# Supplement

# Digital Standard IEEE 802.16 WiMAX

**R&S® AMU-K49**
**1402.7002.02**

**R&S® SMATE-K49**
**1404.6803.02**

**R&S® SMJ-K49**
**1404.1101.02**

**R&S® SMU-K49**
**1161.0366.02**

**R&S® AFQ-K249**
**1401.6654.02**

**R&S® AMU-K249**
**1402.8309.02**

**R&S® CMW-KW700**
**1203.1358.02**

**R&S® SMJ-K249**
**1409.1216.02**

**R&S® SMU-K249**
**1408.6214.02**

ROHDE&SCHWARZ
Test and Measurement

**Dear Customer,**

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

# Grouped Safety Messages

**Make sure to read through and observe 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, if expressly permitted, also in the field and must not be used in any way that may cause personal injury or property damage. You are responsible if the product is used for 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 only skilled and specialized staff or thoroughly trained personnel with the required skills be allowed to use the product. If personal safety gear is required for using Rohde & Schwarz products, this will be indicated at the appropriate place in the product documentation. Keep the basic safety instructions and the product documentation in a safe place and pass them on to the subsequent users.

## 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 | DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury. |
| WARNING | WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury. |
| CAUTION | CAUTION indicates a hazardous situation which, if not avoided, may result in minor or moderate injury. |
| NOTICE | NOTICE indicates a property damage message. |
| | In the product documentation, the word ATTENTION is used synonymously. |

These tags are in accordance with the standard definition for civil applications in the European Economic Area. Definitions that deviate from the standard definition may also exist in other economic areas or military applications. It is therefore essential to make sure that the tags described here are always used only in connection with the related product documentation and the related product. The use of tags in connection with unrelated products or documentation can result in misinterpretation and 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.
   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 liquids, 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.
34. Prior to cleaning, disconnect the product from the AC supply. Use a soft, non-linting cloth to clean the product. Never use chemical cleaning agents such as alcohol, acetone or diluent for cellulose lacquers.

# Informaciones elementales de seguridad

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

El principio del grupo de empresas Rohde & Schwarz consiste en tener nuestros productos siempre al día con los estándares de seguridad y de ofrecer a nuestros clientes el máximo grado de seguridad. Nuestros productos y todos los equipos adicionales son siempre fabricados y examinados según las normas de seguridad vigentes. 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 estándares técnicos de seguridad. Para poder preservar este estado y garantizar un funcionamiento libre de peligros, el usuario deberá atenerse a todas las indicaciones, informaciones de seguridad y notas de alerta. El grupo de empresas Rohde & Schwarz está siempre a su disposición en caso de que tengan preguntas referentes a estas informaciones de seguridad.

Además queda en la responsabilidad del usuario utilizar el producto en la forma debida. Este producto está destinado exclusivamente al uso en la industria y el laboratorio o, si ha sido expresamente autorizado, para aplicaciones de campo y de ninguna manera deberá ser utilizado de modo que alguna persona/cosa pueda sufrir daño. El uso del producto fuera de sus fines definidos o 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 básicas del idioma inglés. Por eso se debe tener en cuenta que el producto sólo pueda ser operado por personal especializado o personas minuciosamente instruidas con las capacidades correspondientes. 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. Guarde bien las informaciones de seguridad elementales, así como la documentación del producto y entréguela a usuarios posteriores.

## Símbolos y definiciones de seguridad

| | | | | | | | |
|---|---|---|---|---|---|---|---|
|  |  |  |  |  |  |  |  |
| Ver documen-tación de producto | Informaciones para maquinaria con un 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. |
| AVISO | Indica la posibilidad de utilizar mal el producto y a consecuencia dañarlo.<br>En la documentación del producto se emplea de forma sinónima el término CUIDADO. |

Las palabras de señal corresponden a la definición habitual para aplicaciones civiles en el área económica europea. Pueden existir definiciones diferentes a esta definición en otras áreas económicas o en aplicaciones militares. Por eso se deberá tener en cuenta que las palabras de señal aquí descritas sean utilizadas siempre solamente en combinación con la correspondiente documentación 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 por principio la posición con el suelo de la caja para abajo, modo de protección IP 2X, grado de suciedad 2, categoría de sobrecarga eléctrica 2, utilizar solamente en estancias interiores, utilización hasta 2000 m sobre el nivel del mar, transporte hasta 4.500 m sobre el nivel del mar.
   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 especializado 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. Después 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 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 averiguar 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, deberán 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 radiocomunicación RF, 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/usuario está comprometido a valorar y señalar áreas 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 producto.
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 bastidores 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 del estándar IEC950/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 efectuadas 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 cortocircuitos 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 líquidos 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 usuario 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 células 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 observadas. 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 láser 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 láser puede dañar irreversiblemente sus ojos. Nunca trate de descomponer estos productos. Nunca mire dentro del rayo láser.
34. Antes de proceder a la limpieza, desconecte el producto de la red. Realice la limpieza con un paño suave, que no se deshilache. No utilice de ninguna manera agentes limpiadores químicos como, por ejemplo, alcohol, acetona o nitrodiluyente.

# Contents- Digital Standard WiMAX

# Digital Standard IEEE 802.16 WiMAX

## Introduction - Digital Standard WiMAX

The R&S Signal Generator provides you with the ability to generate signals in accordance with the Institute of Electrical and Electronics Engineers (IEEE 802.16-2004) standard.
WiMAX is a wireless metropolitan-area network technology that provides interoperable broadband wireless connectivity to fixed and portable users. It provides up to 50 kilometers of service area, allows users to get broadband connectivity without the need of direct line-of-sight to the base station, and provides total data rates up to 75 Mbps - enough bandwidth to simultaneously support hundreds of businesses and homes with a single base station.
The R&S Signal Generator generates the IEEE 802.16 WiMAX signals in the arbitrary waveform mode; the signal is first calculated and then output.
The R&S Signal Generator simulates IEEE 802.16 WiMAX at the physical level. Supported features include:

- Configuration of OFDM (orthogonal frequency division multiplexing) and OFDMA (orthogonal frequency division multiple access) physical layer mode.
- Downlink and Uplink mode.
- Pre-defined settings for receiver tests.
- All frame duration settings defined by the standard, including a “user” mode with freely configurable Frame Duration, and a “continuous” mode. In “continuous” mode, gaps between bursts/subframes are eliminated.
- Sequence length of up to 511 frames.
- Up to 64 bursts per frame/zone with independent power setting.
- Channel bandwidth and sampling rate settings according to the ETSI, MMDS, WCS, U-NII or WiBro bands, or alternatively arbitrary settings in “User” mode.
- Full RS/CC, CC and CTC channel coding.
- BPSK, QPSK, 16-QAM or 64-QAM modulation, independently configurable for any of the 64 bursts.
- FCH, DL-MAP and UL-MAP burst generation in “automatic” mode (using signal configuration parameters set by the user) or in “user” mode, with arbitrary data.
- Ranging Bursts in uplink
- Up to 8 Zones per frame in OFDMA mode
- Predefined data sources such as PN9, PN11 and others, or arbitrary user data.
- Optional generic MAC headers and CRC for each burst.
- Subchannelization modes.
- Clipping for reducing the crest factor.

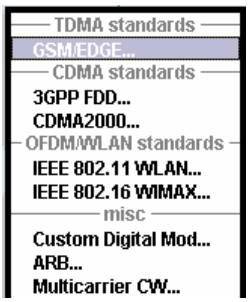
*Table 1 Parameters of the modulation system IEEE 802.16 WiMAX*

| **Digital standard 802.16-2004** | **meets IEEE Std 802.16™-2004/Cor2/D4 and 802.16e-2005** |
|---|---|
| Physical layer modes | OFDM, OFDMA, OFDMA – WiBro |
| Link direction | forward link and reverse link |
| Frame durations | 2, 2.5, 4, 5, 8, 10, 12.5, 20 ms, continuous, user definable |
| Sequence length | 1 – 511 frames (depending on frame duration) |
| Clipping | Vector or scalar clipping, applied before filtering |
| Marker modes | Restart, frame start, frame active part, pulse, pattern, on/off ratio |
| Parameters in OFDM Mode | |
| Duplexing | TDD, FDD |
| Predefined frames | Short, mid and long length test messages for testing receivers with all modulation types and RS-CC rates |
| Level reference | FCH/Burst or preamble level |
| Frequency bands | ETSI, MMDS, WCS, U-NII, User |
| Channel bandwidth | 1.25 – 30 MHz, depending on selected frequency band |
| Sampling rate | 1.5 – 32 MHz, depending on channel bandwidth |
| Tg / Tb settings | 1/4, 1/8, 1/16, 1/32 |
| FFT size | 256 (fixed) |
| Nr. Of possible subchannels in subchannelization mode | 1, 2, 4, 8, 16 (all) |
| Nr. Of bursts per frame | 0 – 64 |
| Preamble / midamble modes | Burst preamble / midambles off,<br>burst preamble in downlink,<br>midamble repetition 5, 9 or 17 in uplink |
| Modulation & RS-CC rates | BPSK ½, QPSK ½, QPSK ¾, 16-QAM ½, 16-QAM ¾, 64-QAM 2/3, 64-QAM ¾ |
| Data | all 0 , all 1, pattern (up to 64 bit), PN 9 to PN 23, data lists |
| Burst power range | -80 dB - +10 dB |
| MAC functions | One generic MAC header + CRC available per burst |
| Parameters in OFDMA Mode | |
| Duplexing | TDD |
| Level reference | Subframe RMS Power or preamble level (downlink only) |
| Frequency bands | ETSI, MMDS, WCS, U-NII, WiBro, User |
| Channel bandwidth | 1.25 – 30 MHz, depending on selected frequency band |
| Sampling rate | 1.5 – 32 MHz, depending on channel bandwidth |
| Tg / Tb settings | ¼, 1/8, 1/16, 1/32 |
| FFT size | 128, 512, 1024 or 2048 |
| Subcarrier Permutation | PUSC, FUSC (downlink only), AMC 2x3, Sounding (uplink only) |
| Nr. Of bursts per frame | 0 – 64 |
| Modulation & CC rates | QPSK ½, QPSK ¾, 16-QAM ½, 16-QAM ¾, 64-QAM ½, 64-QAM 2/3, 64-QAM ¾, 64-QAM 5/6 |
| Data | all 0 , all 1, pattern (up to 64 bit), PN 9 to PN 23, data lists |
| Burst power range | -80 dB - +10 dB |
| MAC functions | One generic MAC header + CRC available per burst |

| Parameters in OFDMA - WiBro Mode (identical to OFDMA) | |
|---|---|
| Duplexing | TDD |
| Level reference | Subframe RMS Power or preamble level (downlink only) |
| Frequency bands | ETSI, MMDS, WCS, U-NII, WiBro, User |
| Channel bandwidth | 1.25 – 30 MHz, depending on selected frequency band |
| Sampling rate | 1.5 – 32 MHz, depending on channel bandwidth |
| Tg / Tb settings | ¼, 1/8, 1/16, 1/32 |
| FFT size | 128, 512, 1024 or 2048 |
| Subcarrier Permutation | PUSC, FUSC (downlink only), AMC 2x3, Sounding (uplink only) |
| Nr. Of bursts per frame | 0 – 64 |
| Modulation & CC rates | QPSK ½, QPSK ¾, 16-QAM ½, 16-QAM ¾, 64-QAM ½, 64-QAM 2/3, 64-QAM ¾, 64-QAM 5/6 |
| Data | all 0 , all 1, pattern (up to 64 bit), PN 9 to PN 23, data lists |
| Burst power range | -80 dB - +10 dB |
| MAC functions | One generic MAC header + CRC available per burst |

# WiMAX Menu

The menu for setting the IEEE 802.16 WiMAX digital standard is either called from the baseband block or from the menu tree under Baseband.

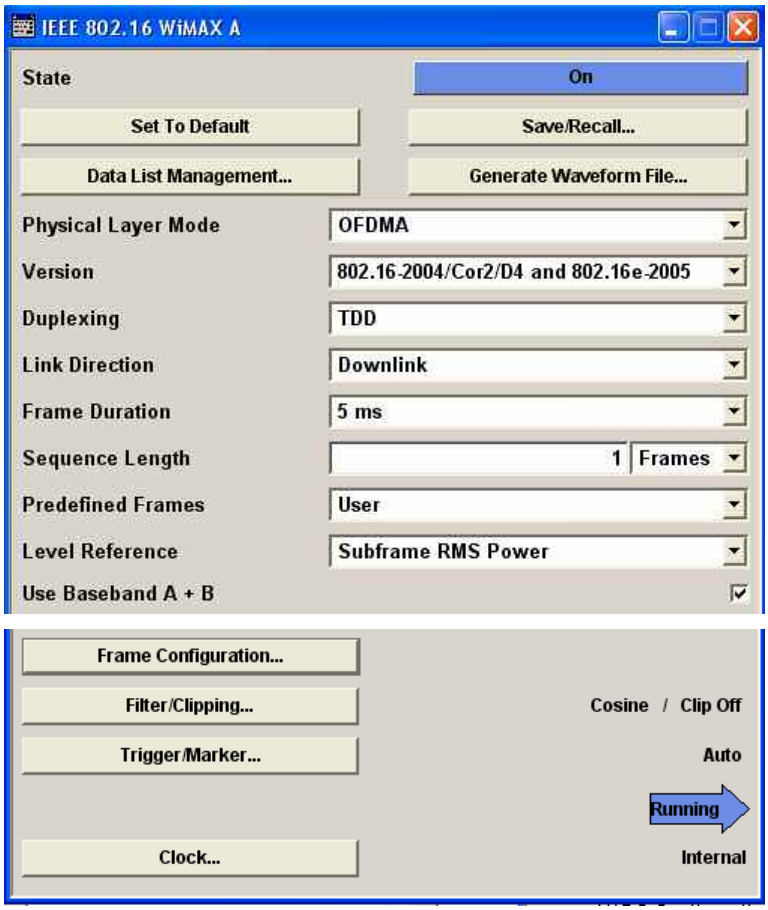



The menu is split into several sections for configuring the standard. The choice of transmission direction determines which displays and parameters are made available in the lower section.

The upper section of the menu is where the IEEE 802.16 WiMAX digital standard is enabled, the default settings are called and the physical layer mode, the duplexing and the transmission direction are selected. Additional parameters include Frame Duration, Sequence Length and a set of Predefined Frames for receiver testing.

A button leads to the submenu for loading and saving the IEEE 802.16 WiMAX configuration.

The buttons of the lower menu section lead to submenus for configuring the frame and for setting the filter, clipping, trigger, and clock parameters.




## General Settings for WiMAX Signals

The upper menu section is where the IEEE 802.16 WiMAX digital standard is enabled and reset and where all the settings for the signal in both transmission directions are made.

**State - WiMAX**

Enables/disables the IEEE 802.16 WiMAX 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).

***Note**:*
*For two path instruments and enabled parameter **Use of Baseband A+B**, enabling the WiMAX signal simulation will disable all other digital standards and digital modulation modes even in the path B.*

The IEEE 802.16 WiMAX signal is generated in arbitrary waveform mode.

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

**Set to Default - WiMAX**

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:WIM:PRES`

| Parameter | Value |
|---|---|
| General Settings | |
| State | Not affected by Set to default |
| Physical Layer Mode | OFDM |
| Version | 802.16-2004/Cor1-2005 and 802.16e-2005 |
| Duplexing | TDD |
| Link Direction | Downlink |
| Frame Duration | 10 ms |
| Sequence Length | 1 frame |
| Predefined Frames | User |
| Level Reference | FCH/Burst |
| Clipping | Off |
| OFDM mode | |
| Frequency Band | ETSI |
| Channel Bandwidth | 1.75 MHz |
| Sampling Rate | 2.00 MHz |
| BSID (4 LSBs) | 0 |
| Tg/Tb | 1/4 |
| Nr. of used Subchannels | 16 (all) |
| Frame Preamble | Long |
| FCH Configuration | On, Auto mode, Frame Number Offset = 0 and Configuration Change Count = 0 |
| Nr. of Bursts | 1 |
| OFDMA mode | |
| Frequency Band | ETSI |
| Channel Bandwidth | 1.75 MHz |
| Sampling Rate | 2.00 MHz |
| n = | 8/7 |
| Tg/Tb | 1/4 |
| FFT Size | 2048 |
| Subcarrier Permutation | PUSC |
| Subchannel 0 ... 59 State | ON |
| OFDMA - WiBro mode | |
| Frequency Band | WiBro |
| Channel Bandwidth | 8.75 MHz |
| Sampling Rate | 10 MHz |
| n = | 8/7 |
| Tg/Tb | 1/8 |
| FFT Size | 1024 |
| Subcarrier Permutation | PUSC |

| Parameter | Value |
|---|---|
| Subchannel 0 … 59 State | ON |
| Frame Duration | 5 ms |

**Save/Recall - WiMAX**

Calls the **Save/Recall** menu.

From the **Save/Recall** menu, the **File Select** windows for saving and recalling IEEE 802.16 WiMAX configurations and the **File Manager** can be called.


IEEE 802.16 WiMAX configurations are stored as files with the predefined file extension ***.wimax.** The file name and the directory they are stored in are user-definable.

The complete settings in the **IEEE 802.16 WiMAX** menu are saved and recalled.

**Recall WiMAX Setting**

Opens the **File Select** window for loading a saved IEEE 802.16 WiMAX configuration.

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

Remote-control command:

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

SOUR:BB:WIM:SETT:CAT?
Response:   'wimax_1',wimax_2'

SOUR:BB:WIM:SETT:LOAD "wimax_1"
```

**Save WiMAX Setting**

Opens the **File Select** window for saving the current IEEE 802.16 WiMAX 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\wimax'

SOUR:BB:WIM:SETT:STOR 'wimax_3'
```

**File Manager**

Calls the **File Manager**.

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

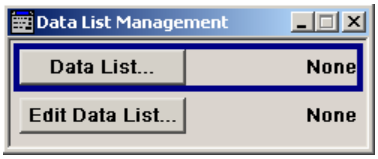
Remote-control commands:

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

SOUR:BB:WIM:SETT:DEL 'wimax_1'
```

**Data List Management… - WiMAX**

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 cells.

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:WIM:AOFD:ZONE0:BURS1:DATA:DLIS
SOUR:BB:WIM:AOFD:ZONE0:BURS1:DATA:DSEL "dlist1"

SOUR:BB:WIM:OFDM:BURS1:DATA:DLIS
SOUR:BB:WIM:OFDM:BURS1:DATA:DSEL "dlist1"

SOUR:BB:WIM:OFDM:FCH:DATA:DLIS
SOUR:BB:WIM:OFDM:FCH:DATA:DSEL "dlist1"
```

**Generate Waveform File… - WiMAX**

Calls the **Generate Waveform** menu. This menu is used to store the current WiMAX 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:WIM:WAV:CRE "d:\temp\wimax.wv"
```

**Physical Layer Mode - WiMAX**

Selects the physical layer mode.

The settings of the frame are provided in the submenu **Frame Configuration** (see "Frame Configuration OFDM - WiMAX") in accordance with the selection.

**OFDM**

The OFDM mode supports signal generation according to IEEE 802.16-2004 section 8.3 with a fixed FFT size of 256.

Remote-control command:
`SOUR:BB:WIM:MODE OFDM`

**OFDMA**

Orthogonal Frequency Division Multiple Access (OFDMA) groups multiple subcarriers of the OFDM into sub-channels. A single client or subscriber station might transmit using all of the sub-channels within the carrier space, or multiple clients might transmit with each using a portion of the total number of sub-channels simultaneously. OFDMA thus enables a more flexible use of resources. It can support nomadic and mobile operation.

Remote-control command:
`SOUR:BB:WIM:MODE AOFD`

**OFDMA - WiBro**

The OFDMA – WiBro (Wireless Broadband) mode groups multiple subcarriers of the OFDM into sub-channels. A single client or subscriber station might transmit using all of the sub-channels within the carrier space, or multiple clients might transmit with each using a portion of the total number of sub-channels simultaneously. OFDMA thus enables a more flexible use of resources. It can support nomadic and mobile operation.

The OFDMA – WiBro mode is identical to the OFDMA mode. When selecting OFDMA – WiBro, these parameters are set to their WiBro defaults (see Set to Default – WiMAX*)*:

Frame Duration: 5ms
Frequency Band: WiBro
Channel Bandwidth: 8.75 MHz
Sampling Rate: 10 MHz
Tg/Tb: 1/8
FFT Size: 1024

Remote-control command:
`SOUR:BB:WIM:MODE WIBR`

**Version - WiMAX**

Selects the version of the standard to use.

**802.16-2004/Cor2/D4 and 802.16e-2005**

Selecting “802.16-2004/Cor2/D4 and 802.16e-2005” ensures that all signal parameters are in line with the latest Corrigendum 2 version.

Using this mode is recommended.

Remote-control command:
`SOUR:BB:WIM:SVER VC2D4`

**802.16-2004/Cor1-2005 and 802.16e-2005**

Selecting “802.16-2004/Cor1-2005 and 802.16e-2005” provides backward compatibility for devices that do not yet comply with the latest Corrigendum 2 version.

Remote-control command:
```
SOUR:BB:WIM:SVER VC1
SOUR:BB:WIM:SVER?
Response:   802.16-2004/Cor1-2005
```

**Duplexing - WiMAX**

Selects the duplexing. The duplexing mode determines how the uplink and downlink signals are separated.

**TDD**

In TDD mode, the same frequency is used for both directions of transmission (uplink and downlink). With one baseband, either downlink or uplink frames can be generated.

Remote-control command:
```
SOUR:BB:WIM:DUPL TDD
```

**FDD (OFDM only)**

In FDD mode, different frequencies are used for downlink and uplink directions. If only one link direction is considered at once, the IEEE 802.16 standard defines no differences between TDD and FDD signals on the physical layer.

The FDD mode has been provided for convenience, it completely fills the defined frame with bursts to simulate a continuous transmission environment. It is recommended to use TDD mode instead if FDD devices are to be tested with frames including transmission gaps.

Remote-control command:
```
SOUR:BB:WIM:DUPL FDD
```

**Link Direction - WiMAX**

Selects the transmission direction.

**Downlink**

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

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

**Uplink**

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

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

**Frame Duration - WiMAX**

Selects the frame duration.

Only distinct values are allowed in the standard. For test reasons, continuous generation or generation for a freely selectable duration (User) are available. In continuous mode, the frame duration equals the sum of the burst durations in OFDM mode or the subframe duration in OFDMA mode.

Remote-control command:
`SOUR:BB:WIM:FRAM:TIME MS4`

**User Frame Duration - WiMAX**

**(This parameter is only available if the Frame Duration is set to User.)**

Sets the frame duration for selection **User**. The values are freely selectable.

Remote-control command:
`SOUR:BB:WIM:FRAM:TIME USER`
`SOUR:BB:WIM:FRAM:TIME:USER 0.0043`

**Downlink Subframe Duration - WiMAX**

**(This feature is only available for the uplink direction in TDD mode.)**

Delays the first uplink burst by the set time duration.

Remote-control command:
`SOUR:BB:WIM:SUBF:TIME  0.1ms`

**Initial Delay of Burst 1 - WiMAX**

**(This feature is only available for the uplink direction in FDD mode with physical layer mode OFDM.)**

Delays the first uplink burst by the set time duration.

In FDD mode, this parameter is provided for convenience to enable a constant delay of the signal with respect to an internal or external frame trigger.

Remote-control command:
`SOUR:BB:WIM:FRAM:BURS:DEL 0.1`

**Sequence Length - WiMAX**

Sets the sequence length of the signal in number of frames. The signal is calculated in advance and output in the arbitrary waveform generator. Burst data sources are continuously read over the whole sequence length.

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

**Predefined Frames - WiMAX**

Selects the frame type.

**Test Message BPSK 1/2 Short, Test Message BPSK 1/2 Mid, … (OFDM only)**

Predefined setups for receiver test messages according to IEEE 802.16-2004 section 8.3.11

Remote-control command:
`SOUR:BB:WIM:OFDM:FRAM:PRED FBPSK12MID`

**Downlink/Uplink 35MHz QPSK 1/2, Downlink/Uplink 35MHz QPSK 3/4, … (OFDMA/ OFDMA-WiBro only)**

Predefined setups for receiver test messages. The available predefined frames depend on the selected link direction.

Remote-control command:
`SOUR:BB:WIM:AOFD:FRAM:PRED DL3M21S64QAM12`

**User**

The settings for the frame can be defined by the user.

Remote-control command:
`SOUR:BB:WIM:OFDM:FRAM:PRED USER`
`SOUR:BB:WIM:AOFD:FRAM:PRED USER`

**Level Reference - WiMAX**

Selects the level reference.

**FCH / Burst (OFDM only)**

The instrument's level setting refers to the mean power of FCH (Frame Control Header) or bursts with a burst power setting of 0 dB.

To obtain the absolute burst power value, the burst power value has to be added to the level value.

`Remote-control command:`
`SOUR:BB:WIM:OFDM:POW:REF BURS`

**Preamble (OFDM uplink and downlink OFDMA/OFDMA - WiBro downlink only)**

The instrument's level setting refers to the preamble, which is

FCH / Burst power + 3dB in OFDM mode.

Remote-control command:
`SOUR:BB:WIM:OFDM:POW:REF PRE`
`SOUR:BB:WIM:AOFD:POW:REF PRE`

**Subframe RMS Power (OFDMA/OFDMA - WiBro only)**

The instrument's level setting refers to the rms power of the subframe. This includes the preamble and all symbols with allocated carriers in downlink or the whole uplink subframe in uplink.

Remote-control command:
`SOUR:BB:WIM:AOFD:POW:REF RMS`

**Subframe RMS Power w/o Preamble (OFDMA/OFDMA - WiBro only)**

The instrument's level setting refers to the rms power of the subframe, excluding the preamble. This includes all symbols with allocated carriers in downlink or the whole uplink subframe in uplink.

Remote-control command:
`SOUR:BB:WIM:AOFD:POW:REF WOPR`

**Use Baseband A+B - WiMAX**

**(Available only in path A of two-path instruments and for OFDMA and OFDMA-WIBro Physical Layer Mode)**

Enables/disables control of both paths via the WiMAX menu.

***Note**:*
*For two path instruments and enabled parameter **Use of Baseband A+B**, enabling the WiMAX signal simulation will disable all other digital standards and digital modulation modes even in the path B.*

An active Baseband A+B mode is useful for STC (MIMO) signal setups. In this case, baseband B is controlled from baseband A and generates an identical setup, just with opposite STC antenna configuration. Triggering is performed automatically such that both basebands are aligned in time.

**Example:**

Configure baseband A to generate one SISO zone (set the parameter **Space-Time Coding Mode** to off for this zone) and one additional STC zone with antenna 0 (parameter **Space-Time Coding Antenna** set to Antenna 0).
Enable parameter **Use Baseband A+B**.
Switch on baseband A .

Baseband B is automatically activated.
Baseband A generates preamble, SISO zone and STC zone with antenna 0.
Baseband B omits preamble and SISO zone and generates the STC zone with antenna 1.

Remote-control command:

```
SOUR:BB:WIM:AOFD:ZONE0:STC:MODE OFF
SOUR:BB:WIM:AOFD:ZONE1:STC:MODE MA2
SOUR:BB:WIM:AOFD:ZONE1:STC:ANT ANT0
SOUR:BB:WIM:PATH:COUP:STAT ON
SOUR:BB:WIM:STAT ON
```

**Frame Configuration - WiMAX**

Calls the menu for configuration of the frame.

The menu is described separately for the two physical layer modes in sections "Frame Configuration OFDM - WiMAX", Page 14, and "Frame Configuration OFDMA - WiMAX" ., Page 32.Remote-control command: `n.a.`

**Filter / Clipping - WiMAX**

Calls the menu for setting clipping and the sample rate variation of the arbitrary waveform. The current setting is displayed next to the button.

The menu is described in section "Filter / Clipping Settings - WiMAX", Page 77.

Remote-control command: `n.a.`

**Trigger/Marker - WiMAX** **(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 - WiMAX", Page 73).

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

Remote-control command: `n.a.`

**Execute Trigger - WiMAX** **(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:WIM:TRIG:SOUR INT
SOUR:BB:WIM:SEQ RETR
SOUR:BB:WIM:TRIG:EXEC
```

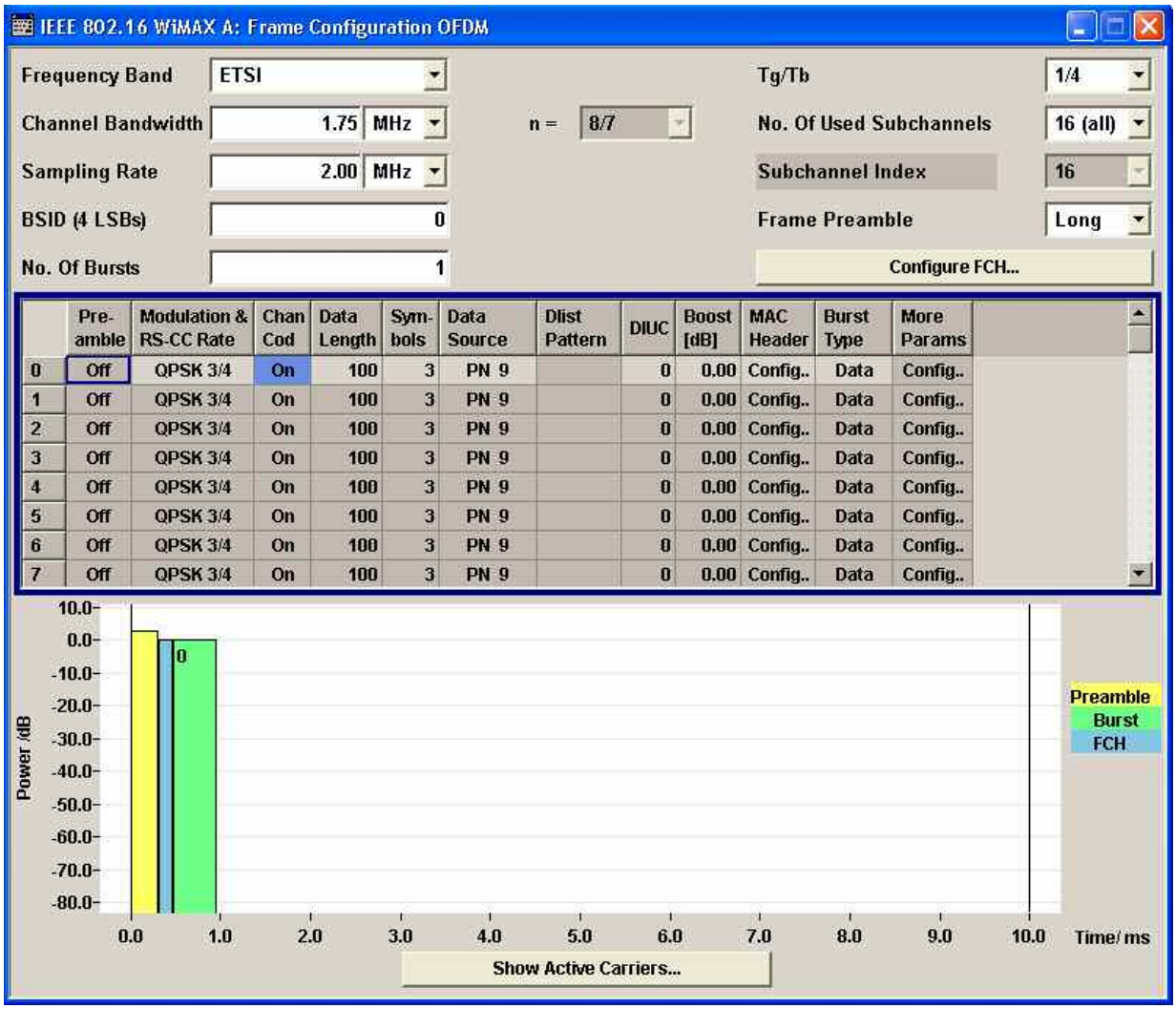
**Clock - WiMAX** **(R&S SMx and R&S AMU instruments only)**

Calls the menu for selecting the clock source and for setting a delay (see section "Trigger/Marker/Clock - WiMAX", page 77).

Remote-control command: `n.a.`

# Frame Configuration OFDM - WiMAX

This menu provides all parameters to configure frames in OFDM mode. The menu differs depending on the selected link direction. The following graph shows the menu for downlink direction.




**Frequency Band OFDM-WiMAX**

Selects the frequency band for the carrier frequencies. The available ranges for setting the channel bandwidth and the sampling rate depend on the selection here.

**ETSI**

The frequency band as defined Norm by the European Telecommunications Standards Institute applies.

The range is 1.75 to 28 MHz for the channel bandwidth and 2 to 32 MHz for the sampling rate.

Remote-control command:
`SOUR:BB:WIM:OFDM:FBAN ETSI`

**MMDS**

The frequency band as defined by the **Multichannel Multipoint Distribution Service** applies. The RF frequency range is 2500 to 2686 MHz.

The range is 1.50 to 24 MHz for the channel bandwidth and 1.72 to 27.52 MHz for the sampling rate.

Remote-control command:
`SOUR:BB:WIM:OFDM:FBAN MMDS`

**WCS**

The frequency band as defined by the **Wireless Communication Service** applies. It is in the 2.3 GHz band of the electromagnetic spectrum from 2305 to 2320 MHz and 2345 to 2360 MHz.

The range is 2.5 to 15 MHz for the channel bandwidth and 2.88 to 17.28 MHz for the sampling rate.

Remote-control command:
`SOUR:BB:WIM:OFDM:FBAN WCS`

**U-NII**

The frequency band as defined by the **Unlicensed National Information Infrastructure** applies. It is in the 5 GHz band of the electromagnetic spectrum from 5150 to 5350 GHz and 5750 to 5825 GHz.

The range is 10 to 20 MHz for the channel bandwidth and 11.52 to 23.04 MHz for the sampling rate.

Remote-control command:
`SOUR:BB:WIM:OFDM:FBAN UNII`

**User**

This mode is provided for choosing any other channel bandwidth / sampling rate combination.

The range is 1.25 to 28 MHz for the channel bandwidth and 1.44 to 32 MHz for the sampling rate.

Remote-control command:
`SOUR:BB:WIM:OFDM:FBAN USER`

**Channel Bandwidth OFDM - WiMAX**

Sets the channel bandwidth. The range is 1.25 to 28 MHz.

The selected channel bandwidth has to be a multiple of 1.25, 1.5, 1.75, 2.0 or 2.75 MHz. The channel bandwidth determines the parameter n (see *"Sampling Ratio n OFDM - WiMAX"*):

For channel bandwidths

that are a multiple of 1.75 MHz then n = 8/7

that are a multiple of 1.5 MHz then n = 86/75

that are a multiple of 1.25 MHz then n = 144/125

that are a multiple of 2.75 MHz then n = 316/275

that are a multiple of 2.0 MHz then n = 57/50

else for channel bandwidths not otherwise specified then n = 8/7

The sampling rate is derived from the channel bandwidth as follows:

SamplingRate = floor(n * ChannelBandwidth / 8000) * 8000

Remote-control command:
`SOUR:BB:WIM:OFDM:BW 14 MHz`

**Sampling Ratio n OFDM - WiMAX**

Indicates the sampling ratio. The sampling ratio is determined by the channel bandwidth (see *"Channel Bandwidth OFDM - WiMAX"*).

Remote-control command:
`SOUR:BB:WIM:OFDM:N?`

**Sampling Rate OFDM - WiMAX**

Sets the sampling rate. The possible settings depend on the selected frequency band. The full range in **User** mode is 1.44 to 32 MHz.

The sampling rate is related to the channel bandwidth by the parameter n:

SamplingRate = floor(n * ChannelBandwidth / 8000) * 8000

Remote-control command:
`SOUR:BB:WIM:OFDM:SRAT 2 MHz`

**BSID OFDM - WiMAX**

Sets the 4 LSBs of the Base Station ID.

The BSID is transmitted in the FCH (when set to **Auto** mode), and it is used to initialize the randomizer.

Remote-control command:
`SOUR:BB:WIM:OFDM:BSID 4`

**Number of Bursts OFDM - WiMAX**

Sets the number of active bursts in one frame.

With number of bursts = 0, a preamble only or a preamble with an FCH burst is generated.

Remote-control command:
`SOUR:BB:WIM:OFDM:BURS:COUN 2`

**Tg/Tb Ratio OFDM - WiMAX** Selects the ratio of guard period to symbol period.

This value sets the length of the cyclic prefix in fractions of the symbol period.

Remote-control command:
`SOUR:BB:WIM:OFDM:TGTB TGTB1D16`

**Number of used Subchannels OFDM - WiMAX** Selects the number of used subchannels.

Selection 16 (all) deactivates subchannelization and activates all possible carriers. The values 1, 2, 4 and 8 activate only a part of the available subcarriers, unused carriers are blanked.

Remote-control command:
`SOUR:BB:WIM:OFDM:SUBC:COUN SC2`

**Subchannel Index OFDM - WiMAX** Selects the subchannel index in subchannelization mode.

The subchannel index determines the set of used subcarriers according to table 213 of IEEE 802.16-2004 standard.

Remote-control command:
`SOUR:BB:WIM:OFDM:SUBC:IND SUBC4`

**Frame Preamble OFDM - WiMAX** Activates/deactivates the generation of a frame preamble. Either a long preamble or a short preamble can be activated.

The 802.16 standard requires a long preamble as frame start.

Remote-control command:
`SOUR:BB:WIM:OFDM:PRE:MODE LONG`

**Frame Number OFDM - WiMAX** Selects the frame number of the uplink frame in which the UL map that specifies the uplink burst was transmitted.

Remote-control command:
`SOUR:BB:WIM:OFDM:FRAM:NUMB 13`

**Configure FCH OFDM - WiMAX** Calls the menu for configuring FCH mode and parameters (see section "FCH Configuration Downlink OFDM- WiMAX", on page 23).

Remote-control command: `n.a.`

**Generate UL-MAP - WiMAX** Calls the menu for generating the UL-map.

Remote-control command: `n.a.`

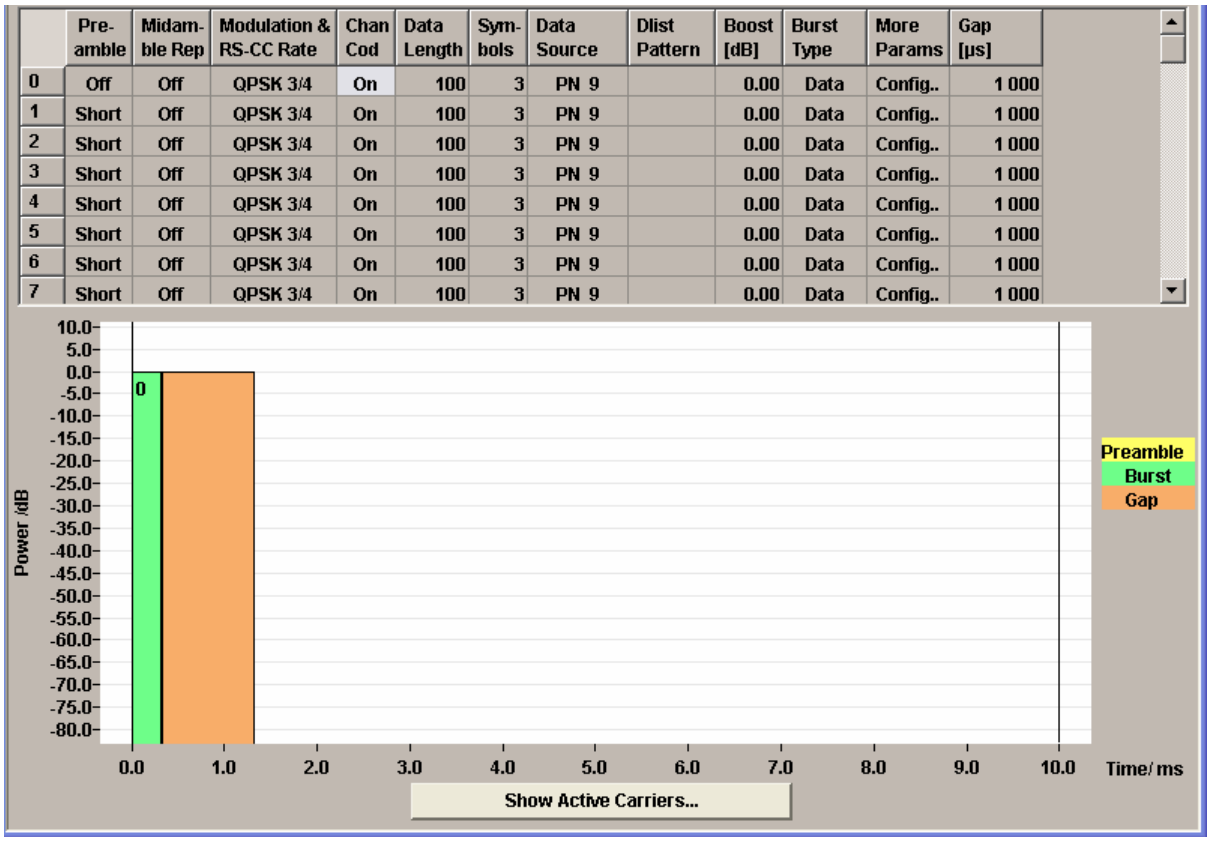
**Burst Table OFDM- WiMAX**

The **burst table** is located in the lower part of the menu. The burst table is where the individual burst parameters are set. A graphic display below the table shows length, position and power of all configured bursts within the frame.

