[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:CGRoup<[1]...8>:COFFset<[1]|4>:TPC:DATA:PATTern	#B0,1...B111..1, 64		
[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:CGRoup<[1]...8>:COFFset<[1]|4>:TPC:MISuse	ON | OFF		
[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:CGRoup<[1]...8>:COFFset<[1]|4>:TPC:PSTep	-10 dB ...+10 dB	dB	
[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:CGRoup<[1]...8>:COFFset<[1]|4>:TPC:READ	CONTinuous | S0A | S1A | S01A | S10A		
[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:CGRoup<0|[1]...8>:COFFset<[1]...14>:TYPE			Query only
[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:CGRoup<0|[1]...8>:COFFset<[1]...13>:WCODe	0 ... 255		
[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:CGRoup<0|[1]...8>:COFFset<[1]...13>:WLENgth			Query only
[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:CGRoup<[1]...8>:RCONfiguration	1 ... 5		
[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:DCONflict:MODE	HAD | BREV		
[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:DCONflict:RESolve			No query
[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:DCONflict[:STATe]			
[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:PDCHannel:PINTerval	5 ms ... 2000 ms	s	
[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:PDCHannel:PSETup	ON | OFF		
[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:PDCHannel:SUBPacket<[1]...8>ID	0 ... 3		
[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:PDCHannel:SUBPacket<[1]...8>PARameters	1 .. 127		
[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:PDCHannel:SUBPacket<[1]...8>STATe	ON | OFF		
[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:PDCHannel:SUBPacket<[1]...8>TOFFset	0 ... 1000 slots		
[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:PDCHannel:SUBPacket<[1]...8>WCODes			Query only
[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:PDCHannel:WINDex	0 ... 3		
[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:PNOFfset	0 ... 511		
[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:QWSet	1 ...3		
[SOURce<[1]|2>:]BB:C2K:BSTation:PRESet			No query
[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:STATe	ON | OFF		
[SOURce<[1]|2>:]BB:C2K:BSTation<2|3|4>:TDELay	0...98 304 chips		
[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:TDIVersity	OFF | ANT1 | ANT2		
[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:TDIVersity:MODE	OTD | STS		

[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:CGRoup<0|[1]...8>:COFFset<[1]...13>:CCODing:BINTerleaver?

The command queries the number of symbols per block which are processed by the interleaver. This value is only available for channel coding modes **Complete** and **Without Interleaving** (`SOURce:BB:C2K:BST<n>:CGRoup<n>:COFFset<n>:CCODing:MODE COMP | NOIN`).

The command is a query and therefore does not have an *RST value. For the traffic channels, this value is specific for the selected radio configuration.

Example: `"BB:C2K:BST:CGR3:COFF1:CCOD:MODE COMP"`
'selects channel coding mode **Complete** for F-FCH of the third traffic channel.

`"BB:C2K:BST:CGR3:COFF1:CCOD:BINT?"`
'queries the number of symbols per block which are processed by the interleaver.

Response: `384`
'384 symbols per block are processed.

*RST value	Resolution	SCPI
-	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:CGRoup<0|[1]...8>:COFFset<[1]...13>:CCODing:BITFrame?

The command queries the number of input bits per frame for the channel coder. This value is only available for channel coding modes **Complete** and **Without Interleaving** (`SOURce:BB:C2K:BST<n>:CGRoup<n>:COFFset<n>:CCODing:MODE COMP | NOIN`).

The command is a query and therefore does not have an *RST value. For the traffic channels, this value is specific for the selected radio configuration.

Example: `"BB:C2K:BST:CGR3:COFF1:CCOD:MODE COMP"`
'selects channel coding mode **Complete** for F-FCH of the third traffic channel.

`"BB:C2K:BST:CGR3:COFF1:CCOD:BITF?"`
'queries the number of input bits per frame.

Response: `16`
'16 bits per frame.

*RST value	Resolution	SCPI
-	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:CGRoup<0|[1]...8>:COFFset<[1]...13>:CCODing:CRC?

The command queries the CRC (cyclic redundancy code) type (length). This value is only available for channel coding modes **Complete** and **Without Interleaving** (`SOURce:BB:C2K:BST<n>:CGRoup<n>:COFFset<n>:CCODing:MODE COMP | NOIN`).

The command is a query and therefore does not have an *RST value. For the traffic channels, this value is specific for the selected radio configuration.

Example: `"BB:C2K:BST:CGR1:COFF1:CCOD:MODE COMP"`
'selects channel coding mode **Complete** for F-FCH of the first traffic channel.

`"BB:C2K:BST:CGR1:COFF1:CCOD:CRC?"`
'queries the CRC type.

Response: `"6"`
'CRC type 6 is used.

*RST value	Resolution	SCPI
-	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:CGRoup<0|[1]...8>:COFFset<[1]...13>:CCODing:DATA:RATE?

The command queries the effective data rate in Hz. This value is only available for channel coding modes **Off** and **Interleaving Only** (`SOURce:BB:C2K:BST<n>:CGRoup<n>:COFFset<n>:CCODing:MODE OFF | OINT`).

When channel coding is switched off, the effective data rate differs from the data rate set in the channel table. The data are read out with the effective rate.

The command is a query and therefore does not have an *RST value. For the traffic channels, this value is specific for the selected radio configuration.

Example: `"BB:C2K:BST:CGR3:COFF1:CCOD:MODE OINT"`
'selects channel coding mode **Interleaving Only** for F-FCH of the third traffic channel.

`"BB:C2K:BST:CGR3:COFF1:CCOD:DATA:RATE?"`
'queries the effective data rate.

Response: `"19200"`
'the effective data is 19.2 kbps.

*RST value	Resolution	SCPI
-	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:CGRoup<0|[1]...8>:COFFset<[1]...13>:CCODing:MODE

OFF | COMPlete | OINTerleaving | NOINterleaving

The command selects channel coding mode. For the traffic channels, this value is specific for the selected radio configuration.

Parameter:

OFF
Channel coding is deactivated.

COMPlete
The complete channel coding is performed. The channel coding procedure may slightly vary depending on channel type, frame length and data rate.

OINTerleaving
Except for the block interleaver, the whole channel coding procedure is carried out. In this mode the frame structure and the convolutional coder of an receiver can be tested.

NOINterleaving
In this mode only block interleaver is used for coding. This allows the deinterleaver in the receiver to be tested independently of the remaining (de-)coding process.

Example: `"BB:C2K:BST:CGR3:COFF1:CCOD:MODE OFF"`
'deactivates channel coding for F-FCH of the third traffic channel.

*RST value	Resolution	SCPI
COMPlete	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:CGRoup<0|[1]...8>:COFFset<[1]...13>:CCODing:SPUNcture?

The command queries the symbol puncture rate. This value is only available for channel coding modes **Complete** and **Without Interleaving** (`SOURce:BB:C2K:BST<n>:CGRoup<n>:COFFset<n>:CCODing:MODE COMP | NOIN`).

The command is a query and therefore does not have an *RST value. For the traffic channels, this value is specific for the selected radio configuration.

Parameter:

xOFy
a symbol puncture rate of x out of y is used

TxOFy
a symbol puncture rate of x out of y Turbo is used

Example: `"BB:C2K:BST:CGR3:COFF1:CCOD:MODE COMP"`
'selects channel coding mode **Complete** for F-FCH of the third traffic channel.

`"BB:C2K:BST:CGR3:COFF1:CCOD:SPUN?"`
'queries the symbol puncture rate.

Response: `"8OF24"`
'a symbol puncture rate of 8 out of 24 is used.

*RST value	Resolution	SCPI
-	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:CGRoup<0|[1]...8>:COFFset<[1]...13>:CCODing:SREPetition?

The command queries symbol repetition rate. This value is only available for channel coding modes **Complete** and **Without Interleaving** (`SOURce:BB:C2K:BST<n>:CGRoup<n>:COFFset<n>:CCODing:MODE COMP | NOIN`).

The command is a query and therefore does not have an *RST value. For the traffic channels, this value is specific for the selected radio configuration.

Example: `"BB:C2K:BST:CGR3:COFF1:CCOD:MODE COMP"`
'selects channel coding mode **Complete** for F-FCH of the third traffic channel.

`"BB:C2K:BST:CGR3:COFF1:CCOD:SREP?"`
'queries symbol repetition rate.

Response: `"8"`
'a symbol repetition rate of 8 is used.

*RST value	Resolution	SCPI
-	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:CGRoup<0|[1]...8>:COFFset<[1]...13>:CCODing:TYPE CON2 | CON3 | CON4 | CON6 | TUR2 | TUR3 | TUR4 | TUR5 | OFF | DEFault

The command sets the channel coding type.

