R&S®SMW-K49
IEEE 802.16 WiMAX™
User Manual

1175673202
Version 19

ROHDE&SCHWARZ
Make ideas real

This document describes the following software options:

- R&S®SMW-K49 IEEE 802.16 WiMAX™ (1413.3984.xx)

This manual describes firmware version FW 5.30.047.xx and later of the R&S®SMW200A.

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The following abbreviations are used throughout this manual: R&S®SMW200A is abbreviated as R&S SMW, R&S®WinIQSIM2™ is abbreviated as R&S WinIQSIM2; the license types 02/03/07/11/13/16/12 are abbreviated as xx.

Contents

1 Welcome to the IEEE 802.16 WiMAX digital standard

The R&S SMW-K49 is a firmware application that adds functionality to generate signals in accordance with the IEEE 802.16 standard WiMAX.

The R&S SMW-K49 key features

The R&S SMW simulates IEEE 802.16 WiMAX at the physical level. The IEEE 802.16 WiMAX signals are generated in the arbitrary waveform mode; the signal is first calculated and then output. The following list gives an overview of the main functions:

- Support of IEEE 802.16™-2004/Cor1/D5 and IEEE 802.16e-2005
- Physical layer modes: OFDM, OFDMA, OFDMA/WiBro
- Forward and reverse link, FDD and TDD duplexing
- Burst types: FCH, DL-MAP, UL-MAP, DCD, UCD, HARQ; ranging, fast feedback, data
- Multiple zones and segments (PUSC, FUSC, AMC, sounding)
- Diversity and MIMO coding (DL, UL)

This user manual contains a description of the functionality that the application provides, including remote control operation.

All functions not discussed in this manual are the same as in the base unit and are described in the R&S SMW user manual. The latest version is available at:

www.rohde-schwarz.com/manual/SMW200A

Installation

You can find detailed installation instructions in the delivery of the option or in the R&S SMW service manual.

1.1 Accessing the IEEE 802.16 WiMAX dialog

To open the dialog with IEEE 802.16 WiMAX settings

► In the block diagram of the R&S SMW, select "Baseband > IEEE 802.16 WiMAX".

A dialog box opens that display the provided general settings.

The signal generation is not started immediately. To start signal generation with the default settings, select "State > On".

1.2 What's new

This manual describes firmware version FW 5.30.047.xx and later of the R&S®SMW200A.

Compared to the previous version, it provides the new features listed below:

- Time-based triggering, see "Time Based Trigger" on page 23 and "Trigger Time" on page 24.
- Editorial changes

1.3 Documentation overview

This section provides an overview of the R&S SMW user documentation. Unless specified otherwise, you find the documents at:

www.rohde-schwarz.com/manual/smw200a

1.3.1 Getting started manual

Introduces the R&S SMW and describes how to set up and start working with the product. Includes basic operations, typical measurement examples, and general information, e.g. safety instructions, etc. A printed version is delivered with the instrument.

1.3.2 User manuals and help

Separate manuals for the base unit and the software options are provided for download:

- Base unit manual
  Contains the description of all instrument modes and functions. It also provides an introduction to remote control, a complete description of the remote control commands with programming examples, and information on maintenance, instrument interfaces and error messages. Includes the contents of the getting started manual.
- Software option manual
  Contains the description of the specific functions of an option. Basic information on operating the R&S SMW is not included.

The contents of the user manuals are available as help in the R&S SMW. The help offers quick, context-sensitive access to the complete information for the base unit and the software options.

All user manuals are also available for download or for immediate display on the Internet.

1.3.3 Tutorials

The R&S SMW provides interactive examples and demonstrations on operating the instrument in form of tutorials. A set of tutorials is available directly on the instrument.

1.3.4 Service manual

Describes the performance test for checking compliance with rated specifications, firmware update, troubleshooting, adjustments, installing options and maintenance.

The service manual is available for registered users on the global Rohde & Schwarz information system (GLORIS):

https://gloris.rohde-schwarz.com

1.3.5 Instrument security procedures

Deals with security issues when working with the R&S SMW in secure areas. It is available for download on the internet.

1.3.6 Printed safety instructions

Provides safety information in many languages. The printed document is delivered with the product.

1.3.7 Data sheets and brochures

The data sheet contains the technical specifications of the R&S SMW. It also lists the options and their order numbers and optional accessories.

The brochure provides an overview of the instrument and deals with the specific characteristics.

See www.rohde-schwarz.com/brochure-datasheet/smw200a

1.3.8 Release notes and open source acknowledgment (OSA)

The release notes list new features, improvements and known issues of the current firmware version, and describe the firmware installation.

The software makes use of several valuable open source software packages. An open-source acknowledgment document provides verbatim license texts of the used open source software.

See www.rohde-schwarz.com/firmware/smw200a

1.3.9 Application notes, application cards, white papers, etc.

These documents deal with special applications or background information on particular topics.

See www.rohde-schwarz.com/application/smw200a and www.rohde-schwarz.com/manual/smw200a

1.3.10 Videos

Find various videos on Rohde & Schwarz products and test and measurement topics on YouTube: https://www.youtube.com/@RohdeundSchwarz

On the menu bar, search for your product to find related videos.

Figure 1-1: Product search on YouTube

1.4 Scope

Tasks (in manual or remote operation) that are also performed in the base unit in the same way are not described here.

In particular, it includes:

- Managing settings and data lists, like saving and loading settings, creating and accessing data lists, or accessing files in a particular directory.
- Information on regular trigger, marker and clock signals and filter settings, if appropriate.
- General instrument configuration, such as checking the system configuration, configuring networks and remote operation
- Using the common status registers

For a description of such tasks, see the R&S SMW user manual.

1.5 Notes on screenshots

When describing the functions of the product, we use sample screenshots. These screenshots are meant to illustrate as many as possible of the provided functions and possible interdependencies between parameters. The shown values may not represent realistic usage scenarios.

The screenshots usually show a fully equipped product, that is: with all options installed. Thus, some functions shown in the screenshots may not be available in your particular product configuration.