Up to 64 bursts can be configured per frame. Each table row defines the settings of one specific burst, where the first row defines the first burst of the frame and the last row defines the last burst.

For both transmission directions, different modulations and channel coding rates are available for each burst. A generic MAC header with encrypted payload and checksum determination can be activated.

Some setting parameters differ for the two transmission directions. The graph below shows the table in uplink direction.




**Burst Index OFDM - WiMAX** Displays the consecutive burst index from 0 to 63.

All the rows are always displayed, even if the bursts are inactive. They are switched on and off by the selection of **No. of Bursts** above the table. The active bursts are highlighted.

Remote-control command: `n.a.`
(selected via the suffix to the keyword :BURSt<n> )

**Preamble OFDM - WiMAX** Enables generation of the burst preamble.

If activated, a preamble is placed before the burst. Long or short preambles are available. The preamble has the same power as the burst. If subchannelization is used, a subchannelization preamble is generated accordingly.

Remote-control command:
`SOUR:BB:WIM:OFDM:BURS2:PRE:MODE OFF`

**Midamble Repetition OFDM - WiMAX**

Activates/deactivates midamble repetition.

If midamble repetition is switched on, midambles are placed into the burst with the specified interval, i.e. if 5 is selected, every 5$^{th}$ symbol of the burst is a midamble.

A short preamble is used as midamble when subchannelization is off or a subchannelization preamble is used in subchannelization mode. The power of the midambles is identical to the burst power.

Remote-control command:
`SOUR:BB:WIM:OFDM:BURS2:MID REP5`

**Modulation and RS-CC Rate OFDM - WiMAX**

Selects the modulation and channel coding rate. Channel coding includes randomization, reed solomon coding, convolutional coding and interleaving.

For a given modulation type and channel coding rate, the data length determines the number of symbols and vice versa.

Remote-control command:
`SOUR:BB:WIM:OFDM:BURS:FORM QPSK3D4`

**Channel Coding OFDM - WiMAX**

Switches channel coding on or off.

If channel coding is switched off, the bits read from the data source are directly modulated onto the carriers. Due to randomization missing, this could result in very high crest factors of the signal.

Remote-control command:
`SOUR:BB:WIM:OFDM:BURS:CCOD:STAT ON`

**Data Length OFDM - WiMAX**

Determines the data length in bytes.

The given number of bytes is read from the data source. The total number of data bytes in the burst (before channel coding) is determined as follows:

TotalDataBytes = DataLength + MACHeaderBytes + CRCBytes + TailByte

The tail byte is only added when channel coding is switched on. The same is the case for the MAC header and CRC, they are not added when switched off. Additionally padding with 0xFF bytes is applied at the end of the data sequence to reach an integer number of OFDM symbols.

The data length determines the number of symbols and vice versa. The maximum data length of 10000 bytes defines the maximum number of symbols for a given modulation type and channel coding rate.

Remote-control command:
`SOUR:BB:WIM:OFDM:BURS:DLEN 1000`

**Number of Symbols OFDM - WiMAX**

Enters the number of symbols for the selected burst. If the number of symbols is changed, the data length is adjusted to fill the specified number of symbols with data so that no padding has to be applied.

The maximum data length of 10 000 bytes defines the maximum number of symbols for a given modulation type and channel coding rate.

Remote-control command:
```
SOUR:BB:WIM:OFDM:BURS:SYMB:COUN 114
```

**Data Source OFDM - WiMAX**

Selects data source for the selected bursts.

The data sources **PN9**, **PN11, PN15**, **PN16**, **PN20**, **PN21**, **PN23**, **ALL 0**, **ALL1**, **Pattern** and **Data List** are all available to choose from.

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

Data lists are selected in the **File Select** window, which is called by means of the **Data List Management** button.

If the **Pattern** data type is used, the bit pattern is defined in the **Pattern** input box. The length is limited to 64 bits.

Remote-control command:
```
SOUR:BB:WIM:OFDM:BURS2:DATA   PATT
SOUR:BB:WIM:OFDM:BURS2:DATA:PATT #H3F,8

SOUR:BB:WIM:OFDM:BURS2:DATA   DLIS
SOUR:BB:WIM:OFDM:BURS2:DATA:DSEL "BS2_OFDM"
```

**DIUC OFDM - WiMAX**

Sets the specific interval usage code.

The code is used to initialize the randomizer.

Remote-control command:
```
SOUR:BB:WIM:OFDM:BURS2:DIUC 2
```

**Boost OFDM - WiMAX**

Sets the burst power in dB.

To set the absolute power of a burst correctly, level reference **FCH / Burst** must be selected. In this mode, the output power of a burst equals Level + BurstPower.

In downlink, the preamble is transmitted with +3 dB and the FCH is transmitted with 0 dB.

In uplink, the power of the first burst is fixed to 0 dB.

Remote-control command:
```
SOUR:BB:WIM:OFDM:BURS2:POW -20
```

**MAC Header OFDM - WiMAX**

Calls the menu for configuring the generic MAC (Media Access Control) header of the selected burst and for activating the checksum determination.

Remote-control command: `n.a.`

**Burst Type OFDM - WiMAX** Select the burst type from Data, DL-MAP, UL-MAP or Ranging.

**DATA**

Regular bursts are called “Data” bursts. All data sources are available for this type of burst.

Remote-control command:
`SOUR:BB:WIM:OFDM:BURS2:TYPE DATA`

**DL-MAP**

A DL-MAP is generated, taking into account all active bursts. The DL-MAP fields are filled with the following parameters:

DCD Count:
Set to “Configuration Change Count” from the FCH panel

Base Station ID:
Set to BSID from the Frame Configuration panel

CID:
Set to CID from the MAC header panel for each burst

DIUC:
Set to DIUC from the burst table for each burst

Preamble present:
Set to 1 if a burst preamble is present

Start Time:
Set to burst start time in OFDM symbols, relative to frame start

Remote-control command:
`SOUR:BB:WIM:OFDM:BURS2:TYPE DLM`

**UL-MAP**

A UL-MAP is generated using the specified data list, including additional parameters from the “**More Param**” panel. See “Generate UL-MAP - WiMAX” for more information on how to create UL-MAP bursts.

Remote-control command:
`SOUR:BB:WIM:OFDM:BURS2:TYPE ULM`

**Ranging**

An uplink ranging burst is composed of a long preamble following two subchannelized preambles using one active subchannel. The subchannel index for the two preambles is read from the configured data source. For each frame 4 bits are read from the data source (called “data”), which define the subchannel index as follows:
Index = data * 2 + 1

Remote-control command:
`SOUR:BB:WIM:OFDM:BURS2:TYPE RANG`

**More Parameter OFDM – WiMAX**

Calls the menu for configuring additional parameters for the bursts.

Remote-control command: `n.a.`

**Gap OFDM - WiMAX**

Sets the length of the gap between the selected burst and the next burst in µs. The setting is only available for transmission direction uplink.

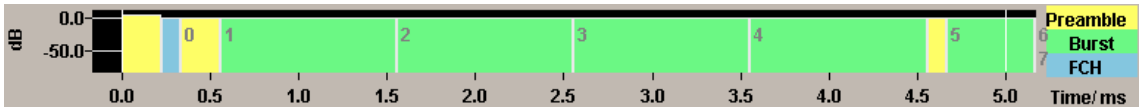
Remote-control command:
`SOUR:BB:WIM:OFDM:BURS2:GAP 0.001`

## Frame Graph OFDM - WiMAX

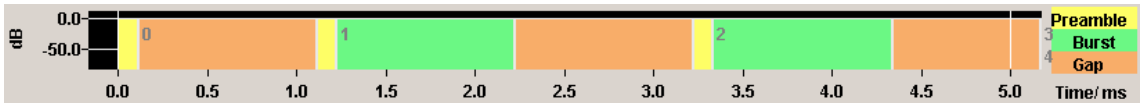
The frame graph indicates the configuration of one frame. The scaling of the X-axis is always adapted to the set frame duration. The preamble length, FCH length and the burst length are drawn to scale. The relative power can be taken from the height of the bar. The power of the preamble is always +3 dB and of the FCH always 0 dB relative to the power of the other bursts.

The shown frame configuration is repeated over the whole sequence length.

In downlink direction the frame preamble is sent at the beginning of the frame.

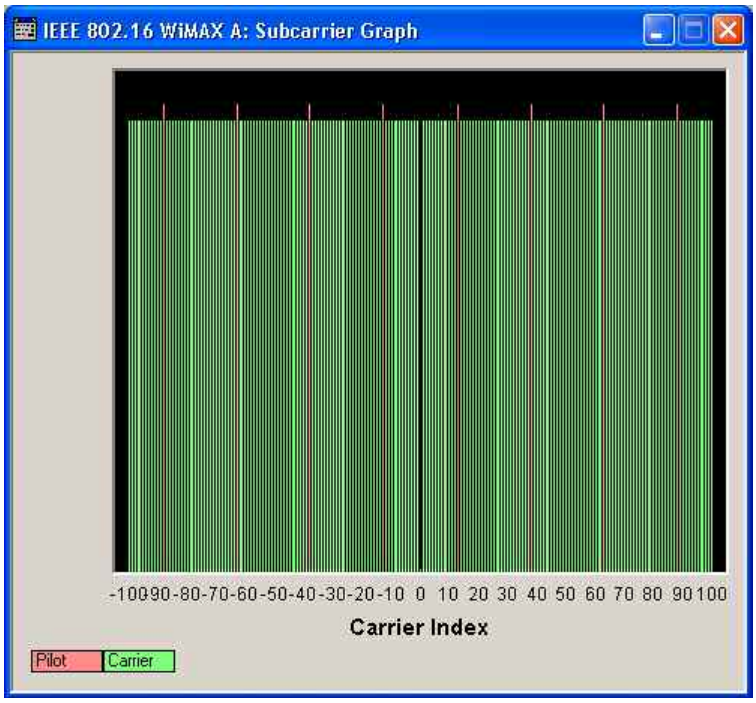



In uplink direction each burst starts with a preamble. The first gap at the beginning of the frame is determined by the Downlink Subframe Duration (specified in the main menu), the following gaps are defined by the gap value specified for the associated burst in the burst table.



## Show Active Carriers OFDM - WiMAX

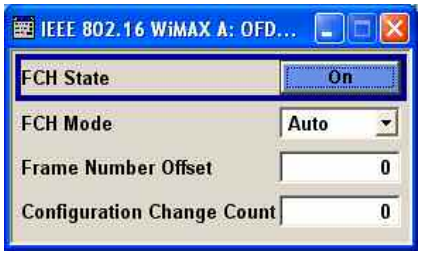
The Active Carrier graph is reached via the **Show Active Carrier...** button at the Bottom of the **Frame Configuration...** submenu.




The graph shows used pilots and carriers of the current subchannelization mode. When subchannelization is activated by setting **No. of used Subchannels** to a value different than 16, the graph shows the used and blanked carriers according to the setting of **Subchannel Index**.

## FCH Configuration Downlink OFDM- WiMAX

The **FCH Configuration** menu is reached via the **Configure FCH..** button in the frame configuration menu. The FCH is only available in downlink mode. The following describes the FCH options in OFDM mode.




**FCH State OFDM - WiMAX** Switches the FCH on or off.

Remote-control command:
`SOUR:BB:WIM:OFDM:FCH:STAT ON`

**FCH Mode OFDM - WiMAX** Selects the mode for generating the FCH.

Channel Coding of the FCH is performed both in **Auto** and **User** mode.

**Auto**

In **Auto** mode, the DLFP (Downlink Frame Prefix) fields, which form the FCH, are filled automatically with parameters specified at different locations.

The following mapping applies in Auto mode:

Base_Station_ID:
Set to the BSID value specified in the frame configuration menu.

Frame_Number:
Set to the current frame number modulo 16. The first frame of the generated sequence has the number specified in Frame Number Offset below. For the following frames, this number will increase by 1 per frame.

Configuration_Change_Count:
Set to the value specified below.

Rate_ID:
The Rate ID parameter of the first burst is set according to its modulation setting.

DIUC:
The DIUC value for the second, third and fourth burst is taken from the DIUC value in the burst table.

Preamble Present:
Set to 1 when the burst preamble is activated for the corresponding burst.

Length:
Set to the calculated number of symbols of the corresponding burst.

HCS:
The Header Check Sequence is automatically calculated.

Remote-control command:
`SOUR:BB:WIM:OFDM:FCH:MODE AUTO`

**User**

In **User** mode, the FCH is filled with data specified under Data Source. This enables any arbitrary data to be sent with the FCH burst.

Remote-control command:
`SOUR:BB:WIM:OFDM:FCH:MODE USER`

**Frame Number Offset FCH OFDM - WiMAX**

Sets the frame number offset.

This value is added to the current frame number of the sequence. After modulo 16 division, the result is used as Frame_Number in the FCH (in Auto mode) and is also used to initialize the randomizers.

Remote-control command:
```
SOUR:BB:WIM:OFDM:FCH:FNOF 14
```

**Configuration Change Count FCH OFDM - WiMAX**

Sets the configuration change count value.

This value is used for the corresponding FCH field in Auto mode.

Remote-control command:
```
SOUR:BB:WIM:OFDM:FCH:CCC  14
```

**Data Source FCH OFDM - WiMAX**

Specifies the data source in User mode.
The FCH contents are filled from the selected data source.

The data sources **PN9**, **PN11, PN15**, **PN16**, **PN20**, **PN21**, **PN23**, **ALL 0**, **ALL1**, **Pattern** and **Data List** are all available to choose from.

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

Data lists are selected in the **File Select** window, which is called by means of the **Data List Management** button.

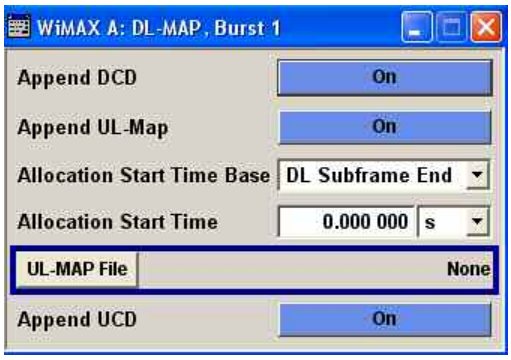
If the **Pattern** data type is used, the bit pattern is defined in the **Pattern** input box. The length is limited to 64 bits.

Remote-control command:
```
SOUR:BB:WIM:OFDM:FCH:DATA PATT
SOUR:BB:WIM:OFDM:FCH:DATA:PATT  #H3F,8

SOUR:BB:WIM:OFDM:FCH:DATA   DLIS
SOUR:BB:WIM:OFDM:FCH:DATA:DSEL "FCH"
```

# DL-MAP Configuration Downlink OFDM - WiMAX

The **DL-MAP Configuration** menu is reached via the **More Param** button in the OFDM burst table for burst type DL-MAP. The DL-MAP is only available in OFDM downlink mode.




**Append DCD OFDM - WiMAX**

If activated, the DCD is appended to the DL-MAP. The DCD message carries its own MAC header and CRC, but is included within the DL-MAP burst.

Remote-control command:
`SOUR:BB:WIM:OFDM:BURS1:DLM:DCD:STATE ON`

**Append UL-Map OFDM - WiMAX**

If activated, a UL-Map is appended to the DL-Map.

Remote-control command:
`SOUR:BB:WIM:OFDM:BURS1:DLM:ULM:STAT ON`

**Allocation Start Time Base OFDM - WiMAX**

Selects the Allocation Start Time base, required for the UL-Map appended to the DL-Map. The **Allocation Start Time** field of the UL-Map specifies the start of the uplink subframe.

If Start Time Base is set to DL Subframe End, the Allocation Start Time of the UL-Map is set to the end of the downlink subframe + **Allocation Start Time** parameter set below.

When Start Time Base is set to Frame Start, the Allocation Start Time of the UL-Map is set to the beginning of the frame + **Allocation Start Time** parameter set below.

Remote-control command:
`SOUR:BB:WIM:OFDM:BURS1:DLM:AMOD DLSF`

**Allocation Start Time OFDM - WiMAX**

Sets the **Allocation Start Time** in the UL-Map, appended to the DL-Map.

Remote-control command:
`SOUR:BB:WIM:OFDM:BURS1:DLM:ATIM 0.00077`

**UL-MAP File OFDM - WiMAX**

Calls the menu for selecting the UL-Map file.

Remote-control command: n.a.

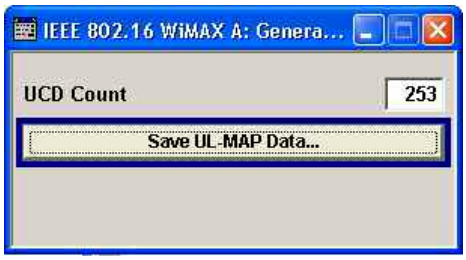
**Append UCD OFDM - WiMAX**

If activated, the UCD is appended to the DL-MAP. The UCD message is transmitted with its own MAC header and CRC, included in the same burst allocation used by the DL-MAP.

Remote-control command:
`SOUR:BB:WIM:OFDM:BURS1:DLM:UCD:STAT ON`

## Generate UL-MAP Uplink OFDM- WiMAX

The **Generate UL-MAP** menu is reached via the **Generate UL-MAP..** button in the frame configuration menu.




**UCD Count OFDM - WiMAX**

Sets the value for the UCD count.

Remote-control command:
`SOUR:BB:WIM:OFDM:UCD 253`

**Save UL-MAP Data OFDM - WiMAX**

Opens the **File Select** window for saving the current UL-map.

The name of the file is specified in the **File name** entry field, the directory selected in the **save into** field. The file is saved by pressing the **Save** button.

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

The saved ***.dm_iqd** file is in the data list format and contains a UL-MAP that describes the current uplink subframe. The UL-MAP is composed of the following parameters:

UCD Count:
Set to UCD Count specified above.

Allocation Start Time:
Set to 0. Can be modified later when loading the UL-MAP in downlink mode

CID:
CID from the **More Param** panel for each burst

Start Time:
Burst start in OFDM symbols for each burst

Subchannel Index:
Subchannel Index set in the Frame Configuration panel

UIUC:
UIUC from the **More Param** panel for each burst

Duration:
Burst duration in symbols

Midamble repetition interval:
Midamble repetition for each burst

The following steps are required to generate a valid UL-MAP

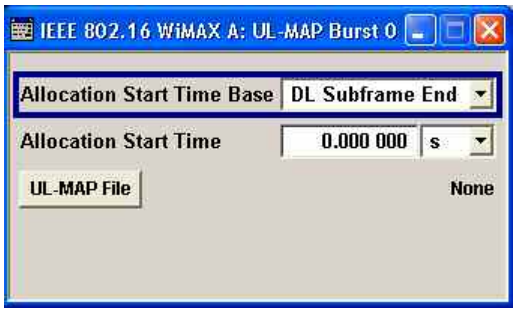
1. Switch to uplink mode
2. Define the layout of the uplink subframe by setting a number of bursts and specifying the parameters above for each burst
3. Select Generate UL-MAP and save the UL-MAP to a file
4. Switch to downlink mode
5. Set one of the downlink bursts to Burst Type UL-MAP
6. Open the **More Param** panel
7. Select UL-MAP File and load the file created before.

The downlink frame is then transmitting a UL-MAP that specifies the uplink structure defined in uplink mode before.

Remote-control command:
`SOUR:BB:WIM:OFDM:ULM:CRE 'ul-map_zone1'`

## UL-MAP Downlink OFDM- WiMAX

The **UL-MAP** menu is enabled for burst type UL-MAP only and can be reached via the **More Param** button in the OFDM burst table.




**Allocation Start Time Base - WiMAX**

Selects the Allocation Start Time base. The Allocation Start Time field of the UL-MAP specifies the start of the uplink subframe.

When Start Time Base is set to DL Subframe End, the Allocation Start Time of the UL-MAP is set to the end of the downlink subframe + the Allocation Start Time parameter set below.

When Start Time Base is set to Frame Start, the Allocation Start Time of the UL-MAP is set to the beginning of the frame + the Allocation Start Time parameter set below.

Remote-control command:
`SOUR:BB:WIM:OFDM:BURS2:ULM:AMOD DLSF`

**Allocation Start Time - WiMAX**

Sets the Allocation Start Time in the UL-MAP.

Remote-control command:
`SOUR:BB:WIM:OFDM:BURS2:ULM:ATIM 0.001`

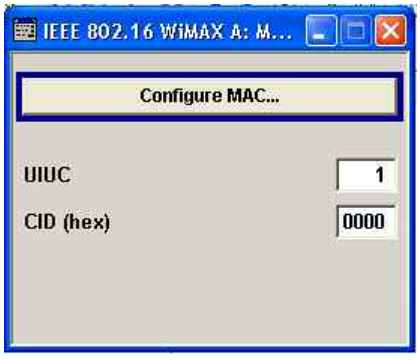
**UL-MAP File - WiMAX**

Calls the menu for selecting the UL-map file.

Remote-control command: `n.a.`

## More Parameters Uplink OFDM- WiMAX

The **More parameters** menu is reached via the OFDM burst table.



**Configure MAC - WiMAX** Calls the menu for configuring the Mac header panel for the selected burst.

Remote-control command: `n.a.`

**UIUC OFDM - WiMAX** Sets the specific UIUC.

Remote-control command:
`SOUR:BB:WIM:OFDM:BURS2:UIUC 2`

**MAC CID - WiMAX** The command sets the CID (connection control identifier) of the medium access control layer (MAC). The CID identifies a connection to equivalent peers in the MAC of the base station and subscriber station.

This parameter is identical to the CID set in the MAC Header settings.

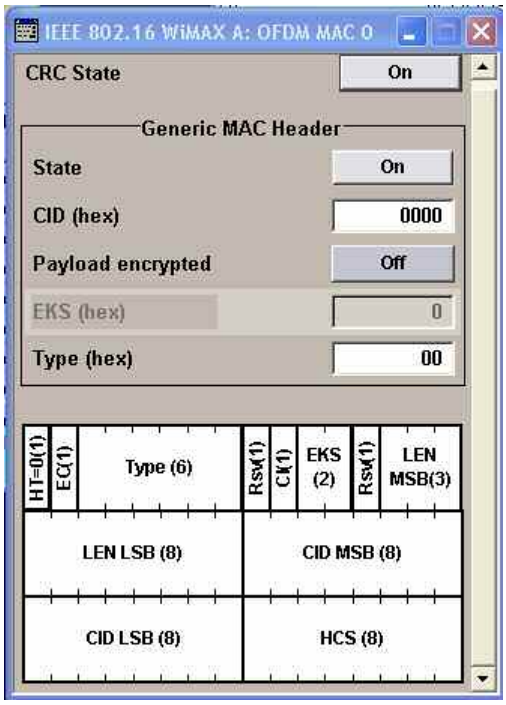
Remote-control command:
`SOUR:BB:WIM:OFDM:BURS2:MAC:CID #H333`

## MAC Header Configuration OFDM - WiMAX

The **MAC** menu is reached via the **Configure MAC...** button of the **More Parameters menu** of the burst table.

This menu provides settings for a generic MAC header, which is placed at the beginning of the burst when activated.

In addition CRC (cyclic redundancy check) can be activated, which is added at the end of the burst. It covers MAC header and all data.



**CRC State - WiMAX** Activates/deactivates the checksum determination. The state of the CRC can be set independently of the state of MAC header generation.

Remote-control command:
`SOUR:BB:WIM:OFDM:BURS2:MAC:CRC:STAT ON`

The **Generic MAC Header** section is where the header generation is activated and the header parameters are defined.

**MAC Header State - WiMAX** Activates the generation of the generic MAC header.

Remote-control command:
`SOUR:BB:WIM:OFDM:BURS2:MAC:STAT ON`

**MAC CID - WiMAX** The command sets the CID (connection control identifier) of the medium access control layer (MAC). The CID identifies a connection to equivalent peers in the MAC of the base station and subscriber station.

Remote-control command:
`SOUR:BB:WIM:OFDM:BURS2:MAC:CID #H333`

**Payload encrypted - WiMAX** Activates/deactivates payload encryption.

If activated, the EC (encryption control) field is set to 1 and the EKS (encryption key sequence) field can be set.

Remote-control command:
`SOUR:BB:WIM:OFDM:BURS2:MAC:ENCR:STAT ON`

**EKS - WiMAX** Sets the EKS (encryption key sequence) value in the MAC header. The payload encryption itself is not performed by the signal generator.

Remote-control command:
`SOUR:BB:WIM:OFDM:BURS2:MAC:EKS 4`

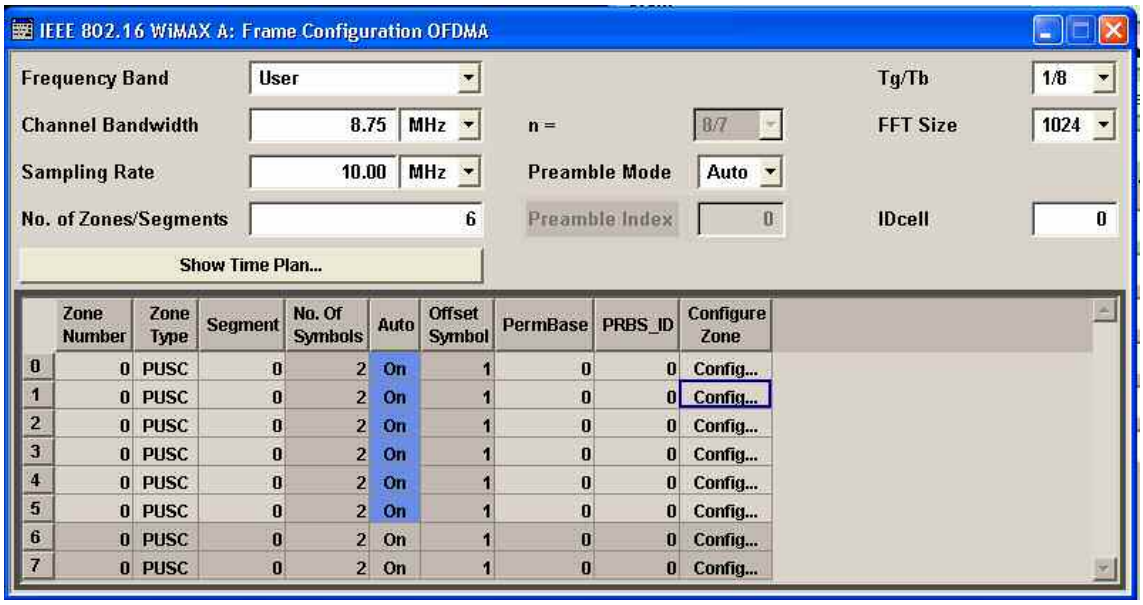
**Mac Type - WiMAX** Specifies the MAC type.

The value of the 6-bit type field is set which indicates the payload type, including the presence of subheaders.

Remote-control command:
`SOUR:BB:WIM:OFDM:BURS2:MAC:TYPE #H333`

# Frame Configuration OFDMA - WiMAX

This menu provides all parameters to configure frames in OFDMA mode.




**Frequency Band OFDMA-WiMAX**

Selects the frequency band for the carrier frequencies. The available ranges for setting the channel bandwidth and the sampling rate depend on the selection here.

**ETSI**

The frequency band as defined by the European Telecommunications Standards Institute applies.

The range is 1.75 to 28 MHz for the channel bandwidth and 2 to 32 MHz for the sampling rate.

Remote-control command:
`SOUR:BB:WIM:AOFD:FBAN ETSI`

**MMDS**

The frequency band as defined by the **Multichannel Multipoint Distribution Service** applies. The RF frequency range is 2500 to 2686 MHz.

The range is 1.50 to 24 MHz for the channel bandwidth and 1.68 to 26.88 MHz for the sampling rate.

Remote-control command:
`SOUR:BB:WIM:AOFD:FBAN MMDS`

**WCS**

The frequency band as defined by the **Wireless Communication Service** applies. It is in the 2.3 GHz band of the electromagnetic spectrum from 2305 to 2320 MHz and 2345 to 2360 MHz.

The range is 2.5 to 15 MHz for the channel bandwidth and 2.8 to 16.8 MHz for the sampling rate.

Remote-control command:
`SOUR:BB:WIM:AOFD:FBAN WCS`

**U-NII**

The frequency band as defined by the **Unlicensed National Information Infrastructure** applies. It is in the 5 GHz band of the electromagnetic spectrum from 5150 to 5350 GHz and 5750 to 5825 GHz.

The range is 10 to 20 MHz for the channel bandwidth and 11.2 to 22 MHz for the sampling rate.

Remote-control command:
`SOUR:BB:WIM:AOFD:FBAN UNII`

**WiBro**

The frequency band as defined by the Telecommunications Technology Association of Korea. It is in the 2.3 GHz band of the electromagnetic spectrum.

Remote-control command:
`SOUR:BB:WIM:AOFDM:FBAN WIBR`

**User**

This mode is provided for choosing any other channel bandwidth / sampling rate combination.

The range is 1.25 to 28 MHz for the channel bandwidth and 1.4 to 32 MHz for the sampling rate.

Remote-control command:
`SOUR:BB:WIM:AOFD:FBAN USER`

**Channel Bandwidth OFDMA - WiMAX**

Sets the channel bandwidth. The range is 1.25 to 28 MHz.

The selected channel bandwidth has to be a multiple of 1.25, 1.5, 1.75, 2.0 or 2.75 MHz. The channel bandwidth determines the parameter n (see *"Sampling Ratio n OFDMA - WiMAX"*):

For channel bandwidths

that are a multiple of 1.75 MHz then n = 8/7

that are a multiple of 1.5 MHz then n = 28/25

that are a multiple of 1.25 MHz then n = 28/25

that are a multiple of 2.75 MHz then n = 28/25

that are a multiple of 2.0 MHz then n = 28/25

else for channel bandwidths not otherwise specified then n = 8/7

The sampling rate is derived from the channel bandwidth as follows:

SamplingRate = floor (n * ChannelBandwidth / 8000) * 8000

Remote-control command:
`SOUR:BB:WIM:AOFD:BW 14 MHz`

**Sampling Ratio n OFDMA - WiMAX**

Indicates the sampling ratio. The sampling ratio is determined by the channel bandwidth (see *"Channel Bandwidth OFDMA - WiMAX"*).

Remote-control command:
`SOUR:BB:WIM:AOFD:N?`

**Sampling Rate OFDMA - WiMAX**

Sets the sampling rate. The possible settings depend on the selected frequency band. The full range in **User** mode is 1.44 to 32 MHz.

The sampling rate is related to the channel bandwidth by the parameter n:

SamplingRate = floor (n * ChannelBandwidth / 8000) * 8000

Remote-control command:
`SOUR:BB:WIM:AOFD:SRAT 2 MHz`

**Number of Zones/Segments OFDMA - WiMAX**

Sets the number of active zones/segments in one frame.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE:COUN 2`

**Preamble Mode OFDMA - WiMAX**

Selects the mode for selecting the preamble index.

**Auto**

The preamble index value is automatically derived from the segments used in the first zone and the IDcell parameter. The Preamble Index field below shows the used preamble index. If more than one segment is active in the first zone, the Preamble Index shows -1. In this case, a multi-segment preamble is generated.

Remote-control command:
`SOUR:BB:WIM:AOFD:PRE:IND:MODE AUTO`

**User**

Sets the preamble index to one of the available indices from 1 to 113 specified in the **Preamble Index** field.

Remote-control command:
`SOUR:BB:WIM:AOFD:PRE:IND:MODE USER`

**Preamble Index OFDMA - WiMAX**

Sets the preamble index to one of the available indices from 1 to 113 in preamble mode “user”.

Remote-control command:
`SOUR:BB:WIM:AOFD:PRE:IND 12`

**Tg/Tb Ratio OFDMA - WiMAX**

Selects the ratio of guard period to symbol period.

This value sets the length of the cyclic prefix in fractions of the symbol period.

Remote-control command:
`SOUR:BB:WIM:AOFD:TGTB TGTB1D16`

**FFT Size OFDMA - WiMAX**

Selects the FFT size.

Remote-control command:
`SOUR:BB:WIM:AOFD:FFT FFT2048`

**IDCell OFDMA - WiMAX**

Sets the IDcell. The IDcell is used in the preamble, as PermBase parameter for the permutation equations in the first downlink zone and partly sets the subcarrier randomizer initialisation vector in the first downlink zone.

Remote-control command:
`SOUR:BB:WIM:AOFD:IDC 4`

**Show Time Plan OFDMA - WiMAX**

Calls the graphical display of the OFDMA Time Plan (see Section Time Plan - WiMAX, page 1).

Remote-control command: `n.a.`

**Time Plan - WiMAX**

The time plan indicates the assignment of the active bursts. The x-axis shows the OFDMA symbol number relative to frame/zone start on the top of the diagram and the time in ms relative to frame/zone start on the bottom of the diagram. The vertical line on the right side shows the frame boundary. The y-axis indicates the physical/logical subchannel numbers.

The bursts are numbered with ZoneIndex.

**Time Plan View Mode OFDMA - WiMAX**

Selects the display range.

Remote-control command: `n.a.`

**Total Frame** The display range extends to all zones including the gap to the frame duration. The y-axis shows the physical subchannels. All logical subchannels are mapped to physical before display. In uplink mode, the data subchannel rotation is not displayed.

**Subframe** The display range is zoomed to the subframe of the corresponding link direction.

**Zone** The display range is zoomed to the selected zone index. The y-axis shows the logical subchannels of the zone/segment.

**Time Plan Zone Index OFDMA - WiMAX**

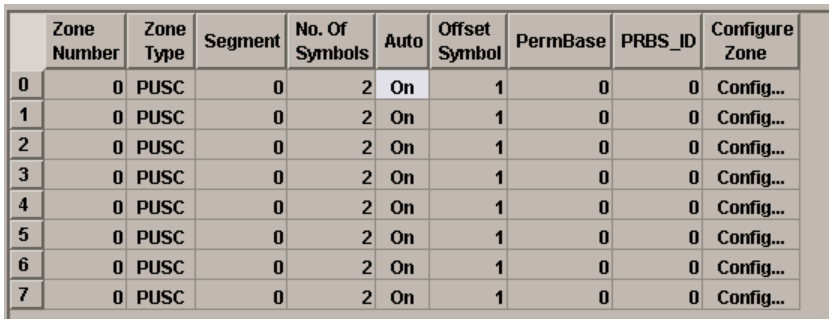
Selects the zone index to be displayed.

This feature is only available, if **Zone** is selected in the **View Mode** field.

Remote-control command: `n.a.`

**Zone Table OFDMA- WiMAX**

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



| | Zone Number | Zone Type | Segment | No. Of Symbols | Auto | Offset Symbol | PermBase | PRBS_ID | Configure Zone |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | PUSC | 0 | 2 | On | 1 | 0 | 0 | Config... |
| 1 | 0 | PUSC | 0 | 2 | On | 1 | 0 | 0 | Config... |
| 2 | 0 | PUSC | 0 | 2 | On | 1 | 0 | 0 | Config... |
| 3 | 0 | PUSC | 0 | 2 | On | 1 | 0 | 0 | Config... |
| 4 | 0 | PUSC | 0 | 2 | On | 1 | 0 | 0 | Config... |
| 5 | 0 | PUSC | 0 | 2 | On | 1 | 0 | 0 | Config... |
| 6 | 0 | PUSC | 0 | 2 | On | 1 | 0 | 0 | Config... |
| 7 | 0 | PUSC | 0 | 2 | On | 1 | 0 | 0 | Config... |

**Zone Index OFDMA - WiMAX**

Displays the consecutive zone index from 0 to 7.

Remote-control command: `n.a.`
(selected via the suffix to the keyword :BURSt<n> )

**Zone Number OFDMA - WiMAX**

Sets the zone number of the zone. The value range is 0 to 7. Zones are generated in the order of zone number, the lowest zone number is generated first. If the same zone number is applied to more than one row, different segments can be used within one zone. In this case, the segment numbers must differ and the activated subchannels of the segments must not overlap.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:NUMB 5`

**Zone Type OFDMA - WiMAX**

Selects the type of subcarrier permutation for the zone.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:TYPE FUSC`

**Segment OFDMA - WiMAX**

Selects the segment of the zone index. Multiple segments within one zone can be configured by setting the same zone number and configuring different segment numbers for each zone index. The activated subchannels must not overlap between the segments of one zone.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE1:SEGM2`

**No. Of Symbols OFDMA - WiMAX**

Sets the zone length in number of symbols. Zones with identical zone number have the same length, as they overlap in time.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE1:SYMB:COUN 3`

**Auto OFDMA - WiMAX**

Activates or deactivates automatic zone length. In auto mode, the number of symbols in the zone is derived from the configured bursts such that all bursts fit into the zone, except if the frame duration is exceeded.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE1:SYMB:COUN:AUTO ON`

**Offset Symbol OFDMA - WiMAX**

Displays the symbol offset of the zone.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE1:SYMB:OFFS`

**PermBase OFDMA - WiMAX**

Selects the PermBase of the zone.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE1:PERM 5`

**PRBS_ID OFDMA - WiMAX**

Selects the PRBS_ID of the zone.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE1:PRBS 3`

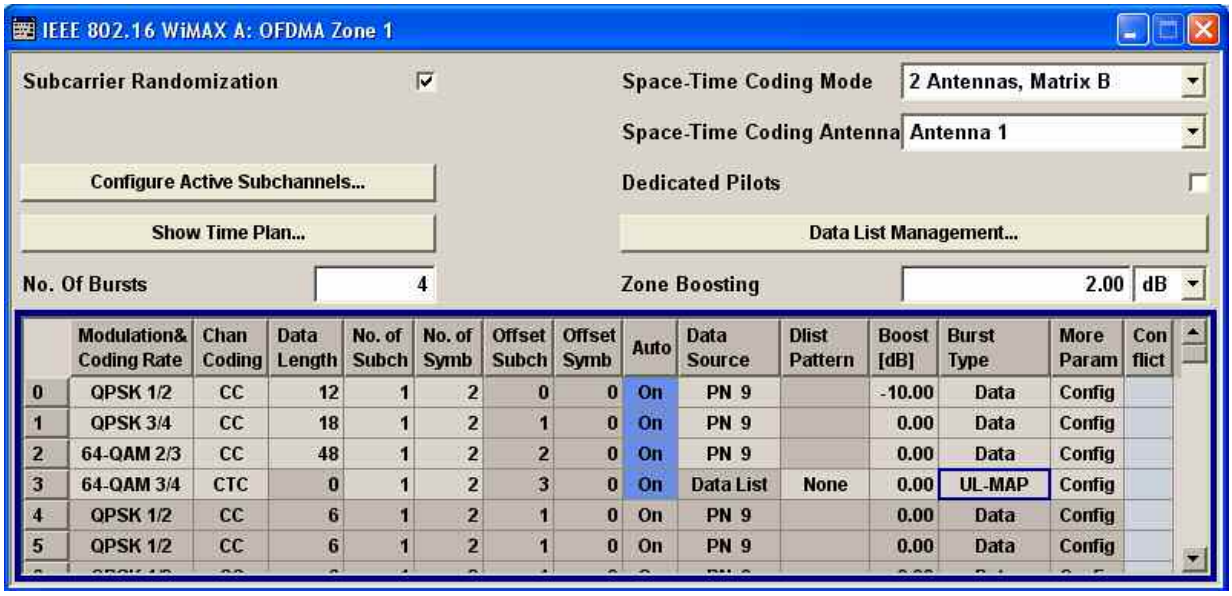
**Configure Zone OFDMA - WiMAX**

Calls the menu for configuring the parameters of the zone.

Remote-control command: `n.a.`

## Zone Configuration OFDMA - WiMAX

This menu provides all parameters to configure zones in OFDMA mode.




| | Modulation& Coding Rate | Chan Coding | Data Length | No. of Subch | No. of Symb | Offset Subch | Offset Symb | Auto | Data Source | Dlist Pattern | Boost [dB] | Burst Type | More Param | Con flict |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | QPSK 1/2 | CC | 12 | 1 | 2 | 0 | 0 | On | PN 9 | | -10.00 | Data | Config | |
| 1 | QPSK 3/4 | CC | 18 | 1 | 2 | 1 | 0 | On | PN 9 | | 0.00 | Data | Config | |
| 2 | 64-QAM 2/3 | CC | 48 | 1 | 2 | 2 | 0 | On | PN 9 | | 0.00 | Data | Config | |
| 3 | 64-QAM 3/4 | CTC | 0 | 1 | 2 | 3 | 0 | On | Data List | None | 0.00 | UL-MAP | Config | |
| 4 | QPSK 1/2 | CC | 6 | 1 | 2 | 1 | 0 | On | PN 9 | | 0.00 | Data | Config | |
| 5 | QPSK 1/2 | CC | 6 | 1 | 2 | 1 | 0 | On | PN 9 | | 0.00 | Data | Config | |

**Subcarrier Randomization OFDMA - WiMAX**

Activates or deactivates the subcarrier randomization. Subcarrier randomization is performed after PUSC/FUSC/AMC permutation and before IFFT conversion.

Remote-control command:
`SOUR:BB:WIM:AOFD:SCAR:RAND ON`

**Subchannel Rotation OFDMA - WiMAX**

(**Available for zone type PUSC in link direction uplink only**)

Activates or deactivates the subchannel rotation.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:SUBC:ROT ON`

**Configure active Subchannels OFDMA - WiMAX**

Calls the menu for activating/deactivating subchannels.