This value is only available for channel coding modes **Complete** and **Without Interleaving** (`SOURce:BB:C2K:BST<n>:CGRoup<n>:COFFset<n>:CCODing:MODE COMP | NOIN`). For the traffic channels, this value is specific for the selected radio configuration.

Parameter:

NONE
No error protection

TURx
Turbo Coder of rate 1/x in accordance with the CDMA specifications.

CONx
Convolution Coder of rate 1/x with generator polynomials defined by CDMA.

Example: `"BB:C2K:BST:CGR3:COFF2:CCOD:MODE COMP"`
'selects channel coding mode **Complete** for F-SCH1 of the third traffic channel.

`"BB:C2K:BST:CGR3:COFF2:CCOD:TYPE TURB4"`
'selects turbo coder with a rate of 1/4 for F-SCH1 of the third traffic channel.

*RST value	Resolution	SCPI
Channel-specific	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:CGRoup<0|[1]...8>:COFFset<[1]...13>:DATA PN9 | PN11 | PN15 | PN16 | PN20 | PN21 | PN23 | DLISt | ZERO | ONE | PATTern

The command selects the data source for the specified channel.
For the traffic channels, this value is specific for the selected radio configuration.
The data source for the power control bits is selected with the command `:BB:C2K:BST<n>:CGRoup<n>:COFFset<n>:TPC:DATA`.

Parameter:

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:C2K:BST<n>:CGRoup<n>:COFFset<n>:DATA:DSEL`.

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:C2K:BST:CGRoup:COFFset:DATA:PATT`.

Example:

`"BB:C2K:BST2:CGR3:COFF1:DATA PATT"`
'selects as the data source for the F-FCH of the third traffic channel of base station 2, the bit pattern defined with the following command:

`"BB:C2K:BST2:CGR3:COFF1:DATA:PATT #H3F,8"`
'defines the bit pattern.

*RST value	Resolution	SCPI
F-PICH/ F-TDPICH/ F-APICH F-ATDPICH: ALL0 all other channels: PN9	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:CGRoup<0|[1]...8>:COFFset<[1]...13>:DATA:DSELect <data list name>

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.
For the traffic channels, this value is specific for the selected radio configuration.

Example:

`"BB:C2K:BST2:CGR3:COFF1:DATA DLIS"`
'selects the Data Lists data source for the F-FCH of the third traffic channel of basestation2.

`"MMEM:CDIR 'D:\Lists\DM\IqData'"`
'selects the directory for the data lists.

`"BB:C2K:BST2:CGR3:COFF1:DATA:DLIS 'cdma_list1'"`
'selects file 'cdma_list1' as the data source. This file must be in the directory `D:\Lists\DM\IqData` and have the file extension *.dm_iqd.

*RST value	Resolution	SCPI
-	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:CGRoup<0|[1]...8>:COFFset<[1]...13>:DATA:PATTern
#B0,1 ... #B111..1,64

The command sets the bit pattern for the PATTern selection. 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 64 bits.

For the traffic channels, this value is specific for the selected radio configuration.

Example: `"BB:C2K:BST2:CGR3:COFF1:DATA:PATT #H800FE038,30"`
'defines the bit pattern.

*RST value	Resolution	SCPI
0	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:CGRoup<0|[1]...8>:COFFset<[1]...13>:DATA:RATE DR1K2 | DR1K3 | DR1K5 | DR1K8 | DR2K4 | DR2K7 | DR3K6 | DR4K8 | DR7K2 | DR9K6 | DR14K4 | DR19K2 | DR28K8 | DR38K4 | DR57K6 | DR76K8 | DR115K2 | DR153K6 | DR230K4 | DR259K2 | DR307K2 | DR460K8 | DR518K4 | DR614K4 | DR1036K8 | NUSed

The command sets the data rate for the specified channel. The value range depends on the channel type, the selected radio configuration and the frame length. Parameter NUSed is returned for channel 0-1 to 0-4.

For the traffic channels, this value is specific for the selected radio configuration.

Example: `"BB:C2K:BST2:CGR3:COFF1:DATA:RATE DR4K8"`
'sets a data rate of 4.8 kbps for F-FCH of the third traffic channel of base station 2.

*RST value	Resolution	Dependencies	SCPI
Channel-specific	-	The value range depends on the frame length. If the frame length is changed so that the set data rate becomes invalid, the next permissible value is automatically set. The data rate affects the Walsh code (spreading factor) that are possible within a channel. If a data rate is changed so that the selected Walsh code becomes invalid, the next permissible value is automatically set.	Device-specific

[SOURce<[1]|2>:]BB:C2K:BSTation:CGRoup<0|1>:COFFset<[1]...7>:DERRor:BIT:RATE 1E-7 .. 1E-1 (0.0000001...0.1)

The command sets the bit error rate.

This command is available only for the realtime channels of base station 1.

Example: `"BB:C2K:BST:CGR1:COFF3:REAL:STAT ON"`
'activates the real time generation of F-SCH2 of the first traffic channel of base station1.

`"BB:C2K:BST:CGR1:COFF3:DERR:BIT:RATE 1E-4"`
'sets a bit error rate of 0.0001.

*RST value	Resolution	SCPI
1E-3	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:BSTation[1]:CGRoup<0|1>:COFFset<[1]...7>:DERRor:BIT:STATe ON | OFF

The command activates bit error generation.

This command is available only for the realtime channels of base station 1.

Example: "BB:C2K:BST:CGR1:COFF3:REAL:STAT ON"
'activates the real time generation of F-SCH2 of the first traffic channel of base station 1.

"BB:C2K:BST:CGR1:COFF3:DERR:BIT:STAT ON"
'activates bit error generation.

*RST value	Resolution	SCPI
OFF	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:BSTation[1]:CGRoup<0|1>:COFFset<[1]...7>:DERRor:BLOCk:RATE 1E-4 .. 1E-1 (0.0001...0.1)

The command sets the block error rate.

Block error generation is only possible when channel coding is activated. This command is available only for the realtime channels of base station 1.For the traffic channels, this value is specific for the selected radio configuration.

Example: "BB:C2K:BST:CGR1:COFF3:REAL:STAT ON"
'activates the real time generation of F-SCH2 of the first traffic channel of base station 1.

"BB:C2K:BST:CGR1:COFF3:CCOD:MODE COMP"
'activates complete channel coding.

"BB:C2K:BST:CGR1:COFF3:DERR:BLOC:RATE 1E-2"
'sets the block error rate to 0.01.

"BB:C2K:BST:CGR1:COFF3:DERR:BLOC:STAT ON"
'activates block error generation.

*RST value	Resolution	SCPI
1E-1	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:BSTation[1]:CGRoup<0|1>:COFFset<[1]...7>:DERRor:BLOCk:STATe ON | OFF

The command activates or deactivates block error generation.

This command is available only for the realtime channels of base station 1.

Example: "BB:C2K:BST:CGR1:COFF3:REAL:STAT ON"
'activates the real time generation of F-SCH2 of the first traffic channel of base station 1.

"BB:C2K:BST:CGR1:COFF3:CCOD:MODE COMP"
'activates complete channel coding.

"BB:C2K:BST:CGR1:COFF3:DERR:BLOC:RATE 1E-2"
'sets the block error rate to 0.01.

"BB:C2K:BST:CGR1:COFF3:DERR:BLOC:STAT ON"
'activates block error generation.

*RST value	Resolution	SCPI
OFF	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:CGRoup<0|[1]...8>:COFFset<[1]...11>:FLENgth 5 ms | 10 ms | 20 ms | 26 ms | 40ms | 80 ms | 160 ms

The command sets the frame length of the selected channel. The value range is channel specific.

For the traffic channels, this value is specific for the selected radio configuration.

Parameter: **26 ms**
Frame length of 26,6. Also all inputs between 26.6 and 26.7 ms are allowed.

Example: "BB:C2K:BST:CGR3:COFF4:FLEN 5 ms
'sets the frame length of sub channel 3-4 to 5 ms.

*RST value	Resolution	Dependencies	SCPI
F-SYNC: 26.6 F_BCH: 40 ms F_CACH: 5 ms all other channels: 20 ms	-	The value range of the frame length depends on the channel type and the selected radio configuration. The frame length affects the data rates that are possible within a channel. Changing the frame length may lead to a change of data rate and this in turn may bring about a change of Walsh code.	Device-specific

[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:CGRoup<[1]...8>:COFFset<[1]...8>:LCMask #H0 ... #H3FF FFFF FFFF

The command sets the mask of the Long Code Generator of the base station.