2 About the IEEE 802.16 WiMAX option

This section lists required options and provides an overview of the supported features in more details.

2.1 Required options

The basic equipment layout for generating WiMAX signals includes the:

- Standard baseband generator (R&S SMW-B10)
- Baseband main module (R&S SMW-B13)
- Frequency option (e.g. R&S SMW-B1003)
- Digital standard WiMAX IEEE 802.16 (R&S SMW-K49)

You can generate signals via play-back of waveform files at the signal generator. To create the waveform file using R&S WinIQSIM2, you do not need a specific option.

To play back the waveform file at the signal generator, you have two options:

- Install the R&S WinIQSIM2 option of the digital standard, e.g. R&S SMW-K255 for playing LTE waveforms
- If supported, install the real-time option of the digital standard, e.g. R&S SMW-K55 for playing LTE waveforms

For more information, see data sheet.

2.2 WiMAX modulation system

The option R&S SMW-K49 supports the following WiMAX modulation features:

- 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 user-defined signal configuration parameters) or in "user" mode, with arbitrary data.
- Ranging bursts in uplink
- Up to eight 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 2-1: Parameters of the modulation system IEEE 802.16 WiMAX

Digital standard 802.16-2004	**Meets IEEE 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 to 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 MHz to 30 MHz, depending on selected frequency band
Sampling rate	1.5 MHz to 32 MHz, depending on channel bandwidth
Tg / Tb settings	1/4, 1/8, 1/16, 1/32
FFT size	256 (fixed)
Number of possible subchannels in subchannelization mode	1, 2, 4, 8, 16 (all)
Number of bursts per frame	0 – 64
Preamble / midamble modes	Burst preamble / midambles off, burst preamble in downlink, 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

Digital standard 802.16-2004	**Meets IEEE 802.16™-2004/Cor2/D4 and 802.16e-2005**
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 MHz to 30 MHz, depending on selected frequency band
Sampling rate	1.5 MHz to 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)
Number 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 MHz to 30 MHz, depending on selected frequency band
Sampling rate	1.5 MHz to 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)
Number of bursts per frame	0 – 64

Digital standard 802.16-2004	**Meets IEEE 802.16™-2004/Cor2/D4 and 802.16e-2005**
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

3 WiMAX configuration and settings

Access:

► Select "Baseband" > "IEEE 802.16 WiMAX".

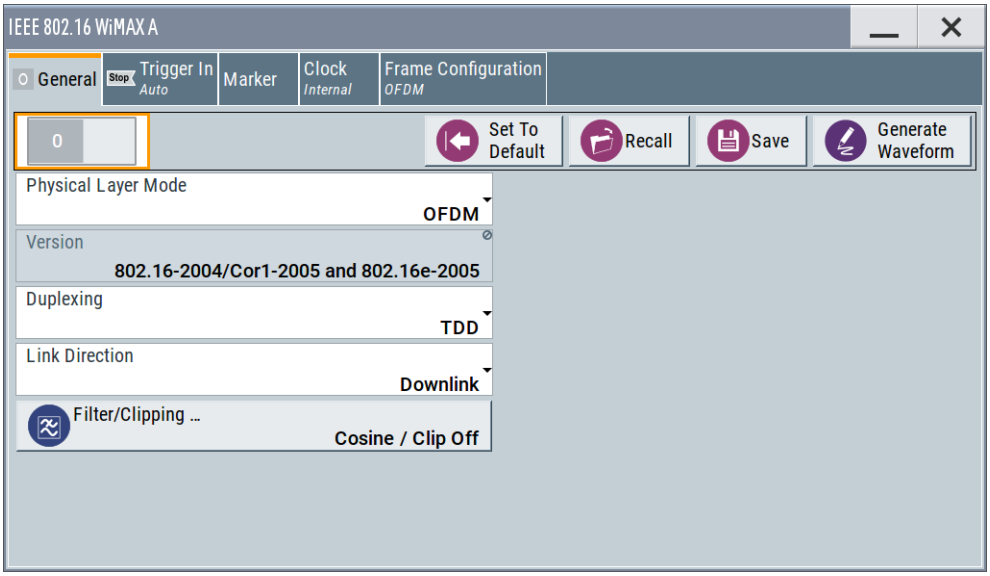
The remote commands required to define these settings are described in Chapter 4, "Remote-control commands", on page 128.

3.1 General settings for WiMAX signals

In this dialog, IEEE 802.16 WiMAX digital standard is enabled and reset and all the settings for the signal in both transmission directions are made.

Access:

► Select "Baseband > IEEE 802.16 WiMAX > General".



This tab contains the standard general settings, valid for the signal in both transmission directions.

Settings:

State

Activates the standard and deactivates all the other digital standards and digital modulation modes in the same path.

Remote command:

`[:SOURce<hw>]:BB:WIMax:STATe` on page 133

Set to Default

Calls the default settings. The values of the main parameters are listed in the following table.

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

Parameter	Value
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
Number of used subchannels	16 (all)
Frame Preamble	Long
FCH Configuration	On, "Auto" mode, F"rame 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 to 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

Parameter	Value
Subcarrier Permutation	PUSC
Subchannel 0 to 59 State	On
Frame Duration	5 ms

Remote command:
`[:SOURce<hw>]:BB:WIMax:PRESet` on page 131

Save/Recall
Accesses the "Save/Recall" dialog, that is the standard instrument function for saving and recalling the complete dialog-related settings in a file. The provided navigation possibilities in the dialog are self-explanatory.

The settings are saved in a file with predefined extension. You can define the filename and the directory, in that you want to save the file.

See also, chapter "File and Data Management" in the R&S SMW user manual.

Remote command:
`[:SOURce<hw>]:BB:WIMax:SETTing:CATalog?` on page 132
`[:SOURce<hw>]:BB:WIMax:SETTing:LOAD` on page 132
`[:SOURce<hw>]:BB:WIMax:SETTing:STORe` on page 133
`[:SOURce<hw>]:BB:WIMax:SETTing:DELete` on page 132

Generate Waveform File…
With enabled signal generation, triggers the instrument to save the current settings of an arbitrary waveform signal in a waveform file with predefined extension `*.wv`. You can define the filename and the directory, in that you want to save the file.