**Use All Subchannels**

Activates the generation of all subchannels.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:SUBC:MODE ALL`

**Use Subchannels x...y (downlink PUSC only)**

Activates the generation of the selected group(s) of subchannels.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:SUBC:MODE USER`
`SOUR:BB:WIM:AOFD:ZONE0:SUBC2:MAP ON`
`SOUR:BB:WIM:AOFD:ZONE0:SUBC3:MAP ON`

**Allocated Subchannels Bitmap (uplink only)**

In uplink mode, each physical subchannel can be individually activated or deactivated. This is realized with a 9 byte field identical to the UL allocated subchannels bitmap in the UCD message. The bytes of the bitmap are read from left to right and specify the physical subchannels in LSB first order. The LSB of the first (most left) byte selects the physical subchannel 0.

The same order applies for all FFT Sizes. Subchannel bitmap bits that are not needed in modes with less than 70 physical subchannels are discarded.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:SUBC:PATT #HFFFFFFFFFFFFFFFF3F,72`

**Show Time Plan OFDMA - WiMAX**

Calls the graphical display of the OFDMA Time Plan (see Section Time Plan - WiMAX, page 35).

Remote-control command: `n.a.`

**No of Bursts OFDMA - WiMAX**

Sets the number of active bursts in the zone/segment.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:COUN 2`

**Space-Time Coding Mode OFDMA - WiMAX**

Sets the space-time coding mode or switches diversity off.

**Off**

Deactivates diversity.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:STC:MODE OFF`

**2 Antennas, Matrix A/ 2 Antennas, Matrix B**

Sets the space-time coding mode to 2 Antennas and Matrix A or Matrix B encoding respectively.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:STC:MODE MA2`

**Burst Defined**

Enables mixing Matrix A and Matrix B encoding on burst level.

The used matrix can be defined in the **More Parameter** dialog box of each burst. (see also *"Data Configuration OFDMA - WiMAX"* and *"UL-MAP Configuration Downlink OFDMA - WiMAX"*)

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:STC:MODE BURS`
`SOUR:BB:WIM:AOFD:ZONE0:BURS3:STC:MODE MA2`

**Collaborative Multiplexing**

Enables Uplink Collaborative spatial multiplexing.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:STC:MODE COLL`

**Space-Time Coding Antenna OFDMA - WiMAX**

Sets the antenna for the space-time coding modes.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:STC:ANT ANT0`

**Generate UL-MAP - WiMAX**

(**Available for link direction uplink only**)

Calls the menu for generating a UL-MAP.

Remote-control command: `n.a.`

**Dedicated Pilots OFDMA - WiMAX**

(**This feature is available only for zone type AMC and PUSC with link direction Downlink).**

When activated, pilot symbols are generated for subchannels with allocated bursts only. When deactivated, pilot symbols are generated for all subchannels allocated to the current segment, whether or not bursts are active on these subchannels.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:PILD ON`

**Data List Management… - WiMAX** Calls the **Data List Management** menu. This menu is used to create and edit a data list.

**Pilot Pattern OFDMA - WiMAX** Sets the pilot pattern in uplink Collaborative Multiplexing mode.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:STC:PIL A`

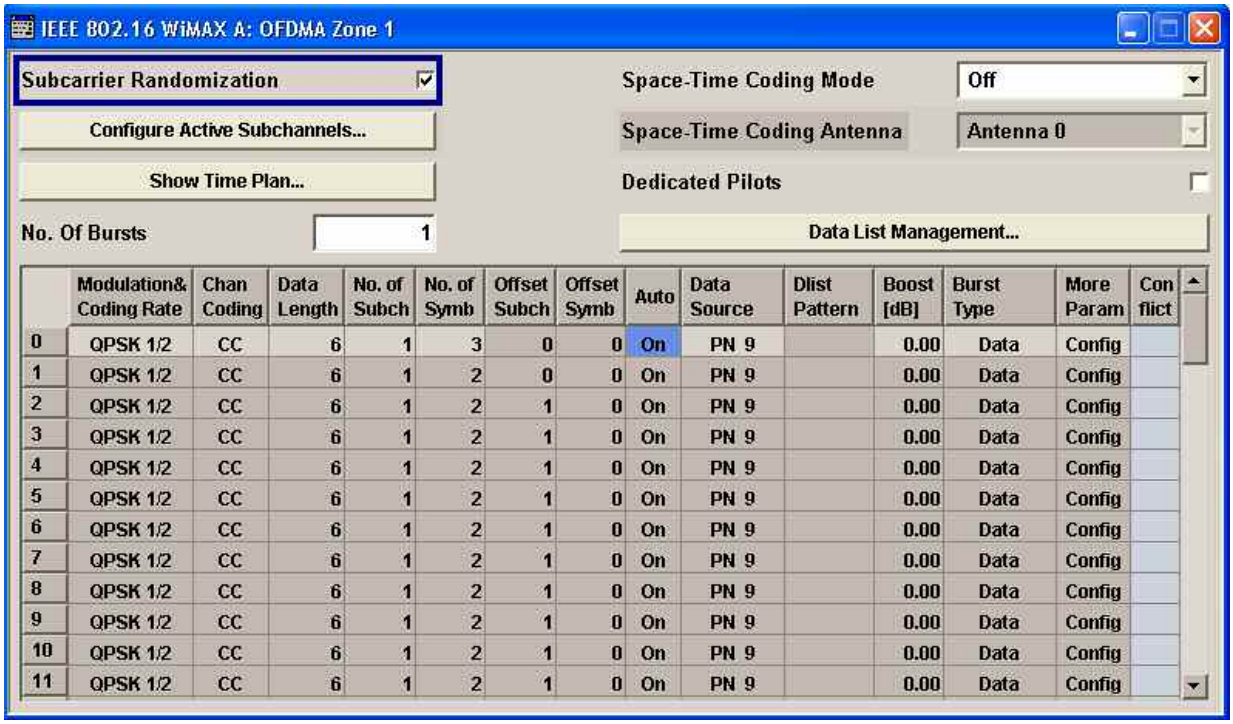
**Zone Boosting OFDMA - WiMAX** Sets an additional zone boosting in dB. The zone boosing is applied to both the data and pilot carriers.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BOOS -33`

**Burst Table OFDMA - WiMAX**

The **burst table** is located in the lower part of the menu where individual burst parameters are set. A graphic display of the current burst locations in time and subchannel space can be viewed with the **Show Time Plan** button.

Each frame supports up to 64 bursts with individual parameters. For both transmission directions, different modulations and channel coding rates are available. For each burst, an optional generic MAC header and CRC is provided.




| | Modulation& Coding Rate | Chan Coding | Data Length | No. of Subch | No. of Symb | Offset Subch | Offset Symb | Auto | Data Source | Dlist Pattern | Boost [dB] | Burst Type | More Param | Con flict |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | QPSK 1/2 | CC | 6 | 1 | 3 | 0 | 0 | On | PN 9 | | 0.00 | Data | Config | |
| 1 | QPSK 1/2 | CC | 6 | 1 | 2 | 0 | 0 | On | PN 9 | | 0.00 | Data | Config | |
| 2 | QPSK 1/2 | CC | 6 | 1 | 2 | 1 | 0 | On | PN 9 | | 0.00 | Data | Config | |
| 3 | QPSK 1/2 | CC | 6 | 1 | 2 | 1 | 0 | On | PN 9 | | 0.00 | Data | Config | |
| 4 | QPSK 1/2 | CC | 6 | 1 | 2 | 1 | 0 | On | PN 9 | | 0.00 | Data | Config | |
| 5 | QPSK 1/2 | CC | 6 | 1 | 2 | 1 | 0 | On | PN 9 | | 0.00 | Data | Config | |
| 6 | QPSK 1/2 | CC | 6 | 1 | 2 | 1 | 0 | On | PN 9 | | 0.00 | Data | Config | |
| 7 | QPSK 1/2 | CC | 6 | 1 | 2 | 1 | 0 | On | PN 9 | | 0.00 | Data | Config | |
| 8 | QPSK 1/2 | CC | 6 | 1 | 2 | 1 | 0 | On | PN 9 | | 0.00 | Data | Config | |
| 9 | QPSK 1/2 | CC | 6 | 1 | 2 | 1 | 0 | On | PN 9 | | 0.00 | Data | Config | |
| 10 | QPSK 1/2 | CC | 6 | 1 | 2 | 1 | 0 | On | PN 9 | | 0.00 | Data | Config | |
| 11 | QPSK 1/2 | CC | 6 | 1 | 2 | 1 | 0 | On | PN 9 | | 0.00 | Data | Config | |

**Burst Index OFDMA - WiMAX**

Displays the consecutive burst index from 0 to 63.

All the rows are always displayed, even if the bursts are inactive. They are switched on and off by the selection of **No. of Bursts** above the table. The active bursts are highlighted.

Remote-control command: `n.a.`
(selected via the suffix to the keyword :BURSt<n> )

**Modulation and Coding Rate OFDMA - WiMAX**

Selects the modulation and channel coding rate. Channel coding includes randomization, convolutional/turbo coding and interleaving.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:FORM QPSK1D2`

**Channel Coding OFDMA - WiMAX**

Selects the channel coding mode. Available modes are CC (convolutional coding), CTC (convolutional turbo coding) or Off. In Off mode, channel coding is switched off completely.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:CCOD:MODE CC`

**Data Length OFDMA - WiMAX**

Determines the data length in bytes.

The given number of bytes is read from the data source. The total number of data bytes in the burst (before channel coding) is determined as follows:

TotalDataBytes = DataLength + MACHeaderBytes + CRCBytes

Additionally padding with 0xFF bytes is applied at the end of the data sequence to fill up the allocated slots specified by **No. of Subch** and **No. of Symb** in downlink mode and **Duration [Slots]** in uplink mode. Thus, the Data Length can be lower than the burst's allocated number of bytes.

Up to 10 000 data bytes can be set for each burst.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:DATA:LENG 1000`

**Number of Subchannels OFDMA - WiMAX**

Enters the number of subchannels for the selected burst. If the number of subchannels is changed, the data length is adjusted to fill the allocated space defined by **No. of Subch** and **No. of Symb** with data so that no padding has to be applied. The data length can be lowered afterwards if data bytes less than the allocated number shall be read from the data source.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE1:BURS2:SUBC:COUN 114`

**Number of Symbols OFDMA - WiMAX**

Enters the number of symbols for the selected burst.

If the number of symbols is changed, the data length is adjusted to fill the allocated space defined by **No. of Subch** and **No. of Symb** with data so that no padding has to be applied. The data length can be decreased afterwards if data bytes less than the allocated number shall be read from the data source. The entered number of symbols is automatically adjusted to a multiple of the number of symbols per slot for the set subcarrier permutation.

Remote-control command:
```
SOUR:BB:WIM:AOFD:ZONE0:BURS4:SYMB:COUN 14
```

**Duration-Slots OFDMA - WiMAX**

Enters the number of slots for the selected burst. If the number of slots is changed, the data length is adjusted to fill the specified number of slots with data so that no padding has to be applied.

Remote-control command:
```
SOUR:BB:WIM:AOFD:ZONE0:BURS3:SLOT:COUN 114
```

**Offset Subchannel OFDMA - WiMAX**

Indicates the subchannel offset for the selected burst. This value can be modified after **Auto Offset** is deactivated.

It is possible that bursts overlap in manual offset mode. The Conflict column indicates overlapping bursts.

Remote-control command:
```
SOUR:BB:WIM:AOFD:ZONE0:BURS2:OFFS:MODE USER
SOUR:BB:WIM:AOFD:ZONE0:BURS2:OFFS:SUBC  7
```

**Offset Symbol OFDMA - WiMAX**

Indicates the symbol offset for the selected burst. The symbol offset is specified relative to zone start. In the first downlink zone, symbol offset 0 refers to the first symbol after the preamble.

This value can be modified after **Auto Offset** is deactivated.

The set symbol offset is rounded to a multiple of the number of symbols per slot defined by the set subcarrier permutation.

It is possible that bursts overlap in manual offset mode. The Conflict column indicates overlapping bursts.

Remote-control command:
```
SOUR:BB:WIM:AOFD:ZONE0:BURS2:OFFS:MODE USER
SOUR:BB:WIM:AOFD:ZONE0:BURS2:OFFS:SYMB 2
```

**Auto OFDMA - WiMAX**

Activates/deactivates the **Auto Offset** mode. In Auto mode, **Offset Subchannel** and **Offset Symbol** are set such that bursts are not overlapping in the subchannel/symbol space.

Remote-control command:
```
SOUR:BB:WIM:AOFD:ZONE0:BURS2:OFFS:MODE USER
```

**Data Source OFDMA-WiMAX**

Selects data source for the selected bursts.

The data sources **PN9**, **PN11, PN15**, **PN16**, **PN20**, **PN21**, **PN23**, **ALL 0**, **ALL1**, **Pattern** and **Data List** are all available to choose from.

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

Data lists are selected in the **File Select** window, which is called by means of the **Data List Management** button.

If the **Pattern** data type is used, the bit pattern is defined in the **Pattern** input box. The length is limited to 64 bits.

Remote-control command::

```
SOUR:BB:WIM:AOFD:ZONE0:BURS2:DATA    PATT
SOUR:BB:WIM:AOFD:ZONE0:BURS2:DATA:PATT #H3F,8

SOUR:BB:WIM:AOFD:ZONE0:BURS2:DATA    DLIS
SOUR:BB:WIM:AOFD:ZONE0:BURS2:DATA:DSEL "BS2_AOFD"
```

**Boost OFDMA - WiMAX**

Sets the burst power in dB. This setting affects the data tones only in downlink mode, the pilot power is fixed. In uplink, the setting affects both data and pilot tones.

Remote-control command:

```
SOUR:BB:WIM:AOFD:ZONE0:BURS2:POW -20
```

**Burst Type OFDMA - WiMAX**

Selects the burst type from Data, FCH, DL-MAP, UL-MAP, Ranging, HARQ, or Fast Feedback.

**DATA**

Regular bursts are called “Data” bursts. All data sources are available for this type of burst.

Remote-control command:

```
SOUR:BB:WIM:AOFDM:ZONE0:BURS2:TYPE
DATA
```

**FCH**

An FCH is generated at subchannel and symbol offset 0. See “FCH Configuration Downlink OFDMA - WiMAX” on the FCH contents.

```
Remote-control command:
SOUR:BB:WIM:AOFDM:ZONE0:BURS2:TYPE
DATA
```

**DL-MAP**

A DL-MAP is generated, taking into account all active bursts of all zones. See “DL-MAP Configuration Downlink OFDMA - WiMAX” on the DL-MAP contents.

Remote-control command:

```
SOUR:BB:WIM:OFDM:BURS2:TYPE DLM
```

**UL-MAP**

A UL-MAP is generated using the specified data list, including additional parameters from the **More Param** panel. See “UL-MAP Configuration Downlink OFDMA - WiMAX” for more information on how to create UL-MAP bursts.

Remote-control command:

```
SOUR:BB:WIM:AOFDM:ZONE0:BURS2:TYPE
ULM
```

**Ranging**

An uplink ranging allocation is configured, which can be used for initial ranging, periodic ranging, or bandwidth request transmissions. See "Ranging Uplink OFDMA - WiMAX" for more information on how to create ranging channels. The burst type Ranging requires a PUSC zone.

Remote-control command:
`SOUR:BB:WIM:AOFDM:ZONE0:BURS2:TYPE RANG`

**HARQ**

A HARQ burst is generated. See "HARQ Configuration OFDMA - WiMAX" for more information on how to create HARQ bursts.

Remote-control command:
`SOUR:BB:WIM:AOFDM:ZONE0:BURS2:TYPE HARQ`

**Fast Feedback**

A fast feedback burst is generated. See "Fast Feedback Configuration OFDMA - WiMAX" for more information on how to create fast feedback bursts. The burst type Fast Feedback requires a PUSC zone.

Remote-control command:
`SOUR:BB:WIM:AOFDM:ZONE0:BURS2:TYPE FAST`

**DCD**

A regular data burst containing a DCD message is generated. The DCD message specifies a downlink burst profile for each DIUC value that is being used in the zone configuration.

Remote-control command:
`SOUR:BB:WIM:AOFDM:ZONE0:BURS2:TYPE DCD`

**UCD**

A regular data burst containing a UCD message is generated. The UCD message specifies an uplink burst profile for each UIUC value that is being used in the zone configuration.

Remote-control command:
`SOUR:BB:WIM:AOFDM:ZONE0:BURS2:TYPE UCD`

**More Parameter OFDMA – WiMAX**

Calls the menu for configuring additional parameters for the bursts.

The menu depends on the selected burst type.

Remote-control command: `n.a.`

**Conflict OFDMA - WiMAX**

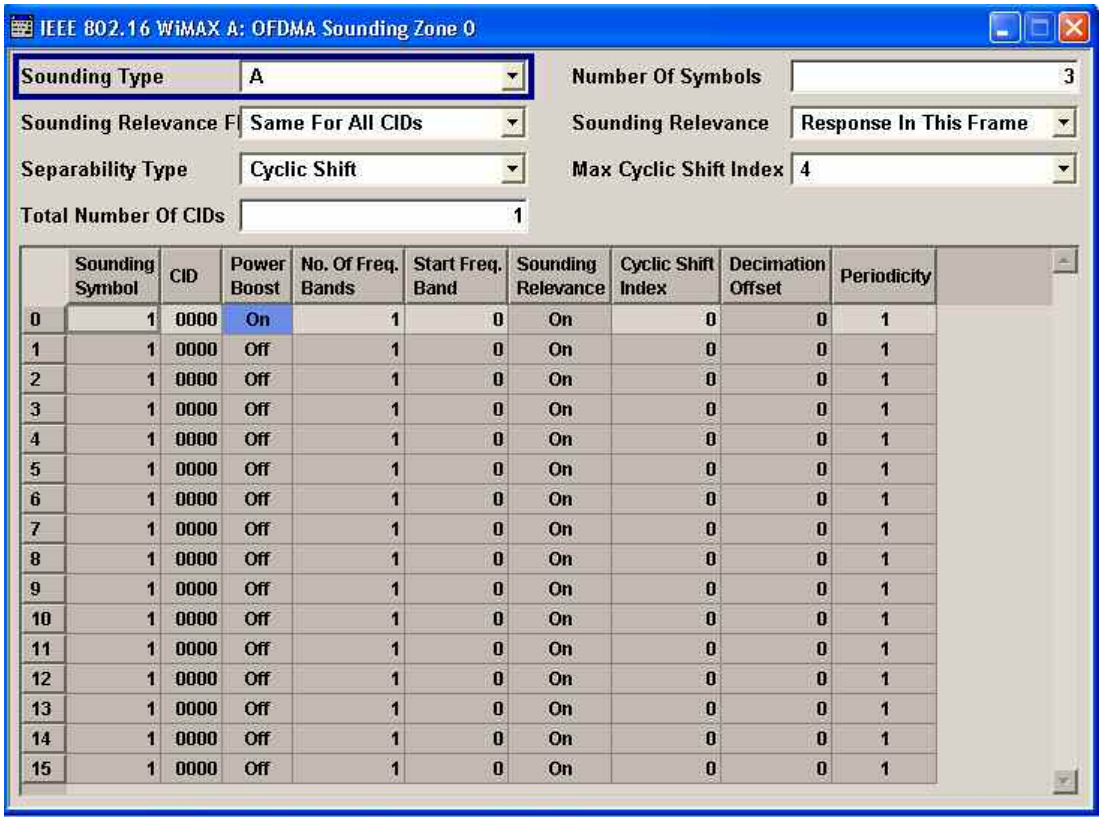
Indicates a conflict between the settings of the bursts.

Conflicts can occur if subchannel and symbol offsets are set manually and two or more bursts overlap. Bursts can also overlap with the FCH or DL-MAP. The position of FCH and DL-MAP is fixed and cannot be changed. In uplink mode, a conflict is also indicated for bursts that do not fit into the available zone space and are therefore omitted.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:CONF:STAT?`

## Sounding Zone Configuration OFDMA - WiMAX

This menu provides all parameters to configure the sounding zones in OFDMA mode.




| | Sounding Symbol | CID | Power Boost | No. Of Freq. Bands | Start Freq. Band | Sounding Relevance | Cyclic Shift Index | Decimation Offset | Periodicity |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 0000 | On | 1 | 0 | On | 0 | 0 | 1 |
| 1 | 1 | 0000 | Off | 1 | 0 | On | 0 | 0 | 1 |
| 2 | 1 | 0000 | Off | 1 | 0 | On | 0 | 0 | 1 |
| 3 | 1 | 0000 | Off | 1 | 0 | On | 0 | 0 | 1 |
| 4 | 1 | 0000 | Off | 1 | 0 | On | 0 | 0 | 1 |
| 5 | 1 | 0000 | Off | 1 | 0 | On | 0 | 0 | 1 |
| 6 | 1 | 0000 | Off | 1 | 0 | On | 0 | 0 | 1 |
| 7 | 1 | 0000 | Off | 1 | 0 | On | 0 | 0 | 1 |
| 8 | 1 | 0000 | Off | 1 | 0 | On | 0 | 0 | 1 |
| 9 | 1 | 0000 | Off | 1 | 0 | On | 0 | 0 | 1 |
| 10 | 1 | 0000 | Off | 1 | 0 | On | 0 | 0 | 1 |
| 11 | 1 | 0000 | Off | 1 | 0 | On | 0 | 0 | 1 |
| 12 | 1 | 0000 | Off | 1 | 0 | On | 0 | 0 | 1 |
| 13 | 1 | 0000 | Off | 1 | 0 | On | 0 | 0 | 1 |
| 14 | 1 | 0000 | Off | 1 | 0 | On | 0 | 0 | 1 |
| 15 | 1 | 0000 | Off | 1 | 0 | On | 0 | 0 | 1 |

**Sounding Type OFDMA - WiMAX**

Selects either sounding type A or B.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:SOUN:TYPE A`

**Sounding Relevance Flag OFDMA - WiMAX**

Selects whether sounding is relevant individually for each CID or for all CIDs.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:SOUN:REL:FLAG SAME`

**Separability Type OFDMA - WiMAX**

**(only for Sounding Type A)**

Selects the sounding separability type.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:SOUN:SEP DEC`

**Total Number Of CIDs OFDMA - WiMAX**

Sets the total number of CIDs.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:SOUN:CID:COUN 6`

**Number Of Symbols OFDMA - WiMAX**

Sets the sounding zone length in number of symbols.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:SYMB:COUN 2`

**Sounding Relevance OFDMA - WiMAX**

**(only if Sounding Relevance Flag is set to Same For All CIDs)**

Selects the sounding relevance mode.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:SOUN:REL:MODE THIS`

**Max Cyclic Shift Index OFDMA - WiMAX**

**(only for Sounding Type A and Separability Type Cyclic Shift)**

Sets the value for the maximum cyclic shift index.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:SOUN:CMAX MC4`

**Permutation OFDMA - WiMAX**

**(only for Sounding Type B)**

Indicates the permutation used for this sounding zone.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:SOUN:PERM?`

**DL PermBase OFDMA - WiMAX**

**(only for Sounding Type B)**

Sets the value for the DL Perm Base.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:SOUN:DLP 20`

**Decimation Value OFDMA - WiMAX**

**(only for Sounding Type A and Separability Type Decimated Subcarriers)**

Sets the value for the decimation.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:SOUN:DEC:VAL DEC2`

**Decimation Offset Randomization OFDMA - WiMAX**

**(only for Sounding Type A and Separability Type Decimated Subcarriers)**

Activates/deactivates the decimation offset randomization.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:SOUN:DEC:RAND:STAT ON`

## Sounding Table OFDMA - WiMAX

The **sounding table** is located in the lower part of the menu where individual sounding parameters for each CID are set.

| | Sounding Symbol | CID | Power Boost | No. Of Freq. Bands | Start Freq. Band | Sounding Relevance | Cyclic Shift Index | Decimation Offset | Periodicity |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 0000 | On | 1 | 0 | On | 0 | 0 | 1 |
| 1 | 1 | 0000 | Off | 1 | 0 | On | 0 | 0 | 1 |
| 2 | 1 | 0000 | Off | 1 | 0 | On | 0 | 0 | 1 |
| 3 | 1 | 0000 | Off | 1 | 0 | On | 0 | 0 | 1 |
| 4 | 1 | 0000 | Off | 1 | 0 | On | 0 | 0 | 1 |
| 5 | 1 | 0000 | Off | 1 | 0 | On | 0 | 0 | 1 |
| 6 | 1 | 0000 | Off | 1 | 0 | On | 0 | 0 | 1 |
| 7 | 1 | 0000 | Off | 1 | 0 | On | 0 | 0 | 1 |
| 8 | 1 | 0000 | Off | 1 | 0 | On | 0 | 0 | 1 |
| 9 | 1 | 0000 | Off | 1 | 0 | On | 0 | 0 | 1 |
| 10 | 1 | 0000 | Off | 1 | 0 | On | 0 | 0 | 1 |
| 11 | 1 | 0000 | Off | 1 | 0 | On | 0 | 0 | 1 |
| 12 | 1 | 0000 | Off | 1 | 0 | On | 0 | 0 | 1 |
| 13 | 1 | 0000 | Off | 1 | 0 | On | 0 | 0 | 1 |
| 14 | 1 | 0000 | Off | 1 | 0 | On | 0 | 0 | 1 |
| 15 | 1 | 0000 | Off | 1 | 0 | On | 0 | 0 | 1 |

**Sounding Index OFDMA - WiMAX**

Displays the consecutive CID index from 0 to 15.

All the rows are always displayed, even if the CIDs are inactive. They are switched on and off by the selection of **Total Number Of CIDs** above the table. The active CIDs are highlighted.

Remote-control command: `n.a.`
(selected via the suffix to the keyword :CID<n> )

**Sounding Symbol OFDMA - WiMAX**

Sets the symbol used for this CID from the available symbols of the zone. Each sounding CID occupies one symbol only.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:SOUN:CID3:SYMB 1`

**CID OFDMA - WiMAX**

Sets the CID (connection control identifier).

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:SOUN:CID2:CID #H1299`

**Power Boost OFDMA - WiMAX**

Activates/deactivates the power boost.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:SOUN:CID2:POW:STAT ON`

**No. Of Freq. Bands OFDMA - WiMAX** **(only for Sounding Type A)**

Sets the number of frequency bands.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:SOUN:CID2:FBAN:COUN 20`

**Start Freq. Band OFDMA - WiMAX** **(only for Sounding Type A)**

Sets the start frequency band.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:SOUN:CID2:FBAN:STAR 2`

**Sounding Relevance - WiMAX**

Activates/deactivates the sounding relevance.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:SOUN:CID2:REL:STAT ON`

**Cyclic Shift Index OFDMA - WiMAX** **(only for Sounding Type A)**

Sets the value for the cyclic shift index. If the **Separability Type** is set to **Decimated Subcarriers**, the cyclic shift index is not used.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:SOUN:CID3:CIND 3`

**Decimation Offset OFDMA - WiMAX** **(only for Sounding Type A)**

Sets the value for the decimation offset. If the **Separability Type** is set to **Cyclic Shift**, the decimation offset is not used.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:SOUN:CID3:DEC 1`

**Periodicity - WiMAX**

Sets the value for the periodicity.
A value of 0 transmits this sounding CID only once at the beginning of the signal sequence.
A value of 1 activates continuous transmission of the sounding CID with each frame.
Larger values specify the period in frames that active sounding CIDs occur.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:SOUN:CID3:PER PER2`

**No. Of Subch - WiMAX** **(only for Sounding Type B)**

Sets the number of subchannels.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:SOUN:CID3:SUBC:COUN 2`

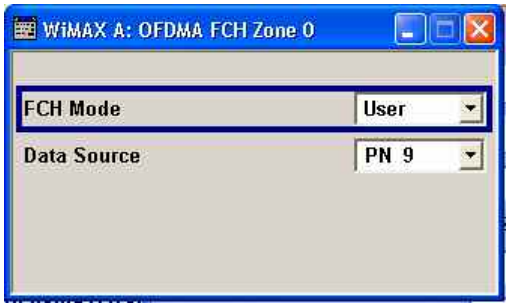
**Offset Subch - WiMAX** **(only for Sounding Type B)**

Sets the subchannel offset.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:SOUN:CID3:SUBC:OFFS 2`

# FCH Configuration Downlink OFDMA - WiMAX

The **FCH Configuration** menu is reached via the **More Param** button in the OFDMA burst table. The FCH is only available in downlink mode. The following describes the FCH options in OFDMA mode.




**FCH Mode OFDMA - WiMAX**

Selects the mode for generating the FCH.

The Channel Coding of the FCH is performed both in **Auto** and **User** mode.

**Auto**

In **Auto** mode, the DLFP (Downlink Frame Prefix) fields, which form the FCH, are filled automatically with parameters specified at different locations.

The following mapping applies in Auto mode:

Used subchannel bitmap:
Set to the bitmap specified in the "Configure active Subchannels" panel.

Repetition_Coding_Indication:
Specifies the DL-MAP repetition coding set in the "Configure DL-MAP" panel.

Coding_Indication:
Specifies channel coding of the DL-MAP (CC or CTC)

DL-Map_Length:
Set to the number of slots allocated for the DL-MAP.

The FCH is transmitted with QPSK 1/2 and repetition coding of 4. For FFT Size 128 a reduced FCH is transmitted in one slot.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:FCH:MODE AUTO`

**User**

In **User** mode, the FCH is filled with data specified under Data Source. This enables any arbitrary data to be sent with the FCH burst. 24 bits are read from the data source, these bits are repeated once to form 48 bits. The FCH is transmitted with QPSK 1/2 and repetition coding of 4. For FFT Size 128 a reduced FCH of size 12 bits is transmitted in one slot.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:FCH:MODE USER`

**Data Source FCH OFDMA - WiMAX**

Specifies the data source in User mode.
The FCH contents are filled from the selected data source.

The data sources **PN9**, **PN11, PN15**, **PN16**, **PN20**, **PN21**, **PN23**, **ALL 0**, **ALL1**, **Pattern** and **Data List** are all available to choose from.

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

Data lists are selected in the **File Select** window, which is called by means of the **Data List Management** button.

If the **Pattern** data type is used, the bit pattern is defined in the **Pattern** input box. The length is limited to 64 bits.

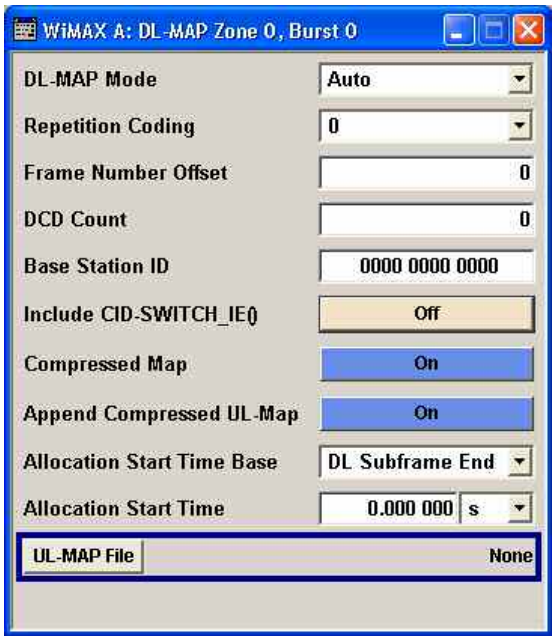
Remote-control commands::

```
SOUR:BB:WIM:AOFD:ZONE0:BURS2:DATA   PATT
SOUR:BB:WIM:AOFD:ZONE0:BURS2:DATA:PATT #H3F,8

SOUR:BB:WIM:AOFD:ZONE0:BURS2:DATA   DLIS
SOUR:BB:WIM:AOFD:ZONE0:BURS2:DATA:DSEL "BS2_AOFD"
```

## DL-MAP Configuration Downlink OFDMA - WiMAX

The DL-MAP **Configuration** menu is reached via the **More Param** button in the OFDMA burst table. The DL-MAP is only available in OFDMA downlink mode.




**DL-MAP Mode OFDMA - WiMAX**

Selects the mode for generating the DL-MAP.

Channel Coding of the DL-MAP is performed both in **Auto** and **User** mode.

**Auto**

In **Auto** mode, the DL-MAP is filled automatically with parameters specified at different locations.

The following mapping applies in Auto mode:

Frame Duration Code:
Specified by the Frame Duration set in the WiMAX main panel.

Frame Number:
Starts with the value specified by “Frame Number Offset” in the first generated frame and advances by 1 in every following frame.

DCD Count:
Directly set by the “DCD Count” field.

Base Station ID:
48 bits specified by the “Base Station ID” field.

No. OFDMA symbols:
Set to the total number of OFDMA symbols in all downlink zones

For each burst:

DIUC:
Set to the “DIUC” field in the **More Param** Panel.

CID:
Set to the “CID” field in the **More Param** Panel. This field is only included if **Include CID-SWITCH_IE()** is active.

OFDMA Symbol offset:
Set to “Offset Symb” +1 for the first zone and to the absolute symbol offset in all other zones.

Subchannel offset:
Set to “Offset Subch” of the burst table.

Boosting:
Depends on the “Boost” setting of the corresponding burst. The following mapping applies:
000: 0dB
001: +6dB
010: -6dB
011: +9dB
100: +3dB
101: -3dB
110: -9dB
111: -12dB
000 is set if any other value is specified for “Boost”.

No. OFDMA Symbols:
Set to “No. of Symb” of the burst table.

No. Subchannels:
Set to “No. of Subch” of the burst table.

Repetition Coding Indication:
Set to Repetition Coding in the **More Param** Panel.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:DLM:MODE AUTO`

**User**

In **User** mode, the DL-MAP is filled with data specified under Data Source. This enables any arbitrary data to be sent with the DL-MAP burst.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:DLM:MODE USER`

**DL-MAP Repetition Coding OFDMA - WiMAX**

Repetition coding can be activated for the DL-MAP by specifying any value other than 0.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:DLM:REPC RC0`

**Frame Number Offset DL-MAP OFDMA - WiMAX**

Sets the frame number offset.

This value is added to the current frame number of the sequence. The result is used as Frame Number in the DL-MAP (in **Auto** mode).

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:DLM:FNOF 556`

**DCD Count DL-MAP OFDMA - WiMAX**

Sets the DCD count value.

This value is used for the corresponding DL-MAP field (in **Auto** mode).

Remote-control command:
`SOUR:BB:WIM:AOFD:DLM:DCD:COUN 12`

**Base Station ID OFDMA - WiMAX**

Sets the Base Station ID.

This value is used for the corresponding DL-MAP field in (**Auto** mode).

Remote-control command:
`SOUR:BB:WIM:AOFD:DLM:BSID #H2322222222FF,48`

**Configure MAC OFDMA - WiMAX**

Calls the menu for configuring the Mac header panel for the DL-MAP.

Remote-control command: `n.a.`

**Include CID-Switch_IE() OFDMA - WiMAX**

Includes/excludes the CID-Switch_IE().

Remote-control command:
`SOUR:BB:WIM:AOFD:DLM:IIE:STATE ON`

**Append DCD OFDMA - WiMAX**

If activated, the DCD is appended to the DL-MAP. The DCD message carries its own MAC header and CRC, but is included within the DL-MAP burst.

Remote-control command:
`SOUR:BB:WIM:AOFD:DLM:DCD:STATE ON`

**DCD CID OFDMA - WiMAX**

**(only if Append DCD is ON)**

Enters the value for the DCD CID.

This CID (connection control identifier) is independent from the DL-Map CID and is only used for the DCD message.

Remote-control command:
`SOUR:BB:WIM:AOFD:DLM:DCD:CID #H456`

**Compressed Map OFDMA - WiMAX**

If activated, a compressed map is generated instead of a normal map.

Remote-control command:
`SOUR:BB:WIM:AOFD:DLM:COMP:STAT ON`

**Append Compressed UL-Map OFDMA - WiMAX**

**(only if Compressed Map is ON)**

If activated, a compressed UL-Map is appended to the DL-Map.

Remote-control command:
`SOUR:BB:WIM:AOFD:DLM:COMP:ULM:STAT ON`

**Allocation Start Time Base OFDMA - WiMAX**

Selects the Allocation Start Time base, required for the UL-Map appended to the DL-Map. The Allocation Start Time field of the UL-Map specifies the start of the uplink subframe.

If Start Time Base is set to DL Subframe End, the Allocation Start Time of the UL-Map is set to the end of the downlink subframe + **Allocation Start Time** parameter set below.

When Start Time Base is set to Frame Start, the Allocation Start Time of the UL-Map is set to the beginning of the frame + **Allocation Start Time** parameter set below.

Remote-control command:
`SOUR:BB:WIM:AOFD:DLM:COMP:AMOD DLSF`

**Allocation Start Time OFDMA - WiMAX**

Sets the Allocation Start Time in the UL-Map, appended to the DL-Map.

Remote-control command:
`SOUR:BB:WIM:AOFD:DLM:COMP:ATIM 0.00077`

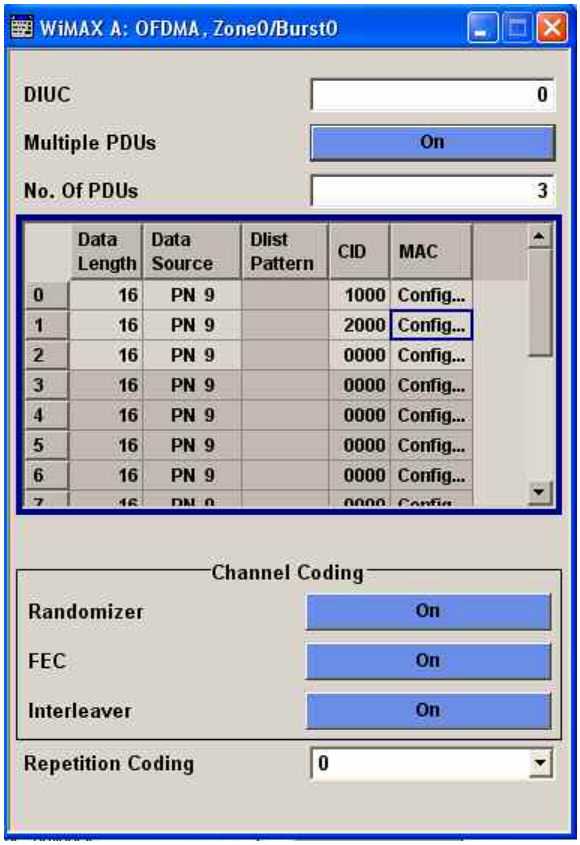
**UL-MAP File OFDMA - WiMAX**

Calls the menu for selecting the UL-Map file.

Remote-control command:
`SOUR:BB:WIM:AOFD:DLM:COMP:ULM:DSEL 'ul-map_zone_1'`

# Data Configuration OFDMA - WiMAX

The **Data Configuration** menu is reached via the **More Param** button in the OFDMA burst table.




**DIUC OFDMA - WiMAX** **(This feature is only available in downlink direction.)**

Sets the specific DIUC.

In DL-MAP mode **Auto**, the DIUC of each burst is included in the DL-MAP.

Remote-control command:
`SOUR:BB:WIM:AOFDM:ZONE0:BURS2:DIUC 2`

**UIUC OFDMA - WiMAX** **(This feature is only available in uplink direction.)**

Sets the specific UIUC. The UIUC is used for the UL-MAP, if generated.

Remote-control command:
`SOUR:BB:WIM:AOFDM:ZONE0:BURS2:UIUC 2`

**Multiple PDUs OFDMA - WiMAX**

Enables/disables configuration of multiple PDUs.
If this parameter is enabled, multiple PDUs each with own MAC header and CRC are available within one burst (see *"PDU Table OFDMA - WiMAX"*).

Remote-control command:
`SOUR:BB:WIM:AOFDM:ZONE0:BURS2:PDU:STAT ON`

**No. Of PDUs OFDMA - WiMAX**

**Available for enabled parameter Multiple PDUs only**

Sets the number of PDUs in the burst.

Remote-control command:
`SOUR:BB:WIM:AOFDM:ZONE0:BURS2:PDU:COUN 7`

**CID (hex) - WiMAX**

**Available for disabled parameter Multiple PDUs only**

The command sets the CID (connection control identifier) of the medium access control layer (MAC). The CID identifies a connection to equivalent peers in the MAC of the base station and subscriber station.

This parameter is identical to the CID set in the MAC Header settings.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:MAC:CID #H333`

**Configure MAC - WiMAX**

**Available for disabled parameter Multiple PDUs only**

Calls the menu for configuring the MAC header panel for the selected burst (see "MAC Header Configuration OFDMA - WiMAX").

Remote-control command: `n.a.`

**Channel Coding Randomizer - WiMAX**

Activates or deactivates the randomizer applied before channel coding.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:CCOD:RAND ON`

**FEC - WiMAX**

Activates or deactivates the FEC.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:CCOD:FEC ON`

**Interleaver - WiMAX**

Activates or deactivates the interleaver state.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:CCOD:INT ON`

**Repetition Coding - WiMAX**

Activates repetition coding by specifying any value other than 0.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:CCOD:REPC REP4`

**Space-Time Coding Mode - WiMAX**

Selects the space time coding mode for the specified burst.