For the traffic channels, this value is specific for the selected radio configuration.

Example: "BB:C2K:BST1:CGR2:COFF1:LCM #H55"
'sets the Long Code Mask to #H55.

*RST value	Resolution	Dependencies	SCPI
#H0	-	The LC Mask is the same for all sub channels of a traffic channel. If the mask is modified for one of the sub channels the new value is then automatically used by all other subchannels of this traffic channel.	Device-specific

[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:CGRoup<0|[1]...8>:COFFset<[1]...13>:POWer -80 dB... 0 dB

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 Output Power Control.

With the command `SOURce:BB:C2K: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.

For the traffic channels, this value is specific for the selected radio configuration.

Example: `"BB:C2K:BST2:CGR3:COFF4:POW -10dB"`
'sets the channel power of sub channel 3-4 of base station 2 to -10 dB relative to the power of the other channels.

*RST value	Resolution	SCPI
Channel-specific	0.01 dB	Device-specific

[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:CGRoup<0|[1]...8>:COFFset<[1]...13>:QWCode:STATe ON | OFF

This command activates/deactivates the use of the quasi orthogonal Walsh codes for the channel.

The quasi orthogonal Walsh Code set is selected for all channels of the base station with command`SOUR:BB:C2K:BST:QWSet`.

For the traffic channels, this value is specific for the selected radio configuration. It is only available for radio configuration 3 and higher.

Example: `"BB:C2K:BST1:QWS 3"`
'selects quasi orthogonal Walsh code set 3 for base station 1.

`"BB:C2K:BST1:CGR3:COFF4:QWC:STAT ON"`
'activates the use of the quasi orthogonal Walsh code for sub channel 3-4.

*RST value	Resolution	SCPI
OFF		Device-specific

[SOURce<[1]|2>:]BB:C2K:BSTation:CGRoup<0|1>:COFFset<[1]...7>:REALtime:STATe ON | OFF

This command activates/deactivates realtime generation of the selected channel. Realtime generation is possible for F-SYNC and the first traffic channel of base station 1.

For the traffic channel, this value is specific for the selected radio configuration.

Example: `"BB:C2K:BST:CGR0:COFF5:REAL:STAT ON"`
'activates realtime generation of F-SYNC of base station 1.

*RST value	Resolution	SCPI
OFF	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:CGRoup<0|[1]...8>:COFFset<[1]...14>:STATe ON | OFF

This command activates/deactivates the selected channel.

For the traffic channels, this value is specific for the selected radio configuration.

Example: "BB:C2K:BST2:CGR1:COFF2:STAT OFF"
'deactivates sub channel 1-2 of base station 1.

*RST value	Resolution	SCPI
Off	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:CGRoup<[1]...8>:COFFset<[1]|4>:TPC:DATA DLISt | ZERO | ONE | PATTern

The command determines the data source for the power control bits of the selected F-FCH or F-DCCH.

Power control is available for sub channel types F-FCH and F-DCCH. F-DCCH is only generated for radio configurations 3, 4 and 5.

For the traffic channels, this value is specific for the selected radio configuration.

Parameter:

DLISt
A data list is used. The data list is selected with the command BB:C2K:BST:CGR:COFF:TPC:DATA:DSEL.

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:C2K:BST:CGR:COFF:TPC:DATA:PATTern. The maximum length is 64 bits.

Example: "BB:C2K:BST2:CGR1:RCON 4"
'selects radio configuration4 for the first traffic channel of base station 2. This setting is valid for all sub channels of this traffic channel. With RC4, the traffic channel includes a F-DCCH.

"BB:C2K:BST2:CGR1:COFF4:TPC:DATA PATT"
'selects as the data source for the power control bits of F-DCCH the bit pattern defined with the following command.

"BB:C2K:BST2:CGR1:COFF4:TPC:DATA:PATT #HF0C20,19"
'defines the bit pattern.

*RST value	Resolution	SCPI
ZERO	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:CGRoup<[1]...8>:COFFset<[1]|4>:TPC:DATA:DSELect <data list name>

The command selects the data list for the DLISt data source selection.

Power control is available for sub channel types F-DCCH and F-FCH. F-DCCH is only generated for radio configurations 3, 4 and 5.

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.

For the traffic channels, this value is specific for the selected radio configuration.

Example:

```
"BB:C2K:BST2:CGR1:RCON 4"
```
'selects radio configuration RC4 for the first traffic channel of base station 2. This setting is valid for all sub channels of the traffic channel. With RC4, the traffic channel includes a F-DCCH.

```
:BB:C2K:BST2:CGR1:COFF4:TPC:DATA DLIS"
```
'selects the DLISt data source.

```
"MMEM:CDIR 'D:\Lists\DM\IqData'"
```
'selects the directory for the data lists.

```
"BB:C2K:BST2:CGR1:COFF4:TPC:DATA:DSEL 'cdma_ch4'"
```
'selects the file 'cdma_ch4' as the data source. This file must be in the directory `D:\Lists\DM\IqData` and have the file extension *.dm_iqd.

*RST value	Resolution	SCPI
-	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:CGRoup<[1]...8>:COFFset<[1]|4>:TPC:DATA:PATTern #B0,1 ... #B111..1, 64

The command determines the bit pattern for the PATTern selection. The maximum bit pattern length is 64 bits.

Power control is available for sub channel types F-DCCH and F-FCH. F-DCCH is only generated for radio configurations 3, 4 and 5.

For the traffic channels, this value is specific for the selected radio configuration.

Example:

```
"BB:C2K:BST2:CGR1:RCON 4"
```
'selects radio configuration RC4 for the first traffic channel of base station 2. This setting is valid for all sub channels of the traffic channel. With RC4, the traffic channel includes a F-DCCH.

```
"BB:C2K:BST2:CGR1:COFF4:TPC:DATA:PATT  #H3F,8"
```
'defines the bit pattern for the power control-bits.

*RST value	Resolution	SCPI
#H0,1	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:CGRoup<[1]...8>:COFFset<[1]|4>:TPC:MISuse
ON | OFF

The command activates "mis-" use of the power control bits of the selected F-DCCH or F- FCH for controlling the channel powers of these channels.

Power control is available for sub channel types F-DCCH and F-FCH. F-DCCH is only generated for radio configurations 3, 4 and 5.

The bit pattern (see commands `:BB:C2K:BSTation<n>:CGRoup<n>:COFFset<n>:TPC...`) of the power control bits 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 -80 dB. The step width of the change is defined with the command `:BB:C2K:BSTation<n>:CGRoup<n>:COFFset<n>:TPC:PSTep`.

For the traffic channels, this value is specific for the selected radio configuration.

Example: `"BB:C2K:BST2:CGR1:RCON 4"`
'selects radio configuration RC4 for the first traffic channel of base station 2. This setting is valid for all sub channels of the traffic channel. With RC4, the traffic channel includes a F-DCCH.

`"BB:C2K:BST2:CGR1:COFF4:TPC:MIS ON"`
'activates regulation of channel power for DCCH of the first traffic channel of base station 2 via the power control bit pattern.

`"BB:C2K:BST2:CGR1:COFF4:TPC:PST 1 dB"`
'sets the step width for the change of channel powers to 1 dB.

*RST value	Resolution	SCPI
OFF	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:CGRoup<[1]...8>:COFFset<[1]|4>:TPC:PSTep
-10.0 ... 10.0 dB

The command defines the step width for the change of channel powers in the case of "mis-" use of the power control bits.

Power control is available for sub channel types F-DCCH and F-FCH. F-DCCH is only generated for radio configurations 3, 4 and 5.

For the traffic channels, this value is specific for the selected radio configuration.

Example: `"BB:C2K:BST2:CGR1:RCON 4"`
'selects radio configuration RC4 for the first traffic channel of base station 2. This setting is valid for all sub channels of the traffic channel. With RC4, the traffic channel includes a F-DCCH.

`"BB:C2K:BST2:CGR1:COFF4:TPC:PST 1 dB"`
'sets the step width for the change of channel powers to 1 dB.

*RST value	Resolution	SCPI
0	0.01 dB	Device-specific

[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:CGRoup<[1]...8>:COFFset<[1]|4>:TPC:READ
CONTinuous | S0A | S1A | S01A | S10A

The command sets the read out mode for the bit pattern of the power control bits.

The bit pattern is defined with the commands
`:BB:C2K:BST<n>:CGRoup<n>:COFFset<n>:TPC....`

Power control is available for sub channel types F-DCCH and F-FCH. F-DCCH is only generated for radio configurations 3, 4 and 5.

For the traffic channels, this value is specific for the selected radio configuration.