Using the ARB modulation source, you can play back waveform files and/or process the file to generate multi-carrier or multi-segment signals.

Remote command:
`[:SOURce<hw>]:BB:WIMax:WAVeform:CREate` on page 134

Physical Layer Mode
Selects the physical layer mode.

The settings of the frame are provided in the subdialog "Frame Configuration" (see Frame configuration OFDM ,Frame configuration OFDMA) 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.

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

"OFDMA - WiBro"

The OFDMA – WiBro (Wireless Broadband) mode groups multiple subcarriers of the OFDM into subchannels. A single client or subscriber station can transmit using all of the subchannels within the carrier space. Multiple clients can transmit with each using a portion of the total number of subchannels 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):

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

Remote command:
`[:SOURce<hw>]:BB:WIMax:MODE` on page 131

Version

Selects the version of the standard to use.

"802.16 Rev2/D3"

Selecting "802.16 Rev2/D3" make sure that all signal parameters are in line with the latest revision 2 version of the standard.
Using this mode is recommended.

"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 release 2 version.

Remote command:
`[:SOURce<hw>][:BB]:WIMax:SVERsion` on page 134

Duplexing

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.

"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. Use TDD mode instead if FDD devices are to be tested with frames including transmission gaps.

Remote command:
`[:SOURce<hw>]:BB:WIMax:DUPLexing` on page 129

Link Direction
Selects the transmission direction.

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

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

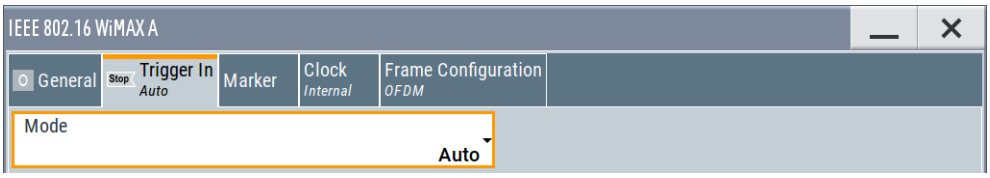
Remote command:
`[:SOURce<hw>]:BB:WIMax:LINK` on page 131

Filter / Clipping...
Access to the dialog for setting baseband filtering, clipping and the sequence length of the arbitrary waveform component, see Chapter 3.29, "Filter / clipping settings", on page 121 .

3.2 Trigger settings

Access:

► Select "Baseband" > "IEEE 802.16 WiMAX" > "Trigger In".



This tab provides settings to select and configure the trigger, like trigger source, trigger mode and trigger delays, and to arm or trigger an internal trigger manually. The header of the tab displays the status of the trigger signal and trigger mode. As in the tabs "Marker" and "Clock", this tab provides also access to the settings of the related connectors.

Routing and activating a trigger signal

1. Define the effect of a trigger event and the trigger signal source.
   a) Select "Trigger In" > "Mode".
   b) Select "Trigger In" > "Source".
2. For external trigger signals, define the connector for signal input. See Chapter 3.5, "Local and global connectors settings", on page 30.
   You can map trigger signals to one or more USER x or T/M connectors.

   Local and global connectors settings allow you to configure the signal mapping, the polarity, the trigger threshold and the input impedance of the input connectors.

3. Activate baseband signal generation. In the block diagram, set "Baseband" > "On".

   The R&S SMW starts baseband signal generation after the configured trigger event.

About baseband trigger signals

This section focuses on the available settings.

For information on how these settings affect the signal, refer to section "Basics on ..." in the R&S SMW user manual.

Settings:

Trigger settings common to all basebands

To enable simultaneous signal generation in all basebands, the R&S SMW couples the trigger settings in the available basebands in any instrument's configuration involving signal routing with signal addition. For example, in MIMO configuration, routing and summing of basebands or of streams.

The icon indicates that common trigger settings are applied.

You can access and configure the common trigger source and trigger mode settings in any of the basebands. An arm or a restart trigger event applies to all basebands, too. You can still apply different delay to each of the triggers individually.

Mode

Selects trigger mode, i.e. determines the effect of a trigger event on the signal generation.

For more information, refer to chapter "Basics" in the R&S SMW user manual.

- "Auto"
  The signal is generated continuously.
- "Retrigger"
  The signal is generated continuously. A trigger event (internal or external) causes a restart.
- "Armed Auto"
  The signal is generated only when a trigger event occurs. Then the signal is generated continuously.

An "Arm" stops the signal generation. A subsequent trigger event (internal or external) causes a restart.

- "Armed Retrigger"
  The signal is generated only when a trigger event occurs. Then the signal is generated continuously. Every subsequent trigger event causes a restart.
  An "Arm" stops signal generation. A subsequent trigger event (internal or external) causes a restart.
- "Single"
  The signal is generated only when a trigger event occurs. Then the signal is generated once to the length specified at "Signal Duration".
  Every subsequent trigger event (internal or external) causes a restart.

Remote command:
`[:SOURce<hw>]:BB:WIMax[:TRIGger]:SEQuence` on page 141

Signal Duration Unit
Defines the unit for describing the length of the signal sequence to be output in the "Single" trigger mode.

Remote command:
`[:SOURce<hw>]:BB:WIMax:TRIGger:SLUNit` on page 145

Signal Duration
Requires trigger "Mode" > "Single".

Enters the length of the trigger signal sequence.

Use this parameter, for example, for the following applications:
- To output the trigger signal partly.
- To output a predefined sequence of the trigger signal.

Remote command:
`[:SOURce<hw>]:BB:WIMax:TRIGger:SLENgth` on page 145

Running/Stopped
With enabled modulation, displays the status of signal generation for all trigger modes.

- "Running"
  The signal is generated; a trigger was (internally or externally) initiated in triggered mode.
- "Stopped"
  The signal is not generated and the instrument waits for a trigger event.