This parameter is available only, if the **Space-Time Coding Mode** is set to **Burst Defined**.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:STC:MODE MA2`

**Ranging Backoff Start - WiMAX**

**(only for burst type UCD)**

Sets the start value for the ranging backoff.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:UCD:RANG:BOST 10`

**Ranging Backoff End - WiMAX**

**(only for burst type UCD)**

Sets the end value for the ranging backoff.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:UCD:RANG:BOEN 10`

**Request Backoff Start - WiMAX**

**(only for burst type UCD)**

Sets the start value for the request backoff.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:UCD:REQ:BOST 10`

**Request Backoff End - WiMAX**

**(only for burst type UCD)**

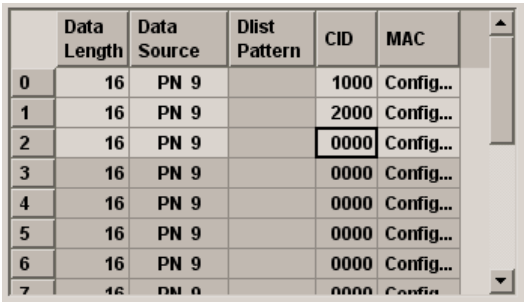
Sets the end value for the request backoff.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:UCD:REQ:BOEN 10`

**PDU Table OFDMA - WiMAX**

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

Each burst supports up to 16 PDUs with individual parameters. For each PDU, the data length, the data source, the CID and the MAC can be individually configured.



| | Data Length | Data Source | Dlist Pattern | CID | MAC |
|---|---|---|---|---|---|
| 0 | 16 | PN 9 | | 1000 | Config... |
| 1 | 16 | PN 9 | | 2000 | Config... |
| 2 | 16 | PN 9 | | 0000 | Config... |
| 3 | 16 | PN 9 | | 0000 | Config... |
| 4 | 16 | PN 9 | | 0000 | Config... |
| 5 | 16 | PN 9 | | 0000 | Config... |
| 6 | 16 | PN 9 | | 0000 | Config... |
| 7 | 16 | PN 9 | | 0000 | Config... |

**Data Length PDU OFDMA - WiMAX**

**Available for enabled parameter Multiple PDUs only**

Sets the data length for the selected PDU in the burst.

Remote-control command:
`SOUR:BB:WIM:AOFDM:ZONE0:BURS2:PDU:DLEN 16`

**Data Source PDU OFDMA - WiMAX**

**Available for enabled parameter Multiple PDUs only**

Sets the PDU data source.

The data sources **PN9**, **PN11, PN15**, **PN16**, **PN20**, **PN21**, **PN23**, **ALL 0**, **ALL1**, **Pattern** and **Data List** are all available to choose from.

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

Data lists are selected in the **File Select** window, which is called by means of the **Data List Management** button.

If the **Pattern** data type is used, the bit pattern is defined in the **Pattern** input box. The length is limited to 64 bits.

Remote-control command:
`SOUR:BB:WIM:AOFDM:ZONE0:BURS2:PDU:DATA PN16`

**Dlist/PAttern PDU OFDMA - WiMAX**

**Available for enabled parameter Multiple PDUs only**

Displays the selected Data List or Pattern.

Remote-control command :
`SOUR:BB:WIM:AOFDM:ZONE0:BURS2:PDU:DATA DLIS`
`SOUR:BB:WIM:AOFDM:ZONE0:BURS2:PDU:DATA:DSEL 'pdu_wimax'`

`SOUR:BB:WIM:AOFDM:ZONE0:BURS2:PDU:DATA PATT`
`SOUR:BB:WIM:AOFDM:ZONE0:BURS2:PDU:DATA #H0,1`

**CID PDU OFDMA - WiMAX**

**Available for enabled parameter Multiple PDUs only**

Sets the CID (connection control identifier) of the medium access control layer (MAC) for the selected PDU.

Remote-control command:
`SOUR:BB:WIM:AOFDM:ZONE0:BURS2:PDU:CID #H11`

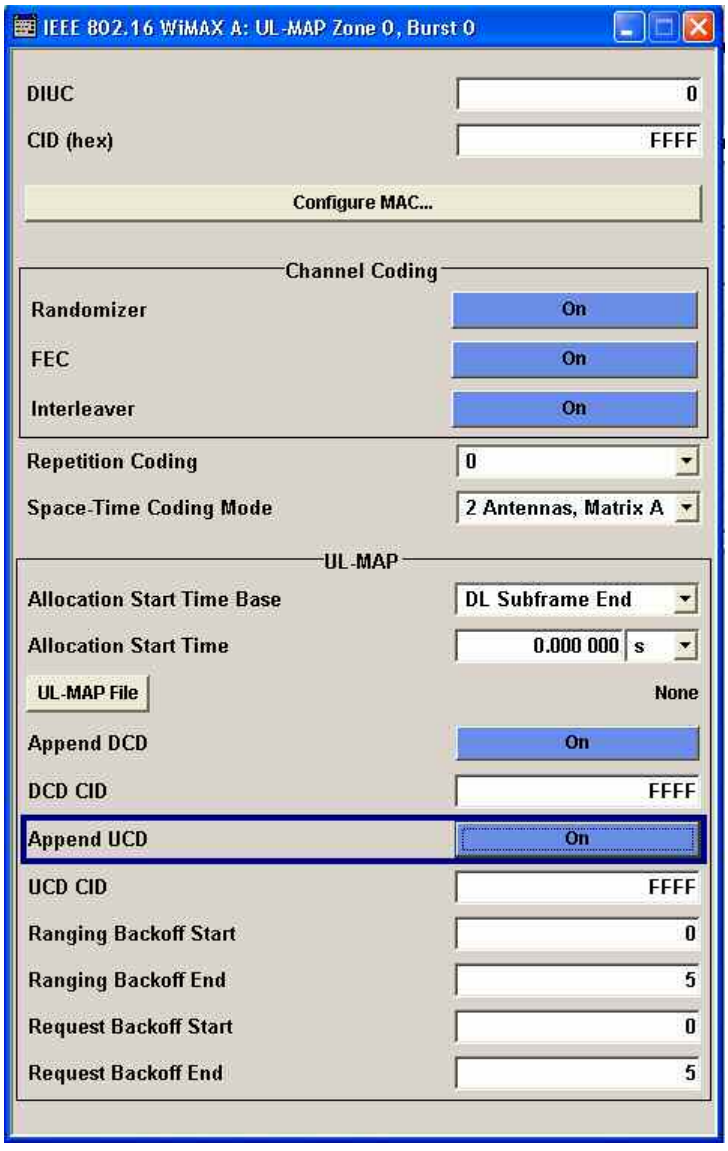
**MAC Config… PDU OFDMA – WiMAX**

Calls the menu for configuring the MAC header panel for the selected PDU (see *"PDU MAC Configuration OFDMA - WiMAX"*).

Remote-control command: `n.a.`:

# UL-MAP Configuration Downlink OFDMA - WiMAX

The **UL-MAP Configuration** menu is reached via the **More Param** button in the OFDMA burst table.




**DIUC OFDMA - WiMAX**

Sets the specific DIUC.

In DL-MAP mode **Auto**, the DIUC of each burst is included in the DL-MAP.

Remote-control command:
`SOUR:BB:WIM:AOFDM:ZONE0:BURS2:DIUC 2`

**MAC CID - WiMAX**

The command sets the CID (connection control identifier) of the medium access control layer (MAC). The CID identifies a connection to equivalent peers in the MAC of the base station and subscriber station.

This parameter is identical to the CID set in the MAC Header settings.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:MAC:CID #H333`

**Configure MAC - WiMAX**

Calls the menu for configuring the Mac header panel for the selected burst.

Remote-control command: `n.a.`

**Channel Coding Randomizer - WiMAX**

Activates or deactivates the randomizer applied before channel coding.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:CCOD:RAND ON`

**FEC - WiMAX**

Activates or deactivates the FEC state.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:CCOD:FEC ON`

**Interleaver - WiMAX**

Activates or deactivates the interleaver state.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:CCOD:INT ON`

**Repetition Coding - WiMAX**

Repetition coding can be activated by specifying any value other than 0.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:CCOD:REPC REP4`

**Allocation Start Time Base - WiMAX**

Selects the Allocation Start Time base. The Allocation Start Time field of the UL-MAP specifies the start of the uplink subframe.

When Start Time Base is set to DL Subframe End, the Allocation Start Time of the UL-MAP is set to the end of the downlink subframe + Allocation Start Time parameter set below.

When Start Time Base is set to Frame Start, the Allocation Start Time of the UL-MAP is set to the beginning of the frame + Allocation Start Time parameter set below.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:ULM:AMOD DLSF`

**Allocation Start Time - WiMAX**

Sets the Allocation Start Time in the UL-MAP.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:ULM:ATIM 0.001`

**UL-MAP File - WiMAX**

Calls the menu for selecting the UL-MAP file.

Remote-control command: `n.a.`

**Append DCD OFDMA - WiMAX**

If activated, the DCD is appended to the UL-MAP. The DCD message is transmitted with its own MAC header and CRC, included in the same burst allocation used by the UL-MAP.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:ULM:DCD:STATE ON`

**DCD CID OFDMA - WiMAX**

**(only if Append DCD is ON)**

Enters the value for the DCD CID.

This CID (connection control identifier) is independent from the UL-Map CID and only used for the DCD.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:ULM:DCD:CID #H456`

**Append UCD OFDMA - WiMAX**

If activated, the UCD is appended to the UL-MAP. The UCD message is transmitted with its own MAC header and CRC, included in the same burst allocation used by the UL-MAP.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:ULM:UCD:STAT ON`

**UCD CID OFDMA - WiMAX**

**(only if Append DCD is ON)**

Enters the value for the UCD CID.

This CID (connection control identifier) is independent from the DL-Map CID and only used for the UCD.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:ULM:UCD:CID #H456`

**Ranging Backoff Start - WiMAX**

Sets the start value for the ranging backoff.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:ULM:RANG:BOST 10`

**Ranging Backoff End - WiMAX**

Sets the end value for the ranging backoff.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:ULM:RANG:BOEN 10`

**Request Backoff Start - WiMAX**

Sets the start value for the request backoff.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:ULM:REQ:BOST 10`

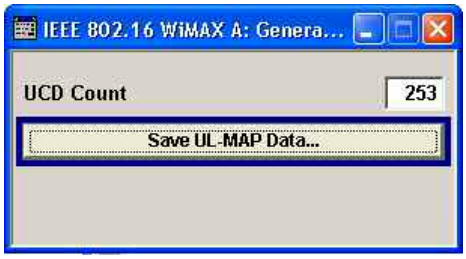
**Request Backoff End - WiMAX**

Sets the end value for the request backoff.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:ULM:REQ:BOEN 10`

# Generate UL-MAP Uplink OFDMA- WiMAX

The **Generate UL-MAP** menu is reached via the **Generate UL-MAP..** button in the zone configuration menu.




**UCD Count OFDMA - WiMAX**

Sets the value for the UCD count.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:UCD 253`

**Save UL-MAP Data OFDMA - WiMAX**

Opens the **File Select** window for saving the current UL-map.

The name of the file is specified in the **File name** entry field, the directory selected in the **save into** field. The file is saved by pressing the **Save** button.

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

The saved *.dm_iqd file is in data list format and contains a UL-MAP that describes the current uplink zone. The UL-MAP is composed of these parameters:

UCD Count:
Set to UCD Count specified above.

Allocation Start Time:
Set to 0. Can be modified later whenloading the UL-MAP in downlink mode

No. OFDMA Symbols:
Total number of OFDMA symbols in the uplink subframe.

CID:
CID from the **More Param** panel for each burst

UIUC:
UIUC from the **More Param** panel for each burst or 12 for ranging.

For ranging bursts:

OFDMA Symbol offset:
Symbol offset relative to allocation starttime

Subchannel offset:
Lowest subchannel used for ranging allocation

No. OFDMA symbols:
Symbols in ranging allocation

No. Subchannnels:
Subchannels in ranging allocation

Ranging method:
Defined by the Opportunity Size in the Ranging panel.

For data bursts:

Duration:
Burst duration in slots

Repetition coding indication:
Repetition coding from the **More Param** panel for each burst

The following steps are required to generate a valid UL-MAP

1. Switch to uplink mode
2. Define the layout of the uplink zone by setting a number of bursts and specifying the parameters above for each burst
3. Select Generate UL-MAP and save the UL-MAP to a file
4. Switch to downlink mode
5. Set one of the downlink bursts to Burst Type UL-MAP
6. Open the **More Param** panel
7. Select UL-MAP File and load the file created before.

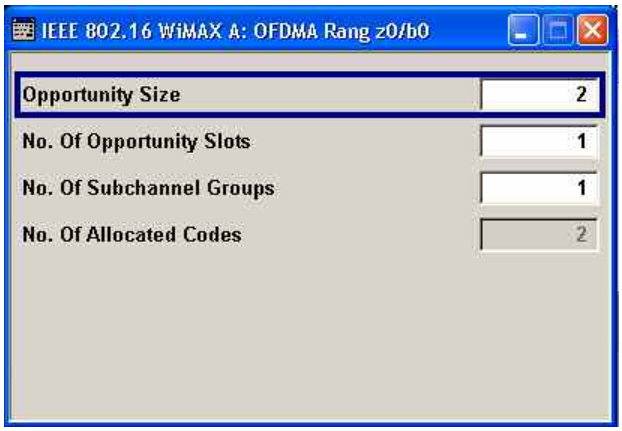
The downlink zone is then transmitting a UL-MAP that specifies the uplink structure defined in uplink mode before.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:ULM:CRE 'ulm'`

## Ranging Uplink OFDMA - WiMAX

Burst type Ranging offers ranging allocations which can be used for initial / periodic ranging or bandwidth request transmissions. For each ranging / bandwidth request slot, 8 bits are read from the data source. These 8 bits select the used code. The codes are numbered from 0 to 255. For opportunity size 4, 8 bits are read once per slot. The first code is specified by the 8 bits and the second consecutive code is the first code advanced by one. For opportunity size 3, the same method is applied. The second code is the first code + 1, the third code is the first code + 2.

The **Ranging** menu is reached via the **More Param** button in the OFDMA burst table in uplink mode. The following describes the ranging options in OFDMA mode.



**Opportunity Size - WiMAX**

Sets the ranging opportunity size. The opportunity size specifies the number of symbols required to transmit one CDMA ranging code.

For initial ranging transmissions, values of 2 or 4 are used. With opportunity size 2, one CDMA code is transmitted in two symbols. With opportunity size 4, two consecutive ranging codes are transmitted in four symbols.

For periodic ranging and bandwidth request transmissions, values of 1 or 3 are used. With opportunity size 1, one CDMA code is transmitted in one symbol. With opportunity size 3, three consecutive ranging codes are transmitted in three symbols.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:RANG:OPP:SIZE 2`

**No. Of Opportunity Slots - WiMAX**

The number of opportunity slots defines the length of the ranging allocation:

Length of Ranging Allocation = OpportunitySize * NoOfOpportunitySlots OFDMA symbols.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:RANG:OPP:SLOT 1`

**No. Of Subchannel Groups - WiMAX**

Sets the number of subchannel groups used in the ranging allocation. In PUSC mode, 6 subchannels form one subchannel group.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:RANG:SCGC 5`

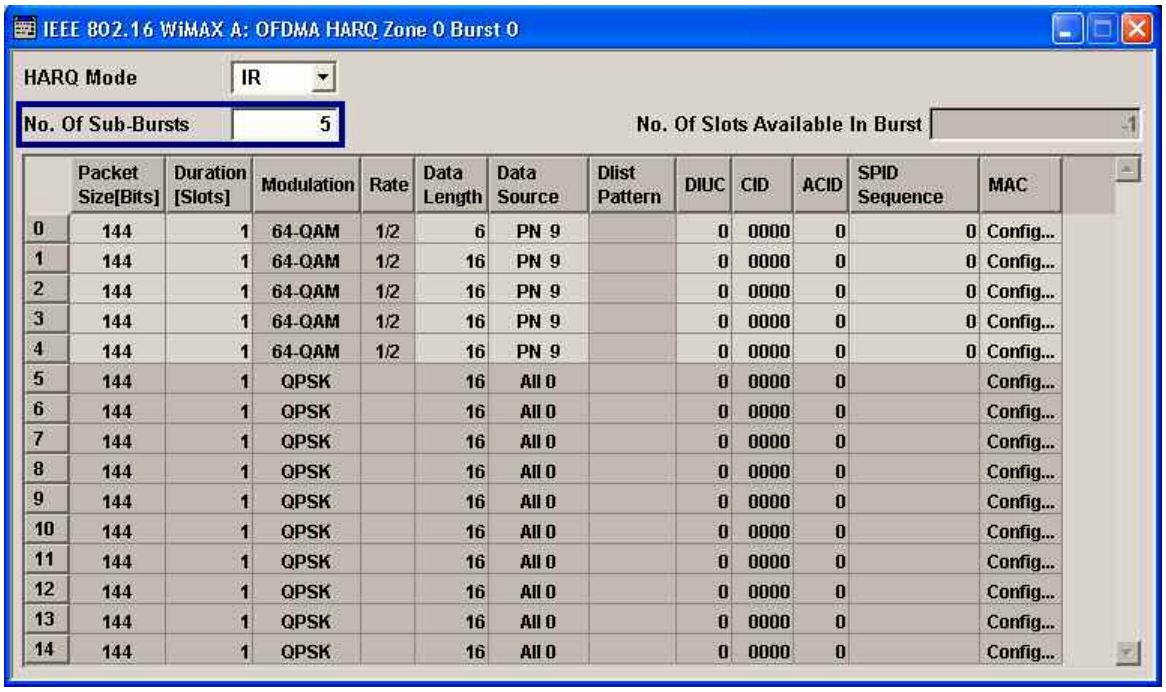
**No. Of Allocated Codes - WiMAX**

Displays the number of allocated codes. The number of codes is NoOfOpportunitySlots * NoOfSubchannelGroups.
Consecutive codes of opportunity sizes 3 and 4 are not taken into account.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:RANG:ACOD?`

# HARQ Configuration OFDMA - WiMAX

The **HARQ Configuration** menu is reached via the **More Param** button in the OFDMA burst table. HARQ bursts are only available with CTC channel coding.




| | Packet Size[Bits] | Duration [Slots] | Modulation | Rate | Data Length | Data Source | Dlist Pattern | DIUC | CID | ACID | SPID Sequence | MAC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 144 | 1 | 64-QAM | 1/2 | 6 | PN 9 | | 0 | 0000 | 0 | 0 | Config... |
| 1 | 144 | 1 | 64-QAM | 1/2 | 16 | PN 9 | | 0 | 0000 | 0 | 0 | Config... |
| 2 | 144 | 1 | 64-QAM | 1/2 | 16 | PN 9 | | 0 | 0000 | 0 | 0 | Config... |
| 3 | 144 | 1 | 64-QAM | 1/2 | 16 | PN 9 | | 0 | 0000 | 0 | 0 | Config... |
| 4 | 144 | 1 | 64-QAM | 1/2 | 16 | PN 9 | | 0 | 0000 | 0 | 0 | Config... |
| 5 | 144 | 1 | QPSK | | 16 | All 0 | | 0 | 0000 | 0 | | Config... |
| 6 | 144 | 1 | QPSK | | 16 | All 0 | | 0 | 0000 | 0 | | Config... |
| 7 | 144 | 1 | QPSK | | 16 | All 0 | | 0 | 0000 | 0 | | Config... |
| 8 | 144 | 1 | QPSK | | 16 | All 0 | | 0 | 0000 | 0 | | Config... |
| 9 | 144 | 1 | QPSK | | 16 | All 0 | | 0 | 0000 | 0 | | Config... |
| 10 | 144 | 1 | QPSK | | 16 | All 0 | | 0 | 0000 | 0 | | Config... |
| 11 | 144 | 1 | QPSK | | 16 | All 0 | | 0 | 0000 | 0 | | Config... |
| 12 | 144 | 1 | QPSK | | 16 | All 0 | | 0 | 0000 | 0 | | Config... |
| 13 | 144 | 1 | QPSK | | 16 | All 0 | | 0 | 0000 | 0 | | Config... |
| 14 | 144 | 1 | QPSK | | 16 | All 0 | | 0 | 0000 | 0 | | Config... |

**HARQ Mode - WiMAX** Selects the mode of the HARQ burst.

**Chase** Selects Chase Combining HARQ. For each sub-burst, only one version of the packet is generated.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:HARQ:MODE CHAS`

**IR** Selects Incremental Redundancy HARQ. For each sub-burst, several versions of encoded sub-packets can be generated. They are identified by a sub-packet ID (SPID).

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:HARQ:MODE IR`

**No. Of Sub-Bursts - WiMAX** Sets the number of sub-bursts in the HARQ bust. Each HARQ burst allocated in the Zone Configuration panel can be divided into up to 15 sub-bursts. The length of each sub-burst is set by the **Duration [Slots]** parameter.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:HARQ:COUN 10`

**No. Of Slots Available In Burst - WiMAX**

Displays the remaining number of slots available for the burst. The number of slots is defined in the zone configuration panel with **No. of Subch** and **No. of Symb** in the downlink and **Duration [Slots]** in the uplink.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:HARQ:SLFR?`

**Sub-Burst Index - WiMAX**

Displays the consecutive sub-burst index from 0 to 14.

All the rows are always displayed, even if the sub-bursts are inactive. They are switched on and off by the selection of No. of Sub-Bursts above the table. The active sub-bursts are highlighted.

Remote-control command: `n.a.`
(selected via the suffix to the keyword :BURSt <n>)

**Packet Size [Bits] - WiMAX**

Sets the HARQ sub-burst packet size (in bits).

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:HARQ5:PSIZ PS48`

**Duration [Slots] - WiMAX**

Sets the duration of the sub-bursts in slots. The duration range is dynamic and depends on the selected link direction and packet size.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:HARQ3:SLOT 1`

**Modulation - WiMAX**

Displays the sub-burst modulation. The modulation is determined by the parameters **Packet Size** and **Duration** and cannot be altered directly.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:HARQ3:FORM?`

**Rate - WiMAX**

Displays the sub-burst code rate. The code rate is determined by the parameters **Packet Size** and **Duration** and cannot be altered directly

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:HARQ5:RATE?`

**Data Length - WiMAX**

Sets the data length of the sub-burst. The data length range is dynamic and depends on the packet size and the MAC header state.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:HARQ3:DLEN 3`

**Data Source - WiMAX**

Selects data source for the selected sub-bursts.

The data sources **PN9**, **PN11**, **PN15**, **PN16**, **PN20**, **PN21**, **PN23**, **ALL 0**, **ALL1**, **Pattern** and **Data List** are all available to choose from.

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

Data lists are selected in the **File Select** window, which is called by means of the **Data List Management** button.

If the **Pattern** data type is used, the bit pattern is defined in the **Pattern** input box. The length is limited to 64 bits.

Remote-control command:

```
SOUR:BB:WIM:AOFD:ZONE0:BURS2:HARQ5:DATA PATT
SOUR:BB:WIM:AOFD:ZONE0:BURS2:HARQ5:DATA:PATT #H3F,8

SOUR:BB:WIM:AOFD:ZONE0:BURS2:HARQ5:DATA DLIS
SOUR:BB:WIM:AOFD:ZONE0:BURS2:HARQ5:DATA:DSEL
'dlist1'
```

**DIUC - WiMAX**

Sets the DIUC (Downlink Interval User Code) for the specified sub-burst.

Remote-control command:

```
SOUR:BB:WIM:AOFD:ZONE0:BURS2:HARQ5:DIUC
```

**CID - WiMAX**

Sets the CID (Connection Control Identifier) of the medium access control layer (MAC). The CID identifies a connection to equivalent peers in the MAC of the base station and subscriber station.

This parameter is identical to the CID set in the MAC Header settings.

Remote-control command:

```
SOUR:BB:WIM:AOFD:ZONE0:BURS2:HARQ5:MAC:CID
```

**ACID - WiMAX**

Sets the HARQ channel identifier for the specified sub-burst.

Remote-control command:

```
SOUR:BB:WIM:AOFD:ZONE0:BURS2:HARQ5:ACID
```

**SPID Sequence - WiMAX**

Sets the sub-packet ID sequence which is used to select the generated sub-packet out of the four possible sub-packets for each frame. Each SPID is identified by a number from 0 to 3. Up to 8 numbers can be entered, separated by colons.

During signal generation, one SPID out of the sequence is used to generate the encoder packet for each frame. The index in the SPID sequence is advanced frame by frame and starts again from the beginning after all entered numbers have been used.

Example:

SPID sequence: 0,1,2

Sequence Length set in the main panel: 10 frames.

The following sequence is output:

0,1,2,0,1,2,0,1,2,0

***Note**:*
*For HARQ mode **Chase**, this field cannot be edited.*

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:HARQ5:SPID 1,2,3`

**MAC - WiMAX**

Calls the menu for configuring the generic MAC (Media Access Control) header of the selected sub-burst and for activating the checksum determination.

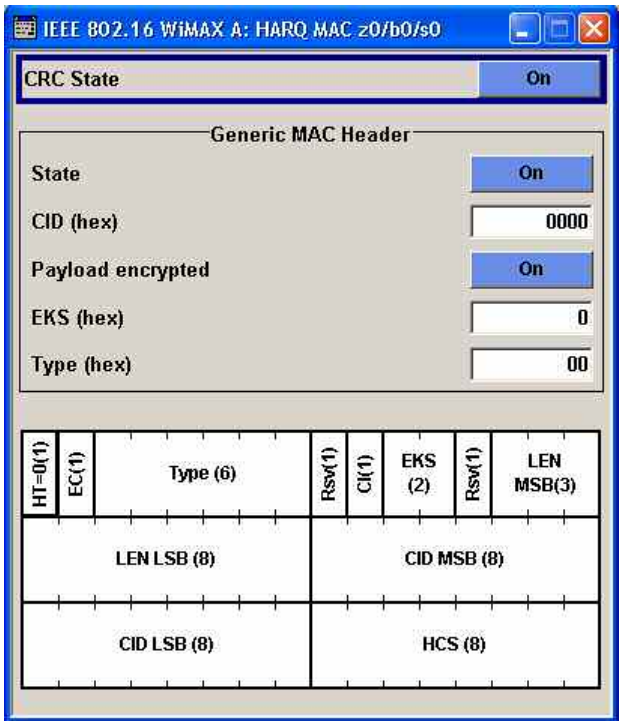
Remote-control command: `n. a.`

## HARQ MAC Header Configuration OFDMA - WiMAX

The **HARQ MAC** menu is reached via the **Config...** button located in the sub-burst table (see "HARQ Configuration OFDMA - WiMAX", page 64).

This menu provides settings for a generic MAC header, which is placed at the beginning of the sub-burst when activated.

In addition CRC (cyclic redundancy check) can be activated, which is added at the end of the burst. It covers MAC header and all data.




**CRC State - WiMAX** Activates/deactivates the checksum determination. The state of the CRC can be set independently of the state of MAC header generation.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:HARQ5:MAC:CRC:STAT ON`

The **Generic MAC Header** section is where the header generation is activated and the header parameters are defined.

**MAC Header State - WiMAX** Activates the generation of the generic MAC header.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:HARQ5:MAC:STAT ON`

**MAC CID - WiMAX** The command sets the CID (Connection Control Identifier) of the medium access control layer (MAC). The CID identifies a connection to equivalent peers in the MAC of the base station and subscriber station.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:HARQ5:MAC:CID #H333`

**Payload encrypted - WiMAX** Activates/deactivates payload encryption.

If activated, the EC (encryption control) field is set to 1 and the EKS (encryption key sequence) field can be set.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:HARQ5:MAC:ENCR:STAT ON`

**EKS - WiMAX**

Sets the EKS (Encryption Key Sequence) value in the MAC header. The payload encryption itself is not performed by the signal generator.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:HARQ5:MAC:EKS 4`

**Mac Type - WiMAX**

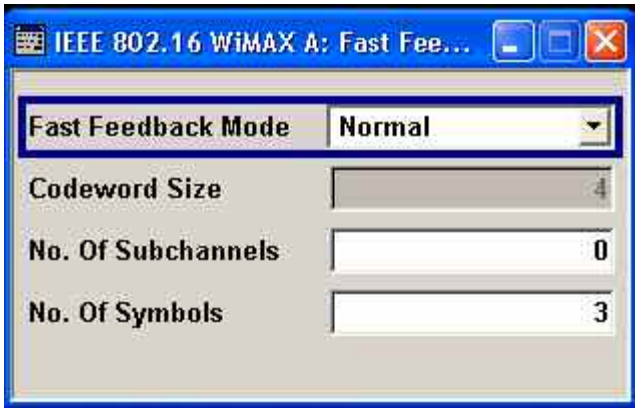
Specifies the MAC type.

The value of the 6-bit type field is set which indicates the payload type, including the presence of subheaders.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:HARQ5:MAC:TYPE 30`

## Fast Feedback Configuration OFDMA - WiMAX

The **Fast Feedback Configuration** menu is reached via the **More Param** button in the OFDMA burst table.




**Fast Feedback Mode - WiMAX**

Selects the fast feedback mode.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:FFB:MODE ENH`

**Codeword Size - WiMAX**

Displays the codeword size. The codeword size depends on the selected **Fast Feedback Mode**. In Normal mode, 4 bits are read out of the data source and are mapped to one fast feedback slot. In Enhanced mode, 6 bits are mapped to one slot.

The Enhanced (MIMO) and ACK modes use two codewords per slot. In Enhanced (MIMO) mode, two times 3 bits are read out of the data source and are mapped to one slot. The first 3 bits are mapped to tiles 0, 2, and 4; the second 3 bits are mapped to tile 1, 3, and 5. For the ACK mode, the procedure is similar. Here, the first bit is mapped to the first half slot and the second bit is mapped to the second half slot.

The data source is read out continuously over the configured frames, MSB first. If the length of the data source is smaller than the number of bits required by codeword size, number of slots in the allocation and configured sequence length, reading the data source is restarted from the beginning.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:FFB:CWS?`
`Response: 1`

**No. Of Subchannels - WiMAX**

Sets the number of subchannels. The number of slots in the fast feedback allocation is subchannels * symbols / 3.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:FFB:SUBC 1`

**No. Of Symbols - WiMAX**

Sets the number of symbols. The number of slots in the fast feedback allocation is subchannels * symbols / 3.

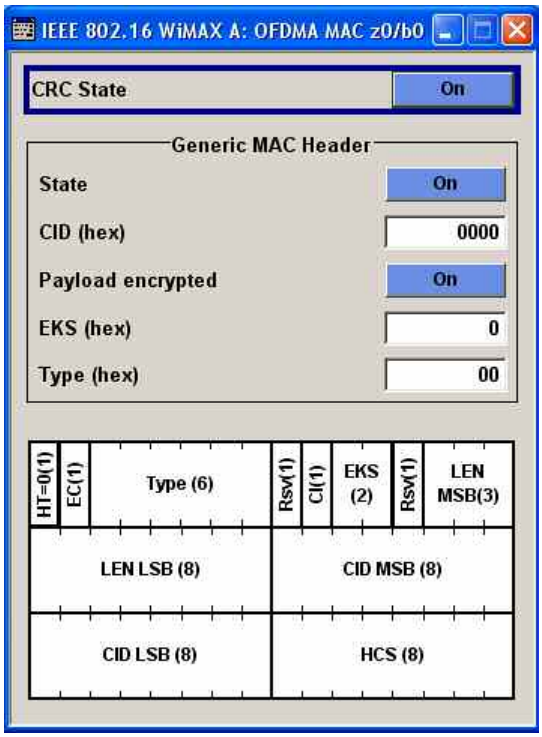
Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:FFB:SYMB 3`

## MAC Header Configuration OFDMA - WiMAX

The **MAC** menu is reached via the **Configure MAC...** button located in the **More Param** panel.

This menu provides settings for a generic MAC header of the corresponding zone and burst. The MAC header is placed at the beginning of the burst when activated.

In addition CRC (Cyclic Redundancy Check) can be activated, which is added at the end of the burst. It covers MAC header and all data.




**CRC State - WiMAX**

Activates/deactivates the checksum determination. The state of the CRC can be set independently of the state of MAC header generation.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:MAC:CRC:STAT ON`

The **Generic MAC Header** section is where the header generation is activated and the header parameters are defined.

**MAC Header State - WiMAX** Activates the generation of the generic MAC header.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:MAC:STAT ON`

**MAC CID - WiMAX** The command sets the CID (Connection Control Identifier) of the medium access control layer (MAC). The CID identifies a connection to equivalent peers in the MAC of the base station and subscriber station.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:MAC:CID  #H333`

**Payload encrypted - WiMAX** Activates/deactivates payload encryption.

If activated, the EC (Encryption Control) field is set to 1 and the EKS (Encryption Key Sequence) field can be set.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:MAC:ENCR:STAT ON`

**EKS - WiMAX** Sets the EKS (Encryption Key Sequence) value in the MAC header. The payload encryption itself is not performed by the signal generator.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:MAC:EKS 4`

**Mac Type - WiMAX** Specifies the MAC type.

The value of the 6-bit type field is set which indicates the payload type, including the presence of subheaders.

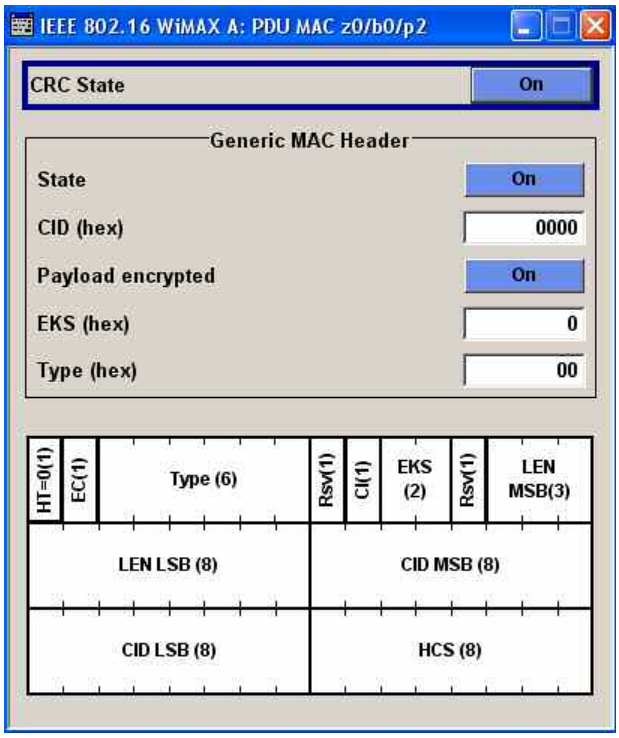
Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:MAC:TYPE 02`

## PDU MAC Configuration OFDMA - WiMAX

The **PDU MAC** menu is reached via the **Configure MAC...** button located in the **PDU Table**.

This menu provides settings for the generic PDU MAC header of the corresponding zone, burst and PDU combination. The MAC header is placed at the beginning of the PDU when activated.

In addition CRC (Cyclic Redundancy Check) can be activated, which is added at the end of the PDU. It covers MAC header and all data.




**CRC State (PDU) - WiMAX** Activates/deactivates the checksum determination. The state of the CRC can be set independently of the state of MAC header generation.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:PDU3:MAC:CRC:STAT ON`

The **Generic MAC Header** section is where the header generation is activated and the header parameters are defined.

**MAC Header State (PDU) - WiMAX** Activates the generation of the generic MAC header.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:PDU3:MAC:STAT ON`

**MAC CID (PDU) - WiMAX** The command sets the CID (Connection Control Identifier) of the medium access control layer (MAC). The CID identifies a connection to equivalent peers in the MAC of the base station and subscriber station.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:PDU3:MAC:CID #H333`

**Payload encrypted (PDU) - WiMAX** Activates/deactivates payload encryption.

If activated, the EC (Encryption Control) field is set to 1 and the EKS (Encryption Key Sequence) field can be set.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:PDU3:MAC:ENCR:STAT ON`

**EKS (PDU) - WiMAX**

Sets the EKS (Encryption Key Sequence) value in the MAC header. The payload encryption itself is not performed by the signal generator.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:PDU3:MAC:EKS 4`

**Mac Type (PDU) - WiMAX**

Specifies the MAC type.

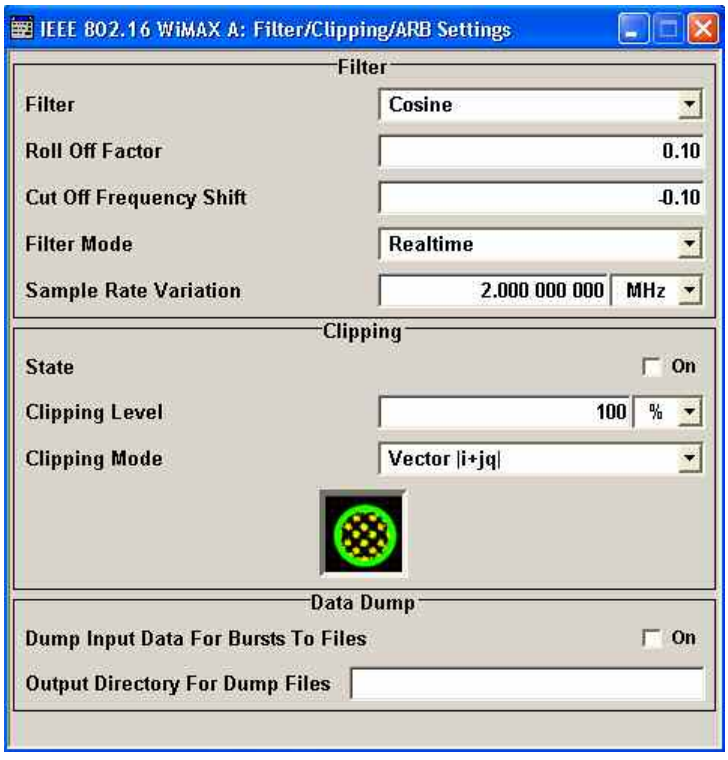
The value of the 6-bit type field is set which indicates the payload type, including the presence of subheaders.

Remote-control command:
`SOUR:BB:WIM:AOFD:ZONE0:BURS2:MAC:PDU3:TYPE 01`

## Filter / Clipping Settings - WiMAX

The **Filter / Clipping** menu is reached via the WiMAX main menu.

The baseband filter, sample rate variation and clipping are defined in this menu.




**Filter - WiMAX**

Sets the baseband filter.

Remote-control command:
`SOUR:BB:WIM:FILT:TYPE COS`

**Roll Off Factor - WiMAX**

Indicates the filter parameter.

For the default cosine filter a roll off factor of 0.07 is used.

Remote-control command:

```
SOUR:BB:WIM:FILT:PAR:COS 0.05
SOUR:BB:WIM:FILT:PAR:RCO 0.05
SOUR:BB:WIM:FILT:PAR:PGA 0.15
SOUR:BB:WIM:FILT:PAR:GAU 0.15
SOUR:BB:WIM:FILT:PAR:SPH 0.15
SOUR:BB:WIM:FILT:PAR:APCO25 0.05
```

**Cut Off Frequency Shift - WiMAX**

**(This feature is available for filter parameter Cosine only.)**

Sets the value for the cut off frequency shift. The cut off frequency of the cosine filter can be adjusted to reach spectrum mask requirements.

The value range is -1.0 to 1.0.