Parameter:

CONTinuous
The bit pattern is used cyclically.

S0A
The bit pattern is used once, then the power control bit sequence continues with 0 bits.

S1A
The bit pattern is used once, then the power control bit sequence continues with 1 bits.

S01A
The bit pattern is used once and then the power control bit sequence is continued with 0 and 1 bits alternately.

S10A
The bit pattern is used once and then the power control bit sequence is continued with 1 and 0 bits alternately.

Example:

`"BB:C2K:BST2:CGR1:RCON 4"`
'selects radio configuration RC4 for the first traffic channel of base station 2. This setting is valid for all sub channels of the traffic channel. With RC4, the traffic channel includes a F-DCCH.

`"BB:C2K:BST2:CGR1:COFF4:TPC:READ S0A"`
"the bit pattern is used once, after which a 0 sequence is generated (applies to F-DCCH of the first traffic channel of base station 2).

*RST value	Resolution	SCPI
CONTinuous		Device-specific

[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:CGRoup<0|[1]...8>:COFFset<[1]...14>:TYPE?

The command queries the channel type.

The channel type is firmly fixed for channel numbers 0-1 to 0-14 (`CGR0:COFF1 to CGR0:COFF14`), i.e. for the special channels (control and packet channels). The remaining channel numbers are assigned to the individual code channels of the eight possible traffic channels. In this case the first traffic channel occupies the range 1-1 to 1-8 (`CGR1:COFF1 to CGR1:COFF8`), the second occupies the range 2-1 to 2-8 (`CGR2:COFF1 to CGR2:COFF8`), etc. Since the type and number of code channels depends on the radio configuration of the channel, the channels x-2 to x-8 are variously occupied. X-1 is always the fundamental channel (F-FCH) of the traffic channel.

The command is a query and therefore does not have an *RST value.

Parameter:

F-PICH	Pilot Channel
F-SYNC	Sync Channel
F-PCH	Paging Channel
F-TDPICH	Transmit Diversity Pilot Channel.
F-APICH	Auxiliary Pilot Channel
F-ATDPICH	Auxiliary Transmit Diversity Pilot Channel
F-BCH	Broadcast Channel
F-CPCCH	Common Power Control Channel
F-QPCH	Quick Paging Channel
F-CACH	Common Assignment Channel
F-CCCH	Common Control Channel
F-DCCH	Dedicated Control Channel
F-FCH	Fundamental Channel
F-SCH	Supplemental Channel
F-PDCCH	Packet Data Control Channel
F-PDCH	Forward Packet Data Channel

Example:

```
"BB:C2K:BST2:CGR0:COFF12:TYPE?"
    'queries type of channel 0-12 of base station 2.
```

Response:

```
"F-PDCCH"
    'channel 0-12 is a Packet Dedicated Control Channel.
```

*RST value	Resolution	SCPI
	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:CGRoup<0|[1]...8>:COFFset<[1]...13>:WCODe 0 ... 255

The command assigns the Walsh Code to the channel. The standard assigns a fixed walsh code to some channels (F-PICH, for example, always uses Walsh code 0). Generally, the Walsh code can only be varied within the range specified by the standard.

For the traffic channels, this value is specific for the selected radio configuration.

Example: "BB:C2K:BST1:CGR3:COFF5:WCOD 23"
'assigns Walsh code 23 to sub channel 3-5 of base station 1.

*RST value	Resolution	Dependencies	SCPI
Channel-specific	1	The value range of the Walsh code depends on the frame length, the channel coding type and the data rate. If one of these parameters is changed so that the set Walsh code gets invalid, the next permissible value is automatically set.	Device-specific

[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:CGRoup<0|[1]...8>:COFFset<[1]...13>:WLENgth

The command queries the Walsh Code length of the channel. For the traffic channels, this value is specific for the selected radio configuration.

The command is a query and therefore does not have an *RST value.

Example: "BB:C2K:BST1:CGR3:COFF5:WLEN?"
'queries Walsh code length of sub channel 3-5 of base station 1.

Response: "64"
'the Walsh code length is 64.

*RST value	Resolution	SCPI
	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:CGRoup<[1]...8>:RCONfiguration 1 | 2 | 3 | 4 | 5

The command selects the radio configuration for the traffic channel. The settings of the channel table parameters are specific for the selected radio configuration.

Example: "BB:C2K:BST2:CGR1:RCON 4"
'selects radio configuration RC4 for the first traffic channel of base station 2. This setting is valid for all sub channels of the traffic channel. With RC4, the traffic channel includes a F-DCCH.

*RST value	Resolution	Dependencies	SCPI
Traffic channel 1/2: 3 all other traffic channels: 1	-	The R&S Signal Generator provides a separate set of settings of all channel table parameters for each radio configuration. If the radio configuration is changed, the set of channel table values belonging to this RC is automatically activated.	Device-specific

[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:DCONflict:MODE

The command switches the order of the spreading codes.

The command is a query and therefore does not have an *RST value.

Parameter: **HAD**
the code channels are displayed in the order determined by the Hadamard matrix. The codes are numbered as Walsh codes according to the standard.

BREV
the code channels are displayed in the order defined by the Orthogonal Variable Spreading Factor (OVSF) code tree (3GPP code).

Example: `"BB:C2K:BST2:DCON:MODE HAD"`
'selects that the codes are numbered as Walsh codes according to the standard.

*RST value	Resolution	SCPI
HAD	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:DCONflict:RESolve

The command resolves existing domain conflicts by modifying the Walsh codes of the affected channels.

The command is an event and therefore does not have an *RST value and a query form.

Example: `"BB:C2K:BST2:DCON:STAT?"`
'queries whether a code domain conflict exists for base station 2.

'Response: `"1"`
'there is a conflict.

`"BB:C2K:BST2:DCON:RES"`
'resolves the code domain error by modifying the Walsh codes of the affected channels.

*RST value	Resolution	SCPI
-	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:DCONflict[:STATe]?

The command queries whether there is (response 1) or is not (response 0) a conflict (overlap) in the hierarchically-structured Walsh codes.

The command is a query and therefore does not have an *RST value.

Example: `"BB:C2K:BST2:DCON:STAT?"`
'queries whether a code domain conflict exists for base station 2.

"Response: `"0"`
'there is no conflict.

*RST value	Resolution	SCPI
-	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:PDCH:PINTerval 5 ms ... 2000 ms

The command sets the interval between two data packets for F-PDCH. The range depends on the ARB settings sequence length (`:BB:C2K:SLENgth`). The values 80 ms, 40 ms, 20 ms, 10 ms and 5 ms can always be set, and the maximum value is 2000 ms. All intermediate values must satisfy the condition.

*Sequence Length * 80ms/2^n*

where n is a whole number.

Example: `"BB:C2K:BST2:PDCH:PINT 10 ms"`
'sets an interval of 10 ms between two data packets.

*RST value	Resolution	SCPI
20 ms	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:PDCH:PSETup ON | OFF

The command selects for F-PDCH if all subpackets are generated using the same settings or if the settings of subchannel 1 are valid for all sub channels. However, the value of **Number of Bits per Encoder Packet** is a quality of the complete encoder packet, therefore it is always set for all sub packet channels via the entry for sub channel 1.

Parameter:
ON Packet parameters can be changed only for sub packet 1, all sub packets are generated with these settings.
OFF Packet parameters can be set individually for each sub packet.

Example: `"BB:C2K:BST2:PDCH:PSET OFF"`
'selects that all sub packets can be configured separately.

*RST value	Resolution	SCPI
ON	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:PDCH:SUBPacket<[1]...8>:ID 0...3

The command selects the sub packet ID for F_PDCH. The sub packet ID determines the sub packet symbol selection and selects one of four available subpackets of the encoder packets. The SPID of sub packet 1 is always 1.

Example: `"BB:C2K:BST2:PDCH:SUBP3:ID 3"`
'selects SPID 3 for sub packet 3.

*RST value	Resolution	SCPI
0	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:PDCH:SUBPacket<[1]...8>:PARameters 1...127

The command selects a fixed combination of parameters **Bits per Encoder Packet**, **Number of 32-Chip Walsh Channels**, **Subpacket Data Rate**, **Number of Slots per Subpackets** and **Modulation Order**. These combinations are shown in the following list in the form of a table for all five parameters.

The complete range of 127 possible combinations is only available for subpacket 1. If **Same Packet Setup for all Subpackets** is enabled (`SOUR:BB:C2K:BST2:PDCH:PSET ON`), this command is only valid for subpacket 1.

Example: "BB:C2K:BST2:PDCH:SUBP1:PAR 48"
'selects combination of parameters with index 48 (see following table).