Remote command:
`[:SOURce<hw>]:BB:WIMax:TRIGger:RMODe?` on page 143

Time Based Trigger
Requires trigger "Mode" > "Armed Auto"/"Single".

Activates time-based triggering with a fixed time reference.

The R&S SMW triggers signal generation when its operating system time ("Current Time") matches a specified time trigger ("Trigger Time"). As trigger source, you can use an internal trigger or an external global trigger.

How to: Chapter "Time-based triggering" in the R&S SMW user manual.

Remote command:
`[:SOURce<hw>]:BB:WIMax:TRIGger:TIME[:STATe]` on page 145

Trigger Time
Requires trigger "Mode" > "Armed Auto"/"Single".

Sets date and time for a time-based trigger signal.

Set a trigger time that is later than the "Current Time". The current time is the operating system time of the R&S SMW. If you set an earlier trigger time than the current time, time-based triggering is not possible.

How to: Chapter "Time-based triggering" in the R&S SMW user manual.

"Date" Sets the date of the time-based trigger in format YYYY-MM-DD.

Remote command:
`[:SOURce<hw>]:BB:WIMax:TRIGger:TIME:DATE` on page 144

"Time" Sets the time of the time-based trigger in format hh:mm:ss.

Remote command:
`[:SOURce<hw>]:BB:WIMax:TRIGger:TIME:TIME` on page 144

Arm
Stops the signal generation until subsequent trigger event occurs.

Remote command:
`[:SOURce<hw>]:BB:WIMax:TRIGger:ARM:EXECute` on page 142

Execute Trigger
For internal trigger source, executes trigger manually.

Remote command:
`[:SOURce<hw>]:BB:WIMax:TRIGger:EXECute` on page 142

Source
Selects the trigger source.

The following sources of the trigger signal are available:

- "Internal"
  The trigger event is executed manually by the "Execute Trigger".
- "Internal (Baseband A/B)"
  The trigger event is provided by the trigger signal from the other basebands.
  If common trigger settings are applied, this trigger source is disabled.
- "External Global Trigger"
  The trigger event is the active edge of an external trigger signal provided and configured at the USER x connectors.
- "External Local Trigger"
  The trigger event is the active edge of an external trigger signal provided and configured at the local T/M/C connector.
  With coupled trigger settings, the signal has to be provided at the T/M/C1/2/3 connectors.
- "External Local Clock"
  The trigger event is the active edge of an external local clock signal provided and configured at the local T/M/C connector.

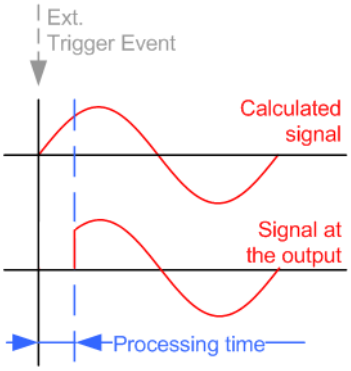
With coupled trigger settings, the signal has to be provided at the T/M/C1 connector.

How to: "Routing and activating a trigger signal" on page 21

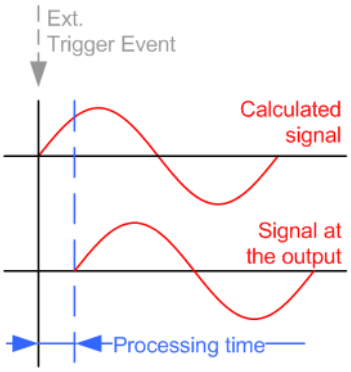
Remote command:
`[:SOURce<hw>]:BB:WIMax:TRIGger:SOURce` on page 141

Sync. Output to External Trigger/Sync. Output to Trigger
Enables signal output synchronous to the trigger event.

- "On"
  Corresponds to the default state of this parameter.
  The signal calculation starts simultaneously with the trigger event. Because of the processing time of the instrument, the first samples are cut off and no signal is output. After elapsing of the internal processing time, the output signal is synchronous to the trigger event.



- "Off"
  The signal output begins after elapsing of the processing time. Signal output starts with sample 0. The complete signal is output.
  This mode is recommended for triggering of short signal sequences. Short sequences are sequences with signal duration comparable with the processing time of the instrument.



Remote command:
`[:SOURce<hw>]:BB:WIMax:TRIGger:EXTernal:SYNChronize:OUTPut` on page 142

External Inhibit/Trigger Inhibit
Applies for external trigger signal or trigger signal from the other path.

Sets the duration with that any following trigger event is suppressed. In "Retrigger" mode, for example, a new trigger event does not cause a restart of the signal generation until the specified inhibit duration does not expire.

For more information, see chapter "Basics" in the R&S SMW user manual.

Remote command:
`[:SOURce<hw>]:BB:WIMax:TRIGger[:EXTernal]:INHibit` on page 146
`[:SOURce<hw>]:BB:WIMax:TRIGger:OBASeband:INHibit` on page 143

External Delay/Trigger Delay
Delays the trigger event of the signal from:
- The external trigger source
- The other path
- The other basebands (internal trigger), if common trigger settings are used.

Use this setting to:
- Synchronize the instrument with the device under test (DUT) or other external devices
- Postpone the signal generation start in the basebands compared to each other

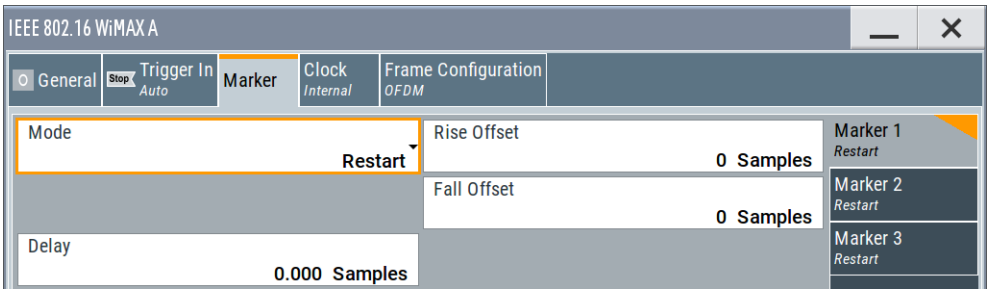
For more information, see chapter "Basics on ..." in the R&S SMW user manual.