Remote-control command:

```
SOUR:BB:WIM:FILT:PAR:COS:COFS 1.0
```

**Cut Off Frequency Factor - WiMAX**

**(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:WIM:FILT:PAR:LPAS 0.5
```

**Filer Mode - WiMAX**

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

Selects whether to apply the filter in real time mode or offline mode.

**Realtime**

The filter is applied to the signal in real-time mode.

Remote-control command:

```
SOUR:BB:WIM:FILT:MODE REAL
```

**Offline**

The filter is applied to the signal in offline mode. This option increases the calculation time and reduces the maximum number of generated frames that can be fit into the ARB memory. It can be useful to filter the signal in offline mode if steeper filter edges are required. In offline mode, more taps are used for the filters; therefore the roll of factor can be further decreased.

Remote-control command:

```
SOUR:BB:WIM:FILT:MODE OFFL
```

**Sample Rate Variation - WiMAX**

Sets the sample rate of the signal.

A variation of this parameter only affects the ARB clock rate; all other signal parameters remain unchanged. If the sampling rate in the frame configuration menu is changed, this parameter is reset to the chosen sampling rate.

Remote-control command:
`SOUR:BB:WIM:SRAT:VAR 40000000`

**Impulse Length - WiMAX**

**(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:WIM:FILT:ILEN:AUTO ON`
`SOUR:BB:WIM:FILT:ILEN 120`

**Oversampling - WiMAX**

**(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:WIM:FILT:OSAM:AUTO ON`
`SOUR:BB:WIM:FILT:OSAM 20`

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

**Clipping State - WiMAX**

Switches baseband clipping on and off.

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

With baseband clipping, the signal level is 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.

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

**Clipping Level- WiMAX**

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.

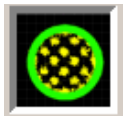
Remote-control command:
`SOUR:BB:WIM:CLIP:LEV 50`

**Clipping Mode - WiMAX**

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

**Vector | i + q |**

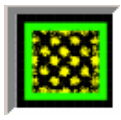
The limit is related to the amplitude | i + q | . The I and Q components are mapped together, the angle is retained (see also Clipping State).



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

**Dump Input Data for Bursts to Files - WiMAX**

Activates burst input data dump. The data that is fed into the channel coding of each burst is output to files named

data_frameXXXX_zoneY_burstZZ.dat

where XXXX specifies the frame number, Y the zone index and ZZ the burst index. The files contain all data including MAC header and CRC in ASCII hex format, MSB left. Read the files from left to right.

Remote-control command:
`SOUR:BB:WIM:BDUM:STAT ON`

**Output directory for Dump Files - WiMAX**

The directory path specified here is used to store the dumped burst data files. If the field is empty the firmware directory is used (such as C:\Program Files\Rohde&Schwarz\SMUFirmware).

Remote-control command:
`SOUR:BB:WIM:BDUM:DIR 'D:\wimax\dump'`

# Trigger/Marker/Clock - WiMAX

***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 IEEE 802.16 WiMAX main menu.

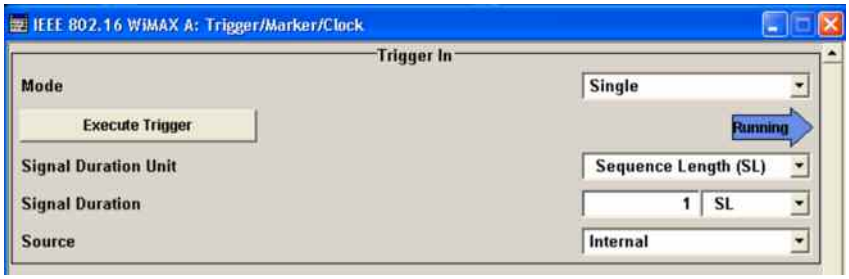
The **Trigger In** section is where the trigger for the WiMAX signal is set. Various parameters will be provided for the settings, depending on which trigger source - internal or external - is selected. The current status of signal generation (**Running** or **Stopped**) is indicated for all trigger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

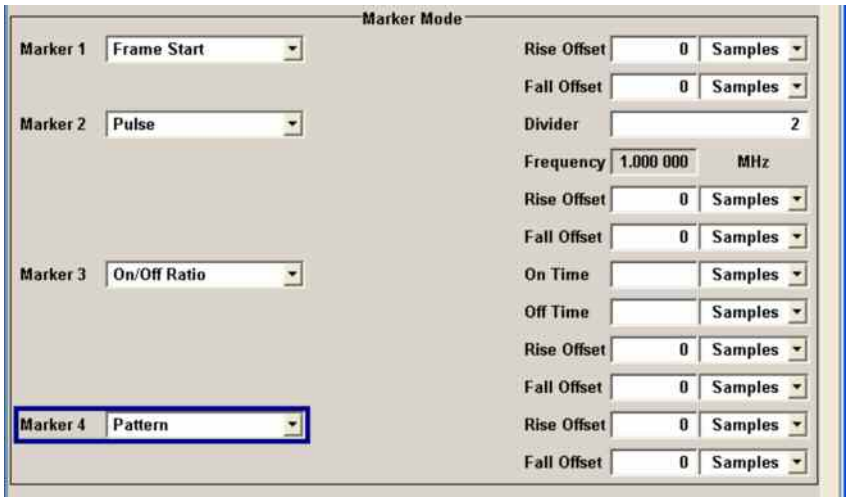
The **Marker Mode** section is where the marker signals at the MARKER output connectors are configured.

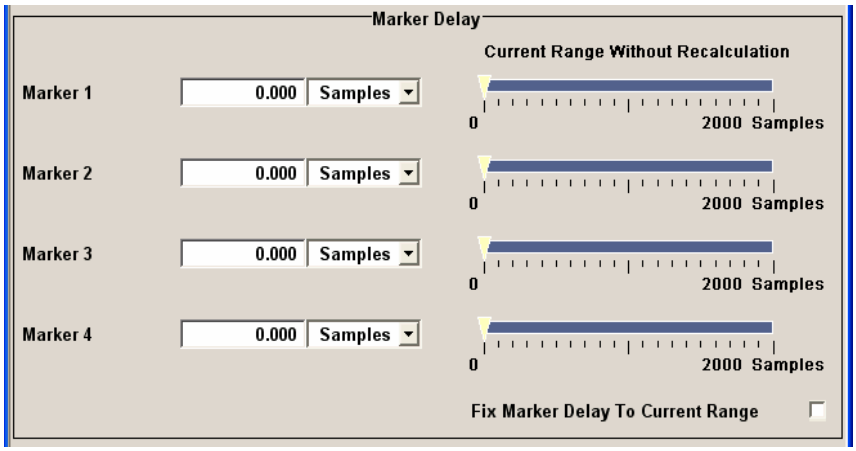
The **Marker Delay** section is where a marker signal delay can be defined, either without restriction or restricted to the dynamic section, i.e., the section in which it is possible to make settings without restarting signal and marker generation.

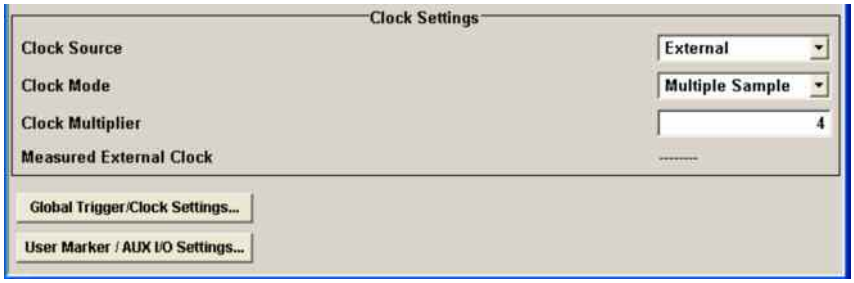
The **Clock Settings** section is where the clock source is selected and - in the case of an external source - the clock type.

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






The **Trigger In** section is where the trigger for the IEEE 802.16 WiMAX signal is set. The current status of the signal generation is displayed for all trigger modes.

**Trigger Mode - WiMAX** **(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 IEEE 802.16 WiMAX signal is generated continuously.

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

**Retrigger**

The IEEE 802.16 WiMAX signal is generated continuously. A trigger event (internal or external) causes a restart.

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

**Armed_Auto**

The IEEE 802.16 WiMAX-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:WIM:SEQ AAUT`

**Armed_ Retrigger**

The IEEE 802.16 WiMAX-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:WIM:SEQ ARET`

**Single**

The IEEE 802.16 WiMAX 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:WIM:SEQ SING`

**Signal Duration - WiMAX**

**(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 input is to be expressed in samples. It is then possible to output deliberately just part of the signal, an exact sequence of the signal, or a defined number of repetitions of the signal.

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

**Signal Duration Unit - WiMAX**

**(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 frame, chip or sequence length (SL).

Remote-control commands:
`SOUR:BB:WIM:TRIG:SLUN FRAM`

**Running - Stopped - WiMAX**

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

Displays the status of signal generation for all trigger modes. This display appears only when IEEE 802.16 WiMAX is enabled (**State On**).

Remote-control command:
`SOUR:BB:WIM:TRIG:RMOD?`
`Response: RUN or STOP`

**Running**

The IEEE 802.16 WiMAX 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 - WiMAX** **(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:WIM:TRIG:ARM:EXEC`

**Execute Trigger - WiMAX** **(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:WIM:TRIG:SOUR INT
SOUR:BB:WIM:SEQ RETR
SOUR:BB:WIM:TRIG:EXEC
```

**Trigger Source - WiMAX** **(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:WIM: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:WIM: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:WIM:TRIG:SOUR EXT | BEXT`

**External / Trigger Delay - WiMAX**

Sets trigger signal delay in samples 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:WIM:TRIG:EXT:DEL 3`
`SOUR:BB:WIM:TRIG:OBAS:DEL 3`

**External / Trigger Inhibit - WiMAX**

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

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

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

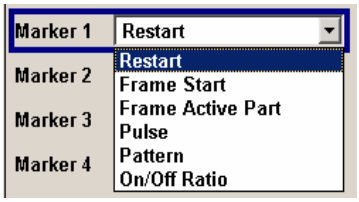
***Note:***
*For two-path instruments, the trigger inhibit can be set separately for each of the two paths.*

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

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

**Marker Mode - WiMAX**

Selects a marker signal for the associated MARKER output.




**Restart**

A marker signal is generated at the start of each ARB sequence.

Remote-control command:
`SOUR:BB:WIM:TRIG:OUTP1:MODE REST`

**Frame Start**

A marker signal is generated at the start of each frame.

Remote-control command:
`SOUR:BB:WIM:TRIG:OUTP1:MODE FRAM`

**Frame Active Part**

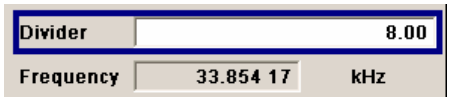
The marker signal is high whenever a burst is active and low during inactive signal parts (such as the gaps between bursts in uplink mode or the uplink subframe in downlink TDD mode).

This marker can be used to decrease the carrier leakage during inactive signal parts by feeding it into the pulse modulator.

Remote-control command:
`SOUR:BB:WIM:TRIG:OUTP1:MODE FACT`

**Pulse**

A regular marker signal is generated. The clock frequency is defined by entering a divider. The frequency is derived by dividing the sample rate by the divider. The input box for the divider opens when **Pulse** is selected, and the resulting pulse frequency is displayed below it.




Remote-control commands:
```
SOUR:BB:WIM:TRIG:OUTP1:MODE PULS
SOUR:BB:WIM:TRIG:OUTP1:PULS:DIV 4
SOUR:BB:WIM:TRIG:OUTP1:PULS:FREQ?
```

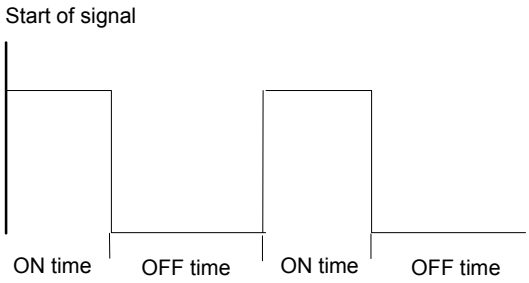
**Pattern**

A marker signal that is defined by a bit pattern is generated. The pattern has a maximum length of 32 bits and is defined in an input field which opens when **pattern** is selected.

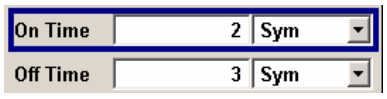

Remote-control commands:
```
SOUR:BB:WIM:TRIG:OUTP1:MODE PATT
SOUR:BB:WIM:TRIG:OUTP1:PATT #B1111,4
```

**ON/OFF ratio**

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




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




Remote-control commands:
```
SOUR:BB:WIM:TRIG:OUTP1:MODE RAT
SOUR:BB:WIM:TRIG:OUTP1:OFFT 20
SOUR:BB:WIM:TRIG:OUTP1:ONT  20
```

**Rise Offset - WiMAX**

Sets the value for the rise offset. The rising ramp of the marker is shifted by the set value in samples. Positive values shift the rising ramp to later positions; negative values shift it to earlier positions.

The value range is -64000 to 64000.

Remote-control command:
`SOUR:BB:WIM:TRIG:OUTP2:ROFF 5000`

**Fall Offset - WiMAX**

Sets the value for the fall offset. The falling ramp of the marker is shifted by the set value in samples. Positive values shift the falling ramp to later positions; negative values shift it to earlier positions.

The value range is -64000 to 64000.

Remote-control command:
`SOUR:BB:WIM:TRIG:OUTP2:FOFF 5000`

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 - WiMAX**

**(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 samples.

If the setting "**Fix marker delay to dynamic range**" is enabled, the setting range is restricted to the dynamic range. In this range the delay of the marker signals can be set without restarting the marker and signal.

The allocation of marker signals to the outputs is described in the section "*Marker Output Signals*".

Remote-control command:
`SOUR:BB:WIM:TRIG:OUTP2:DEL 20`

**Current Range without Calculation - WiMAX**

**(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.

The delay can be defined by moving the setting mark.

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

**Fix marker delay to current range - WiMAX**

**(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:WIM:TRIG:OUTP:DEL:FIX ON`

The clock source is selected in the Clock Settings section.

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

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

Selects the clock source (also see section "*Clock Signals*").

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

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

**Extern** The external clock reference is fed in as the sample clock or multiple thereof via the CLOCK connector.

The sample 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:WIM:CLOC:SOUR EXT`

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

Enters the type of externally supplied clock.

**Sample** A sample clock is supplied via the CLOCK connector.

Remote-control command:
`SOUR:BB:WIM:CLOC:MODE SAMP`

**Multiple Sample** A multiple of the sample clock is supplied via the CLOCK connector; the sample clock is derived internally from this.

The **Multiplier** window provided allows the multiplication factor to be entered.

Remote-control command:
`SOUR:WIM:CLOC:MODE MSAM`

**Sample Clock Multiplier - WiMAX** **(R&S SMx and R&S AMU instruments only)**

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

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

**Measured External Clock - WiMAX**

**(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 - WiMAX**

**(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 clock and trigger inputs.

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

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

**User Marker / AUX I/O Settings - WiMAX**

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

Calls the **User Marker AUX I/O Settings** menu. This menu is used to map the connector on the rear of the instruments see section "*User Marker - AUX IO - Setup-Environment-Global...Settings*".

# SOURce:BB:WIMax Subsystem Remote-Control Commands

## Introduction - WiMax - General Remote-Control Commands

This subsystem contains commands for the primary and general settings of the IEEE 802.16 WiMAX standard. These settings concern activation and deactivation of the standard, setting the transmission direction, filter, clock, trigger and clipping settings, defining the frame duration and the sequence length, as well as the preset setting.

The commands for defining the frame configuration for physical layer modes OFDM and OFDMA are described in the next section. The commands are divided up in this way to make the comprehensive `SOURce:BB:WIMax` 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.

## Command Table - WIMax

| Command | Parameters | Default unit | Comments |
|---|---|---|---|
| [SOURce<[1]\|2>:]BB:WIMax:BDUMp:DIRectory | | | |
| [SOURce<[1]\|2>:]BB:WIMax:BDUMp:STATe | ON \| OFF | | |
| [SOURce<[1]\|2>:]BB:WIMax:CLIPping:LEVel | 1...100 | PCT | |
| [SOURce<[1]\|2>:]BB:WIMax:CLIPping:MODE | VECTor \| SCALar | | |
| [SOURce<[1]\|2>:]BB:WIMax:CLIPping:STATe | ON \| OFF | | |
| [SOURce<[1]\|2>:]BB:WIMax:CLOCk:MODE | SAMPle \| MSAMple | | |
| [SOURce<[1]\|2>:]BB:WIMax:CLOCk:MULTiplier | 1... 64 | | |
| [SOURce<[1]\|2>:]BB:WIMax:CLOCk:SOURce | EXTernal \| INTernal | | |
| [SOURce<[1]\|2>:]BB:WIMax:DUPLexing | TDD \| FDD | | |
| [SOURce<[1]\|2>:]BB:WIMax:FILTer:ILENgth | 1...128 | | |
| [SOURce<[1]\|2>:]BB:WIMax:FILTer:ILENgth:AUTO | ON \| OFF | | |
| [SOURce<[1]\|2>:]BB:WIMax:FILTer:MODE | REALtime \| OFFLine | | |
| [SOURce<[1]\|2>:]BB:WIMax:FILTer:OSAMpling | 1...32 | | |
| [SOURce<[1]\|2>:]BB:WIMax:FILTer:OSAMpling:AUTO | ON \| OFF | | |
| [SOURce<[1]\|2>:]BB:WIMax:FILTer:PARameter:APCO25 | 0.05 ... 0.99 | | |
| [SOURce<[1]\|2>:]BB:WIMax:FILTer:PARameter:COSine | 0.00 ... 0.99 | | |
| [SOURce<[1]\|2>:]BB:WIMax:FILTer:PARameter:COSine:COFS | -1.0 … +1.0 | | |
| [SOURce<[1]\|2>:]BB:WIMax:FILTer:PARameter:GAUSs | 0.15 … 2.5 | | |
| [SOURce<[1]\|2>:]BB:WIMax:FILTer:PARameter:LPASs | 0.05...2.0 | | |
| [SOURce<[1]\|2>:]BB:WIMax:FILTer:PARameter:PGAuss | 0.00 … 2.5 | | |
| [SOURce<[1]\|2>:]BB:WIMax:FILTer:PARameter:RCOSine | 0.00 ... 0.99 | | |

| Command | Parameters | Default unit | Comments |
|---|---|---|---|
| [SOURce<[1]\|2>:]BB:WIMax:FILTer:PARameter:SPHase | 0.15 … 2.5 | | |
| [SOURce<[1]\|2>:]BB:WIMax:FILTer:TYPE | RCOSine \| COSine \| GAUSs \| LGAuss \| CONE \| COF705 \| COEQualizer \| LPASs COFequalizer \| DIRac C2K3x \| APCO25 \| SPHase \| ENPShape RECTangle \| PGAuss \| EWPShape | | |
| [SOURce<[1]\|2>:]BB:WIMax:FRAMe:BURSt:DELay | 0.0 ms ... <frame duration> | | |
| [SOURce<[1]\|2>:]BB:WIMax:FRAMe:TIME | MS2 \| MS2D5 \| MS4 \| MS5 \| MS8 \| MS10 \| MS12D5 \| MS20 \| CONTinuous \| USER | | |
| [SOURce<[1]\|2>:]BB:WIMax:FRAMe:TIME:USER | 0 ... 10E6 s | | |
| [SOURce<[1]\|2>:]BB:WIMax:LINK | FORWard \| REVerse (Alias DOWN \| UP) | | |
| [SOURce<[1]\|2>:]BB:WIMax:MODE | OFDM \| AOFDm \| WIBRo | | |
| [SOURce<[1]\|2>:]BB:WIMax:PRESet | | | No query |
| [SOURce:]BB:WIMax:PATH:COUPling[:STATe] | ON \|OFF | | |
| [SOURce<[1]\|2>:]BB:WIMax:SEQuence | AUTO \| RETRigger \| AAUTo \| ARETrigger \| SINGle | | |
| [SOURce<[1]\|2>:]BB:WIMax:SETTing:CATalog? | | | Query only |
| [SOURce<[1]\|2>:]BB:WIMax:SETTing:DELete | <file_name> | | |
| [SOURce<[1]\|2>:]BB:WIMax:SETTing:LOAD | <file_name> | | |
| [SOURce<[1]\|2>:]BB:WIMax:SETTing:STORe | <file_name> | | |
| [SOURce<[1]\|2>:]BB:WIMax:SLENgth | 1... MAX | | |
| [SOURce<[1]\|2>:]BB:WIMax:SRATe:VARiation | 400 Hz ... 10 MHz | Hz (c/s) | |
| [SOURce<[1]\|2>:]BB:WIMax:STATe | ON \| OFF | | |
| [SOURce<[1]\|2>:]BB:WIMax:SUBFrame:TIME | 0 ... MAX | s | |
| [SOURce<[1]\|2>:]BB:WIMax:TRIGger:ARM:EXECute | | | No query |
| [SOURce<[1]\|2>:]BB:WIMax:TRIGger:EXECute | | | No query |
| [SOURce<[1]\|2>:]BB:WIMax:TRIGger[:EXTernal<[1]\|2>]:DELay | 0 ..65535.0 samples | | |
| [SOURce<[1]\|2>:]BB:WIMax:TRIGger[:EXTernal<[1]\|2>]:INHibit | 0 ...(2^32 - 1) samples | | |
| [SOURce<[1]\|2>:]BB:WIMax:TRIGger:OBASeband:DELay | 0 ...(2^32 - 1) samples | | |
| [SOURce<[1]\|2>:]BB:WIMax:TRIGger:OBASeband:INHibit | 0 ...(2^32 - 1) samples | | |
| [SOURce<[1]\|2>:]BB:WIMax:TRIGger:OUTPut<[1]...4>:DELay | 0 ...(2^32 - 1) samples | | |
| [SOURce<[1]\|2>:]BB:WIMax:TRIGger:OUTPut:DELay:FIXed | ON \| OFF | Hz | |
| [SOURce<[1]\|2>:]BB:WIMax:TRIGger:OUTPut<[1]...4>:DELay:MAXimum | | | Query only |
| [SOURce<[1]\|2>:]BB:WIMax:TRIGger:OUTPut<[1]...4>:DELay:MINimum | | | Query only |
| [SOURce<[1]\|2>:]BB:WIMax:TRIGger:OUTPut<[1]...4>:FOFFset | -640000 … 640000 | | |
| [SOURce<[1]\|2>:]BB:WIMax:TRIGger:OUTPut<[1]...4>:MODE | RESTart \| FRAMe \| FACTive \| PULSe \| PATTern \| RATio | | |
| [SOURce<[1]\|2>:]BB:WIMax:TRIGger:OUTPut<[1]...4>:OFFTime | 2 ... (2^24 - 1) samples | | |

| Command | Parameters | Default unit | Comments |
|---|---|---|---|
| [SOURce<[1]\|2>:]BB:WIMax:TRIGger:OUTPut<[1]...4>:ONTime | 2 ... (2^24 - 1) samples | | |
| [SOURce<[1]\|2>:]BB:WIMax:TRIGger:OUTPut<[1]...4>:PATTern | #B0,1...#B111..1,32 | | |
| [SOURce<[1]\|2>:]BB:WIMax:TRIGger:OUTPut<[1]...4>:PULSe:DIVider | 2 ... 1024 | | |
| [SOURce<[1]\|2>:]BB:WIMax:TRIGger:OUTPut<[1]...4>:PULSe:FREQuency | | | Query only |
| [SOURce<[1]\|2>:]BB:WIMax:TRIGger:OUTPut<[1]...4>:ROFFset | -640000 … 640000 | | |
| [SOURce<[1]\|2>:]BB:WIMax:TRIGger:RMODe | | | Query only |
| [SOURce<[1]\|2>:]BB:WIMax:TRIGger:SLENgth | 0 ...(2^32 - 1) samples | | |
| [SOURce<[1]\|2>:]BB:WIMax:TRIGger:SLUNit | FRAMe \| CHIP \| SEQuence | | |
| [SOURce<[1]\|2>:]BB:WIMax:TRIGger:SOURce | EXTernal \| INTernal \| BEXTernal \| OBASeband | | |
| [SOURce<[1]\|2>:]BB:WIMax:WAVeform:CREate | <file_name> | | |
| [SOURce<[1]\|2>:]BB:WIMax:SVERsion | VC1 \| VC2D4 | | |

# SOURce-WIMax - Primary Commands

### [SOURce<[1]|2>:]BB:WIMax:BDUMp:DIRectory

The directory path specified here is used to store the dumped burst data files. If the field is empty the firmware directory is used (such as C:\Program Files\Rohde&Schwarz\SMUFirmware)..

**Example:** `BB:WIM:BDUMp:DIRirectory 'D:\wimax\dump'`
'sets the directory for OFDMA burst input dump.

| *RST value | Resolution | SCPI |
|---|---|---|
| - | | Device-specific |

### [SOURce<[1]|2>:]BB:WIMax:BDUMp:STATe ON | OFF

Activates burst input data dump. .

**Example:** `BB:WIM:BDUMp:STATe ON`
'activates burst input data dump.

| *RST value | Resolution | SCPI |
|---|---|---|
| OFF | | Device-specific |

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

The command sets the limit for level 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:WIM:CLIP:STAT ON`

**Example:** `BB:WIM:CLIP:LEV 80PCT`
'sets the limit for level clipping to 80% of the maximum level.
`BB:WIM:CLIP:STAT ON`
'activates level clipping.

| *RST value | Resolution | SCPI |
|---|---|---|
| 100 PCT | 1 | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax: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:WIM:CLIP:MODE SCAL
```
'selects the absolute maximum of all the I and Q values as the reference level.

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

```
BB:WIM:CLIP:STAT ON
```
'activates level clipping.

| *RST value | Resolution | SCPI |
|---|---|---|
| VECTor | - | Device-specific |

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

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

**Example:**

```
BB:WIM:CLIP:STAT ON
```
'activates level clipping.

| *RST value | Resolution | SCPI |
|---|---|---|
| OFF | | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:CLOCk:MODE** SAMPle | MSAMple

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

The command enters the type of externally supplied clock (`:BB:WIMax:CLOCk:SOURce EXTernal`).

When `MSAMple` is used, a multiple of the sample clock is supplied via the CLOCK connector and the sample clock is derived internally from this. The multiplier is entered with the command `:BB:WIMax: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:WIM:CLOC:MODE SAMP
```
'selects clock type **SAMPle**, i.e. the supplied clock is a sample clock.

| *RST value | Resolution | SCPI |
|---|---|---|
| SAMPle | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax: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:WIMax:CLOCk:MODE MSAMple`) 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:WIM:CLOC:SOUR EXT`
'selects the external clock source. The clock is supplied via the CLOCK connector.

`BB:WIM:CLOC:MODE MSAM`
'selects clock type **Multiplied**, i.e. the supplied clock has a rate which is a multiple of the sample rate.

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

| *RST value | Resolution | SCPI |
|---|---|---|
| 4 | 1 | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:CLOCk:SOURce** INTernal | EXTernal | AINTernal

***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.

**Parameter:** **INTernal**
The internal clock reference is used.

**EXTernal**
The external clock reference is supplied to the CLOCK connector.

**Example:** `BB:WIM:CLOC:MODE INT`
'specifies that a sample clock is supplied via the CLOCK connector.

| *RST value | Resolution | SCPI |
|---|---|---|
| INTernal | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:DUPLexing** TDD | FDD

The command selects the duplexing. The duplexing mode determines how the uplink and downlink signal are separated.

**Parameters:** **TDD**
The same frequency is used for both directions of transmission (uplink and downlink). With one baseband, either downlink or uplink frames can be generated.

**FDD**

**(OFDM only)**
If only one link direction is considered at once, the IEEE 802.16 standard defines no differences between TDD and FDD signals on the physical layer. The FDD mode has been provided for convenience, it completely fills the defined frame with bursts to simulate a continuous transmission environment. It is recommended to use TDD mode instead if FDD decives are to be tested with frames including transmission gaps.

**Example:** `BB:WIM:DUPL FDD`
'selects frequency division duplexing.

| *RST value | Resolution | SCPI |
|---|---|---|
| TDD | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax: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:WIM:FILT:ILEN 10`
'sets the number of filter tabs to 10.

| *RST value | Resolution | SCPI |
|---|---|---|
| 10 | 1 | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax: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:WIM:FILT:ILEN:AUTO ON`
'the most sensible parameters are selected automatically.

| *RST value | Resolution | SCPI |
|---|---|---|
| ON | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:FILTer:MODE** REALtime | OFFLine

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

The command sets the filter mode.

**Parameters:**

**REALtime**
The filter is applied to a signal in real-time mode.

**OFFLine**
The filter is applied to a signal in offline mode. This option increases the calculation time and reduces the maximum number of generated frames that can be fit into the ARB memory. It can be useful to filter the signal in offline mode if steeper filter edges are required. In offline mode, more taps are used for the filters, therefore the roll of factor can be further decreased.

**Example:** `BB:WIM:FILT:MODE REAL`
'the filter is applied to a signal in real-time mode.

| *RST value | Resolution | SCPI |
|---|---|---|
| REALtime | | Device-specific |

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

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

The command sets the upsampling factor.

**Example:** `BB:WIM:FILT:OSAM 32`
'sets the upsampling factor to 32.

| *RST value | Resolution | SCPI |
|---|---|---|
| 32 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax: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:WIM:FILT:OSAM:AUTO ON`
'the most sensible parameters are selected automatically.

| *RST value | Resolution | SCPI |
|---|---|---|
| ON | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:FILTer:PARameter:APCO25** 0.05 … 0.99

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

**Example:** `BB:WIM:FILT:PAR:APCO25 0.04`
'the roll-off factor is set to 0.04.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0.20 | | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:FILTer:PARameter:COSine** 0.00 … 0.99

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

**Example:** `BB:WIM:FILT:PAR:COS 0.04`
'the roll-off factor is set to 0.04.

| *RST value | Resolution | SCPI |
|---|---|---|
| OFDM: 0.1<br>OFDMA: 0.1 (sampling frequency below 20 MHz)<br>OFDMA: 0.07 (sampling frequency 20 MHz and above) | | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:FILTer:PARameter:COSine:COFS** -0.1 … 1.0

The command sets the "cut of frequency shift' value for the Cosine filter type. The default value gets set when switching between OFDM and OFDMA.

**Example:** `BB:WIM:FILT:PAR:COS:COFS 0.04`
'the "cut of frequency shift" value is set to 0.04.

| *RST value | Resolution | SCPI |
|---|---|---|
| OFDM: -0.1<br>OFDMA: 0.0 (sampling frequency below 20 MHz)<br>OFDMA:- 0.08 (sampling frequency 20 MHz and above) | | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:FILTer:PARameter:GAUSs** 0.15 … 2.5

The command sets the BxT for the Gauss filter type (FSK).

**Example:** `BB:WIM:FILT:PAR:GAUS 0.5`
''the BxT is set to 0.5.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0.5 | | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:FILTer:PARameter:LPASs** 0.05 x symbol rate ... 2.0 x symbol rate

The command sets the cut off frequency factor for the Lowpass filter type. The value range depends on the set symbol rate.

0.05 x symbol rate … 2 x symbol rate

**Example:** `BB:WIM: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:WIMax:FILTer:PARameter:PGAuss** 0.00 … 2.5

The command sets the BxT for the Gauss filter type (pure).

**Example:** `BB:WIM:FILT:PAR:PGA 0.5`
'the BxT is set to 0.5.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0.5 | | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:FILTer:PARameter:RCOSine** 0.00 … 0.99

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

**Example:** `BB:WIM:FILT:PAR:RCOS 0.4`
'the roll-off factor is set to 0.4.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0.22 | | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:FILTer:PARameter:SPHase** 0.15…2.5

The command sets the BxT for the Split Phase filter type.

**Example:** `BB:WIM:FILT:PAR:SPH 2`
'the BxT is set to 2.0.

| *RST value | Resolution | SCPI |
|---|---|---|
| 2.00 | | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:FILTer:TYPE** RCOSine | COSine | GAUSs | LGAuss | CONE | COF705 | COEQualizer | COFequalizer | C2K3x | APCO25 | SPHase | RECTangle | PGAuss | LPASs | DIRac | ENPShape | EWPShape

The command selects the filter type. The filter types are described in section "*Custom Dig Mod*".

**Example:** `BB:WIM:FILT:TYPE RCOS`
'sets the filter type root cosine.

Response: `COS`
'a cosine filter is used.

| *RST value | Resolution | SCPI |
|---|---|---|
| GAUSs | | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:FRAMe:BURSt:DELay** 0.0 ms ... 4 294 967 295 000.0 s

The command sets the delay for the first uplink burst.

The command is only available for physical layer mode OFDM in uplink and for FDD duplexing.

**Example:** `BB:WIM:MODE OFDM`
'selects physical layer mode OFDM.

`BB:WIM:LINK UP`
'selects transmission direction uplink.

`BB:WIM:DUP FDD`
'selects FDD duplexing.

`BB:WIM:FRAM:BURS:DEL 0.004`
'selects a delay of 4 ms for the first burst.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | 0.0 ms | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:FRAMe:TIME** MS2 | MS2D5 | MS4 | MS5 | MS8 | MS10 | MS12D5 | MS20 | CONTinuous | USER

The command selects the frame duration. Only distinct values are allowed in the standard. For test reasons, continuous generation or generation for a freely selectable duration (`USER`) are available. The user duration is set with command `SOUR:BB:WIM:FRAM:TIME:USER`. In continuous mode, the frame duration equals the sum of the burst durations.

**Example:** `BB:WIM:FRAM:TIME MS12D5`
'selects a frame length of 12.5 ms.

| *RST value | Resolution | SCPI |
|---|---|---|
| MS10 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:FRAMe:TIME:USER** 0.000 ... 10E4 seconds

The command sets the frame duration to a freely selectable value.

**Example:** `BB:WIM:FRAM:TIME USER`
'selects a user mode for frame length definition.

`BB:WIM:FRAM:TIME:USER 1`
'sets a frame length of 1 s.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 ms | 0 ms | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax: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 subscriber station (REVerse | UP).

**Example:** `BB:WIM:LINK DOWN`
'the transmission direction selected is base station to subscriber station. The signal corresponds to that of a base station.

| *RST value | Resolution | SCPI |
|---|---|---|
| FORWard\|DOWN | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:MODE** OFDM | AOFDm | WIBRo

The command selects the Physical Layer Mode.

**Parameter:**

**OFDM**
The OFDM mode supports signal generation according to IEEE 802.16-2004 section 8.3 with a fixed FFT size of 256.

**AOFDm**
Orthogonal Frequency Division Multiple Access (OFDMA) groups multiple subcarriers of the OFDM into sub-channels. A single client or subscriber station might transmit using all of the sub-channels within the carrier space, or multiple clients might transmit with each using a portion of the total number of sub-channels simultaneously. OFDMA thus enables a more flexible use of resources. It can support nomadic and mobile operation.

**WIBRo**
The OFDMA – WiBro (Wireless Broadband) mode groups multiple subcarriers of the OFDM into sub-channels. A single client or subscriber station might transmit using all of the sub-channels within the carrier space, or multiple clients might transmit with each using a portion of the total number of sub-channels simultaneously. OFDMA thus enables a more flexible use of resources. It can support nomadic and mobile operation.
The OFDMA – WiBro mode is identical to the OFDMA mode.
When selecting OFDMA – WiBro, these parameters are set to their WiBro defaults:
Frame Duration: 5ms
Frequency Band: WiBro
Channel Bandwidth: 8.75 MHz
Sampling Rate: 10 MHz
Tg/Tb: 1/8
FFT Size: 1024

**Example:** `BB:WIM:MODE OFDM`
'selects physical layer mode OFDM.

| *RST value | Resolution | Dependencies | SCPI |
|---|---|---|---|
| OFDM | - | Duplexing FDD is only possible for physical layer moder OFDM. Duplexing TDD is automatically set when switching to physical layer mode OFDMA. | Device-specific |

**[SOURce:]BB:WIMax:PATH:COUPling[:STATe]** ON | OFF

**(Available only in path A of two-path instruments and for OFDMA and OFDMA-WIBro Physical Layer Mode)**

Enables/disables control of both paths via the WiMAX menu.

***Note**:*
*For two path instruments and enabled parameter **Use of Baseband A+B**, enabling the WiMAX signal simulation will disable all other digital standards and digital modulation modes even in the path B.*

An active Baseband A+B mode is useful for STC (MIMO) signal setups. In this case, baseband B is controlled from baseband A and generates an identical setup, just with opposite STC antenna configuration. Triggering is performed automatically such that both basebands are aligned in time.

**Example:**
```
BB:WIM:MODE AOFD
```
'selects physical layer mode OFDMA.
```
BB:WIM:AOFD:ZONE0:STC:MODE OFF
```
'configure baseband A to generate one SISO zone
```
BB:WIM:AOFD:ZONE1:STC:MODE MA2
```
'Configure baseband A to generate one additional STC zone.
```
BB:WIM:AOFD:ZONE1:STC:ANT0
```
'Sets Antenna 0 for this STC zone.
```
BB:WIM:PATH:COUP:STAT ON
```
'enables control of both paths via the WiMAX menu.
```
BB:WIM:STAT ON
```
'Switch on baseband A

Result:
Baseband B is automatically activated.
Baseband A generates preamble, SISO zone and STC zone with antenna 0.
Baseband B omits preamble and SISO zone and generates the STC zone with antenna 1.

| *RST value | Resolution | Dependencies | SCPI |
|---|---|---|---|
| OFF | - | Available for path A only | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:PRESet**

The command produces a standardized default for the IEEE 802.16 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:WIM:PRES
```
'resets all the IEEE 802.16 settings to default values.

| *RST value | Resolution | Dependencies | SCPI |
|---|---|---|---|
| - | - | All IEEE 802.16 settings are preset. | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax: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.

**Parameter:**

**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:WIM: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:WIM:TRIG:ARM:EXEC` and started again when a trigger event occurs.

**SINGle**
The modulation signal is generated only when a trigger event occurs. Then the signal is generated once to the length specified with command `SOUR:BB:WIM:TRIG:SLEN`. Every subsequent trigger event causes a restart.

**Example:** `BB:WIM: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:WIMax:SETTing:CATalog?**

This command reads out the files with IEEE 802.16 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 ***.wimax** will be listed.

The command is a query command and therefore has no *RST value.

**Example:** "`MMEM:CDIR 'D:\user\wimax`
'sets the default directory to `D:\user\wimax`.

BB`:WIM:SETT:CAT?`
'reads out all the files with IEEE 802.16 settings in the default directory.

Response: "`'ofdm','fbpsk'`
'the files `'ofdm'` and `'fbpsk'` are available.

| *RST value | Resolution | SCPI |
|---|---|---|
| | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:SETTing:DELete** <file_name>

This command deletes the selected file with IEEE 802.16 WiMAX 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 ***.wimax** will be deleted.

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

**Example:** `BB:WIM:SETT:DEL 'ofdm'`
'deletes file 'ofdm'.

| *RST value | Resolution | SCPI |
|---|---|---|
| | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:SETTing:LOAD** <file_name>

This command loads the selected file with IEEE 802.16 WiMAX 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 ***.wimax** will be loaded.

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

**Example:** `BB:WIM:SETT:LOAD 'ofdm'`
'loads file '`ofdm`'.

| *RST value | Resolution | SCPI |
|---|---|---|
| | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:SETTing:STORe** <file_name>

This command stores the current IEE 802.16 WIMAX 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. IEE 802.16 WIMAX settings are stored as files with the specific file extensions ***.wimax**.

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

**Example:** `BB:WIM:SETT:STOR 'ofdm_tdd'`
'stores the current settings into file '`ofdm_tdd`'.

| *RST value | Resolution | SCPI |
|---|---|---|
| - | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:SLENgth** 1 ... max

The command selects the number of frames. The maximum number of frames depends on the sampling rate, the set frame length (2 x sampling rate x frame length / command `BB:WIM:FRAM:TIM`) and the supplied ARB memory size.

**Example:** `BB:WIM:SLEN 4`
'selects the generation of 4 frames.

| *RST value | Resolution | SCPI |
|---|---|---|
| 1 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:SRATe:VARiation** 1 Mcps ... 40 Mcps

The command enters the output sample rate.

A variation of this parameter only affects the ARB clock rate, all other signal parameters remain unchanged. If the sampling rate in the frame configuration menu is changed, this parameter is reset to the chosen sampling rate.

**Example:** `BB:WIM:SRAT:VAR 4000000`
''sets the output sample rate to 4 Mcps.

| *RST value | Resolution | SCPI |
|---|---|---|
| 2 MHz | 0.001 Hz | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:STATe** ON | OFF

The command activates modulation in accordance with the IEE 802.16 WIMAX 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.

***Note**:*
*For two path instruments with enabled parameter **Use of Baseband A+B**, activating WiMAX signal simulation disables all other digital standards and digital modulation modes in path B as well.*

**Example:** `BB:WIM:STAT ON`
'activates modulation in accordance with the IEE 802.16 WiMAX standard.

| *RST value | Resolution | Dependencies | SCPI |
|---|---|---|---|
| OFF | - | `BB:WIM:STAT ON` deactivates the other standards and digital modulation. | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:SUBFrame:TIME** 0.0 ... MAX

The command set the duration of the downlink subframe.

The command is only available for uplink direction and when TDD is selected (in case of two-path instruments, on the same path.

**Example:** `BB:WIM:LINK UP`
'selects uplink transmission.

`BB:WIM:DUPL TDD`
'selects time division duplexing.

`BB:WIM:SUBF:TIME 2ms`
'sets a subframe duration of 1 ms.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | 1 ms | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax: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:WIM:TRIG:SOUR INT`
'sets internal triggering.

`BB:WIM:TRIG:SEQ ARET`
'sets Armed_Retrigger mode, i.e. every trigger event causes signal generation to restart.

`BB:WIM:TRIG:EXEC`
'executes a trigger, signal generation is started.

`BB:WIM:TRIG:ARM:EXEC`
'signal generation is stopped.

`BB:WIM:TRIG:EXEC`
'executes a trigger, signal generation is started again.

| *RST value | Resolution | SCPI |
|---|---|---|
| - | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax: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:WIM:TRIG:SOUR INT` and a trigger mode other than `AUTO` must be selected using the command `:BB:WIM:TRIG:SEQ`.

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

**Example:** `BB:WIM:TRIG:SOUR INT`
'sets internal triggering.

`BB:WIM:TRIG:SEQ RETR`
'sets Retrigger mode, i.e. every trigger event causes signal generation to restart.

`BB:WIM:TRIG:EXEC`
'executes a trigger.

| *RST value | Resolution | SCPI |
|---|---|---|
| - | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:TRIGger[:EXTernal<[1]|2>]:DELay** 0 ... 65535.0

***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 samples) 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:WIM:TRIG:SOUR EXT`
'sets an external trigger via the TRIGGER 1 connector.

`BB:WIM:TRIG:DEL 50`
'sets a delay of 50 samples for the trigger.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 samples | 1 sample | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:TRIGger[:EXTernal<[1]|2>]:INHibit** 0 ... 2^32-1

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

The command specifies the number of samples 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:WIM:TRIG:SOUR EXT
```
'selects an external trigger via the TRIGGER 1 connector.
```
BB:WIM:TRIG:INH 200
```
'sets a restart inhibit for 200 samples following a trigger event.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 samples | 1 sample | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:TRIGger:OBASeband:DELay** 0 ... 2^32-1

***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 samples) for triggering by the trigger signal from the second path.

**Example:**
```
BB:WIM:TRIG:SOUR OBAS
```
'sets for path A the internal trigger executed by the trigger signal from the second path (path B).
```
BB:WIM:TRIG:OBAS:DEL 50
```
'sets a delay of 50 samples for the trigger.

| RST value | Resolution | SCPI |
|---|---|---|
| 0 samples | 1 samples | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:TRIGger:OBASband:INHibit** 0 ... 2^32-1

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

The command specifies the number of samples by which a restart is to be inhibited following a trigger event. This command applies only for triggering by the second path.