*RST value	Resolution	SCPI
1	-	Device-specific

Parameter of command SOUR:BB:C2K:BST:PDCH:PAR	Number of Bits per Encoder Packet	Number of 32-Chip Walsh Channels	Subpacket Data Rate (kbps)	Number of Slots per Subpacket	Modulation Order
1	2328	28	1862.4	1	8-PSK
2	3864	27	1545.6	2	QPSK
3	3096	26	2476.8	1	16-QAM
4	3864	26	3091.2	1	16-QAM
5	1560	25	1248.0	1	QPSK
6	2328	25	1862.4	1	8-PSK
7	3096	25	1238.4	2	QPSK
8	3864	25	1545.6	2	8-PSK
9	2328	23	931.2	2	QPSK
10	2328	23	1862.4	1	16-QAM
11	3096	23	2476.8	1	16-QAM
12	3864	23	1545.6	2	8-PSK
13	1560	22	1248.0	1	QPSK
14	3096	22	1238.4	2	QPSK
15	1560	21	1248.0	1	8-PSK
16	3096	21	1238.4	2	8-PSK
17	3096	21	2476.8	1	16-QAM
18	3864	21	1545.6	2	8-PSK
19	1560	20	624.0	2	QPSK
20	2328	20	465.6	4	QPSK
21	2328	20	931.2	2	QPSK
22	2328	20	1862.4	1	16-QAM
23	3096	20	619.2	4	QPSK
24	408	19	326.4	1	QPSK
25	792	19	316.8	2	QPSK
26	792	19	633.6	1	QPSK
27	1560	19	1248.0	1	8-PSK
28	3096	19	1238.4	2	8-PSK
29	3864	19	772.8	4	QPSK
30	3864	19	1545.6	2	16-QAM
31	2328	18	1862.4	1	16-QAM
32	1560	17	1248.0	1	8-PSK
33	2328	17	931.2	2	QPSK
34	3096	17	1238.4	2	8-PSK
35	3864	17	1545.6	2	16-QAM
36	2328	16	1862.4	1	16-QAM
37	3096	16	619.2	4	QPSK
38	3864	16	772.8	4	QPSK

Parameter of command SOUR:BB:C2K:BST:PDCH:PAR	Number of Bits per Encoder Packet	Number of 32-Chip Walsh Channels	Subpacket Data Rate (kbps)	Number of Slots per Subpacket	Modulation Order
39	792	15	633.6	1	QPSK
40	1560	15	624.0	2	QPSK
41	1560	15	1248.0	1	16-QAM
42	2328	15	931.2	2	8-PSK
43	3096	15	1238.4	2	16-QAM
44	3864	15	1545.6	2	16-QAM
45	1560	14	312.0	4	QPSK
46	2328	14	465.6	4	QPSK
47	3864	14	772.8	4	QPSK
48	3864	14	1545.6	2	16-QAM
49	792	13	633.6	1	QPSK
50	1560	13	624.0	2	QPSK
51	1560	13	1248.0	1	16-QAM
52	2328	13	931.2	2	8-PSK
53	3096	13	619.2	4	QPSK
54	3096	13	1238.4	2	16-QAM
55	3864	13	1545.6	2	16-QAM
56	1560	12	1248.0	1	16-QAM
57	3096	12	1238.4	2	16-QAM
58	3864	12	772.8	4	8-PSK
59	408	11	326.4	1	QPSK
60	792	11	158.4	4	QPSK
61	792	11	316.8	2	QPSK
62	792	11	633.6	1	QPSK
63	1560	11	624.0	2	QPSK
64	1560	11	1248.0	1	16-QAM
65	2328	11	465.6	4	QPSK
66	2328	11	931.2	2	16-QAM
67	3096	11	619.2	4	QPSK
68	3096	11	1238.4	2	16-QAM
69	3864	11	772.8	4	8-PSK
70	792	10	633.6	1	8-PSK
71	1560	10	624.0	2	8-PSK
72	2328	10	931.2	2	16-QAM
73	3096	10	619.2	4	8-PSK
74	792	9	633.6	1	8-PSK
75	1560	9	312.0	4	QPSK
76	1560	9	624.0	2	8-PSK
77	2328	9	465.6	4	QPSK
78	2328	9	931.2	2	16-QAM
79	3096	9	619.2	4	8-PSK
80	3864	9	772.8	4	16-QAM
81	408	8	163.2	2	QPSK
82	408	8	326.4	1	QPSK
83	792	8	316.8	2	QPSK

Parameter of command SOUR:BB:C2K:BST:PDCH:PAR	Number of Bits per Encoder Packet	Number of 32-Chip Walsh Channels	Subpacket Data Rate (kbps)	Number of Slots per Subpacket	Modulation Order
84	792	8	633.6	1	16-QAM
85	1560	8	624.0	2	16-QAM
86	2328	8	465.6	4	8-PSK
87	2328	8	931.2	2	16-QAM
88	3096	8	619.2	4	16-QAM
89	3864	8	772.8	4	16-QAM
90	408	7	326.4	1	QPSK
91	792	7	316.8	2	QPSK
92	792	7	633.6	1	16-QAM
93	1560	7	312.0	4	QPSK
94	1560	7	624.0	2	16-QAM
95	2328	7	465.6	4	8-PSK
96	3096	7	619.2	4	16-QAM
97	3864	7	772.8	4	16-QAM
98	408	6	326.4	1	QPSK
99	792	6	158.4	4	QPSK
100	792	6	316.8	2	QPSK
101	792	6	633.6	1	16-QAM
102	1560	6	312.0	4	QPSK
103	1560	6	624.0	2	16-QAM
104	2328	6	465.6	4	16-QAM
105	3096	6	619.2	4	16-QAM
106	408	5	163.2	2	QPSK
107	408	5	326.4	1	8-PSK
108	792	5	316.8	2	8-PSK
109	1560	5	312.0	4	8-PSK
110	2328	5	465.6	4	16-QAM
111	408	4	81.6	4	QPSK
112	408	4	163.2	2	QPSK
113	408	4	326.4	1	16-QAM
114	792	4	158.4	4	QPSK
115	792	4	316.8	2	16-QAM
116	1560	4	312.0	4	16-QAM
117	2328	4	465.6	4	16-QAM
118	408	3	81.6	4	QPSK
119	408	3	163.2	2	QPSK
120	408	3	326.4	1	16-QAM
121	792	3	158.4	4	QPSK
122	792	3	316.8	2	16-QAM
123	1560	3	312.0	4	16-QAM
124	408	2	81.6	4	QPSK
125	408	2	163.2	2	16-QAM
126	792	2	158.4	4	16-QAM
127	408	1	81.6	4	16-QAM

[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:PDCH:SUBPacket<[1]...8>:STATe ON | OFF

This command activates/deactivates the selected sub packet for F_PDCH. Sub packet 1 is always active.

Example: "BB:C2K:BST2:PDCH:SUBP3:STAT ON"
'activates sub packet 3.

*RST value	Resolution	SCPI
OFF	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:PDCH:SUBPacket<[1]...8>:TOFFset 0 ... 1000 Slots

The command sets start of the sub packet relative to the start of the packet interval. The offset is entered in slots. Sub packet 1 has offset 0. The value range for the individual subpackets depends on the settings of the other subpackets. The time slot offsets of the other sub packet have to be entered in ascending order. Also, two packets cannot be sent at the same time.

In total the maximum value depends on the selected packet interval and the number of slots per sub packet as follows:
Packet Interval/1.25 ms - Number of Slots per Subpacket.

Example: "BB:C2K:BST2:PDCH:SUBP3:TOFF 4"
'enters at time slot offset of 4 slots. Sub packet 3 is sent 4 slots after the begin of the packet interval.

*RST value	Resolution	SCPI
0	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:PDCH:SUBPacket<[1]...8>:RESulting:WCODes?

The command queries the resulting Walsh codes for the selected sub packet of F-PDCH. Packet channels may be assigned to more than one code channel.

The command is a query and therefore does not have an *RST value.

Example: "BB:C2K:BST2:PDCH:SUBP3:RES:WCOD?"
'queries the resulting Walsh codes for sub packet 3 of F-PDCH of base station 2.

Response: "31, 15, 23"
'the resulting walsh codes are 31,15,23.

*RST value	Resolution	SCPI
-	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:PDCH:WINDex 0 | 1 | 2 |3

The command selects a standard Walsh set for F-PDCH. Four different sets are defined in the standard.

Example: "BB:C2K:BST2:PDCH:WIND 2"
'selects set 2 for PDCH of base station 2.