Remote command:
`[:SOURce<hw>]:BB:WIMax:TRIGger[:EXTernal]:DELay` on page 146
`[:SOURce<hw>]:BB:WIMax:TRIGger:OBASeband:DELay` on page 143

3.3 Marker settings

Access:

► Select "Baseband" > "IEEE 802.16 WiMAX" > "Marker".



This tab provides settings to select and configure the marker output signal including marker mode and marker delay.

Routing and activating a marker signal

1. To define the signal shape of an individual marker signal "x", select "Marker" > "Marker x" > "Mode".

2. Optionally, define the connector for signal output. See Chapter 3.5, "Local and global connectors settings", on page 30.
   You can map marker signals to one or more USER x or T/M connectors.
3. Activate baseband signal generation. In the block diagram, set "Baseband" > "On".

   The R&S SMW adds the marker signal to the baseband signal. Also, R&S SMW outputs this signal at the configured USER x connector.

About marker output signals

This section focuses on the available settings.

For information on how these settings affect the signal, refer to section "Basics on ..." in the R&S SMW user manual.

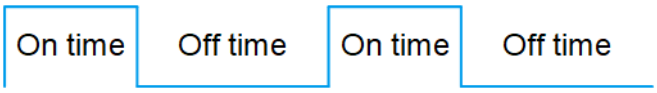
Settings:

Mode
Marker configuration for up to 3 markers. The settings are used to select the marker mode defining the shape and periodicity of the markers. The contents of the dialog change with the selected marker mode.

How to: "Routing and activating a marker signal" on page 26

"Restart"	A marker signal is generated at the start of each ARB sequence.
"Frame"	A marker signal is generated at the start of each frame.
"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.
"Pulse"	A regular marker signal is generated. Remote command: `[:SOURce<hw>]:BB:WIMax:TRIGger:OUTPut<ch>:PULSe:DIVider` on page 150 `[:SOURce<hw>]:BB:WIMax:TRIGger:OUTPut<ch>:PULSe:FREQuency?` on page 150
"Pattern"	The marker signal defined as a bit pattern with a maximum length of 32 bits. Remote command: `[:SOURce<hw>]:BB:WIMax:TRIGger:OUTPut<ch>:PATTern` on page 149

"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.

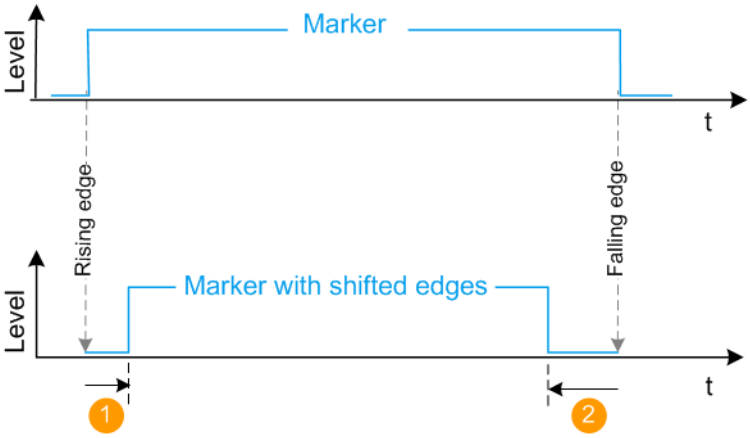


Remote command:
`[:SOURce<hw>]:BB:WIMax:TRIGger:OUTPut<ch>:ONTime` on page 149
`[:SOURce<hw>]:BB:WIMax:TRIGger:OUTPut<ch>:OFFTime` on page 149

Remote command:
`[:SOURce<hw>]:BB:WIMax:TRIGger:OUTPut<ch>:MODE` on page 148

Rise Offset/Fall Offset
Sets the value for the rise/fall offset.

The ramps of the marker signal are shifted by the specified number of samples. Positive values delay the rising ramp; negative values - shift it back.



1 = Positive rise offset
2 = Positive fall offset

Remote command:
`[:SOURce<hw>]:BB:WIMax:TRIGger:OUTPut<ch>:ROFFset` on page 149
`[:SOURce<hw>]:BB:WIMax:TRIGger:OUTPut<ch>:FOFFset` on page 149

Delay
Delays the marker signal at the marker output relative to the signal generation start.

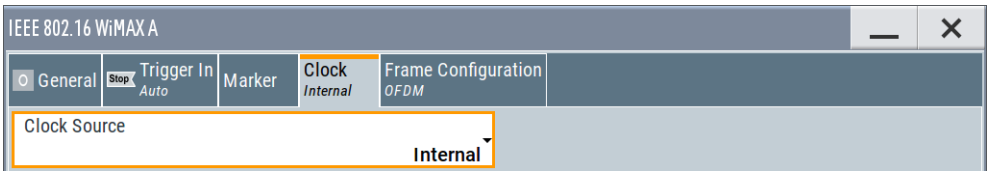
Variation of the parameter "Marker x" > "Delay" causes signal recalculation.

Remote command:
`[:SOURce<hw>]:BB:WIMax:TRIGger:OUTPut<ch>:DELay` on page 150

3.4 Clock settings

Access:

► Select "Baseband" > "IEEE 802.16 WiMAX" > "Clock".



This tab provides settings to select and configure the clock signal, like the clock source and clock mode.

Defining the clock

1. Select "Clock" > "Source" to define the source of clock signal.
2. For external clock signals, define the connector for signal input. See Chapter 3.5, "Local and global connectors settings", on page 30.
   You can map clock signals to one or more USER x or T/M connectors.

   Local and global connectors settings allow you to configure the signal mapping, the polarity, the trigger threshold and the input impedance of the input connectors.
3. Activate baseband signal generation. In the block diagram, set "Baseband" > "On".

   The R&S SMW starts baseband signal generation with a symbol rate that equals the clock rate.

About clock signals

This section focuses on the available settings.