**Example:**
```
BB:WIM:TRIG:SOUR OBAS
```
'sets for path A the internal trigger executed by the trigger signal from the second path (path B).
```
BB:WIM:TRIG:INH 200
```
'sets a restart inhibit for 200 samples following a trigger event.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 samples | 1 sample | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:TRIGger:OUTPut<[1]...4>:DELay** 0 ... 2^32 - 1 Samples

***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 samples. Command `:BB:WIMax: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:WIM:TRIG:OUTP2:DEL 1600`
'sets a delay of 1600 samples for the signal on connector MARKER 2.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | 1 sample | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax: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.

**Example:** `BB:WIM: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:WIMax: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:WIMax:TRIG:OUTP:DEL:FIX ON`.

The command is a query only and therefore has no *RST value.

**Example:** `BB:WIM:TRIG:OUTP:DEL:FIX ON`
'restricts the marker signal delay setting range to the dynamic range.

`BB:WIM:TRIG:OUTP:DEL:MAX`
'queries the maximum of the dynamic range.

Response: `"2000`
'the maximum for the marker delay setting is 2000 samples.

| *RST value | Resolution | SCPI |
|---|---|---|
| - | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax: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:WIMax:TRIGger:OUTPut:DELay:FIXed ON`.

The command is a query only and therefore has no *RST value.

**Example:** `BB:WIM:TRIG:OUTP:DEL:FIX ON`
'restricts the marker signal delay setting range to the dynamic range.

`BB:WIM:TRIG:OUTP:DEL:MIN`
'queries the minimum of the dynamic range.

Response: `"0`
'the minimum for the marker delay setting is 0 samples.

| *RST value | Resolution | SCPI |
|---|---|---|
| - | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:TRIGger:OUTPut<[1]...4>:FOFFset** -640000...+640000 samples

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

The command sets the fall offset for on/off ratio marker in number of samples.

**Example:** `BB:WIM:TRIG:OUTP2:FOFF 200`
'sets a fall offset of 20 samples for marker signal 2.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | 1 | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:TRIGger:OUTPut<[1]...4>:MODE**
RESTart | FRAMe | FACTive | PULSe | PATTern | RATio

The command defines the signal for the selected marker output.

**Parameter:**

**RESTart**
A marker signal is generated at the start of each sequence (the sequence length is set with command `SOUR:BB:WIM:FCOunt`).

**FRAMe**
A marker signal is generated at the start of each frame (the frame length is set with command `SOUR:BB:WIM:FRAM:TIME`).

**FACTive**
The marker signal is high whenever a burst is active and low during inactive signal parts (such as the gaps between bursts in uplink mode or the uplink subframe in downlink TDD mode). This marker can be used to decrease the carrier leakage during inactive signal parts by feeding it into the pulse modulator.

**PATTern**
A marker signal is generated according to the user defined pattern (command `SOURce:BB:WIMax:TRIGger:OUTPut:PATTern`).

**RATio**
A marker signal corresponding to the Time Off / Time On specifications in the commands `SOURce:BB:WIMax:TRIGger:OUTPut:OFFT` and `SOURce:BB:WIMax:TRIGger:OUTPut:ONT` is generated.

**Example:** `BB:WIM:TRIG:OUTP2:MODE FRAMe`
'selects the frame marker signal on output MARKER 2.

| *RST value | Resolution | SCPI |
|---|---|---|
| RESTart | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:TRIGger:OUTPut<[1]...4>:OFFTime** 1.. 2^24 - 1 (1..16 777 215) samples

The command sets the number of samples in a period (ON time + OFF time) during which the marker signal in setting `SOURce:BB:WIMax:TRIGger:OUTPut:MODE RATio` on the marker outputs is OFF.

**Example:** `BB:WIM:TRIG:OUTP2:OFFT 200`
'sets an OFF time of 200 samples for marker signal 2.

| *RST value | Resolution | SCPI |
|---|---|---|
| 1 | 1 | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:TRIGger:OUTPut<[1]...4>:ONTime** 1.. 2^24 - 1 (1..16 777 215) samples

The command sets the number of samples in a period (ON time + OFF time) during which the marker signal in setting `SOURce:BB:WIM:TRIGger:OUTPut:MODE RATio` on the marker outputs is ON.

**Example:** `BB:WIM:TRIG:OUTP2:ONT 200`
'sets an ON time of 200 samples for marker 2.

| *RST value | Resolution | SCPI |
|---|---|---|
| 1 | 1 | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:TRIGger:OUTPut<[1]...4>:PATTern** #B0,1 ... #B111...1, 2

The command defines the bit pattern used to generate the marker signal in the setting `SOURce:BB:WIMax:TRIGger:OUTPut:MODE PATTern`. 0 is marker off, 1 is marker on.

**Example:** `BB:WIM:TRIG:OUTP2:PATT #B000000011111111,15`
'sets a bit pattern.

`BB:WIM:TRIG:OUTP2:MODE PATT`
'activates the marker signal according to a bit pattern on output MARKER 2.

| *RST value | Resolution | SCPI |
|---|---|---|
| #B,1 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:TRIGger:OUTPut<[1]...4>:PULSe:DIVider** 2 ... 2^10

The command sets the divider for Pulse marker mode (`SOUR:BB:WIM:TRIG:OUTP:MODE PULSe`). The resulting pulse frequency is derived by dividing the symbol rate by the divider.

**Example:** `BB:WIM:TRIG:OUTP2:PULS:DIV 2`
'sets the divider to 2 for the marker signal on output MARKER 2.

`BB:WIM:TRIG:OUTP2:FREQ?`
'queries the resulting pulse frequency of the marker signal.

Response: "`66 000`
'the resulting pulse frequency is 66 kHz.

| *RST value | Resolution | SCPI |
|---|---|---|
| 2 | 1 | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:TRIGger:OUTPut<[1]...4>:PULSe:FREQuency?**

The command queries the pulse frequency of the pulsed marker signal in the setting `SOURce:BB:WIMax:TRIGger:OUTPut:MODE PULSe`. The pulse frequency is derived by dividing the symbol rate by the divider.

The command is a query command and therefore has no *RST value.

**Example:** `BB:WIM:TRIG:OUTP2:PULS:DIV 2`
'sets the divider marker signal on output MARKER 2 to the value 2.

`BB:WIM:TRIG:OUTP2:MODE PULS`
'enables the pulsed marker signal.

`BB:WIM:TRIG:OUTP2:PULS:FREQ?`
'queries the pulse frequency of the marker signal.

Response: "`33 000`
'the resulting pulse frequency is 33 kHz.

| *RST value | Resolution | SCPI |
|---|---|---|
| - | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax: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 WIMax 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:TDSC:TRIG:ARM:EXECute` (armed trigger modes only).

**Example:** `SOUR:BB:WIM:TRIG:MODE ARET`
'selects the Armed_Retrigger mode.

SOUR:BB:WIM: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:WIMax:TRIGger:OUTPut<[1]...4>:ROFFset** -640000...+640000 samples

The command sets the rise offset for on/off ratio marker in number of samples.

**Example:** BB:WIM:TRIG:OUTP2:ROFF 200
'sets a rise offset of 20 samples for marker signal 2.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | 1 | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax: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 SOURce:BB:WIM: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:** SOUR2:BB:WIM:TRIG:SOUR EXT
'sets external triggering via the TRIGGER 1 connector for path B of a two-path instrument.

| *RST value | Resolution | SCPI |
|---|---|---|
| INTernal | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:TRIGger:SLENgth** 1 … (2^32-1) samples

***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:WIMax:SEQ SING). The input is made in terms of samples.

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. The unit is defined with command SOUR:BB:WIMax:TRIG:SLUNit.

**Example:** BB:WIM:SEQ SING
'sets trigger mode Single.

BB:WIM:TRIG:SLEN 200
'sets a sequence length of 200 samples. The first 200 samples of the current frame will be output after the next trigger event.

| *RST value | Resolution | SCPI |
|---|---|---|
| 32 768 samples | 1 sample | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax: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:WIMax:TRIG:SLEN) to be output in the **Single** trigger mode (SOUR:BB:WIMax:SEQ SING).

**Parameter:**

**FRAMe**
Unit Frame. A single frame is generated after a trigger event.

**CHIP**
Unit Chip. A single chip is generated after a trigger event.

**SEQuence**
Unit Sequence Length. A single sequence is generated after a trigger event.

**Example:** SOUR:BB:WIM:SEQ SING
'sets trigger mode Single.

SOUR:BB:WIM:TRIG:SLUN FRAM
'sets unit Frame length for the entry of sequence length.

SOUR:BB:WIM:TRIG:SLEN 2
'sets a sequence length of 2 frame. Two frames will be output after the next trigger event.

| *RST value | Resolution | SCPI |
|---|---|---|
| SEQuence | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:WAVeform:CREate** <file_name>

This command creates a waveform using the current settings of the **WiMAX** 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:WIM:WAV:CRE 'wimax_1'
'creates the waveform file wimax_1.wv in the default directory.

| *RST value | Resolution | SCPI |
|---|---|---|
| - | - | device-specific |

**[SOURce<[1]|2>:]BB:WIMax:VERSion** VC1 | VC2D4

Sets the version of the IEEE 802.16 WiMAX standard underlying the definitions.

**Example:** `BB:WIM:SVER?`
'queries the IEEE 802.16 WiMAX version.

| *RST value | Resolution | SCPI |
|---|---|---|
| - | - | Device-specific |

## SOURce-WIMax - OFDMA Physical Layer Settings

The SOURce:BB:WIMax:AOFDm systems contain commands for setting the characteristics of signals with OFDMA and OFDMA-WiBro physical layer.

The commands of this system only take effect if the OFDMA physical layer mode is selected:
`SOURce:BB:WIMax:MODE AOFDMa`

or

`SOURce:BB:WIMax:MODE WIBRo`

***Important:***
*In case of remote control, suffix counting for bursts corresponds to the suffix counting with WiMAX starting with burst 0. SCPI prescribes that suffix 1 is the default state and used when no specific suffix is specified. Therefore, burst 1 (and not burst 0) is selected when no suffix is specified.*

| Command | Parameters | Default unit | Comments |
|---|---|---|---|
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm:BW | 1.25E6 ... 28E6 | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm:FBANd | ETSi \| MMDS \| WCS \| USER \| WIBRo | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm:FFT | FFT128 \| FFT512 \| FFT1024 \| FFT2048 | | |

| Command | Parameters | Default unit | Comments |
|---|---|---|---|
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm:FRAMe:PREDefined | USER \| DL3M21SQPSK12 \| DL3M21SQPSK34 \| DL3M21S16QAM12 \| DL3M21S16QAM34 \| DL3M21S64QAM12 \| DL3M21S64QAM23 \| DL3M21S64QAM34 \| DL3M21S64QAM56 \| DL5M29SQPSK12 \| DL5M29SQPSK34 \| DL5M29S16QAM12 \| DL5M29S16QAM34 \| DL5M29S64QAM12 \| DL5M29S64QAM23 \| DL5M29S64QAM34 \| DL5M29S64QAM56 \| DL7M21SQPSK12 \| DL7M21SQPSK34 \| DL7M21S16QAM12 \| DL7M21S16QAM34 \| DL7M21S64QAM12 \| DL7M21S64QAM23 \| DL7M21S64QAM34 \| DL7M21S64QAM56 \| DL8M27SQPSK12 \| DL8M27SQPSK34 \| DL8M27S16QAM12 \| DL8M27S16QAM34 \| DL8M27S64QAM12 \| DL8M27S64QAM23 \| DL8M27S64QAM34 \| DL8M27S64QAM56 \| DL10M29SQPSK12 \| DL10M29SQPSK34 \| DL10M29S16QAM12 \| DL10M29S16QAM34 \| DL10M29S64QAM12 \| DL10M29S64QAM23 \| DL10M29S64QAM34 \| DL10M29S64QAM56 \| UL3M12SQPSK12 \| UL3M12SQPSK34 \| UL3M12S16QAM12 \| UL3M12S16QAM34 \| UL5M18SQPSK12 \| UL5M18SQPSK34 \| UL5M18S16QAM12 \| UL5M18S16QAM34 \| UL7M12SQPSK12 \| UL7M12SQPSK34 \| UL7M12S16QAM12 \| UL7M12S16QAM34 \| UL8M15SQPSK12 \| UL8M15SQPSK34 \| UL8M15S16QAM12 \| UL8M15S16QAM34 \| UL10M18SQPSK12 \| UL10M18SQPSK34 \| UL10M18S16QAM12 \| UL10M18S16QAM34 | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm:IDCell | 0.0 ...69.0 | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm:N | | | Query only |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm:POWer:REFerence | RMS \| PREamble \| WOPRamble | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm:PREamble:INDex | 0 ... 113 | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm:PREamble:INDex:MODE | AUTO \| USER | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm:SRATe | 1.44E6 ... 32E6 | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm:TGTB | 1D4 \| 1D8 \| 1D16 \| 1D32 | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt[:COUNt] | 1...64 | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:CCODing:FEC | ON \| OFF | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:CCODing:INTerleaver | ON \| OFF | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:CCODing:MODE | OFF \| CC \| CTC | | |

| Command | Parameters | Default unit | Comments |
|---|---|---|---|
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:CCODing:RANDomizer | ON \| OFF | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:CCODing:REPCoding | REP0 \| REP2 \| REP4 \| REP6 | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:CONFlict[:STATe] | ON \| OFF | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:DATA | PN9 \| PN15 \| PN16 \| PN20 \| PN21 \| PN23 \| ZERO \| ONE \| PATTern \| DLISt | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:DATA:DSELect | <dlist_name> | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:DATA:LENGth | 0 .. 10 000 | bytes | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:DATA:PATTern | #B0,1...B11..1,64 | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:DIUC | 0.0 ... 15.0 | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:FFB:CWSize | | | Query |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:FFB:MODE | NORM \| ENHanced \| ENHMimo \| ACK | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:FFB:SUBC | 1...MAX | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:FFB:SYMB | 3...MAX | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:FORMat | QPSK1D2 \| QPSK3D4 \| QAM1D2X16 \| QAM3D4X16 \| QAM1D2X64 \| QAM2D3X64 \| QAM3D4X64 \| QAM5D6X64 | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:HARQ<0...14>ACID | 0 ... 15 | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:HARQ:COUNt | 1 ... 15 | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:HARQ<0...14>:DATA | PN9 \| PN11 \| PN15 \| PN16 \| PN20 \| PN21 \| PN23 \| ZERO \| ONE \| PATTern \| DLISt | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:HARQ<0...14>:DATA:DSELect | <data list> | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:HARQ<0...14>:DATA:PATTern | <bit pattern> | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:HARQ<0...14>:DIUC | 0 ... 15 | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:HARQ<0...14>:DLENgth | 0 ... MAX | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:HARQ<0...14>:FORMat | | | Query only |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:HARQ<0...14>:MAC:CID | 0 ... FFFF | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:HARQ<0...14>:MAC:CRC:STATe | ON \| OFF | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:HARQ<0...14>:MAC:EKS | 0...4 | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:HARQ<0...14>:MAC:ENCRypted:STATe | ON \| OFF | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:HARQ<0...14>:MAC:STATe | ON \| OFF | | |

| Command | Parameters | Default unit | Comments |
|---|---|---|---|
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:HARQ<0...14>:MAC:TYPE | 0 ... FFF | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:HARQ:MODE | CHASe \| IR | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:HARQ<0...14>:PSIZe | PS48 \| PS96 \| PS144 \| PS192 \| PS288 \| PS384 \| PS480 \| PS960 \| PS1K92 \| PS2K88 \| PS3K84 \| PS4K8 \| PS9K6 \| PS14K4 \| PS24K | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:HARQ<0...14>:RATE | | | Query only |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:HARQ:SLFRee | | | Query only |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:HARQ:<0 14>:SLOTcount | 1 ... MAX | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:HARQ:<0 14>:SPID | <sequence of numbers> | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:MAC:CID | H0 ... HFFFF | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:MAC:CRC:STATe | ON \| OFF | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:MAC:EKS | 0 ... 4 | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:MAC:ENCRypted:STATe | ON \| OFF | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:MAC:STATe | ON \| OFF | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:MAC:TYPE | 0 ... 0x40 | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:OFFSet:MODE | USER \| AUTO | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:OFFSet:SUBChannel | | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:OFFSet:SYMBol | | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:PDU:COUNt | 1 .. 16 | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:PDU:STATe | ON \| OFF | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:PDU<1...16>:DATA | PN9 \| PN11 \| PN15 \| PN16 \| PN20 \| PN21 \| PN23 \| ZERO \| ONE \| PATTern \| DLISt | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:PDU<1...16>:DATA:DSELect | <data list> | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:PDU<1...16>:DATA:PATTern | <bit pattern> | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:PDU<1...16>:DATA:DLENgth | 1 .. Max | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:PDU<1...16>:MAC:CRC:STATe | ON \| OFF | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:PDU<1...16>:MAC:EKS | 0...4 | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:PDU<1...16>:MAC:ENCRypted:STATe | ON \| OFF | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:PDU<1...16>:MAC:STATe | ON \| OFF | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:PDU<1...16>:MAC:TYPE | 0 ... FFF | | |

| Command | Parameters | Default unit | Comments |
|---|---|---|---|
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:PDU<1...16>[:MAC]:CID | 0 ... FFFF | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:POWer | -80 dB ... 0 dB | dB | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:RANGing:ACODe | | | Query only |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:RANGing:OPPortunity:SIZE | 1…4 | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:RANGing:OPPortunity:SLOTcount | <number> | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:RANGing:SCGCount | 1…10 | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:SLOT:COUNt | 0 ... | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:STC:MODE | MA2antenna \| MB2antenna | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:SUBChannel:COUNt | | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:SYMBol[:COUNt] | 0 ... MAX | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:TYPE | DATA \| FCH \| DLMap \| ULMap \| RANGing \| HARQ \| FASTfeedback \| DCD \| UCD | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:UCD:RANGing:BOENd | 1...15 | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:UCD:RANGing:BOSTart | 1...15 | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:UCD:REQuest:BOENd | 1...15 | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:UCD:REQuest:BOSTart | 1...15 | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:UIUC | 0.0 … 15.0 | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:ULMap:AMODe | DLSFend \| FRAMestart | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:ULMap:ATIMe | 0 ... frame duration | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:ULMap:DCD:CID | 0...FFFF | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:ULMap:DCD:STATe | On \| OFF | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:ULMap:UCD:CID | 0...FFFF | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:ULMap:UCD:STATe | On \| OFF | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:ULMap:RANGing:BOENd | 0...15 | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:ULMap:RANGing:BOSTart | 0...15 | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:ULMap:REQuest:BOENd | 0...15 | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:ULMap:REQuest:BOSTart | 0...15 | | |
| [:SOURce<HW>]:BB:WIMax:AOFDm:ZONE:COUNt | 1 … 8 | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:DLMap:BSID | #H0,0...#H2322222222FF,48 | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:DLMap:COMPressed:AMODe | DLSFend \| FRAMestart | | |

| Command | Parameters | Default unit | Comments |
|---|---|---|---|
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:DLMap:COMPressed:ATIMe | 0...frame duration | s | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:DLMap:COMPressed:STATe | ON \| OFF | s | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:DLMap:COMPressed:ULMap:DSELect | <file name> | s | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:DLMap:COMPressed:ULMap:STATe | ON \| OFF | s | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:DLMap:DATA:DCD[:COUNt] | 0 .255 | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:DLMap:DCD:CID | 0...0xFFFF | s | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:DLMap:DCD:STATe | ON \|OFF | s | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:DLMap:FNOFfset | 0 ... 16777215 | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:DLMap:IIE:STATe | ON \|OFF | s | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:DLMap:MODE | AUTO \| USER | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:DLMap:REPCoding | RC0 \| RC2 \| RC4 \| RC6 | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm:ZONE<0...7>:FCH:MODE | AUTO \| USER | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm:ZONE<0...7>:NUMBer | 0 … 7 | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm:ZONE<0...7>:PERMbase | 0 … 69 | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm:ZONE<0...7>:PILDedicated | ON \| OFF | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm:ZONE<0...7>:PRBSid | 0 … 3 | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:SCARrier:RANDomizer | ON \| OFF | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm:ZONE<0...7>:SEGMent | 0 … 2 | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm:ZONE<0...7>:STC:ANTenna | ANT0 \| ANT1 | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm:ZONE<0...7>:STC:MODE | OFF \| MA2antenna\| MB2antenna \| BURSt \| COLLaborative | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm:ZONE<0...7>:STC:PILotpattern | A \| B | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm:ZONE<0...7>:SOUNding:CID<0...15>:FBANd[:COUNt] | 1...MAX | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm:ZONE<0...7>:SOUNding:CID<0...15>:FBANd[:STARt] | 1...MAX | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm:ZONE<0...7>:SOUNding:CID<0...15>:CID | 0...FFFF | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm:ZONE<0...7>:SOUNding:CID<0...15>:DECoffset | 0...MAX | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm:ZONE<0...7>:SOUNding:CID<0...15>COUNt | 1...16 | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm:ZONE<0...7>:SOUNding:CID<0...15>PERiodicity | PER0 \| PER1 \| PER2 \| PER4 \| PER8 \| PER16 \| PER32 \| PER64 | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm:ZONE<0...7>:SOUNding:CID<0...15>POWer[:STATe] | ON \|OFF | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm:ZONE<0...7>:SOUNding:CID<0...15>RELevance[:STATe] | ON \|OFF | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm:ZONE<0...7>:SOUNding:CID<0...15>CINDex | 0...MAX | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm:ZONE<0...7>:SOUNding:CID<0...15>SUBChannel[:COUNt] | 1...MAX | | |

| Command | Parameters | Default unit | Comments |
|---|---|---|---|
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm:ZONE<0...7>:SOUNding:CID<0...15>:SUBChannel[:OFFSet] | 1...MAX | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm:ZONE<0...7>:SOUNding:CID<0...15>:SYMBol | 1...MAX | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm:ZONE<0...7>:SOUNding:DECimation:RANDomozation[:STATe] | ON \| OFF | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm:ZONE<0...7>:SOUNding:DECimation:VALue | DEC2 \| DEC4 \| DEC5 \| DEC8 \| DEC16 \| DEC32 \| DEC64 \| DEC128 | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm:ZONE<0...7>:SOUNding:DLPermbase | 0...63 | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm:ZONE<0...7>:SOUNding:CMAXimum | MC4 \| MC8 \| MC16 \| MC32 \| MC9 \| MC18 | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm:ZONE<0...7>:SOUNding:PERMutation | | | Query only |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm:ZONE<0...7>:SOUNding:RELevance:FLAG | SAME \| INDividual | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm:ZONE<0...7>:SOUNding:RELevance:MODE | THIS \| NEXT | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm:ZONE<0...7>:SOUNding:SEPArability | CYCLic \| DECimated | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm:ZONE<0...7>:SOUNding:TYPE | A \| B | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:SUBChannel:MODE | ALL \| USER | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:SUBChannel:PATTern | #B0,1...B11..1,72 | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:SUBChannel:ROTation | ON \| OFF | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:SUBChannel<0…5>:MAP | ON \| OFF | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm:ZONE<0...7>:SYMBol:COUNt | <number> | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm:ZONE<0...7>:SYMBol:COUNt:AUTO | | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm:ZONE<0...7>:SYMBol:OFFSet | | | Query only |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:TYPE | FUSC \| PUSC \| AMC2x3 \| SOUNding | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:UCD | 0 … 255 | | |
| [SOURce<[1]\|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:ULMap:CREate | <file_name> | | |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm:BW** 1.25 to 28 MHz.

The command sets the channel bandwidth. The selected channel bandwidth has to be a multiple of 1.25, 1.5, 1.75, 2.0 or 2.75 MHz. The channel bandwidth determines the parameter n (sampling ratio, command `SOUR:BB:WIMax:AOFD:N`).

The sampling rate is derived from the channel bandwidth as follows:

SamplingRate = floor(n * ChannelBandwidth / 8000) * 8000

**Downlink:** The allowed values depend on the selected frequency band (command `SOUR:BB:WIMax:AOFD:FBAN`). Only discrete sets of values are available. If a new value is not allowed, the next allowed value in the direction of change is set.

**Uplink:** The full range between 1.25 and 28 MHz is available. Only discrete sets of values are available. If a new value is not allowed, the next allowed value in the direction of change is set.

**Example:** 14 MHz and 28 MHz are allowed, the current value is 14 MHz. If a new value of 15 MHz is entered it is changed to 28 MHz.

**Example:** `BB:WIM:AOFD:FBAN ETSI`
'selects frequency band according to ETSI specifications.

`BB:WIM:AOFD:BW 7E6`
'sets the channel bandwidth to 7 MHz.

| *RST value | Resolution | SCPI |
|---|---|---|
| 1.75 MHz | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm:FBANd** ETSI | MMDS | WCS | UNII | USER | WIBRo

The command selects the available frequency band for the carrier frequencies.

**Parameter:**

**ETSI**
The frequency band as defined by the **European Telecommunications Standards Institute** applies. The range is 1.75 to 28 MHz for the channel bandwidth and 2 to 32 MHz for the sampling rate.

**MMDS**
The frequency band as defined by the **Multichannel Multipoint Distribution Service** applies. The RF frequency range is 2500 to 2686 MHz. The range is 1.50 to 24 MHz for the channel bandwidth and 1.72 to 27.52 MHz for the sampling rate.

**WCS**
The frequency band as defined by the **Wireless Communication Service** applies. It is in the 2.3 GHz band of the electromagnetic spectrum from 2305 to 2320 MHz and 2345 to 2360 MHz. The range is 2.5 to 15 MHz for the channel bandwidth and 2.88 to 17.28 MHz for the sampling rate.

**UNII**
The frequency band as defined by the **Unlicensed National Information Infrastructure** applies. IIt is in the 5 GHz band of the electromagnetic spectrum from 5150 to 5350 GHz and 5750 to 5825 GHz. The range is 10 to 20 MHz for the channel bandwidth and 11.52 to 23.04 MHz for the sampling rate.

**USER**
This mode is provided for choosing any other channel bandwidth / sampling rate combination. The range is 1.25 to 28 MHz for the channel bandwidth and 1.44 to 32 MHz for the sampling rate.

**WIBRo**
The frequency band as defined by the **Telecommunications Technology Association of Korea**. It is in the 2.3 GHz band of the electromagnetic sprectrum.

**Example:** `BB:WIM:AOFD:FBAN ETSI`
'selects frequency band according to ETSI specifications.

| *RST value | Resolution | SCPI |
|---|---|---|
| ETSI | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm:FFT** FFT128 | FFT512 | FFT1024 | FFT2048

The command sets the size of the fast fourier transform. For OFDM channels, the size is fixed to 256. For OFDMA configuration, the possible configurations of the subchannel map depend on the selected FFT size.

**Example:** `BB:WIM:AOFD:FFT FFT2048`
'sets the FFT size to 2048.

| *RST value | Resolution | SCPI |
|---|---|---|
| FFT2048 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm:FRAMe:PREDefined** USER | DL3M21SQPSK12 | DL3M21SQPSK34 | DL3M21S16QAM12 | DL3M21S16QAM34 | DL3M21S64QAM12 | DL3M21S64QAM23 | DL3M21S64QAM34 | DL3M21S64QAM56 | DL5M29SQPSK12 | DL5M29SQPSK34 | DL5M29S16QAM12 | DL5M29S16QAM34 | DL5M29S64QAM12 | DL5M29S64QAM23 | DL5M29S64QAM34 | DL5M29S64QAM56 | DL7M21SQPSK12 | DL7M21SQPSK34 | DL7M21S16QAM12 | DL7M21S16QAM34 | DL7M21S64QAM12 | DL7M21S64QAM23 | DL7M21S64QAM34 | DL7M21S64QAM56 | DL8M27SQPSK12 | DL8M27SQPSK34 | DL8M27S16QAM12 | DL8M27S16QAM34 | DL8M27S64QAM12 | DL8M27S64QAM23 | DL8M27S64QAM34 | DL8M27S64QAM56 | DL10M29SQPSK12 | DL10M29SQPSK34 | DL10M29S16QAM12 | DL10M29S16QAM34 | DL10M29S64QAM12 | DL10M29S64QAM23 | DL10M29S64QAM34 | DL10M29S64QAM56 | UL3M12SQPSK12 | UL3M12SQPSK34 | UL3M12S16QAM12 | UL3M12S16QAM34 | UL5M18SQPSK12 | UL5M18SQPSK34 | UL5M18S16QAM12 | UL5M18S16QAM34 | UL7M12SQPSK12 | UL7M12SQPSK34 | UL7M12S16QAM12 | UL7M12S16QAM34 | UL8M15SQPSK12 | UL8M15SQPSK34 | UL8M15S16QAM12 | UL8M15S16QAM34 | UL10M18SQPSK12 | UL10M18SQPSK34 | UL10M18S16QAM12 | UL10M18S16QAM34

The command selects predefined setting for the frames.

**Parameter:** **USER**
The settings for the frame can be defined by the user.

**DL.../UL…**
Predefined settings for receiver testing are selected. The parameter includes the link direction, the bandwidth, the modulation and the channel coding rate.

**Example:** `BB:WIM:LINK UP`
'selects transmission direction uplink.

`BB:WIM:AFDM:FRAM:PRED UL3M12SQPSK12`
'selects predefined test message with 3MHz, QPSK modulation and channel coding rate 1/2.

| *RST value | Resolution | Dependencies | SCPI |
|---|---|---|---|
| USER | - | All commands concerning the frame configuration are preset | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm:IDCell** 0 ... 31

Sets the IDcell. The IDcell is used in the preamble, as PermBase parameter for the permutation equations in the first downlink zone and partly sets the subcarrier randomizer initialisation vector in the first downlink zone.The uplink alias command is `SOURce:BB:WIMax:AOFDm:ULIDl`.

**Example:** `BB:WIM:AOFD:IDC 4`
'sets ID cell 4.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm:N**

The command queries the factor n (sampling ratio). The sampling ratio is determined by the channel bandwidth (see parameter **Channel Bandwidth**).

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

**Example:** `BB:WIM:AOFD:N?`
'queries the factor n.

Response: "`N8D7`"
'the factor n is 8/7.

| *RST value | Resolution | SCPI |
|---|---|---|
| - | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm:POWer:REFerence** RMS | PREamble | WOPRamble

The command selects the level reference.

**Parameter:**

**RMS**
The instrument's level setting refers to the mean power of the subframe.

**PREamble**
The instrument's level setting refers to the preamble, which is FCH / Burst power + 3dB (downlink only).

**WOPReamble**
The instrument's level setting refers to the rms power of the subframe, excluding the preamble. This includes all symbols with allocated carriers in downlink or the whole uplink subframe in uplink (downlink only).

**Example:** `BB:WIM:MODE AOFD`
'selects physical layer mode OFDMA.

`BB:WIM:LINK DOWN`
'select transmission direction downlink.

`BB:WIM:AOFD:POW:REF PRE`
'the instrument's level setting refers to the preamble.

| *RST value | Resolution | SCPI |
|---|---|---|
| PREamble | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm:PREamble:INDex** 0 ... 113

The command selects the preamble index for the generation of a downlink frame preamble.

This command is available only in downlink and in **User** mode (`SOURce:BB:WIMax:AOFD :PRE:IND:MODE USER`).

**Example:** `BB:WIM:LINK DOWN`
'selects downlink transmission.

`BB:WIM:AOFD:PRE:IND 10`
'selects preamble 10.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm:PREamble:INDex:MODE** AUTO | USER

The command selects the mode for selecting the preamble index.

This command is available only in downlink and in **User** mode (`SOURce:BB:WIMax:AOFD :PRE:IND:MODE USER`).

**Example:** `BB:WIM:LINK DOWN`
'selects downlink transmission.

`BB:WIM:AOFD:PRE:IND:MODE AUTO`
'the preamble index for the generation of a downlink frame preamble is set automatically.

| *RST value | Resolution | SCPI |
|---|---|---|
| AUTO | | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm:SRATe**1.44 MHz ... 32 MHz

The command sets the sampling rate. The sampling rate is related to the channel bandwidth by the parameter n:

SamplingRate = floor(n * ChannelBandwidth / 8000) * 8000

**Downlink:**
The value range depends on the selected frequency band (command `SOUR:BB:WIMax:AOFD:FBAN`). Only discrete sets of values are available. If a new value is not allowed, the next allowed value in the direction of change is set.

**Uplink:**
The full range between 1.44 and 32 MHz is available. Only discrete sets of values are available. If a new value is not allowed, the next allowed value in the direction of change is set.

**Example:** 16 MHz and 32 MHz are allowed, the current value is 16 MHz. If a new value of 17 MHz is entered it is changed to 32 MHz.

**Example:** `BB:WIM:AOFD:SRAT 2E6`
'sets a sampling rate of 2 MHz.

| *RST value | Resolution | SCPI |
|---|---|---|
| 2 MHz | 1 kHz | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm:TGTB** TGTB1D4 | TGTB1D8 | TGTB1D16 | TGTB1D32

The command selects the ratio of guard period to symbol period. This value sets the length of the cyclic prefix in fractions of the symbol period.

**Example:** `BB:WIM:AOFD:TGTB TGTB1D8`
'sets a ratio of 1 to 8.

| *RST value | Resolution | SCPI |
|---|---|---|
| 1D4 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt[:COUNt ]** 1 ... 64

The command sets the number of active bursts in the zone/segment).

**Example:** `BB:WIM:AOFD:ZONE0:BURS2:COUN 2`
'two bursts are sent in one frame.

| *RST value | Resolution | SCPI |
|---|---|---|
| 1 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0…63>:CCODing:FEC** ON | OFF

The command switches channel coding FEC parameter on or off.

**Example:** `BB:WIM:AOFD:ZONE0:BURS:CCOD:FEC ON`
'activates channel coding FEC parameter for burst 1.

| *RST value | Resolution | SCPI |
|---|---|---|
| ON | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0…63>:CCODing:INTerleaver** ON | OFF

The command switches channel coding interleaver on or off.

**Example:** `BB:WIM:AOFD:ZONE:BURS:CCOD:INT ON`
'activates channel coding interleaver for burst 1.

| *RST value | Resolution | SCPI |
|---|---|---|
| ON | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0…63>:CCODing:MODE** OFF | CC | CTC

The command activates/deactivates channel coding and selects channel coding mode. If channel coding is switched off, the bits read from the data source are directly modulated onto the carriers. Due to randomization missing, this could result in very high crest factors of the signal.

**Example:** `BB:WIM:AOFD:ZONE0:BURS2:CCOD:MODE OFF`
'deactivates channel coding for burst 1.

| *RST value | Resolution | SCPI |
|---|---|---|
| ON | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0…63>:CCODing:RANDomizer** ON | OFF

The command switches channel coding randomizer on or off.

**Example:** `BB:WIM:AOFD:ZONE:BURS:CCOD:RAND ON`
'activates channel coding randomizer for burst 1.

| *RST value | Resolution | SCPI |
|---|---|---|
| ON | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0…63>:CCODing:REPCoding** REP0 | REP2 | REP4 | REP6

The command selects the channel coding repetition coding.

**Example:** `BB:WIM:AOFD:ZONE0:BURS:CCOD:REPC REP0`
'deactivates repetition coding.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm:ZONE<0…7>:BURSt<0…63>:CONFlict[:STATe]**

The command indicates a conflict between two bursts.

Conflicts can occur if subchannel and symbol offsets are set manually and two or more bursts overlap. Bursts can also overlap with the FCH or DL-MAP. The position of FCH and DL-MAP is fixed and cannot be changed.

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

**Example:** `BB:WIM:AOFD:ZONE0:BURS2:CONF?`
'queries if there exist a conflict between the activated OFDMA bursts.

Response: `"0`
'there exists not conflict between the activated OFDMA bursts.

| *RST value | Resolution | SCPI |
|---|---|---|
| - | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:DATA** PN9 | PN15 | PN16 | PN20 | PN21 | PN23 | DLISt | ZERO | ONE | PATTern

The command determines the data source for the specified bursts.

**Parameters:**

**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:WIMax:AOFD:BURS:DATA:DSELect`.

**ZERO | ONE**
Internal 0 and 1 data is used.

**PATTern**
Internal data is used The bit pattern for the data is defined by the command `:BB:WIMax:AOFD:BURS:DATA:PATTern`.

**Example:** `BB:WIM:AOFD:ZONE:BURS:DATA PATT`
'selects as the data source for the data fields of burst 1, the bit pattern defined with the following command.

`BB:WIM:AOFD:BURS:DATA:PATT #H3F,8`
'defines the bit pattern.

| *RST value | Resolution | SCPI |
|---|---|---|
| PN9 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>: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:WIM:AOFD:ZONE0:BURS:DATA DLIS`
'selects the Data Lists data source.

`"MMEM:CDIR 'D:\Lists\DM\IqData'`
'selects the directory for the data lists.

`BB:WIM:AOFD:ZONE:BURS:DATA:DLIS 'wimax_list1'`
'selects file '`wimax_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:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:DATA:LENGth** 0 ... 10 000 Bytes

The command sets the data length in bytes. The given number of bytes is read from the data source. The total number of data bytes in the burst (before channel coding) is determined as follows:

TotalDataBytes = DataLength + MACHeaderBytes + CRCBytes + TailByte

The tail byte is only added when channel coding is switched on. The same is the case for the MAC header and CRC, they are not added when switched off. Additionally padding with 0xFF bytes is applied at the end of the data sequence to reach an integer number of OFDM symbols.

The data length determines the number of symbols and vice versa. The maximum data length of 10000 bytes defines the maximum number of symbols for a given modulation type and channel coding rate.

**Example:** `BB:WIM:AOFD:ZONE0:BURS0:DATA:LENG 256'`
'sets a data length of 256.

| *RST value | Resolution | SCPI |
|---|---|---|
| 100 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:DATA:PATTern** #B0,1... #B111..1,64

The command determines the bit pattern for the PATTern selection. The maximum length is 64 bits.

**Example:** `BB:WIM:AOFD:ZONE0:BURS:DATA:PATT #H3F,8`
'defines the bit pattern.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:DIUC** 0 ... 15

The command sets the specific interval usage code. The code is used to initialize the randomizer and is transmitted in the FCH.

**Example:** `BB:WIM:AOFD:ZONE:BURS2:DIUC 12`
'sets Interval Usage Code12 for burst 2.

| *RST value | Resolution | SCPI |
|---|---|---|
| 1 | | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:FFB:CWSize?**

The command queries the codeword size.

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

**Example:** `BB:WIM:AOFD:ZONE0:BURS2:FFB:CWS?`
'queries the codeword size.

| *RST value | Resolution | SCPI |
|---|---|---|
| - | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:FFB:MODE** NORM | ENHanced | ENHMimo | ACK

The command selects the fast feedback mode.

**Example:** `BB:WIM:AOFD:ZONE0:BURS2:FFB:MODE NORM`
'selects the fast feedback mode “normal”.

| *RST value | Resolution | SCPI |
|---|---|---|
| NORM | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:FFB:SUBC** 1...MAX

The command sets the number of subchannels.

**Example:** `BB:WIM:AOFD:ZONE0:BURS2:FFB:SUBC 25`
'sets the number of subchannels to 25.

| *RST value | Resolution | SCPI |
|---|---|---|
| 1 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:FFB:SYMB** 3...MAX

The command sets the number of symbols.

**Example:** `BB:WIM:AOFD:ZONE0:BURS2:FFB:SYMB 6`
'sets the number of symbols to 6.

| *RST value | Resolution | SCPI |
|---|---|---|
| 3 | 3 | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:FORMat** QPSK1D2 | QPSK3D4 | QAM1D2X16 | QAM3D4X16 | QAM1D2X64 | QAM2D3X64 | QAM3D4X64 | QAM5D6X64

Selects the modulation and channel coding rate. Channel coding includes randomization, reed solomon coding, convoutional coding and interleaving.

For a given modulation type and channel coding rate, the data length determines the number of symbols and vice versa.

QAM5D6X64 is only available for Channel Coding CTC.

**Example:** `BB:WIM:AOFD:ZONE0:BURS:FORM QAM3D4X64`
'selects modulation type 64QAM and a channel coding rate of 3.4 Msamples for burst 1.

| *RST value | Resolution | SCPI |
|---|---|---|
| AOFDm: QPSK1D2<br>OFDM: BPSK1D2 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:HARQ<0..14>:ACID** 1 ... 15

The command sets the HARQ channel identifier for the specified sub-burst.

**Example:** `BB:WIM:AOFD:ZONE0:BURS2:HARQ5:ACID 12`
'sets the sub-burst ACID to 12.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:HARQ:COUNt** 1 ... 15

The command sets the number of sub-bursts in the 2D region.

**Example:** `BB:WIM:AOFD:ZONE0:BURS2:HARQ:COUN 10`
'sets the number of sub-bursts to 10.

| *RST value | Resolution | SCPI |
|---|---|---|
| 1 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:HARQ<0...14>:DATA** PN9 | PN11 | PN15 | PN16 | PN20 | PN21 | PN23 | DLISt | ZERO | ONE | PATTern

The command sets the data source for the specified sub-burst.

**Parameters:**

**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:WIMax:AOFD:ZONE:BURS:HARQ:DATA:DSELect`.

**ZERO | ONE**
Internal 0 and 1 data is used.

**PATTern**
Internal data is used. The bit pattern for the data is defined by the command `:BB:WIMax:AOFD:ZONE:BURS:DATA:PATTern`.

**Example:** `BB:WIM:AOFD:ZONE0:BURS2:HARQ6:DATA PATT`
'selects as the data source the bit pattern defined with the following command.