*RST value	Resolution	SCPI
0	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:PNOFfset 0 ... 511

The command sets the PN offset (short code) of the base station. The PN offset permits signals of different base stations to be distinguished.

Example: "BB:C2K:BST3:PNOF 123"
'sets a PN offset of 123 for base station 3.

*RST value	Resolution	SCPI
0	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:BSTation:PRESet

a standardized default for all the base stations. The settings correspond to the *RST values specified for the commands. .

This command triggers an action and therefore has no *RST value and no query form.

Example: "BB:C2K:BST:PRES"
'resets all the base station settings to default values.

*RST value	Resolution	Dependencies	SCPI
-	-	All base station settings are preset. An overview is provided by Table in Section "Reset All Base Stations".	Device-specific

[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:QWSet 1 | 2 |3

The command selects the quasi orthogonal Walsh code set. The standard defines three different sets.

The quasi-orthogonal Walsh codes are used for a given channel if :SOURce:BB:C2K:BST<n>:CGRoup<n>:COFFset<n>:QWCode:STATe is ON.

Example: "BB:C2K:BST2:QWS 2"
'selects set 2 for base station 2.

*RST value	Resolution	SCPI
1	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:STATe ON | OFF

The command activates and deactivates the specified base station.

Example: "BB:C2K:BST2:STAT OFF"
'deactivates base station 2.

*RST value	Resolution	SCPI
OFF	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:BSTation<2|3|4>:TDELay 0 ... 98304chips

The command sets the time shift of the selected base station compared to base station 1 in chips.

The command is only valid for base stations 2, 3 and 4. So a suffix must be specified at BSTation (2, 3, or 4).

Example: `"BB:C2K:BST2:TDEL 256"`
'shifts base station 2 by 256 chips compared to base station 1.

*RST value	Resolution	SCPI
0		Device-specific

[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:TDIVersity OFF| ANT1 | ANT2

The command activates and deactivates signal calculation with transmit diversity (OFF). To activate transmit diversity, the antenna must be specify whose signals are to be simulated (ANT1 or ANT2): The diversity scheme is selected using command `:SOURce:BB:C2K:BSTation:TDIV:MODE`.

Parameters:

OFF
No transmit diversity.

ANT1
Calculate and apply the output signal for antenna 1.

ANT2
Calculate and apply the output signal for antenna 2.

Example: `"BB:C2K:BST2:TDIV ANT2"`
'activates transmit diversity, the signal of antenna 2 is simulated.

*RST value	Resolution	SCPI
OFF	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:BSTation<[1]|2|3|4>:TDIVersity:MODE OTD | STS

The command selects the diversity scheme.

Command `:SOURce:BB:C2K:BSTation:TDIVersity` activates transmit diversity and selects the antenna.

Parameter:

OTD
Orthogonal Transmit Diversity Mode.

STS
Space Time Spreading Mode.

Example: `"BB:C2K:BST2:TDIV:MODE OTD"`
'selects scheme OTD for Transmit Diversity.

`"BB:C2K:BST2:TDIV ANT2"`
'activates transmit diversity, the signal of antenna 2 is simulated.

*RST value	Resolution	SCPI
OTD	-	Device-specific

SOURce:BB:C2K - Mobile Station Settings

The SOURce:BB:C2K:MSTation system contains commands for setting the mobile stations. The commands of this system only take effect when the CDMA2000 standard is activated, the UP transmission direction is selected and the particular mobile station is enabled:

```
SOURce:BB:C2K:STATe ON
SOURce:BB:C2K:LINK UP
SOURce:BB:C2K:MSTation2:STATe ON
```

The channels of mobile station 1 are always generated in real time.

Important:

For the code channels of a traffic channels, the settings of the channel table parameters are specific for the selected radio configuration. I.e. a complete set of settings exists for each of the four possible radio configurations.

Command	Parameter	Default Unit	Comments
[SOURce<[1]|2>:]BB:C2K:MSTation:ADDitional:COUNt	1...64		
[SOURce<[1]|2>:]BB:C2K:MSTation:ADDitional:LCMask:STEP	#H1...#HFFFFFF		
[SOURce<[1]|2>:]BB:C2K:MSTation:ADDitional:POWer:OFFSet	-80dB ... 0dB	dB	
[SOURce<[1]|2>:]BB:C2K:MSTation:ADDitional:STATe	ON | OFF		
[SOURce<[1]|2>:]BB:C2K:MSTation:ADDitional:TDELay:STEP	0 ... 1535	Chips	
[SOURce<[1]|2>:]BB:C2K:MSTation:PRESet			No query
[SOURce<[1]|2>:]BB:C2K:MSTation<[1]|2|3|4>:CCODing:MODE	OFF | COMPlete | NOINterleaving | OINTerleaving		
[SOURce<[1]|2>:]BB:C2K:MSTation<[1]|2|3|4>:CHANnel<[1]...8>:DATA	PN9 | PN11 | PN15 | PN16 | PN20 | PN21 | PN23 | ZERO | ONE | PATTern		
[SOURce<[1]|2>:]BB:C2K:MSTation<[1]|2|3|4>:CHANnel<[1]...8>:DATA:DSELect	<data_list>		
[SOURce<[1]|2>:]BB:C2K:MSTation<[1]|2|3|4>:CHANnel<[1]...8>:DATA:PATTern	#B0...B111..1, 1...64		
[SOURce<[1]|2>:]BB:C2K:MSTation<[1]|2|3|4>:CHANnel<[1]...8>:DATA:RATE	DR1K2 | DR1K3 | DR1K5 | DR1K8 | DR2K4 | DR2K7 | DR3K6 | DR4K8 | DR7K2 | DR9K6 | DR14K4 | DR19K2 | DR28K8 | DR38K4 | DR57K6 | DR76K8 | DR115K2 | DR153K6 | DR230K4 | DR259K2 | DR307K2 | DR460K8 | DR518K4 | DR614K4 | DR1036K8 | NUSed		
[SOURce<[1]|2>:]BB:C2K:MSTation<[1]|2|3|4>:CHANnel<[1]...8>:FLENgth	5 ms | 10 ms | 20 ms | 40 ms | 80 ms		
[SOURce<[1]|2>:]BB:C2K:MSTation<[1]|2|3|4>:CHANnel<[1]...8>:POWer	-80 dB ... 0 dB	dB	
[SOURce<[1]|2>:]BB:C2K:MSTation<[1]|2|3|4>:CHANnel<[1]...8>:SPRead			Query only
[SOURce<[1]|2>:]BB:C2K:MSTation<[1]|2|3|4>:CHANnel<[1]...8>:STATe	ON | OFF		
[SOURce<[1]|2>:]BB:C2K:MSTation<[1]|2|3|4>:CHANnel<[1]...8>:TYPE			Query only

Command	Parameter	Default Unit	Comments
[SOURce<[1]|2>:]BB:C2K:MSTation<[1]|2|3|4>:CHANnel<[1]...5>:WCODe			Query only
[SOURce<[1]|2>:]BB:C2K:MSTation<[1]|2|3|4>:LCMask	0 ... 3FF FFFF FFFF		
[SOURce<[1]|2>:]BB:C2K:MSTation<[1]|2|3|4>:MODE	TRAFfic | ACCess | EACCess | CCONtrol		
[SOURce<[1]|2>:]BB:C2K:MSTation<[1]|2|3|4>:RCONfiguration	1 ... 4		
[SOURce<[1]|2>:]BB:C2K:MSTation<[1]|2|3|4>:STATe	ON | OFF		
[SOURce<[1]|2>:]BB:C2K:MSTation<[1]|2|3|4>:TPC:DATA	DLISt | ZERO | ONE |PATTern		
[SOURce<[1]|2>:]BB:C2K:MSTation<[1]|2|3|4>:TPC:DATA:DSELect	<list_name>		
[SOURce<[1]|2>:]BB:C2K:MSTation<[1]|2|3|4>:TPC:DATA:PATTern	#H0,1 ... #HFF...,64		
[SOURce<[1]|2>:]BB:C2K:MSTation<[1]|2|3|4>:TPC:MISuse	ON | OFF		
[SOURce<[1]|2>:]BB:C2K:MSTation<[1]|2|3|4>:TPC:PSTep	-10 dB ...+10 dB		
[SOURce<[1]|2>:]BB:C2K:MSTation<[1]|2|3|4>:TPC:READ	CONTinuous | S0A | S1A | S01A | S10A		

[SOURce<[1]|2>:]BB:C2K:MSTation:ADDitional:COUNt 1 ... 64

The command sets the number of additional mobile stations.