For information on how these settings affect the signal, refer to section "Basics on ..." in the R&S SMW user manual.

Settings:

Clock Source
Selects the clock source.

- "Internal"
  The instrument uses its internal clock reference.
- "External Local Clock"
  Option: R&S SMW-B10
  The instrument expects an external clock reference at the local T/M/C connector.

Remote command:
`[:SOURce<hw>]:BB:WIMax:CLOCk:SOURce` on page 151

Clock Mode
Sets the type of externally supplied clock.

How to: "Defining the clock" on page 29

Remote command:
`[:SOURce<hw>]:BB:WIMax:CLOCk:MODE` on page 151

Measured External Clock
Provided for permanent monitoring of the enabled and externally supplied clock signal.

Remote command:
`CLOCk:INPut:FREQuency?`

3.5 Local and global connectors settings

Accesses a dialog to configure local connectors or global connectors.

The button is available in the following dialogs or tabs:

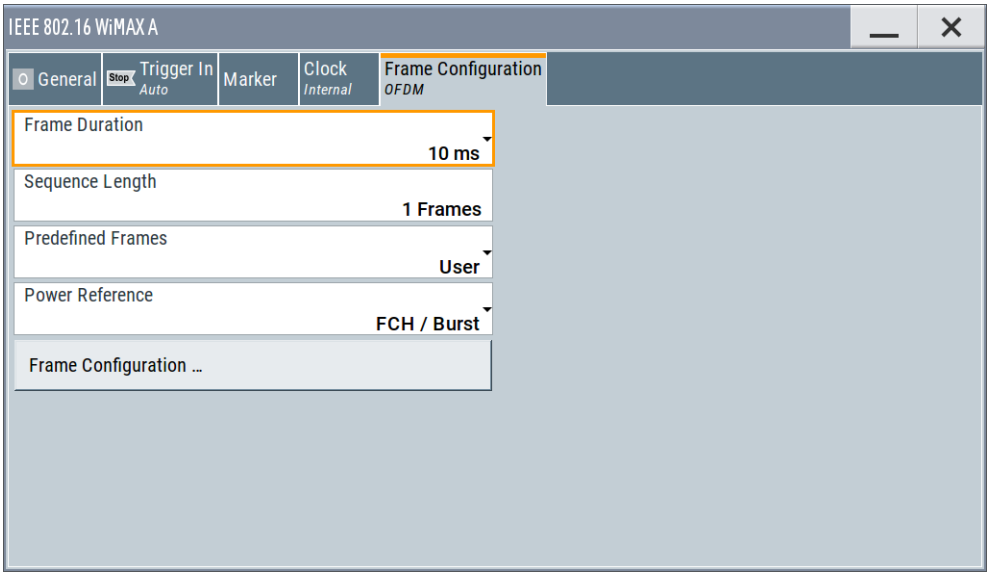
- "Trigger / Marker / Clock" dialog that is accessible via the "TMC" block in the block diagram.
- "Trigger In", "Marker" and "Clock" tabs that are accessible via the "Baseband" block in the block diagram.

See also chapter "Local and global connectors settings" in the user manual.

3.6 Frame configuration general settings

Access:

► Select "Baseband > IEEE 802.16 WiMAX > Frame Configuration".



This dialog contains the general parameters required for frame configuration.

Settings:

Frame Duration
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 command:
`[:SOURce<hw>]:BB:WIMax:FRAMe:TIME` on page 130

User Frame Duration
(available for Frame Duration set to User)

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

Remote command:
`[:SOURce<hw>]:BB:WIMax:FRAMe:TIME:USER` on page 131

Downlink Subframe Duration
(available for uplink direction in TDD mode)

Delays the first uplink burst by the set time duration.

Remote command:
`[:SOURce<hw>]:BB:WIMax:SUBFrame:TIME` on page 134

Initial Delay of Burst 1
(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 command:
`[:SOURce<hw>]:BB:WIMax:FRAMe:BURSt:DELay` on page 130

Sequence Length
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 command:
`[:SOURce<hw>]:BB:WIMax:SLENgth` on page 133

Predefined Frames
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

"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.

"User" The settings for the frame can be defined.

Remote command:
`[:SOURce<hw>]:BB:WIMax:OFDM:FRAMe:PREDefined` on page 228
`[:SOURce<hw>]:BB:WIMax:AOFDm:FRAMe:PREDefined` on page 156

Power Reference
Selects the power 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.

"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.

"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.

"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 command:
`[:SOURce<hw>]:BB:WIMax:OFDM:POWer:REFerence` on page 229
`[:SOURce<hw>]:BB:WIMax:AOFDm:POWer:REFerence` on page 158

Frame Configuration
Accesses the dialog for configuration of the frame.

The dialog depends on the selected physical layer mode, see Chapter 3.7, "Frame configuration OFDM", on page 33 and Chapter 3.14, "Frame configuration OFDMA", on page 55.

Remote command:
n.a.

3.7 Frame configuration OFDM

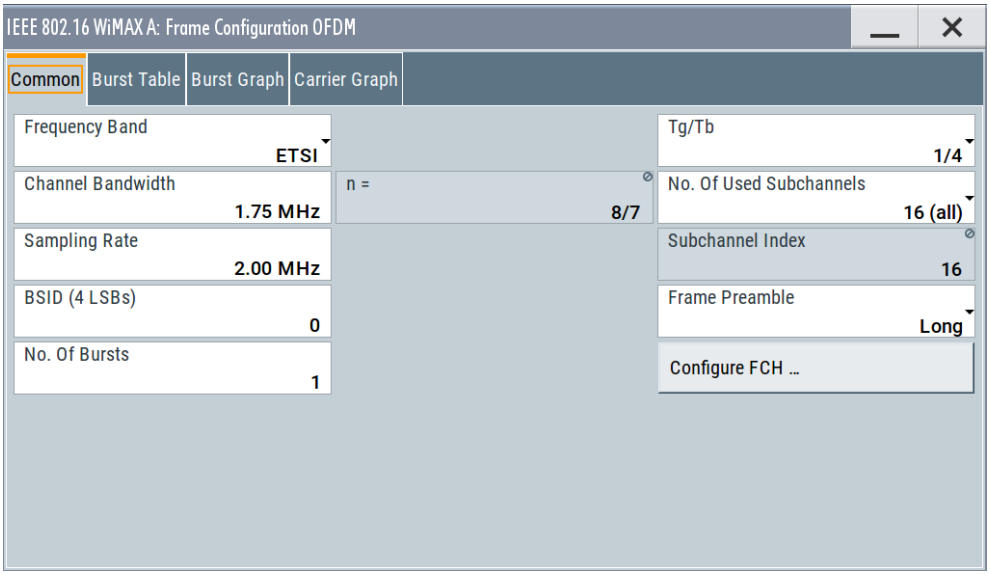
This dialog provides all parameters to configure frames in OFDM mode. The selected link direction determines the available parameters.