`BB:WIM:AOFD:ZONE0:BURS2:HARQ6:DATA:PATT #H3F,8`
'defines the bit pattern.

| *RST value | Resolution | SCPI |
|---|---|---|
| PN9 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:HARQ<0...14>:DATA:DSELect** <data list>

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:WIM:AOFD:ZONE0:BURS2:HARQ6:DATA DLIS`
'selects the Data Lists data source.

`"MMEM:CDIR 'D:\Lists\DM\IqData'`
'selects the directory for the data lists.

`BB:WIM:AOFD:ZONE0:BURS2:HARQ6:DATA:DSEL 'wimax_list1'`
'selects file 'wimax_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:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:HARQ<0...14>:DATA:PATTern** <bit pattern>

The command determines the bit pattern for the PATTern selection. The maximum length is 64 bits.

**Example:** `BB:WIM:AOFD:ZONE0:BURS2:HARQ6:DATA:PATT #B0,1`
'defines the bit pattern.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:HARQ<0...14>:DIUC** 0...15

Sets the DIUC (Downlink Interval User Code) for the specified sub-burst. The code is used to initialize the randomizer and is transmitted in the FCH.

**Example:** `BB:WIM:AOFD:ZONE0:BURS2:HARQ6:DIUC5`
'sets the Interval Usage Code 5 for sub-burst 6.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:HARQ<0...14>:DLENgth** 1 ... MAX

Sets the data length of the sub-burst. The data length range is dynamic and depends on the packet size and the MAC header state.

**Example:** `BB:WIM:AOFD:ZONE0:BURS2:HARQ4:DLEN 10`
'sets the data length of the sub-burst to 10.

| *RST value | Resolution | SCPI |
|---|---|---|
| MAX | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:HARQ<0...14>:FORMat?**

The command displays the sub-burst modulation.

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

**Example:** `BB:WIM:AOFD:ZONE0:BURS2:HARQ5:FORM?`
'queries the sub-burst modulation.

| *RST value | Resolution | SCPI |
|---|---|---|
| - | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:HARQ<0...14>:MAC:CID** 0...FFFF

The command sets the CID (Connection Control Identifier) of the medium access control layer (MAC). The CID identifies a connection to equivalent peers in the MAC of the base station and subscriber station.

**Example:** `BB:WIM:AOFD:ZONE0:BURS2:HARQ5:MAC:CID #H33`
'sets the CID for sub-burst 5 to 33.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:HARQ<0...14>:MAC:CRC:STATe** ON | OFF

The command activates/deactivates the checksum determination. The state of the CRC can be set independently of the state of MAC header generation.

**Example:** `BB:WIM:AOFD:BURS2:HARQ5:MAC:CRC:STAT ON`
'activates the checksum determination for the specified sub-burst.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:HARQ<0...14>:MAC:EKS** 0...3

The command sets the EKS (Encryption Key Sequence) value in the MAC header. The payload encryption itself is not performed by the signal generator.

**Example:** `BB:WIM:AOFD:BURS2:HARQ5:MAC:ENCR:STAT ON`
'enables payload encryption.

`BB:WIM:AOFD:BURS2:HARQ5:MAC:EKS 2`
'sets the EKS for burst 2.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:HARQ<0...14>:MAC:ENCRypted:STATe** ON | OFF

The command activates/deactivates payload encryption. If activated, the EC (encryption control) field is set to 1 and the EKS (encryption key sequence) field can be set.

**Example:** `BB:WIM:AOFD:BURS2:HARQ5:MAC:ENCR:STAT ON`
'enables payload encryption for sub-burst 5.

`BB:WIM:AOFD:BURS2:HARQ5:MAC:EKS 2`
'sets the EKS.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:HARQ<0...14>:MAC:STATe** ON | OFF

The command activates/deactivates the checksum determination. The state of the CRC can be set independently of the state of MAC header generation.

**Example:** `BB:WIM:AOFD:BURS2:HARQ5:MAC:STAT ON`
'enables generation of the generic MAC header for sub-burst 5.

| *RST value | Resolution | SCPI |
|---|---|---|
| OFF | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:HARQ<0...14>:MAC:TYPE** 0...FFF

The command specifies the MAC type. The value of the 6-bit type field is set which indicates the payload type, including the presence of subheaders.

**Example:** `BB:WIM:AOFD:BURS2:HARQ5:MAC:TYPE #H3F`
'sets the type field of the MAC header of sub-burst 5.

| *RST value | Resolution | SCPI |
|---|---|---|
| OFF | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:HARQ:MODE** CHASe | IR

The command selects the mode of the HARQ burst.

**Example:** `BB:WIM:AOFD:ZONE0:BURS2:HARQ:MODE CHAS`
'sets the HARQ mode to chase.

| *RST value | Resolution | SCPI |
|---|---|---|
| CHASe | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:HARQ<0...14>:PSIZe** PS48 | PS96 | PS144 | PS192 | PS288 | PS384 | PS480 | PS960 | PS1K92 | PS2K88 | PS3K84 | PS4K8 | PS9K6 | PS14K4 | PS24K

The command sets the HARQ sub-burst packet size (in bits).

**Example:** `BB:WIM:AOFD:ZONE0:BURS2:HARQ5:PSIZ PS144`
'sets the packet size to 144 bit.

| *RST value | Resolution | SCPI |
|---|---|---|
| PS144 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:HARQ<0...14>:RATE?**

The command queries the sub-burst code rate.

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

**Example:** `BB:WIM:AOFD:ZONE0:BURS2:HARQ5:RATE?`
'queries the sub-burst rate.

| *RST value | Resolution | SCPI |
|---|---|---|
| - | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:HARQ:SLFRee?**

The command queries the remaining number of slots available for the burst.

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

**Example:** `BB:WIM:AOFD:ZONE0:BURS2:HARQ:SLFR?`
'queries the remaining number of slots available for the burst.

| *RST value | Resolution | SCPI |
|---|---|---|
| - | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:HARQ<0...14>:SLOTcount** 1...MAX

The command sets the duration of the sub-bursts in slots. The duration range is dynamic and depends of the selected link direction and packet size.

**Example:** `BB:WIM:AOFD:ZONE0:BURS2:HARQ5:SLOT 1`
'sets the duration of sub-burst 5 to one slot.

| *RST value | Resolution | SCPI |
|---|---|---|
| 1 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:HARQ<0...14>:SPID** <sequence>

The command sets the sub-packet ID, which is used to identify the four sub-packets generated from an encoder packet.

***Note**:*
*For HARQ mode **Chase**, this field cannot be edited.*

**Example:** `BB:WIM:AOFD:ZONE0:BURS2:HARQ5:SPID 1,2,3`
'sets the SPID sequence.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:MAC:CID** #H0...#HFFFF

The command sets the CID (Connection Control Identifier) of the medium access control layer (MAC). The CID identifies a connection to equivalent peers in the MAC of the base station and subscriber station.

**Example:** `BB:WIM:AOFD:ZONE0:BURS2:MAC:CID #HE7`
'sets the CID for burst 2 to 231.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm:BURSt<0...7>:MAC:CRC:STATe** ON | OFF

The command activates/deactivates the checksum determination. The state of the CRC can be set independently of the state of MAC header generation.

**Example:** `BB:WIM:AOFD:BURS2:MAC:CRC:STAT ON`
'activates the checksum determination for burst 2.

| *RST value | Resolution | SCPI |
|---|---|---|
| OFF | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm:BURSt<0...7>:MAC:EKS** 0 ... 4

The command sets the EKS (Encryption Key Sequence) value in the MAC header. The payload encryption itself is not performed by the signal generator.

**Example:** `BB:WIM:AOFD:BURS2:MAC:ENCR:STAT ON`
'enables payload encryption.

`BB:WIM:AOFD:BURS2:MAC:EKS 2`
'sets the EKS for burst 2.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm:BURSt<0...7>:MAC:ENCRypted:STATe** ON | OFF

The command activates/disactivates payload encryption. If activated, the EC (Encryption Control) field is set to 1 and the EKS (Encryption Key Sequence) field can be set.

**Example:** `BB:WIM:AOFD:BURS2:MAC:ENCR:STAT ON`
'enables payload encryption for burst 2.

`BB:WIM:AOFD:BURS2:MAC:EKS 2`
'sets the EKS.

| *RST value | Resolution | SCPI |
|---|---|---|
| OFF | | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm:BURSt<0...7>:MAC:STATe** ON | OFF

The command enables/disables generation of the generic MAC header for the selected burst.

**Example:** `BB:WIM:AOFD:BURS2:MAC:STAT ON`
'enables generation of the generic MAC header for burst 2.

| *RST value | Resolution | SCPI |
|---|---|---|
| OFF | | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm:BURSt<0...7>:MAC:TYPE** #H0,0...#H40,6

The command specifies the MAC type..The value of the 6-bit type field is set which indicates the payload type, including the presence of subheaders.

**Example:** `BB:WIM:AOFD:BURS2:MAC:TYPE #H3F`
'sets the type field of the MAC header of burst 2.

| *RST value | Resolution | SCPI |
|---|---|---|
| #H0 | | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:OFFSet:MODE** USER | AUTO

The command selects the offset mode for the selected burst. The offset mode determines if the subchannel offset and the symbol offset of each burst are set automatically or manually.

**Example:** `BB:WIM:AOFD:ZONE0:BURS2:OFFS:MODE USER`
'sets the manual offset mode. The start subchannel and symbol of the burst are set manually with commands
`BB:WIM:ZONE0:AOFD:BURS2:OFFS:SUBChannel` and
`BB:WIM:AOFD:ZONE0:BURS2:OFFS:SYMBol`.

| *RST value | Resolution | SCPI |
|---|---|---|
| AUTO | | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:OFFSet:SUBChannel** 0 ... 4 294 967 295

The command sets the subchannel offset for the selected burst. This command is only available for offset mode user (`BB:WIM:AOFD:ZONE0:BURS2:OFFS:MODE USER`).

**Example:** `BB:WIM:AOFD:ZONE0:BURS2:OFFS:MODE USER`
'sets the manual offset mode.

BB:WIM:AOFD:ZONE0:BURS2:OFFS:SUBC 8
'selects subchannel 8 as start subchannel for burst 2.

| *RST value | Resolution | SCPI |
|---|---|---|
| Burst0: 7<br>All other bursts: 0 | | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:OFFSet:SYMBol** 3 ... 1000

The command sets the symbol offset for the selected burst. This command is only available for offset mode user (BB:WIM:AOFD:ZONE0:BURS2:OFFS:MODE USER).

**Example:** BB:WIM:AOFD:ZONE0:BURS2:OFFS:MODE USER
'sets the manual offset mode.

BB:WIM:AOFD:ZONE0:BURS2:OFFS:SYMB 2
'selects symbol 2 as start symbol for burst 2.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:PDU:COUNt** 1 ... 16

Sets the number of PDUs in the burst.

This command is only available for enabled multiple PDUS (BB:WIM:AOFD:ZONE<0..7>:BURS<0..63>:PDU:STAT ON).

**Example:** BB:WIM:AOFD:ZONE0:BURS2:PDU:STAT ON
'activates multiple PDUs.

BB:WIM:AOFD:ZONE0:BURS2:PDU:COUN 5
'selects 5 PDUs to be configured.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:PDU:STATe** ON | OFF

Enables/disables configuration of multiple PDUs.
If this parameter is enabled, multiple PDUs each with own MAC header and CRC are available within one burst.

**Example:** BB:WIM:AOFD:ZONE0:BURS2:PDU:STAT ON
'activates multiple PDUs.

| *RST value | Resolution | SCPI |
|---|---|---|
| OFF | | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:PDU<1...16>:DATA** PN9 | PN11 | PN15 | PN16 | PN20 | PN21 | PN23 | DLISt | ZERO | ONE | PATTern

The command sets the data source for the specified PDU.

**Parameters:** **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:WIMax:AOFD:ZONE:BURS:PDU:DATA:DSELect`.

**ZERO | ONE**
Internal 0 and 1 data is used.

**PATTern**
Internal data is used. The bit pattern for the data is defined by the command `:BB:WIMax:AOFD:ZONE:BURS:PDU:DATA:PATTern`.

**Example:** `BB:WIM:AOFD:ZONE0:BURS2:PDU6:DATA PATT`
'selects as the data source the bit pattern defined with the following command.

`BB:WIM:AOFD:ZONE0:BURS2:PDU6:DATA:PATT #H3F,8`
'defines the bit pattern.

| *RST value | Resolution | SCPI |
|---|---|---|
| PN9 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:PDU<1...16>:DATA:DSELect** <data list>

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:WIM:AOFD:ZONE0:BURS2:PDU6:DATA DLIS`
'selects the Data Lists data source.

`"MMEM:CDIR 'D:\Lists\WiMAX\PDU'`
'selects the directory for the data lists.

`BB:WIM:AOFD:ZONE0:BURS2:PDU6:DATA:DSEL 'pdu6_wimax'`
'selects file 'pdu6_wimax' as the data source. This file must be in the directory `D:\Lists\WiMAX\PDU` and have the file extension *.dm_iqd.

| *RST value | Resolution | SCPI |
|---|---|---|
| - | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:PDU<1...16>:DATA:PATTern** <bit pattern>

The command determines the bit pattern for the PATTern selection. The maximum length is 64 bits.

**Example:** `BB:WIM:AOFD:ZONE0:BURS2:PDUQ6:DATA:PATT #B0,1`
'defines the bit pattern.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:PDU<1...16>:DLENgth** 1 ... MAX

Sets the data length of the PDU. The data length range is dynamic and depends on the packet size and the MAC header state.

**Example:** `BB:WIM:AOFD:ZONE0:BURS2:HARQ4:DLEN 10`
'sets the data length of the sub-burst to 10.

| *RST value | Resolution | SCPI |
|---|---|---|
| MAX | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:PDU<1...16>:MAC:CRC:STATe** ON | OFF

The command activates/deactivates the checksum determination. The state of the CRC can be set independently of the state of MAC header generation.

**Example:** `BB:WIM:AOFD:BURS2:PDU5:MAC:CRC:STAT ON`
'activates the checksum determination for the specified PDU.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:PDU<1...16>:MAC:EKS** 0...3

The command sets the EKS (Encryption Key Sequence) value in the MAC header. The payload encryption itself is not performed by the signal generator.

**Example:** `BB:WIM:AOFD:BURS2:PDU5:MAC:ENCR:STAT ON`
'enables payload encryption.

`BB:WIM:AOFD:BURS2:PDU5:MAC:EKS 2`
'sets the EKS for burst 2.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:PDU<1...16>:MAC:ENCRypted:STATe** ON | OFF

The command activates/deactivates payload encryption. If activated, the EC (encryption control) field is set to 1 and the EKS (encryption key sequence) field can be set.

**Example:** `BB:WIM:AOFD:BURS2:PDU5:MAC:ENCR:STAT ON`
'enables payload encryption for PDU5.

`BB:WIM:AOFD:BURS2:PDU5:MAC:EKS 2`
'sets the EKS.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:PDU<1...16>:MAC:STATe** ON | OFF

The command activates/deactivates the checksum determination. The state of the CRC can be set independently of the state of MAC header generation.

**Example:** `BB:WIM:AOFD:BURS2:PDU5:MAC:STAT ON`
'enables generation of the generic MAC header for PDU5.

| *RST value | Resolution | SCPI |
|---|---|---|
| OFF | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:PDU<1...16>:MAC:TYPE** 0...FFF

The command specifies the MAC type. The value of the 6-bit type field is set which indicates the payload type, including the presence of subheaders.

**Example:** `BB:WIM:AOFD:BURS2:PDU5:MAC:TYPE #H3F`
'sets the type field of the MAC header of PDU5.

| *RST value | Resolution | SCPI |
|---|---|---|
| OFF | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:PDU<1...16>[:MAC]:CID** 0...FFFF

The command sets the CID (Connection Control Identifier) of the medium access control layer (MAC). The CID identifies a connection to equivalent peers in the MAC of the base station and subscriber station.

**Example:** `BB:WIM:AOFD:ZONE0:BURS2:PDU5:MAC:CID #H33`
'sets the CID for PDU5 to 33.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>:POWer** -80 dB ... +10 dB

The command sets the power for the selected burst in dB. To set the absolute power of a burst correctly, level reference **FCH / Burst** must be selected. In this mode, the output power of a burst equals Level + BurstPower.

In downlink, the preamble is transmitted with +3 dB and the FCH is transmitted with 0 dB.

In uplink, the power of the first burst is fixed to 0 dB.

**Example:** `BB:WIM:AOFD:ZONE0:BURS2:POW -2dB`
'sets the burst power to -2 dB.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | 0.01 dB | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:RANGing:ACODe**?

The command queries the number of allocated codes for OFDMA ranging.

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

Burst Type Ranging is available in uplink only.

**Example:** `BB:WIM:AOFD:ZONE0:BURS2:RANG:ACOD?`
'queries the number of allocated code.

| *RST value | Resolution | SCPI |
|---|---|---|
| | | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:RANGing:OPPortunity:SIZE** 1 ... 4

The command sets the ranging opportunity size. The opportunity size specifies the number of symbols required to transmit one CDMA ranging code.

Burst Type Ranging is available in uplink only.

**Example:** `BB:WIM:AOFD:ZONE0:BURS2:RANG:OPP:SIZE 2`
'sets a opportunity size of 2.

| *RST value | Resolution | SCPI |
|---|---|---|
| 1 | | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:RANGing:OPPortunity:SLOTcount** 1 ... MAX

The command sets the number of ranging opportunity slots. The number of opportunity slots defines the length of the ranging allocation, which is OpportunitySize * NoOfOpportunitySlots OFDMA symbols.

Burst Type Ranging is available in uplink only.

**Example:** `BB:WIM:AOFD:ZONE0:BURS2:RANG:OPP:SLOT 2`
'sets a number of 2 opportunity slots.

| *RST value | Resolution | SCPI |
|---|---|---|
| 1 | | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:RANGing:SCGCount** 1 ... 10

The command sets the number of ranging sub channel groups.

Burst Type Ranging is available in uplink only.

**Example:** `BB:WIM:AOFD:ZONE0:BURS2:RANG:SCGC 2`
'sets a number of 2 opportunity subchannel groups.

| *RST value | Resolution | SCPI |
|---|---|---|
| 1 | | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:SLOT:COUNt** 1 ... 10000

The command sets the number of slots for the selected burst. If the number of slots is changed, the data length is adjusted to fill the specified number of slots with data so that no padding has to be applied.

The maximum data length of 10 000 bytes defines the maximum number of symbols for a given modulation type and channel coding rate.

This command is available in uplink only.

**Example:** `BB:WIM:AOFD:ZONE0:BURS2:SLOT:COUN 12`
'sets 2 slots for burst 2.

| *RST value | Resolution | SCPI |
|---|---|---|
| 1 | | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:BURSt<0...63>STC:MODE** MA2antenna | MB2antenna

The command sets the space-timing coding mode.

**Example:** `BB:WIM:AOFD:ZONE:BURS3:STC:MODE MA2`
'selects space time coding mode with two antennas and matrix A in zone 1.

| *RST value | Resolution | SCPI |
|---|---|---|
| MA2antenna | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:SUBChannel[:COUNt]** 1 ... 1000

The command sets the number of subchannels for the selected burst. If the number of subchannels is changed, the data length is adjusted to fill the specified number of symbols with data so that no padding has to be applied.

The maximum data length of 10 000 bytes defines the maximum number of symbols for a given modulation type and channel coding rate.

For physical layer mode OFDMA, this command is available in downlink only.

**Example:** `BB:WIM:AOFD:ZONE0:BURS2:SUBC:COUN 16`
'sets 16 subchannels for burst 2.

| *RST value | Resolution | SCPI |
|---|---|---|
| 1 | | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:SYMBol[:COUNt]** 1 ...1000

The command sets the number of symbols for the selected burst. If the number of symbols is changed, the data length is adjusted to fill the specified number of symbols with data so that no padding has to be applied.

The maximum data length of 10 000 bytes defines the maximum number of symbols for a given modulation type and channel coding rate.

**Example:** `BB:WIM:AOFD:ZONE0:BURS2:SYMB:COUN 12`
'sets 12 symbols for burst 2.

| *RST value | Resolution | SCPI |
|---|---|---|
| 9 | | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:TYPE** DATA | FCH | DLMap | ULMap | RANGing | HARQ | FASTfeedback | DCD | UCD

The command selects the burst type.

Available burst types for downlink: DATA | FCH | DLMap | ULMap | HARQ | DCD | UCD

Available burst types for uplink: DATA | RANGing | HARQ | FASTfeedback

**Example:** `BB:WIM:AOFD:ZONE0:BURS2:TYPE DATA`
'selects burst type DATA.

| *RST value | Resolution | SCPI |
|---|---|---|
| DATA | | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:UCD:RANGing:BOENd** 0 ... 15

**(only for burst type UCD)**

The command sets the end value for the ranging backoff.

**Example:** `BB:WIM:AOFD:ZONE0:BURS2:UCD:RANG:BOEN 10`
'sets the end value for the ranging backoff to 10.

| *RST value | Resolution | SCPI |
|---|---|---|
| 5 | | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:UCD:RANGing:BOSTart** 0 ... 15

**(only for burst type UCD)**

The command sets the start value for the ranging backoff.

**Example:** `BB:WIM:AOFD:ZONE0:BURS2:UCD:RANG:BOST 10`
'sets the start value for the ranging backoff to 10.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:UCD:REQuest:BOENd** 0 ... 15

**(only for burst type UCD)**

The command sets the end value for the request backoff.

**Example:** `BB:WIM:AOFD:ZONE0:BURS2:UCD:REQ:BOEN 10`
'sets the end value for the request backoff to 10.

| *RST value | Resolution | SCPI |
|---|---|---|
| 15 | | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:UCD:REQuest:BOSTart** 0 ... 15

**(only for burst type UCD)**

The command sets the start value for the request backoff.

**Example:** `BB:WIM:AOFD:ZONE0:BURS2:UCD:REQ:BOST 10`
'sets the start value for the request backoff to 10.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:UIUC** 0.0 ... 15.0

The command sets uplink interval usage code. The UIUC is used for the UL-MAP, if generated.

This command is only available for link direction uplink.

**Example:** `BB:WIM:AOFD:ZONE0:BURS2:UIUC 2`
'sets uplink interval usage code 2.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:ULMap:AMODe** DLSFend | FRAMestart

The command sets the UL-MAP Allocation Start Time Base. Allocation Start Time field of the UL-MAP specifies the start of the uplink subframe.

This command is available for link direction downlink only.

**Example:** `BB:WIM:AOFD:ZONE0:BURS2:ULM:AMOD DLSF`
'sets the allocation start time base to DL subframe end.

| *RST value | Resolution | SCPI |
|---|---|---|
| DLSFend | | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:ULMap:ATIMe** 0...frame duration

The command sets the UL-MAP Allocation Start Time.

This command is available for link direction downlink only.

**Example:** `BB:WIM:AOFD:ZONE0:BURS2:ULM:ATIM 4`
'sets the allocation start time to 2.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:ULMap:DCD:CID** 0...0xFFFF

The command enters the value for the DCD CID. This CID (connection control identifier) is independent from the UL-Map CID and only used for the DCD.

**Example:** `BB:WIM:AOFD:ZONE0:BURS2:ULM:DCD:CID #H456`
'enters the value for the DCD CID.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0xFFFF | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:ULMap:DCD:STATe** ON | OFF

The command activates/deactivates that the DCD is appended to the UL-MAP. The DCD message is transmitted with its own MAC header and CRC, included in the same burst allocation used by the UL-MAP.

**Example:** `BB:WIM:AOFD:ZONE0:BURS2:ULM:DCD:STAT ON`
'appends the DCD to the UL-Map.

| *RST value | Resolution | SCPI |
|---|---|---|
| OFF | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:ULMap:UCD:CID** 0...0xFFFF

The command enters the value for the UCD CID. This CID (connection control identifier) is independent from the UL-Map CID and only used for the UCD.

**Example:** `BB:WIM:AOFD:ZONE0:BURS2:ULM:UCD:CID #H456`
'enters the value for the UCD CID.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0xFFFF | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:ULMap:UCD:STATe** ON | OFF

The command activates/deactivates that the UCD is appended to the UL-MAP. The UCD message is transmitted with its own MAC header and CRC, included in the same burst allocation used by the UL-MAP.

**Example:** `BB:WIM:AOFD:ZONE0:BURS2:ULM:UCD:STAT ON`
'appends the DCD to the UL-Map.

| *RST value | Resolution | SCPI |
|---|---|---|
| OFF | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:ULMap:RANGing:BOENd** 0 ... 15

The command sets the end value for the ranging backoff.

**Example:** `BB:WIM:AOFD:ZONE0:BURS2:ULM:RANG:BOEN 10`
'sets the end value for the ranging backoff to 10.

| *RST value | Resolution | SCPI |
|---|---|---|
| 5 | | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:ULMap:RANGing:BOSTart** 0 ... 15

The command sets the start value for the ranging backoff.

**Example:** `BB:WIM:AOFD:ZONE0:BURS2:ULM:RANG:BOST 10`
'sets the start value for the ranging backoff to 10.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:ULMap:REQuest:BOENd** 0 ... 15

The command sets the end value for the request backoff.

**Example:** `BB:WIM:AOFD:ZONE0:BURS2:ULM:REQ:BOEN 10`
'sets the end value for the request backoff to 10.

| *RST value | Resolution | SCPI |
|---|---|---|
| 15 | | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:BURSt<0...63>:ULMap:REQuest:BOSTart** 0 ... 15

The command sets the start value for the request backoff.

**Example:** `BB:WIM:AOFD:ZONE0:BURS2:ULM:REQ:BOST 10`
'sets the start value for the request backoff to 10.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm:ZONE:COUNt 1…8**

The command sets the number of active zones in one frame. The burst configuration is performed for each zone separately.

**Example:** `BB:WIM:AOFD:ZONE:COUN 2`
'two zones are defined.

| *RST value | Resolution | SCPI |
|---|---|---|
| 1 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:DLMap:BSID** #H0,0 ... #HFFFFFFFFFFFF,48

The command sets the 4 LSBs of the Base Station ID. Only the four least significant bits are given. The BSID is transmitted in the FCH (when set to **Auto** mode), and it is used to initialize the randomizer.

This command is available in downlink only and for DL-MAP Mode Auto (`BB:WIM:AOFD:ZONE0:DLM:MODE AUTO`).

**Example:** `BB:WIM:AOFD:ZONE0:DLM:BSID 2`
'the base station id is 2.

| *RST value | Resolution | SCPI |
|---|---|---|
| #H0,0 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:DLMap:COMPressed:AMODe** DLSFend |FRAMestart

The command selects the Allocation Start Time base. The Allocation Start Time field of the DL-MAP specifies the start of the downlink subframe.

If Start Time Base is set to DL Subframe End, the Allocation Start Time of the DL-MAP is set to the end of the downlink subframe + Allocation Start Time parameter set below.

When Start Time Base is set to Frame Start, the Allocation Start Time of the DL-MAP is set to the beginning of the frame + Allocation Start Time parameter set below.

**Example:** `BB:WIM:AOFD:ZONE0:DLM:COMP:AMOD DLSF`
'sets the start time base to DL Subframe End.

| *RST value | Resolution | SCPI |
|---|---|---|
| DLSFend | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:DLMap:COMPressed:ATIMe** 0...frame durationt

The command sets the Allocation Start Time in the DL-Map.

**Example:** `BB:WIM:AOFD:ZONE0:DLM:COMP:ATIM 2`
'sets the Allocation Start Time to 2 s.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:DLMap:COMPressed:STATe** ON | OFF

The command activates/deactivates that a compressed map is generated instead of a normal map.

**Example:** `BB:WIM:AOFD:ZONE0:DLM:COMP:STAT ON`
'generates a compressed map.

| *RST value | Resolution | SCPI |
|---|---|---|
| OFF | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:DLMap:COMPressed:ULMap:DSELect** <file name>

The command selects the UL-Map file.

**Example:** `BB:WIM:AOFD:ZONE0:DLM:COMP:ULM:DSEL 'ul-map_zone_1'`
'selects the UL-Map file `'ul-map_zone_1'`.

| *RST value | Resolution | SCPI |
|---|---|---|
| - | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:DLMap:COMPressed:ULMap:STATe** ON | OFF

The command activates/deactivates that a compressed UL-Map is appended to the DL-Map.

**Example:** `BB:WIM:AOFD:ZONE0:DLM:COMP:ULM:STAT ON`
'appends the compressed map to the DL-Map.

| *RST value | Resolution | SCPI |
|---|---|---|
| OFF | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:DLMap:DATA:DCD[:COUNt]** 0 ... 255

The command sets the DCD Count. This value is used for the corresponding DL-MAP field in Auto mode.

This command is available in downlink only and for DL-MAP Mode Auto (`BB:WIM:AOFD:ZONE:DLM:MODE AUTO`).

**Example:** `BB:WIM:ZONE:AOFD:DLM:DCD 2`
'sets the DCD count to 2.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:DLMap:DCD:CID** 0...0xFFFF

The command enters the value for the DCD CID. This CID (connection control identifier) is independent from the DL-Map CID and is only used for the DCD message.

**Example:** `BB:WIM:AOFD:ZONE0:DLM:DCD:CID #H456`
'enters the value for the DCD CID.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:DLMap:DCD:STATe** ON | OFF

The command activates/deactivates that the DCD is appended to the DL-MAP. The DCD message carries its own MAC header and CRC, but is included within the DL-MAP burst.

**Example:** `BB:WIM:AOFD:ZONE0:DLM:DCD:STAT ON`
'appends the DCD to the DL-Map.

| *RST value | Resolution | SCPI |
|---|---|---|
| OFF | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:DLMap:FNOFfset** 0 ... 16777215

The command sets the frame number offset of the DL-MAP. This value is added to the current frame number of the sequence. The result is used as Frame Number in the DL-MAP (in Auto mode).

This command is available in downlink only and for DL-MAP Mode Auto (`BB:WIM:AOFD:ZONE0:DLM:MODE AUTO`).

**Example:** `BB:WIM:AOFD:ZONE0:DLM:FNOF 12`
'sets a frame number offset of 2 frames.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:DLMap:IIE:STATe** ON | OFF

The command includes/excludes the CID-Switch_IE().

**Example:** `BB:WIM:AOFD:ZONE0:DLM:IIE:STAT ON`
'includes the CID-Switch_IE() to the DL-Map.

| *RST value | Resolution | SCPI |
|---|---|---|
| ON | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:DLMap:MODE** USER | AUTO

The command selects the mode for configuration of the DL map. Depending on this setting the above commands are available.

This command is available in downlink only.

**Parameter:** **AUTO**
The DL-MAP is filled automatically with parameters specified at different locations.

**USER**
The DL-MAP is filled with data specified under Data Source. This enables any arbitrary data to be sent with the DL-MAP burst.

**Example:** `BB:WIM:AOFD:ZONE0:DLM:MODE AUTO`
'The DL-MAP is filled automatically.

| *RST value | Resolution | SCPI |
|---|---|---|
| AUTO | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0…7>]:DLMap:REPCoding** RC0 | RC2 | RC4 | RC6

The command activates/deactivates repetition coding. Setting RCO deactivates, all other settings activate repetition coding.

**Example:** `BB:WIM:AOFD:ZONE0:DLM:REPC RC2`
'activates repetition coding.

| *RST value | Resolution | SCPI |
|---|---|---|
| RC0 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm:ZONE<0...7>:BOOSt** -80 ... 10

Sets an additional zone boosting in dB.
The zone boosing is applied to both the data and pilot carriers.

**Example:** `BB:WIM:AOFD:ZONE0:BOOS -33`
'sets th zone boost to - 33dB.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm:ZONE<0...7>:FCH:MODE** AUTO | USER

The command selects the mode for generating the FCH.Channel Coding of the FCH is performed both in **Auto** and **User** mode.

**Parameter:** **AUTO**

The DLFP fields, which form the FCH, are filled automatically with parameters specified at different locations. The following mapping applies in Auto mode:

Used subchannel bitmap:
Set to the bitmap specified in the “Configure active Subchannels” panel.

Repetition_Coding_Indication:
Specifies the DL-MAP repetition coding set in the “Configure DL-MAP” panel.

Coding_Indication:
Specifies channel coding of the DL-MAP (CC or CTC).

DL-Map_Length:
Set to the number of slots allocated for the DL-MAP.

**USER**

the FCH is filled with data specified under Data Source. This enables any arbitrary data to be sent with the FCH burst.

**Example:** `BB:WIM:AOFD:ZONE0:FCH:MODE AUTO`
'selects FCH mode AUTO.

| *RST value | Resolution | SCPI |
|---|---|---|
| AUTO | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm:ZONE<0...7>:NUMBer** 0 ... 7

The command selects the zone number.

**Example:** `BB:WIM:AOFD:ZONE0:NUMB 4`
'assigns number 4 to zone 1.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm:ZONE<0...7>:PERMbase** 0 ... 69

The command selects the PermBase of the zone.

**Example:** `BB:WIM:AOFD:ZONE0:PERM 5`
'selects PermBase 5.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm:ZONE<0...7>:PILDedicated** ON | OFF

The command activates/deactivates dedicated pilots. If deactivated, the pilot symbol are broadcast.

***Note:***
*This feature is available only for zone type AMC and PUSC with link direction Downlink.*

**Example:** `BB:WIM:AOFD:ZONE0:PILD ON`
'activates dedicted pilot symbols for the specified zone.

| *RST value | Resolution | SCPI |
|---|---|---|
| OFF | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm:ZONE<0...7>:PRBSid** 0 ... 3

The command selects the PRBS_ID of the zone.

**Example:** `BB:WIM:AOFD:ZONE0:PRBS 2`
'selects PRBS_ID 5.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm:ZONE<0...7>:SCARrier:RANDomizer** ON | OFF

The command activates / deactivates the subcarrier redomization for OFDMA configurations.

**Example:** `BB:WIM:AOFD:ZONE0:SCAR:RAND OFF`
'deactivates the subcarrier randomization.

| *RST value | Resolution | SCPI |
|---|---|---|
| ON | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm:ZONE<0...7>:SEGMent** 0…2

The command selects the zone segment for OFDMA configurations.

**Example:** `BB:WIM:AOFD:ZONE:SEGM 1`
'selects one segment for zone 1.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm:ZONE<0...7>:STC:ANTenna** 0…2

The command selects the the antenna for the space-time coding modes.

**Example:** `BB:WIM:AOFD:ZONE:STC:ANT ANT0`
'selects antenna 0 for space time coding.

| *RST value | Resolution | SCPI |
|---|---|---|
| ANT0 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm:ZONE<0...7>:STC:MODE** OFF | MA2antenna | MB2antenna | BURSt | COLLaborative

The command sets the space-timing coding mode (2 antennas, matrix A or B) or switches diversity off.

**Example:** `BB:WIM:AOFD:ZONE:STC:MODE MA2`
'selects space time coding mode with two antennas and matrix A in zone 1.

| *RST value | Resolution | SCPI |
|---|---|---|
| OFF | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm:ZONE<0...7>:STC:PILotpattern** A |B

**(only for Space-Time Coding Mode Collaborative Multiplexing)**

The command sets the pilot pattern in uplink Collaborative Multiplexing mode.

**Example:** `BB:WIM:AOFD:ZONE:STC:PIL A`
'sets the pilot pattern to A.

| *RST value | Resolution | SCPI |
|---|---|---|
| A | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm:ZONE<0...7>:SOUNding:CID<0...15>:FBANd[:COUNt]** 1...MAX

**(only for Sounding Type A)**

The command sets the number of frequency bands.

**Example:** `BB:WIM:AOFD:ZONE:SOUN:CID5 FBAN:COUN 2`
'sets the number of frequency band to 2.

| *RST value | Resolution | SCPI |
|---|---|---|
| MAX | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm:ZONE<0...7>:SOUNding:CID<0...15>:FBANd[:STARt]** 1...MAX

**(only for Sounding Type A)**

The command sets the start frequency band.

**Example:** `BB:WIM:AOFD:ZONE:SOUN:CID5 FBAN:STAR 1`
'sets the value for the start frequency band to 1.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm:ZONE<0...7>:SOUNding:CID<0...15>:CID** 0...0xFFFF

The command sets the CID (connection control identifier).

**Example:** `BB:WIM:AOFD:ZONE:SOUN:CID5:CID FFFF`
'sets the connection control identifier to #HFFFF.

| *RST value | Resolution | SCPI |
|---|---|---|
| 1 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm:ZONE<0...7>:SOUNding:CID<0...15>:DECoffset** 0...MAX

**(only for Sounding Type A)**

The command sets the decimation offset.The maximum value depends on the setting for the decimation value (command: `SOUR:BB:WIM:AOFD:ZONE<0...7>:SOUN:DEC:VAL`).

**Example:** `BB:WIM:AOFD:ZONE:SOUN:CID5:DEC 10`
'sets the decimation offset to 10..

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm:ZONE<0...7>:SOUNding:CID<0...15>:COUNt** 1...16

The command sets the total number of CIDs.

**Example:** `BB:WIM:AOFD:ZONE:SOUN:CID5:COUN 1`
'sets the number of total CIDs to 1.

| *RST value | Resolution | SCPI |
|---|---|---|
| 1 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm:ZONE<0...7>:SOUNding:CID<0...15>:PERiodicity** PER0 | PER1 | PER2 | PER4 | PER8 | PER16 | PER32 | PER64

The command sets the value for the periodicity.

**Example:** `BB:WIM:AOFD:ZONE:SOUN:CID5:PER2`
'sets the value for the periodicity to 2.

| *RST value | Resolution | SCPI |
|---|---|---|
| PER0 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm:ZONE<0...7>:SOUNding:CID<0...15>:POWer[:STATe]** ON | OFF

The command activates/deactivates the power boost.

**Example:** `BB:WIM:AOFD:ZONE:SOUN:CID5:POW:STAT ON`
'activates the power boost.

| *RST value | Resolution | SCPI |
|---|---|---|
| OFF | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm:ZONE<0...7>:SOUNding:CID<0...15>:RELevance[:STATe]** ON | OFF

The command activates/deactivates the sounding relevance.

**Example:** `BB:WIM:AOFD:ZONE:SOUN:CID5:REL:STAT ON`
'activates the sounding relevance.

| *RST value | Resolution | SCPI |
|---|---|---|
| ON | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm:ZONE<0...7>:SOUNding:CID<0...15>:CINDex** 0...MAX

**(only for Sounding Type A)**

The command sets the value for the cyclic shift index. The maximum value depends on the setting for the maximum cyclic shift index (command: `SOUR:BB:WIM:AOFD:ZONE<0...7>:SOUN:CMAX`).

**Example:** `BB:WIM:AOFD:ZONE:SOUN:CID5:CIND 3`
'sets the value for the cyclic shift index to 3.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm:ZONE<0...7>:SOUNding:CID<0...15>:SUBChannel[:COUNt]** 1...MAX

**(only for Sounding Type B)**

The command sets the number of subchannels.

**Example:** `BB:WIM:AOFD:ZONE:SOUN:CID5:SUBC:COUN 3`
'sets the number of subchannels to 3.

| *RST value | Resolution | SCPI |
|---|---|---|
| 1 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm:ZONE<0...7>:SOUNding:CID<0...15>:SUBChannel[:OFFSet]** 1...MAX

**(only for Sounding Type B)**

The command sets the subchannel offset.

**Example:** `BB:WIM:AOFD:ZONE:SOUN:CID5:SUBC:OFFS 3`
'sets the subchannel offset to 3.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm:ZONE<0...7>:SOUNding:CID<0...15>:SYMBol** 1...MAX

Sets the symbol used for this CID from the available symbols of the zone. Each sounding CID occupies one symbol only.
The maximum value depends on the setting for the number of symbols (command: `SOUR:BB:WIM:AOFD:ZONE<0...7>:SYMB:COUN`)

**Example:** `BB:WIM:AOFD:ZONE:SOUN:CID5:SYMB 5`
'sets the number of sounding symbols to 5.

| *RST value | Resolution | SCPI |
|---|---|---|
| 1 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm:ZONE<0...7>:SOUNding:CID<0...15>:DECimation:RANDomization[:STATe]** ON | OFF

**(only for Sounding Type A and Separability Type Decimated Subcarriers)**

The command activates/deactivates the decimation offset randomization.

**Example:** `BB:WIM:AOFD:ZONE:SOUN:CID5:DEC:RAND STAT ON`
'activates decimation offset randomization.

| *RST value | Resolution | SCPI |
|---|---|---|
| OFF | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm:ZONE<0...7>:SOUNding:CID<0...15>:DECimation:VALue** DEC2 | DEC4 | DEC5 | DEC8 | DEC16 | DEC32 | DEC64 | DEC128

**(only for Sounding Type A and Separability Type Decimated Subcarriers)**

The command sets the value for the decimation.

**Example:** `BB:WIM:AOFD:ZONE:SOUN:CID5:DEC:VAL DEC16`
'sets the value for the decimation to 16.

| *RST value | Resolution | SCPI |
|---|---|---|
| DEC2 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm:ZONE<0...7>:SOUNding:CID<0...15>:DLPermbase** 0...63

**(only for Sounding Type B)**

The command sets the value for the DL PermBase.

**Example:** `BB:WIM:AOFD:ZONE:SOUN:CID5:DLP 16`
'sets the value for the decimation to 16.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm:ZONE<0...7>:SOUNding:CMAXimum** MC4 | MC8 | MC16 | MC32 | MC9 | MC18

**(only for Sounding Type A and Separability Type Cyclic Shift)**

The command sets the value for the maximum cyclic shift index.