The R&S Signal Generator provides the opportunity to simulate up to 64 additional mobile stations - corresponding to a receive signal for a base station with high capacity utilization. The fourth mobile station (MS4) serves as a template for all other stations. The only parameters of the additional mobile stations to be modified are the LC mask and the power. A time delay of the additional mobile stations to one another can be defined.

Example:

```
"BB:C2K:MST:ADD:COUN 20"
```
'sets 20 additional mobile stations.

```
"BB:C2K:MST:ADD:POW:OFFS -3.0"
```
'sets the power offset to -3 dB.

```
"BB:C2K:MST:ADD:LCM:STEP #H1"
```
'sets the step width for increasing the LC mask to 1.

```
"BB:C2K:MST:ADD:STAT ON"
```
'connects the 20 mobile stations to the CDMA signal.

*RST value	Resolution	SCPI
4	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:MSTation:ADDitional:LCMask:STEP #H1 ... #HFFFFFF

The command sets the step width for increasing the LC mask of the additional mobile stations. The start value is the LC mask of MS4.

Example:

```
"BB:C2K:MST:ADD:LCM:STEP #H55"
```
'sets the step width for increasing the long code mask to #H55.

*RST value	Resolution	SCPI
#H1		Device-specific

[SOURce<[1]|2>:]BB:C2K:MSTation:ADDitional:POWer:OFFSet -80 dB... 0 dB

The command sets the power offset of the active channels of the additional mobile stations relative to the power of the active channels of the reference station MS4.

The offset applies to all the additional mobile stations. 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.

Example: `"BB:C2K:MST:ADD:POW:OFFS -3.0"`
'sets the offset to -3 dB.

*RST value	Resolution	SCPI
0 dB	0.1 dB	Device-specific

[SOURce<[1]|2>:]BB:C2K:MSTation:ADDitional:STATe ON | OFF

The command activates additional mobile stations.

The suffix at MSTation has no significance for this command and should not be specified.

Example: `"BB:C2K:MST:ADD:STAT ON"`
'connects the additional mobile stations to the CDMA2000 signal.

*RST value	Resolution	SCPI
OFF		Device-specific

[SOURce<[1]|2>:]BB:C2K:MSTation:ADDitional:TDELay:STEP 0...1535

The command sets the step width for the time delay of the additional mobile stations to one another. The start value returns the time delay of MS4. Entry is made in chips and can be a maximum of 1 frame.

Example: `"BB:C2K:MST:ADD:TDEL:STEP 256"`
'shifts each of the mobile stations 256 chips apart, starting from the time delay of MS4.

*RST value	Resolution	SCPI
0 Chips	1 Chip	Device-specific

[SOURce<[1]|2>:]BB:C2K:MSTation<[1]|2|3|4>:CCODing:MODE
OFF | COMPlete | OINTerleaving | NOINterleaving

The command selects the channel coding mode.

Parameter:

OFF
Channel coding is deactivated.

COMPlete
The complete channel coding is performed. The channel coding procedure may slightly vary depending on channel type, frame length and data rate.

OINTerleaving
Except for the block interleaver, the whole channel coding procedure is carried out.

NOINterleaving
In this mode only block interleaver is used for coding.

Example:
```
"BB:C2K:MST:CCOD:MODE OFF"
```
'deactivates channel coding for mobile station 1.

*RST value	Resolution	SCPI
OFF	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:MSTation<[1]|2|3|4>:CHANnel<[1]...8>:DATA
PN9 | PN11 | PN15 | PN16 | PN20 | PN21 | PN23 | DLISt | ZERO | ONE | PATTern

The command sets the data source for the specified channel.

The data source for the power control bits is selected with the command `:BB:C2K:MST:TPC:DATA`. For the traffic channels, this value is specific for the selected radio configuration.

Parameter:

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:C2K:MST:CHANnel<n>: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:BB:C2K:MST:CHANnel<n>:DATA:PATTern`.

Example:
```
"BB:C2K:MST1:CHAN2:DATA PN16"
```
'selects as the data source for channel 2 of mobile station 1, internal PRBS data with a sequence length of 2^{16}-1.

*RST value	Resolution	SCPI
PN9	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:MSTation<[1]|2|3|4>:CHANnel<[1]...8>:DATA:DSELect
<data list name>

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.

For the traffic channels, this value is specific for the selected radio configuration.

Example:
```
"BB:C2K:MST1:CHAN1:DATA DLIS"
```
'selects the Data Lists data source.
```
"MMEM:CDIR 'D:\Lists\Dm\IQData'"
```
'selects the directory for the data lists.
```
"BB:C2K:MST1:CHAN1:DATA:DSEL 'dpdch_13'"
```
'selects file 'cdma_13' as the data source. This file must be in the directory `D:\Lists\DM\IqData` and have the file extension `*.dm_iqd.`

*RST value	Resolution	SCPI
-	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:MSTation<[1]|2|3|4>:CHANnel<[1]...8>:DATA:PATTern
#B0,1...B11..,64

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. The maximum length is 64 bits.

For the traffic channels, this value is specific for the selected radio configuration.

Example:
```
"BB:C2K:MST1:CHAN1:DATA PATT"
```
'selects Pattern data source.
```
"BB:C2K:MST1:CHAN1:DATA:PATT  #H800FFFF80003FFE,60"
```
'defines the bit pattern.

*RST value	Resolution	SCPI
0	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:MSTation<[1]|2|3|4>:CHANnel<[1]...8>:DATA:RATE
DR1K2 | DR1K3 | DR1K5 | DR1K8 | DR2K4 | DR2K7 | DR3K6 | DR4K8 | DR7K2 | DR9K6 | DR14K4 | DR19K2 | DR28K8 | DR38K4 | DR57K6 | DR76K8 | DR115K2 | DR153K6 | DR230K4 | DR259K2 | DR307K2 | DR460K8 | DR518K4 | DR614K4 | DR1036K8

The command sets the data rate for the specified channel. The value range depends on the channel type, the selected radio configuration and the frame length.

For the traffic channels, this value is specific for the selected radio configuration.

Example: `"BB:C2K:MST2:MODE TRAF"`
'selects operating mode traffic.

`"BB:C2K:MST2:RCON 3"`
'selects radio configuration 3 for the traffic channel.

`"BB:C2K:MST2:CHAN3:DATA:RATE DR4K8"`
'sets a data rate of 4.8 kbps for channel 3 f mobile station 2 (R-FCH in this configuration).

*RST value	Resolution	Dependencies	SCPI
R-DCCH: DR9K6 R-FCH: DR1K5 R-SCH: DR1K5 R-ACC: DR4K8	-	The value range of the data rate depends on the channel type and the frame length. If the frame length is changed so that the set data rate becomes invalid, the next permissible value is automatically set.	Device-specific

[SOURce<[1]|2>:]BB:C2K:MSTation<[1]|2|3|4>:CHANnel<[1]...8>:FLENgth 5 ms | 10 ms | 20 ms | 40 ms | 80 ms

The command sets the frame length of the selected channel. The value range depends on the channel type and the selected radio configuration

For the traffic channels, this value is specific for the selected radio configuration.

Example: `"BB:C2K:MST:CHAN3:FLEN 5 ms`
'sets the frame length of sub channel 3 to 5 ms.

*RST value	Resolution	Dependencies	SCPI
20 ms	-	The frame length affects the data rates that are possible within a channel. Changing the frame length may lead to a change of data rate..	Device-specific

[SOURce<[1]|2>:]BB:C2K:MSTation<[1]|2|3|4>:CHANnel<[1]...8>:POWer -80 dB... 0 dB

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 Output Power Control.

With the command `SOURce:BB:C2K: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.

For the traffic channels, this value is specific for the selected radio configuration.

Example: `"BB:C2K:MST2:CHAN3:POW -10dB"`
'sets the channel power of sub channel 3 of mobile station 2 to -10 dB relative to the power of the other channels.

*RST value	Resolution	SCPI
0 dB	0.01 dB	Device-specific

[SOURce<[1]|2>:]BB:C2K:MSTation<[1]|2|3|4>:CHANnel<[1]...8>:SPRead?

The command queries he spreading factor of the channel. The spreading factor corresponds to the length of the employed Walsh code. The Walsh codes to be used are specified by the standard and cannot be chosen.

The command is a query and therefore does not have an *RST value. For the traffic channels, this value is specific for the selected radio configuration.

Example: `"BB:C2K:MST2:CHAN1:SPR?"`
'queries he spreading factor of channel 1 of mobile station 2.

Response: "32".

*RST value	Resolution	SCPI
-	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:MSTation<[1]|2|3|4>:CHANnel<[1]...8>:STATe ON | OFF

This command activates/deactivates the selected channel.