Access:

1. Select "General > Physical Layer Mode > OFDM".
2. Select "Frame Configuration (OFDM) > Frame Configuration"

3.7.1 Frame configuration common settings

► Select "Common".



This dialog contains the common parameters required for frame configuration in OFDM mode.

Settings:

Frequency Band OFDM

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 ETSI applies.
The range is 1.75 MHz to 28 MHz for the channel bandwidth and 2 MHz 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 MHz to 2686 MHz.
The range is 1.50 MHz to 24 MHz for the channel bandwidth and 1.72 MHz 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 MHz to 2320 MHz and 2345 MHz to 2360 MHz.
The range is 2.5 MHz to 15 MHz for the channel bandwidth and 2.88 MHz to 17.28 MHz for the sampling rate.

"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 GHz to 5350 GHz and 5750 GHz to 5825 GHz.
The range is 10 MHz to 20 MHz for the channel bandwidth and 11.52 MHz 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 MHz to 28 MHz for the channel bandwidth and 1.44 MHz to 32 MHz for the sampling rate.

Remote command:
`[:SOURce<hw>]:BB:WIMax:OFDM:FBANd` on page 224

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

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

- For channel bandwidths:
  - A multiple of 1.75 MHz then n = 8/7
  - A multiple of 1.5 MHz then n = 86/75
  - A multiple of 1.25 MHz then n = 144/125
  - A multiple of 2.75 MHz then n = 316/275
  - 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 command:
`[:SOURce<hw>]:BB:WIMax:OFDM:BW` on page 224

Sampling Ratio n OFDM
Indicates the sampling ratio. The sampling ratio is determined by the channel bandwidth (see Channel Bandwidth OFDM).

Remote command:
`[:SOURce<hw>]:BB:WIMax:OFDM:N?` on page 229

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

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

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

Remote command:
`[:SOURce<hw>]:BB:WIMax:OFDM:SRATe` on page 230

BSID OFDM
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 command:
`[:SOURce<hw>]:BB:WIMax:OFDM:BSID` on page 215

No. of Bursts OFDM
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 command:
`[:SOURce<hw>]:BB:WIMax:OFDM:BURSt[:COUNt]` on page 224

Tg/Tb Ratio OFDM
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 command:
`[:SOURce<hw>]:BB:WIMax:OFDM:TGTB` on page 231

No. of Used Subchannels OFDM
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 command:
`[:SOURce<hw>]:BB:WIMax:OFDM:SUBChannel[:COUNt]` on page 231

Subchannel Index OFDM
Selects the subchannel index in subchannelization mode.

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

Remote command:
`[:SOURce<hw>]:BB:WIMax:OFDM:SUBChannel:INDex` on page 230

Frame Preamble OFDM
Activates 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 command:
`[:SOURce<hw>]:BB:WIMax:OFDM:PREamble:MODE` on page 229

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

Remote command:
`[:SOURce<hw>]:BB:WIMax:OFDM:FRAMe[:NUMBer]` on page 228

Configure FCH OFDM
Accesses the dialog for configuring FCH mode and parameters (see Chapter 3.8, "FCH configuration downlink OFDM", on page 43).

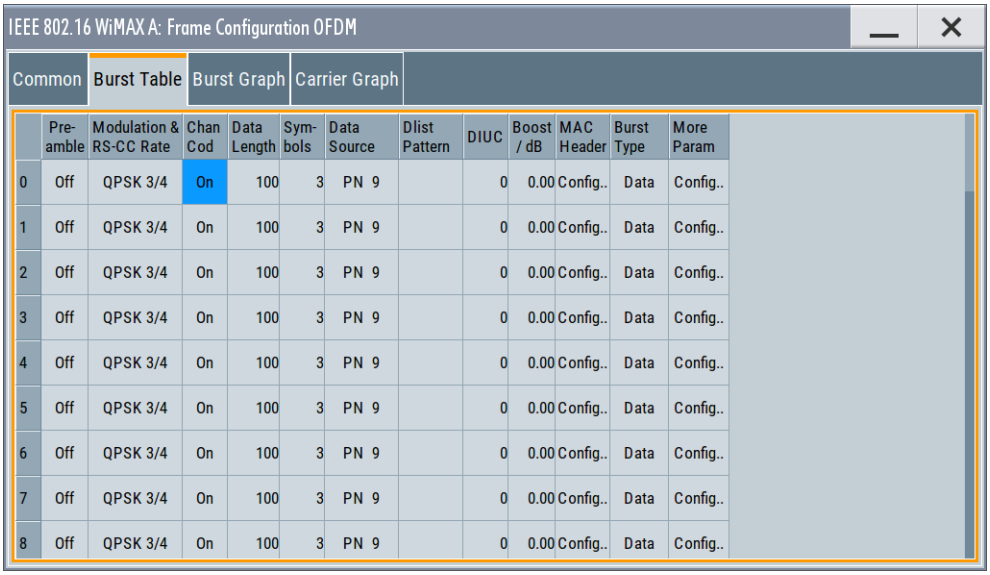
Remote command:
n.a.

Generate UL-MAP...
Accesses the dialog for generating the UL-Map, see Chapter 3.11, "UL-MAP configuration downlink OFDM", on page 50.