**Example:** `BB:WIM:AOFD:ZONE:SOUN:CMAX MC4`
'sets the value for the maximum cyclic shift to 4.

| *RST value | Resolution | SCPI |
|---|---|---|
| MC4 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm:ZONE<0...7>:SOUNding:PERMutation**?

**(only for Sounding Type B)**

The command queries the permutation used for the selected sounding zone.

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

**Example:** `BB:WIM:AOFD:ZONE:SOUN:PERM?`
'queries the permutation.

| *RST value | Resolution | SCPI |
|---|---|---|
| - | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm:ZONE<0...7>:SOUNding:RELevance:FLAG** SAME | INDividual

The command selects whether sounding is relevant individually for each CID or for all CIDs.

**Example:** `BB:WIM:AOFD:ZONE:SOUN:REL:FLAG SAME`
'sounding is relevant for all CIDs.

| *RST value | Resolution | SCPI |
|---|---|---|
| SAME | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm:ZONE<0...7>:SOUNding:RELevance:MODE** THIS | NEXT

**(only if Sounding Relevance Flag is set to Same For All CIDs)**

The command selects the sounding relevance mode.

**Example:** `BB:WIM:AOFD:ZONE:SOUN:REL:MODE THIS`
'selects the sounding relevance mode THIS.

| *RST value | Resolution | SCPI |
|---|---|---|
| THIS | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm:ZONE<0...7>:SOUNding:SEParability** CYCLic | DECimated

**(only for Sounding Type A)**

The command selects the sounding separability type.

**Example:** `BB:WIM:AOFD:ZONE:SOUN:SEP CYCL`
'selects the separability mode cyclic.

| *RST value | Resolution | SCPI |
|---|---|---|
| CYCLic | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm:ZONE<0...7>:SOUNding:TYPE** A | B

The command selects either sounding type A or B.

**Example:** `BB:WIM:AOFD:ZONE:SOUN:TYPE A`
'selects sounding type A.

| *RST value | Resolution | SCPI |
|---|---|---|
| A | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:SUBChannel<0 ...5>:MAP** ON | OFF

The command activates /deactivates the selected set of subchannels. There are 6 sets of subchannels available 0 = 0...5; 1 = 6...9; 2 =10-15; 3 = 16 - 19; 4 = 20 ...25; 5 = 26 ... 29).

This command is available only in uplink and for subchannel mode user (`BB:WIM:AOFD:ZONE0:SUBC:MODE USER`).

**Example:** `BB:WIM:AOFD:ZONE0:SUBC2:MAP ON`
'activates subchannel set 2 (i.e. subchannels 6 ... 9).

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:SUBChannel<n>:MODE** ALL| USER

The command determines if all or selected sets of subchannels are activated. The sets of subchannel to be activated are selected with command `SOUR:BB:WIM:AOFD:ZONE0:SUBC2:MAP`.

**Example:** `BB:WIM:AOFD:ZONE0:SUBC:MODE USER`
'selects user mode for selecting the activated subchannels.

`BB:WIM:AOFD:ZONE0:SUBC2:MAP ON`
'activates generation of set subchannels 20 to 31.

| *RST value | Resolution | SCPI |
|---|---|---|
| ALL | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:SUBChannel<n>:PATTern** <bit pattern>

The command determines the 'allocated subchannel bitmap'. The pattern is a 72 bit value.

This command is available in uplink only.

**Example:** `BB:WIM:AOFD:ZONE0:SUBC:PATT #HFFFFFFFFFFFFFFFF3F,72`
'determines the 'allocated subchannel bitmap.

| *RST value | Resolution | SCPI |
|---|---|---|
| #HFFFFFFFFFFFFFFFF3F,72 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:SUBChannel<n>:ROTation ON | OFF**

The command activates or deactivates the subchannel rotation.

This command is available for zone type PUSC in uplink only.

**Example:** `"SOUR:BB:WIM:AOFD:ZONE0:SUBC:ROT ON`
'activates the subchannel rotation.

| *RST value | Resolution | SCPI |
|---|---|---|
| ON | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm:ZONE<0...7>:SYMBol[:COUNt]** 0…MAX

The command selects the number of symbols in UL zone for OFDMA configurations. The duration of uplink bursts can not exceed the specified number of symbols.

**Example:** `BB:WIM:AOFD:ZONE:SYMB:COUN 3`
'selects 3 symbols for zone 1.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm:ZONE<0...7>:SYMBol[:COUNt]:AUTO** ON | OFF

The command activates or deactivates automatic zone length. In auto mode, the number of symbols in the zone is derived from the configured bursts such that all bursts fit into the zone, except if the frame duration is exceeded.

This command is available in downlink only.

**Example:** `BB:WIM:AOFD:ZONE:SYMB:AUTO ON`
'activates automatic symbol count for zone 1.

| *RST value | Resolution | SCPI |
|---|---|---|
| OFF | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm:ZONE<0...7>:SYMBol:OFFSet ?**

The command queries the symbol offset of the zone.

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

**Example:** `BB:WIM:AOFD:ZONE:SYMB:OFFS?`
'queries the symbol count offset in zone 1.

| *RST value | Resolution | SCPI |
|---|---|---|
| | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:TYPE** PUSC | FUSC | AMC2X3 | SOUNding

The command selects the zone type. This setting is identical to the setting of the type of subcarrier permutation for OFDMA configurations, a change here also changes the value of command `BB:WIM:AOFD:ZONE:SUBC:PERM`.

**Example:** `BB:WIM:AOFD:ZONE3:TYPE PUSC`
'sets zone type PUSC for the specified zone.

| *RST value | Resolution | SCPI |
|---|---|---|
| FUSC | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:UCD** 0...255

The command sets the value for the UCD count.

This command is available in uplink only.

**Example:** `BB:WIM:AOFD:ZONE0:UCD 255`
'sets the value for the UCD count to 255.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:AOFDm[:ZONE<0...7>]:ULMap:CREate** <file_name>

The command saves the current UL-map. The default directory is set using command `MMEM:CDIRectory`. A path can also be specified, in which case the UL-map files in the specified directory are read. The file are stored with the extension ***.dm_iqd**.

This command is available in uplink only.

**Example:** `BB:WIM:AOFD:ZONE1:ULM:CRE 'ul-map_zone1'`
'save the current UL-map to the file `'ul-map_zone1'`.

| *RST value | Resolution | SCPI |
|---|---|---|
| - | - | Device-specific |

# SOURce-WIMax - OFDM Physical Layer Settings

The SOURce:BB:WIMax:OFDM system contain commands for setting the characteristics of signals with OFDM physical layer.

The commands of this system only take effect if the OFDM physical layer mode is selected:
`SOURce:BB:WIMax:MODE OFDM`

***Important:***

*In case of remote control, suffix counting for bursts corresponds to the suffix counting with WiMAX starting with burst 0. SCPI prescribes that suffix 1 is the default state and used when no specific suffix is specified. Therefore, burst 1 (and not burst 0) is selected when no suffix is specified.*

| Command | Parameters | Default unit | Comments |
|---|---|---|---|
| [SOURce<[1]\|2>:]BB:WIMax:OFDM:BSID | 0...15 | | |
| [SOURce<[1]\|2>:]BB:WIMax:OFDM:BURSt[:COUNt] | 1...64 | | |
| [SOURce<[1]\|2>:]BB:WIMax:OFDM:BURSt<0...63>:CCODing:STATe | ON \| OFF | | |
| [SOURce<[1]\|2>:]BB:WIMax:OFDM:BURSt<0...63>:DATA | PN9 \| PN15 \| PN16 \| PN20 \| PN21 \| PN23 \| ZERO \| ONE \| PATTern \| DLISt | | |
| [SOURce<[1]\|2>:]BB:WIMax:OFDM:BURSt<0...63>:DATA:DSELect | <dlist_name> | | |
| [SOURce<[1]\|2>:]BB:WIMax:OFDM:BURSt<0...63>:DATA:PATTern | #B0,1...B11..1,64 | | |
| [SOURce<[1]\|2>:]BB:WIMax:OFDM:BURSt<0...63>:DIUC | 0.0 ... 15.0 | | |
| [SOURce<[1]\|2>:]BB:WIMax:OFDM:BURSt<0...63>:DLENgth | 0 .. 10 000 | Bytes | |
| [SOURce<[1]\|2>:]BB:WIMax:OFDM:BURSt<0...63>:DLMap:AMODe | DLSFend \| FRAMestart | | |
| [SOURce<[1]\|2>:]BB:WIMax:OFDM:BURSt<0...63>:DLMap:ATIMe | | | |
| [SOURce<[1]\|2>:]BB:WIMax:OFDM:BURSt<0...63>:DLMap:DCD:STATe | ON \| OFF | | |
| [SOURce<[1]\|2>:]BB:WIMax:OFDM:BURSt<0...63>:DLMap:UCD:STATe | ON \| OFF | | |
| [SOURce<[1]\|2>:]BB:WIMax:OFDM:BURSt<0...63>:DLMap:ULM:STATe | ON \| OFF | | |
| [SOURce<[1]\|2>:]BB:WIMax:OFDM:BURSt<0...63>:FORMat | BPSK1D2 \| QPSK1D2 \| QPSK3D4 \| QAM1D2X16 \| QAM3D4X16 \| QAM2D3X64 \| QAM3D4X64 | | |
| [SOURce<[1]\|2>:]BB:WIMax:OFDM:BURSt<0...63>:GAP | 0 us ... 1 000 000 us | s | |
| [SOURce<[1]\|2>:]BB:WIMax:OFDM:BURSt<0...63>:MAC:CID | H0 ... HFFFF | | |
| [SOURce<[1]\|2>:]BB:WIMax:OFDM:BURSt<0...63>:MAC:CRC:STATe | ON \| OFF | | |
| [SOURce<[1]\|2>:]BB:WIMax:OFDM:BURSt<0...63>:MAC:EKS | 0 ... 4 | | |
| [SOURce<[1]\|2>:]BB:WIMax:OFDM:BURSt<0...63>:MAC:ENCRypted:STATe | ON \| OFF | | |
| [SOURce<[1]\|2>:]BB:WIMax:OFDM:BURSt<0...63>:MAC:STATe | ON \| OFF | | |
| [SOURce<[1]\|2>:]BB:WIMax:OFDM:BURSt<0...63>:MAC:TYPE | #H0...#H3F | | |
| [SOURce<[1]\|2>:]BB:WIMax:OFDM:BURSt<0...63>:MIDamble | OFF \| REP5 \| REP9 \| REP17 | | |
| [SOURce<[1]\|2>:]BB:WIMax:OFDM:BURSt<0...63>:POWer | -80 dB ... 0 dB | dB | |
| [SOURce<[1]\|2>:]BB:WIMax:OFDM:BURSt<0...63>:PREamble:MODE | OFF \| LONG \| SHORt | | |
| [SOURce<[1]\|2>:]BB:WIMax:OFDM:BURSt<0...63>:SYMBol[:COUNt] | 0 ... MAX | | |
| [SOURce<[1]\|2>:]BB:WIMax:OFDM:BURSt<0...63>:TYPE | DATA \| DLMap \| RANGing \| ULMap | | |
| [SOURce<[1]\|2>:]BB:WIMax:OFDM:BURSt<0...63>:UIUC | 0.0 ... 15.0 | | |

| Command | Parameters | Default unit | Comments |
|---|---|---|---|
| [SOURce<[1]\|2>:]BB:WIMax:OFDM:BURSt<0...63>:ULMap:AMODe | DLSFend \| FRAMestart | | |
| [SOURce<[1]\|2>:]BB:WIMax:OFDM:BURSt<0...63>:ULMap:ATIMe | 0…frame duration | | |
| [SOURce<[1]\|2>:]BB:WIMax:OFDM:BW | 1.25E6 ... 28E6 | | |
| [SOURce<[1]\|2>:]BB:WIMax:OFDM:FBANd | ETSI \| MMDS \| WCS \| UNII \| USER | | |
| [SOURce<[1]\|2>:]BB:WIMax:OFDM:FCH:CCC | 0 ... 15 | | |
| [SOURce<[1]\|2>:]BB:WIMax:OFDM:FCH:DATA | PN9 \| PN15 \| PN16 \| PN20 \| PN21 \| PN23 \| ZERO \| ONE \| PATTern \| DLISt | | |
| [SOURce<[1]\|2>:]BB:WIMax:OFDM:FCH:DATA:DSELect | <dlist_name> | | |
| [SOURce<[1]\|2>:]BB:WIMax:OFDM:FCH:DATA:PATTern | #B0,1...B11..1,64 | | |
| [SOURce<[1]\|2>:]BB:WIMax:OFDM:FCH:FNOFfset | 0 ... 15 | | |
| [SOURce<[1]\|2>:]BB:WIMax:OFDM:FCH:MODE | AUTO \| USER | | |
| [SOURce<[1]\|2>:]BB:WIMax:OFDM:FCH:STATe | IN \| OFF | | |
| [SOURce<[1]\|2>:]BB:WIMax:OFDM:FFT | | | Query only |
| [SOURce<[1]\|2>:]BB:WIMax:OFDM:FRAMe:PREDefined | USER \| FBPSK12SHORT \| FBPSK12MID \| FBPSK12LONG \| FQPSK12SHORT \| FQPSK12MID \| FQPSK12LONG \| FQPSK34SHORT \| FQPSK34MID \| FQPSK34LONG \| F16QAM12SHORT \| F16QAM12MID \| F16QAM12LONG \| F16QAM34SHORT \| F16QAM34MID \| F16QAM34LONG \| F64QAM23SHORT \| F64QAM23MID \| F64QAM23LONG \| F64QAM34SHORT \| F64QAM34MID \| F64QAM34LONG | | |
| [SOURce<[1]\|2>:]BB:WIMax:OFDM:FRAMe[:NUMBer] | 0 ... 15 | | |
| [SOURce<[1]\|2>:]BB:WIMax:OFDM:N | | | Query only |
| [SOURce<[1]\|2>:]BB:WIMax:OFDM:POWer:REFerence | BURSt \| PREamble | | |
| [SOURce<[1]\|2>:]BB:WIMax:OFDM:PREamble:MODE | OFF \| LONG \| SHORT | | |
| [SOURce<[1]\|2>:]BB:WIMax:OFDM:SRATe | Slot 0 ...slot 14 | | |
| [SOURce<[1]\|2>:]BB:WIMax:OFDM:SUBChannel[:COUNt] | SC1 \| SC2 \| SC4 \| SC8 \| SC16 | | |
| [SOURce<[1]\|2>:]BB:WIMax:OFDM:SUBHannel:INDex | 0 ... 15 | | |
| [SOURce<[1]\|2>:]BB:WIMax:OFDM:TGTB | TGTB1D4 \| TGTB1D8 \| TGTB1D16 \| TGTB1D32 | | |
| [SOURce<[1]\|2>:]BB:WIMax:OFDM:UCD | 0..255 | | |
| [SOURce<[1]\|2>:]BB:WIMax:OFDM:ULMap:CREate | <file_name> | | |

**[SOURce<[1]|2>:]BB:WIMax:OFDM:BSID** 1 ... 15

The command sets the 4 LSBs of the Base Station ID. Only the four least significant bits are given. The BSID is transmitted in the FCH (when set to **Auto** mode), and it is used to initialize the randomizer.

**Example:** `BB:WIM:OFDM:BSID 2`
'the base station id is 2.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:OFDM:BURSt[:COUNt ]** 1 ... 64

The command sets the number of active bursts in one frame. With number of bursts = 0, a preamble only or a preamble with an FCH burst is generated.

**Example:** `BB:WIM:OFDM:BURS:COUN 2`
'two bursts are sent in one frame.

| *RST value | Resolution | SCPI |
|---|---|---|
| 1 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:OFDM:BURSt:CCODing:STATe** ON | OFF

The command switches channel coding on or off. If channel coding is switched off, the bits read from the data source are directly modulated onto the carriers. Due to randomization missing, this could result in very high crest factors of the signal.

**Example:** `BB:WIM:OFDM:BURS:CCOD:STAT ON`
'activates channel coding for burst 1.

| *RST value | Resolution | SCPI |
|---|---|---|
| ON | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:OFDM:BURSt<0...63>:DATA** PN9 | PN15 | PN16 | PN20 | PN21 | PN23 | DLISt | ZERO | ONE | PATTern

The command determines the data source for the specified bursts.

**Parameters:**

**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:WIMax:OFDM:BURS:DATA:DSELect`.

**ZERO | ONE**
Internal 0 and 1 data is used.

**PATTern**
Internal data is used The bit pattern for the data is defined by the command `:BB:WIMax:OFDM:BURS:DATA:PATTern`.

**Example:** `BB:WIM:OFDM:BURS:DATA PATT`
'selects as the data source for the data fields of burst 1, the bit pattern defined with the following command.

`BB:WIM:OFDM:BURS:DATA:PATT #H3F,8`
'defines the bit pattern.

| *RST value | Resolution | SCPI |
|---|---|---|
| PN9 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:OFDM:BURSt<0...63>: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:WIM:OFDM:BURS:DATA DLIS`
'selects the Data Lists data source.

`"MMEM:CDIR 'D:\Lists\DM\IqData'`
'selects the directory for the data lists.

`BB:WIM:OFDM:BURS:DATA:DLIS 'wimax_list1'`
'selects file '`wimax_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:WIMax:OFDM:BURSt<0...63>:DATA:PATTern** #B0,1... #B111..1,64

The command determines the bit pattern for the PATTern selection. The maximum length is 64 bits.

**Example:** `BB:WIM:OFDM:BURS:DATA:PATT #H3F,8`
'defines the bit pattern.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:OFDM:BURSt<0...63>:DIUC** 0 ... 15

The command sets the specific interval usage code. The code is used to initialize the randomizer and is transmitted in the FCH.

**Example:** `BB:WIM:OFDM:BURS2:DIUC 12`
'sets Interval Usage Code12 for burst 2.

| *RST value | Resolution | SCPI |
|---|---|---|
| 1 | | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:OFDM:BURSt<0...63>:DLENgth** 0 ... 10 000 Bytes

The command sets the data length in bytes. The given number of bytes is read from the data source. The total number of data bytes in the burst (before channel coding) is determined as follows:

TotalDataBytes = DataLength + MACHeaderBytes + CRCBytes + TailByte

The tail byte is only added when channel coding is switched on. The same is the case for the MAC header and CRC, they are not added when switched off. Additionally padding with 0xFF bytes is applied at the end of the data sequence to reach an integer number of OFDM symbols.

The data length determines the number of symbols and vice versa. The maximum data length of 10000 bytes defines the maximum number of symbols for a given modulation type and channel coding rate.

**Example:** `BB:WIM:OFDM:BURS:DLEN 256'`
'sets a data length of 256.

| *RST value | Resolution | SCPI |
|---|---|---|
| 100 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:OFDM:BURSt<0…63>]:DLMap:AMODe** DLSFend |FRAMestart

The command selects the Allocation Start Time base. The Allocation Start Time field of the DL-MAP specifies the start of the downlink subframe.

If Start Time Base is set to DL Subframe End, the Allocation Start Time of the DL-MAP is set to the end of the downlink subframe + Allocation Start Time parameter set below.

When Start Time Base is set to Frame Start, the Allocation Start Time of the DL-MAP is set to the beginning of the frame + Allocation Start Time parameter set below.

**Example:** `BB:WIM:OFDM:BURS1:DLM:AMOD DLSF`
'sets the start time base to DL Subframe End.

| *RST value | Resolution | SCPI |
|---|---|---|
| DLSFend | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:OFDM:BURSt<0…63:DLMap:ATIMe** 0...frame durationt

The command sets the Allocation Start Time in the DL-Map.

**Example:** `BB:WIM:OFDM:BURS1:DLM:ATIM 2`
'sets the Allocation Start Time to 2 s.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:OFDM:BURSt<0…63>:DLMap:ULMap:STATe** ON | OFF

The command activates/deactivates that a UL-Map is appended to the DL-Map.

**Example:** `BB:WIM:OFDM:BURS1:DLM:ULM:STAT ON`
'appends the UL-Map to the DL-Map.

| *RST value | Resolution | SCPI |
|---|---|---|
| OFF | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:OFDM:BURSt<0…63>:DLMap:DCD:STATe** ON | OFF

The command activates/deactivates that the DCD is appended to the DL-MAP. The DCD message carries its own MAC header and CRC, but is included within the DL-MAP burst.

**Example:** `BB:WIM:OFDM:BURS1:DLM:DCD:STAT ON`
'appends the DCD to the DL-Map.

| *RST value | Resolution | SCPI |
|---|---|---|
| OFF | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:OFDM:BURSt<0…63>:DLMap:UCD:STATe** ON | OFF

The command activates/deactivates that the UCD is appended to the DL-MAP. The UCD message is transmitted with its own MAC header and CRC, included in the same burst allocation used by the DL-MAP.

**Example:** `BB:WIM:OFDM:BURS2:DLM:UCD:STAT ON`
'appends the UCD to the DL-Map.

| *RST value | Resolution | SCPI |
|---|---|---|
| OFF | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:OFDM:BURSt<0...63>:FORMat** BPSK1D2 | QPSK1D2 | QPSK3D4 | QAM1D2X16 | QAM3D4X16 | QAM2D3X64 | QAM3D4X64

Selects the modulation and channel coding rate. Channel coding includes randomization, reed solomoon coding, convoutional coding and interleaving.

For a given modulation type and channel coding rate, the data length determines the number of symbols and vice versa.

**Example:** `BB:WIM:OFDM:BURS:FORM QAM3D4X64`
'selects modulation type 64QAM and a channel coding rate of 3.4 Msamples for burst 1.

| *RST value | Resolution | SCPI |
|---|---|---|
| BPSK1D2 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:OFDM:BURSt<0...63>:GAP** 0 ... 1 s

The command sets the length of the gap between the selected burst and the next burst in µs. The setting is only available for transmission direction uplink.

**Example:** `BB:WIM:LINK UP`
'sets transmission direction uplink.

`BB:WIM:OFDM:BURS2:GAP 0.003`
'sets the gap between burst 2 and 3 to 3 ms.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | 1 us | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:OFDM:BURSt<0...63>:MAC:CID** #H0...#HFFFF

The command sets the CID (connection control identifier) of the medium access control layer (MAC). The CID identifies a connection to equivalent peers in the MAC of the base station and subscriber station.

**Example:** `BB:WIM:OFDM:BURS2:MAC:CID #HE7`
'sets the CID for burst 2 to 231.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:OFDM:BURSt<0...63>:MAC:CRC:STATe** ON | OFF

The command activates/deactivates the checksum determination. The state of the CRC can be set independently of the state of MAC header generation.

**Example:** `BB:WIM:OFDM:BURS2:MAC:CRC:STAT ON`
'activates the checksum determination for burst 2.

| *RST value | Resolution | SCPI |
|---|---|---|
| OFF | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:OFDM:BURSt<0...63>:MAC:EKS** 0 ... 4

The command sets the EKS (encryption key sequence) value in the MAC header. The payload encryption itself is not performed by the signal generator.

**Example:** `BB:WIM:OFDM:BURS2:MAC:ENCR:STAT ON`
'enables payload encryption.

`BB:WIM:OFDM:BURS2:MAC:EKS 2`
'sets the EKS for burst 2.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:OFDM:BURSt<0...63>:MAC:ENCRypted:STATe** ON | OFF

The command activates/disactivates payload encryption. If activated, the EC (Encryption Control) field is set to 1 and the EKS (Encryption Key Sequence) field can be set.

**Example:** `BB:WIM:OFDM:BURS2:MAC:ENCR:STAT ON`
'enables payload encryption for burst 2.

`BB:WIM:OFDM:BURS2:MAC:EKS 2`
'sets the EKS.

| *RST value | Resolution | SCPI |
|---|---|---|
| OFF | | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:OFDM:BURSt<0...63>:MAC:STATe** ON | OFF

The command enables/disables generation of the generic MAC header for the selected burst.

**Example:** `BB:WIM:OFDM:BURS2:MAC:STAT ON`
'enables generation of the generic MAC header for burst 2.

| *RST value | Resolution | SCPI |
|---|---|---|
| OFF | | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:OFDM:BURSt<0...63>:MAC:TYPE** #H0...#H3F

The command specifies the MAC type. The value of the 6-bit type field is set which indicates the payload type, including the presence of subheaders.

**Example:** `BB:WIM:OFDM:BURS2:MAC:TYPE #H3F`
'sets the type field of the MAC header of burst 2.

| *RST value | Resolution | SCPI |
|---|---|---|
| #H0 | | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:OFDM:BURSt<0...63>:MIDamble** OFF | REP5 | REP9 | REP17

The command activates/deactivates midamble repetition. If midamble repetition is switched on, midambles are placed into the burst with the specified interval, i.e. if 5 is selected, every 5th symbol of the burst is a midamble.

A short preamble is used as midamble when subchannelization is off or a subchannelization preamble is used in subchannelization mode. The power of the midambles is identical to the burst power.

The command is available in uplink only.

**Example:** `BB:WIM:LINK UP`
'selects transmission direction uplink.

`BB:WIM:OFDM:BURS2:MID REP9`
'the midamble is repeated each 9th symbol of burst 2.

| *RST value | Resolution | SCPI |
|---|---|---|
| OFF | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:OFDM:BURSt<0...63>:POWer** -80 dB ... +10 dB

The command sets the power for the selected burst in dB. To set the absolute power of a burst correctly, level reference **FCH / Burst** must be selected. In this mode, the output power of a burst equals Level + BurstPower.

In downlink, the preamble is transmitted with +3 dB and the FCH is transmitted with 0dB.

In uplink, the power of the first burst is fixed to 0dB.

**Example:** `BB:WIM:OFDM:BURS2:POW -2 dB`
'sets the burst power to -2 dB.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | 0.01 dB | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:OFDM:BURSt<0...63>:PREamble:MODE** OFF | LONG | SHORt

The command enables/disables generation of the preamble for the selected burst and selects the mode for generating the preamble. Either a long preamble or a short preamble can be activated.

The 802.16 standard requires a long preamble as frame start.

**Example:** `BB:WIM:OFDM:BURS2:PRE:MODE LONG`
'enables generation of the long preamble for burst 2.

| *RST value | Resolution | SCPI |
|---|---|---|
| OFF | | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:OFDM:BURSt<0...63>:SYMBol[:COUNt]** 1 ... 834

The command sets the number of symbols for the selected burst. If the number of symbols is changed, the data length is adjusted to fill the specified number of symbols with data so that no padding has to be applied.

The maximum data length of 10 000 bytes defines the maximum number of symbols for a given modulation type and channel coding rate.

**Example:** `BB:WIM:OFDM:BURS2:SYMB:COUN 12`
'sets 12 symbols for burst 2.

| *RST value | Resolution | SCPI |
|---|---|---|
| 9 | | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:OFDM:BURSt<0...63>:TYPE** DATA | FCH | DLMap | RANGing

The command selects the burst type.

Available burst types for downlink: DATA | ULMap | DLMap

Available burst types for uplink: DATA | RANGing

**Example:** `BB:WIM:OFDM:BURS2:TYPE DATA`
'selects burst type DATA.

| *RST value | Resolution | SCPI |
|---|---|---|
| DATA | | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:OFDM:BURSt<0...63>:UIUC** 0.0 ... 15.0

The command sets uplink interval usage code.

This command is only available for link direction uplink.

**Example:** `BB:WIM:OFDM:BURS2:UIUC 2`
'sets uplink interval usage code 2.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:OFDM:BURSt<0...63>:ULMap:AMODe** DLSFend | FRAMestart

The command sets the UL-MAP Allocation Start Time Base. The start time is set either relative to the DL subframe end (DLSFend) or the frame start (FRAMestart).

This command is available for link direction downlink only.

**Example:** `BB:WIM:OFDM:BURS2:ULM:AMOD DLSF`
'sets the start time base to DL Subframe End.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:OFDM:BURSt<0...63>:ULMap:ATIMe** 0...frame duration

The command sets the UL-MAP Allocation Start Time.

This command is available for link direction downlink only.

**Example:** `BB:WIM:OFDM:BURS2:ULM:ATIM 4`
'sets the allocation start time to 2.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:OFDM:BW** 1.25 to 28 MHz

The command sets the channel bandwidth. The selected channel bandwidth has to be a multiple of 1.25, 1.5, 1.75, 2.0 or 2.75 MHz. The channel bandwidth determines the parameter n (sampling ratio, command `SOUR:BB:WIMax:OFDM:N`).

The sampling rate is derived from the channel bandwidth as follows:

SamplingRate = floor(n * ChannelBandwidth / 8000) * 8000

**Downlink:** The allowed values depend on the selected frequency band (command `SOUR:BB:WIMax:OFDM:FBAN`). Only discrete sets of values are available. If a new value is not allowed, the next allowed value in the direction of change is set.

**Uplink:** The full range between 1.25 and 28 MHz is available. Only discrete sets of values are available. If a new value is not allowed, the next allowed value in the direction of change is set.

**Example:** 14 MHz and 28 MHz are allowed, the current value is 14 MHz. If a new value of 15 MHz is entered it is changed to 28 MHz.

**Example:** `BB:WIM:OFDM:FBAN ETSI`
'selects frequency band according to ETSI specifications.

`BB:WIM:OFDM:BW 7E6`
'sets the channel bandwidth to 7 MHz.

| *RST value | Resolution | SCPI |
|---|---|---|
| 1.75 MHz | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:OFDM:FBANd** ETSI | MMDS | WCS | UNII | USER

The command selects the available frequency band for the carrier frequencies.

**Parameter:**

**ETSI**
The frequency band as defined by the **European Telecommunications Standards Institute** applies. The range is 1.75 to 28 MHz for the channel bandwidth and 2 to 32 MHz for the sampling rate.

**MMDS**
The frequency band as defined by the **Multichannel Multipoint Distribution Service** applies. The RF frequency range is 2500 to 2686 MHz. The range is 1.50 to 24 MHz for the channel bandwidth and 1.72 to 27.52 MHz for the sampling rate.

**WCS**
The frequency band as defined by the **Wireless Communication Service** applies. It is in the 2.3 GHz band of the electromagnetic spectrum from 2305 to 2320 MHz and 2345 to 2360 MHz. The range is 2.5 to 15 MHz for the channel bandwidth and 2.88 to 17.28 MHz for the sampling rate.

**UNII**
The frequency band as defined by the **Unlicensed National Information Infrastructure** applies. IIt is in the 5 GHz band of the electromagnetic spectrum from 5150 to 5350 GHz and 5750 to 5825 GHz. The range is 10 to 20 MHz for the channel bandwidth and 11.52 to 23.04 MHz for the sampling rate.

**USER**
This mode is provided for choosing any other channel bandwidth / sampling rate combination. The range is 1.25 to 28 MHz for the channel bandwidth and 1.44 to 32 MHz for the sampling rate.

**Example:** `BB:WIM:OFDM:FBAN ETSI`
'selects frequency band according to ETSI specifications.

| *RST value | Resolution | SCPI |
|---|---|---|
| ETSI | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:OFDM:FCH:CCC** 0 ... 15

The command sets the configuration change count value. This value is used for the corresponding FCH field in **Auto** mode (`SOURce:BB:WIMax:OFDM:FCH:MODE AUTO`).

**Example:** `BB:WIM:OFDM:FCH:CCC 4`
'sets configuration change count value to 4.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:OFDM:FCH:DATA** PN9 | PN15 | PN16 | PN20 | PN21 | PN23 | DLISt | ZERO | ONE | PATTern

The command specifies the data source in **User** mode (`SOURce:BB:WIMax:OFDM:FCH:MODE AUTO`). The FCH contents are filled from the selected data source.

**Parameters:**

**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:WIMax:OFDM:FCH:DATA:DSELect`.

**ZERO | ONE**
Internal 0 and 1 data is used.

**PATTern**
Internal data is used The bit pattern for the data is defined by the command `:BB:WIMax:OFDM:FCH:DATA:PATTern`.

**Example:**

```
BB:WIM:OFDM:FCH:DATA PATT
```
'selects as the data source for the data fields of FCH, the bit pattern defined with the following command.

```
BB:WIM:OFDM:FCH:DATA:PATT  #H3F,8
```
'defines the bit pattern.

| *RST value | Resolution | SCPI |
|---|---|---|
| PN9 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:OFDM:FCH: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.

This command is available only in **User** mode (`SOURce:BB:WIMax:OFDM:FCH:MODE AUTO`).

**Example:**

```
BB:WIM:OFDM:FCH:DATA DLIS
```
'selects the Data Lists data source.

```
"MMEM:CDIR 'D:\Lists\DM\IqData'
```
'selects the directory for the data lists.

```
BB:WIM:OFDM:FCH:DATA:DLIS 'wimax_list1'
```
'selects file '`wimax_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:WIMax:OFDM:FCH:DATA:PATTern** #B0,1... #B111..1,64

The command determines the bit pattern for the PATTern selection. The maximum length is 64 bits.

This command is available only in **User** mode (`SOURce:BB:WIMax:OFDM:FCH:MODE AUTO`).

**Example:**

```
BB:WIM:OFDM:BURS:DATA:PATT  #H3F,8
```
'defines the bit pattern.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:OFDM:FCH:FNOFfset** 0 ... 15

The command sets the frame number offset. This value is added to the current frame number of the sequence. After modulo 16 division, the result is used as Frame_Number in the FCH (in Auto mode) and is also used to initialize the randomizers.

**Example:** `BB:WIM:OFDM:FCH:FNOF 4`
'sets a frame number offset of 4.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:OFDM:FCH:MODE** AUTO | USER

The command selects the mode for generating the FCH.Channel Coding of the FCH is performed both in **Auto** and **User** mode.

**Parameter:** **AUTO**
The DLFP fields, which form the FCH, are filled automatically with parameters specified at different locations. The following mapping applies in Auto mode:
Base_Station_ID:
Set to the BSID value specified in the frame configuration menu.
Frame_Number:
Set to the current frame number modulo 16. The first frame of the generated sequence has the number specified in Frame Number Offset below. For the following frames, this number will increase by 1 per frame.
Configuration_Change_Count:
Set to the value specified below.
Rate_ID:
The Rate ID parameter of the first burst is set according to its modulation setting.
DIUC:
The DIUC value for the second, third and fourth burst is taken from the DIUC value in the burst table.
Preamble Present:
Set to 1 when the burst preamble is activated for the corresponding burst.
Length:
Set to the calculated number of symbols of the corresponding burst.
HCS:
The Header Check Sequence is automatically calculated.

**USER**
the FCH is filled with data specified under Data Source. This enables any arbitrary data to be sent with the FCH burst.

**Example:** `BB:WIM:OFDM:FCH:MODE AUTO`
'selects FCH mode AUTO.

| *RST value | Resolution | SCPI |
|---|---|---|
| AUTO | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:OFDM:FCH:STATe** ON | OFF

The command switches the FCH on or off.

**Example:** `BB:WIM:OFDM:FCH:STAT OFF`
'switches off generation of FCH.

| *RST value | Resolution | SCPI |
|---|---|---|
| ON | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:OFDM:FFT** FFT256

The command sets the size of the fast fourier transform. For OFDM channels, the size is fixed to 256. For OFDMA configuration, the possible configurations of the subchannel map depend on the selected FFT size.

**Example:** `BB:WIM:OFDM:FFT?`
'queries the FFT size.

Response: "`FFT256`
'the FFT size is 256.

| *RST value | Resolution | SCPI |
|---|---|---|
| OFDMA: FFT2048<br>OFDM: FFT256 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:OFDM:FRAMe:PREDefined** USER | FBPSK12SHORT | FBPSK12MID | FBPSK12LONG | FQPSK12SHORT | FQPSK12MID | FQPSK12LONG | FQPSK34SHORT | FQPSK34MID | FQPSK34LONG | F16QAM12SHORT | F16QAM12MID | F16QAM12LONG | F16QAM34SHORT | F16QAM34MID | F16QAM34LONG | F64QAM23SHORT | F64QAM23MID | F64QAM23LONG | F64QAM34SHORT | F64QAM34MID | F64QAM34LONG

The command selects predefined setting for the frames.

**Parameter:** **USER**
The settings for the frame can be defined by the user.

**F...**
Predefined settings for receiver testing are selected. The parameter includes the modulation, the channel coding rate and the test message type (long, short or middle). See IEEE 802.16-2004, section 8.3.11 for details.

**Example:** `BB:WIM:LINK UP`
'selects transmission direction uplink.

`BB:WIM:OFDM:FRAM:PRED FBPSK12LONG`
'selects predefined settings with BPSK modulation, channel coding 1 / 2 and long test message.

| *RST value | Resolution | Dependencies | SCPI |
|---|---|---|---|
| USER | - | All commands concerning the frame configuration are preset | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:OFDM:FRAMe[:NUMBer]** 0 ... 15

The command selects the frame number of the uplink frame in which the UL map that specifies the uplink burst was transmitted.

This command is available in uplink only.

**Example:** `BB:WIM:LINK UP`
'selects transmission direction uplink.

`BB:WIM:MODE OFDM`
'selects OFDM physical layer mode.

`BB:WIM:OFDM:FRAM 15`
'selects frame number 15.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:OFDM:N**

The command queries the factor n (sampling ratio). The sampling ratio is determined by the channel bandwidth (see parameter **Channel Bandwidth**).

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

**Example:** `BB:WIM:OFDM:N?`
'queries the factor n.

Response: "`N8D7`"
'the factor n is 8/7.

| *RST value | Resolution | SCPI |
|---|---|---|
| - | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:OFDM:POWer:REFerence** BURSt | PREamble

The command selects the level reference.

**Parameter:** **BURSt**
The instrument's level setting refers to the mean power of FCH or bursts with a burst power setting of 0 dB. To obtain the absolute burst power value, the burst power value has to be added to the level value.

**PREamble**
The instrument's level setting refers to the preamble, which is FCH / Burst power + 3dB.

**Example:** `BB:WIM:OFDM:POW:REF BURS`
'the instrument's level setting refers to the mean power of FCH or bursts with a burst power setting of 0 dB.

| *RST value | Resolution | SCPI |
|---|---|---|
| BURSt | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:OFDM:PREamble:MODE** OFF | LONG | SHORt

The command activates/deactivates the generation of a frame preamble. Either a long preamble or a short preamble can be activated. The 802.16 standard requires a long preamble as frame start in the downlink.

**Example:** `BB:WIM:OFDM:PRE:MODE SHOR`
'enables generation of a short preamble for the frame.

| *RST value | Resolution | SCPI |
|---|---|---|
| LONG | | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:OFDM:SRATe** 1.44 MHz ... 32 MHz

The command sets the sampling rate. The sampling rate is related to the channel bandwidth by the parameter n:

SamplingRate = floor (n * ChannelBandwidth / 8000) * 8000

**Downlink:**
The value range depends on the selected frequency band (command `SOUR:BB:WIMax:OFDM:FBAN`). Only discrete sets of values are available. If a new value is not allowed, the next allowed value in the direction of change is set.

**Uplink:**
The full range between 1.44 and 32 MHz is available. Only discrete sets of values are available. If a new value is not allowed, the next allowed value in the direction of change is set.

**Example:** 16 MHz and 32 MHz are allowed, the current value is 16 MHz. If a new value of 17 MHz is entered it is changed to 32 MHz.

**Example:** `BB:WIM:OFDM:SRAT 2E6`
'sets a sampling rate of 2 MHz.

| *RST value | Resolution | SCPI |
|---|---|---|
| 2 MHz | 1 kHz | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:OFDM:SUBChannel[:COUNt]** SC1 | SC2 | SC4 | SC8 | SC16

The command selects the number of subchannels für OFDM configurations.

Selection 16 (all) deactivates subchannelization and activates all possible carriers. The values 1, 2, 4 and 8 activate only a part of the available subcarriers, unused carriers are blanked.

**Example:** `BB:WIM:OFDM:SUBC:COUN SC4`
'selects 4 subchannels to be used.

| *RST value | Resolution | SCPI |
|---|---|---|
| SC16 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:OFDM:SUBChannel:INDex** SUBC1 ... SUBC31

The command selects the subchannel index in subchannelization mode. The subchannel index determines the set of used subcarriers according to table 213 of IEEE 802.16-2004 standard.

**Example:** `BB:WIM:OFDM:SUBC:IND SUBC4`
'selects subchannel set 4 to be used.

| *RST value | Resolution | SCPI |
|---|---|---|
| SUBC16 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:OFDM:TGTB** TGTB1D4 | TGTB1D8 | TGTB1D16 | TGTB1D32

The command selects the ratio of guard period to symbol period. This value sets the length of the cyclic prefix in fractions of the symbol period.

**Example:** `BB:WIM:OFDM:TGTB TGTB1D8`
'sets a ratio of 1 to 8.

| *RST value | Resolution | SCPI |
|---|---|---|
| 1D4 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:OFDM:UCD** 0...255

The command sets the value for the UCD count.

This command is available in uplink only.

**Example:** `BB:WIM:OFDM:UCD 255`
'sets the value for the UCD count to 255.

| *RST value | Resolution | SCPI |
|---|---|---|
| 0 | - | Device-specific |

**[SOURce<[1]|2>:]BB:WIMax:OFDM:ULMap:CREate** <file_name>

The command saves the current UL-map.The default directory is set using command `MMEM:CDIRectory`. A path can also be specified, in which case the UL-map files in the specified directory are read. The file are stored with the extension ***.dm_iqd**.

This command is available in uplink only.

**Example:** `BB:WIM:OFDM:ULM:CRE 'ul-map_zone1'`
'saves the current UL-map to the file `'ul-map_zone1'`.

| *RST value | Resolution | SCPI |
|---|---|---|
| - | - | Device-specific |

# Alphabetical List of Commands

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