For the traffic channels, this value is specific for the selected radio configuration.

Example: `"BB:C2K:MST2:CHAN2:STAT OFF"`
'deactivates sub channel 2 of mobile station 2.

*RST value	Resolution	SCPI
OFF	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:MSTation<[1]|2|3|4>:CHANnel<[1]...8>:TYPE?
R-PICH | R-ACH | R-EACH | R-CCCH | R-DCCH | R-FCH | R-SCCH | R-SCH2 | R-SCH1

The command queries the channel type. The channel type depends on the selected operating mode and, for the sub channels of the traffic channel, from the selected radio configuration.

The command is a query and therefore does not have an *RST value.

Parameter:

R-ACH
Access Channel.

R-EACH
Enhanced Access Channel

R-CCCH
Common Control Channel

R-PICH
Pilot Channel.

R-DCCH
Dedicated Control Channel

R-FCH
Fundamental Channel

R-SCHx
Supplemental Channel 1 | 2

R-SCCH
Supplemental Control Channel

Example:
```
"BB:C2K:MST2:CHAN2:TYPE?"
```
'queries type of channel 2.

Response:
```
"R-SCCH"
```
'channel 2 is a Supplemental Control Channel.

*RST value	Resolution	SCPI
	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:MSTation<[1]|2|3|4>:CHANnel<[1]...5>:WCODe?

The command queries the Walsh code. The standard assigns a fixed walsh code to some channels.

The command represents a query and thus has no *RST value. For the traffic channels, this value is specific for the selected radio configuration.

Example:
```
"BB:C2K:MST1:CHAN3:WCOD?
```
'queries the Walsh code of channel 3 of mobile station 1.

Response:
```
"3"
```
'the Walsh code is 3.

*RST value	Resolution	SCPI
-	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:MSTation<[1]|2|3|4>:LCMask #H0 ... #H3FF FFFF FFFF

The command sets the mask of the Long Code Generator of the mobile station.

Example: "BB:C2K:MST1:LCM #H55"
'sets the Long Codes to #H55.

*RST value	Resolution	SCPI
#H0		Device-specific

[SOURce<[1]|2>:]BB:C2K:MSTation<[1]|2|3|4>:MODE
TRAFfic | ACCess | EACCess | CCONtrol

The command selects operating mode for the mobile station. The channel specific parameters are set with commands SOUR:BB:C2K:MST<n>:CHANnel<n>:...n.

Parameter:

TRAFfic
The mobile station generates a single traffic channel A traffic channel consists of up to 8 sub channels depending on the selected radio configuration (R-FCH, R-SCCH, R-SCH, R-DCCH). This mode corresponds to the standard mode of a mobile station during voice and data transmission.

ACCess
The mobile station generate an access channel (R-ACH). This channel is needed to set up the connection between the mobile station and the base station.

EACCess
The mobile station generates an enhanced access channel (R-ACH) and a pilot channel (R-PICH).

CCONtrol
The mobile station generates a common control channel (R-ACH) and a pilot channel (R-PICH).

Example: "BB:C2K:MST1:MODE TRAF"
'switches the mobile station into standard mode - voice and data transmission.

*RST value	Resolution	SCPI
TRAFfic	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:MSTation:PRESet

The command produces a standardized default for all the mobile stations. The settings correspond to the *RST values specified for the commands. An overview is provided by Table in Chapter 4, Section "Reset All Mobile Stations".

This command triggers an action and therefore has no *RST value and no query form. The numerical suffix for MSTation has no significance.

Example: "BB:C2K:MST:PRES"
'resets all the mobile station settings to default values.

*RST value	Resolution	Dependencies	SCPI
-	-	All mobile station settings are preset.	Device-specific

[SOURce<[1]|2>:]BB:C2K:MSTation<[1]|2|3|4>:RCONfiguration 1 | 2 | 3 | 4

The command selects the radio configuration for the traffic channel.

The settings of the channel table parameters are specific for the selected radio configuration.

Example: "BB:C2K:MST2:MODE TRAF"
'switches mobile station 2 into standard mode - voice and data transmission.

"BB:C2K:MST2:RCON 3"
'selects radio configuration 3. With RC3, the traffic channel includes five sub channels.

*RST value	Resolution	Dependencies	SCPI
1	-	A separate set of settings of all channel table parameters for each radio configuration is provided. If the radio configuration is changed, the set of channel table values belonging to this RC is automatically activated.	Device-specific

[SOURce<[1]|2>:]BB:C2K:MSTation<[1]|2|3|4>:STATe ON | OFF

The command activates and deactivates the specified mobile station.

Example: "BB:C2K:MST2:STAT OFF"
'deactivates mobile station 2.

*RST value	Resolution	SCPI
OFF	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:MSTation<[1]|2|3|4>:TPC:DATA
DLISt | ZERO | ONE | PATTern

The command sets the data source for the power control bits of the traffic channels.

Parameter:

DLISt
A data list is used. The data list is selected with the command BB:C2K:MST:TPC:DATA:DSEL.

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:C2K:MST:TPC:DATA:PATTern. The maximum length is 64 bits.

Example: "BB:C2K:MST2:TPC:DATA PATT"
'selects Pattern data source for the power control bits. The bit pattern is defined with the following command.

"BB:C2K:MST2:TPC:DATA:PATT #H3F,8"
'defines the bit pattern.

*RST value	Resolution	SCPI
ZERO	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:MSTation<[1]|2|3|4>:TPC:DATA:DSELect <data list name>

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.

Example: `"BB:C2K:MST2:TPC:DATA DLIS"`
'selects the DLISt data source.

`"MMEM:CDIR 'D:\Lists\DM\IqData'"`
'selects the directory for the data lists.

`"BB:C2K:MST2:TPC:DATA:DSEL 'cdma_ch4'"`"selects the file 'cdma_ch4' as the data source. This file must be in the directory `D:\Lists\DM\IqData` and have the file extension *.dm_iqd.

*RST value	Resolution	SCPI
-	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:MSTation<[1]|2|3|4>:TPC:DATA:PATTern #B0,1 ... #B11..1, 64

The command determines the bit pattern for the PATTern selection. The maximum bit pattern length is 64 bits.

Example: `"BB:C2K:MST2:TPC:DATA:PATT #H3F, 8"`
'defines the bit pattern for the power control-bits.

*RST value	Resolution	SCPI
#H0,1	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:MSTation<[1]|2|3|4>:TPC:MISuse ON | OFF

The command activates/deactives the use of the power control data for controlling the mobile station output power. On the uplink, the power control bits are used exclusively for controlling the mobile station output power. Power control puncturing is not defined for controlling the base station power.

The bit pattern (see commands `:BB:C2K:MSTation<n>:TPC...`) of the power control bits w 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 -80 dB. The step width of the change is defined with the command `:BB:C2K:MSTation<n>:TPC:PSTep`.

Example: `"BB:C2K:MST2:TPC:MIS ON"`
'activates regulation of channel power for mobile station 2 via the power control bit pattern.

`"BB:C2K:MST2:TPC:PST 1 dB"`
'sets the step width for the change of channel powers to 1 dB.

*RST value	Resolution	SCPI
OFF	-	Device-specific

[SOURce<[1]|2>:]BB:C2K:MSTation<[1]|2|3|4>:TPC:PSTep -10.0 ... 10.0 dB

The command defines the step width for the change of channel powers in the case of "mis-" use of the power control bits.

Example: "BB:C2K:MST2:TPC:PST 0.1 dB"
'sets the step width for the change of channel powers to 1 dB.

*RST value	Resolution	SCPI
0	0.01 dB	Device-specific

[SOURce<[1]|2>:]BB:C2K:MSTation<[1]|2|3|4>:TPC:READ
CONTinuous | S0A | S1A | S01A | S10A

The command sets the read out mode for the bit pattern of the power control bits.

The bit pattern is defined with the commands :BB:C2K:MST<n>:TPC....

Parameter: **CONTinuous**
The bit pattern is used cyclically.

S0A
The bit pattern is used once, then the power control bit sequence continues with 0 bits.

S1A
The bit pattern is used once, then the power control bit sequence continues with 1 bits.

S01A
The bit pattern is used once and then the power control bit sequence is continued with 0 and 1 bits alternately.

S10A
The bit pattern is used once and then the power control bit sequence is continued with 1 and 0 bits alternately.

Example: "BB:C2K:MST2:TPC:READ S0A"
'the bit pattern is used once, after which a 0 sequence is generated (applies to R-DCCH of mobile station 2).

*RST value	Resolution	SCPI
CONTinuous		Device-specific

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