Remote command:
n.a.

3.7.2 Burst table

► To access this dialog, select "Burst Table".



	Pre-amble	Modulation & RS-CC Rate	Chan Cod	Data Length	Sym-bols	Data Source	Dlist Pattern	DIUC	Boost / dB	MAC Header	Burst Type	More Param
0	Off	QPSK 3/4	On	100	3	PN 9		0	0.00	Config..	Data	Config..
1	Off	QPSK 3/4	On	100	3	PN 9		0	0.00	Config..	Data	Config..
2	Off	QPSK 3/4	On	100	3	PN 9		0	0.00	Config..	Data	Config..
3	Off	QPSK 3/4	On	100	3	PN 9		0	0.00	Config..	Data	Config..
4	Off	QPSK 3/4	On	100	3	PN 9		0	0.00	Config..	Data	Config..
5	Off	QPSK 3/4	On	100	3	PN 9		0	0.00	Config..	Data	Config..
6	Off	QPSK 3/4	On	100	3	PN 9		0	0.00	Config..	Data	Config..
7	Off	QPSK 3/4	On	100	3	PN 9		0	0.00	Config..	Data	Config..
8	Off	QPSK 3/4	On	100	3	PN 9		0	0.00	Config..	Data	Config..

The dialog contains the parameters of the individual bursts.

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 vary depending on the transmission direction.

Burst Index OFDM
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 command:
n.a.
(selected via the suffix to the keyword `BURSt<n>`)

Preamble OFDM
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 command:
`[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:PREamble:MODE` on page 222

Midamble Repetition OFDM
Activates 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.

Remote command:
`[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:MIDamble` on page 221

Modulation and RS-CC Rate OFDM
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 command:
`[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:FORMat` on page 219

Channel Coding OFDM
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 high crest factors of the signal.

Remote command:
`[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:CCODing:STATe` on page 215

Data Length OFDM
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 command:
`[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:DLENgth` on page 217

Number of Symbols OFDM
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 command:
`[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:SYMBol[:COUNt]` on page 222

Data Source OFDM
Selects data source for the selected bursts.

The following standard data sources are available:
- "All 0, All 1"
  An internally generated sequence containing 0 data or 1 data.
- "PNxx"
  An internally generated pseudo-random noise sequence.
- "Pattern"
  An internally generated sequence according to a bit pattern.
  Use the "Pattern" box to define the bit pattern.
- "Data List/Select DList"
  A binary data from a data list, internally or externally generated.
  Select "Select DList" to access the standard "Select List" dialog.
  – Select the "Select Data List > navigate to the list file *.dm_iqd > Select" to select an existing data list.
  – Use the "New" and "Edit" functions to create internally new data list or to edit an existing one.
  – Use the standard "File Manager" function to transfer external data lists to the instrument.

See also:
- Section "Modulation Data" in the R&S SMW user manual.
- Section "File and Data Management" in the R&S SMW user manual.
- Section "Data List Editor" in the R&S SMW user manual

Remote command:
[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:DATA on page 215
[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:DATA:PATTern on page 216
[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:DATA:DSELect on page 216

DIUC OFDM
Sets the specific interval usage code.

The code is used to initialize the randomizer.

Remote command:
[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:DIUC on page 217

Boost OFDM
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 is calculated as the sum of the "Level" and the burst power.

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 command:
[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:POWer on page 221

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

Remote command:
n.a.

Burst Type OFDM
Select the burst type.

"Date" Regular bursts are called "Data" bursts. All data sources are available for this type of burst.

"DL-MAP" A DL-MAP is generated, considering 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

"UL-MAP" A UL-MAP is generated using the specified data list, including additional parameters from the "More Param" panel. SeeGenerate UL-MAP... for more information on how to create UL-MAP bursts.

"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 command:
`[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:TYPE` on page 222

More Parameter OFDM – WiMAX
Accesses the dialog for configuring additional parameters for the bursts, see Chapter 3.12, "More parameters uplink OFDM", on page 52.

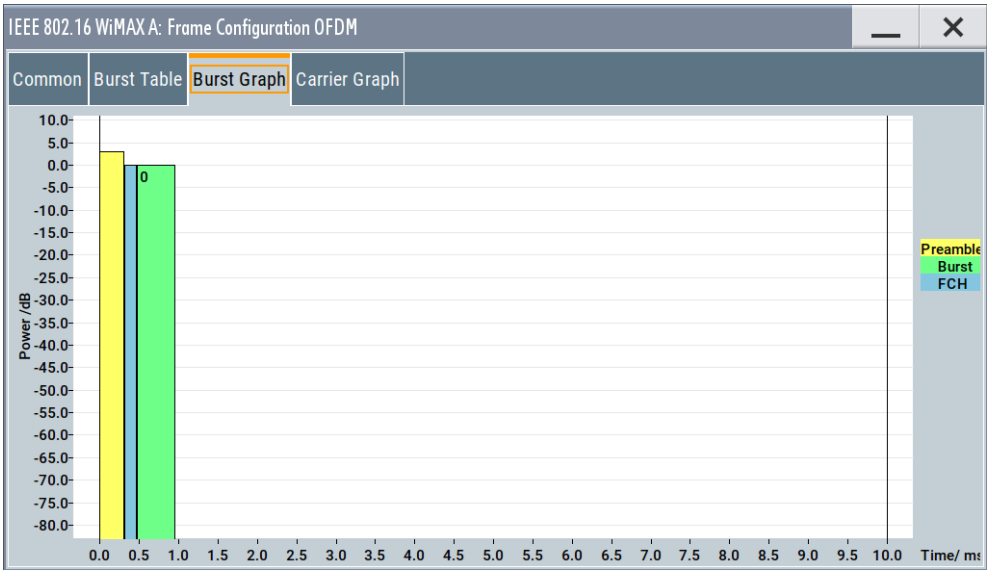
Remote command:
n.a.

Gap OFDM
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 command:
`[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:GAP` on page 219

3.7.3 Frame burst graph OFDM

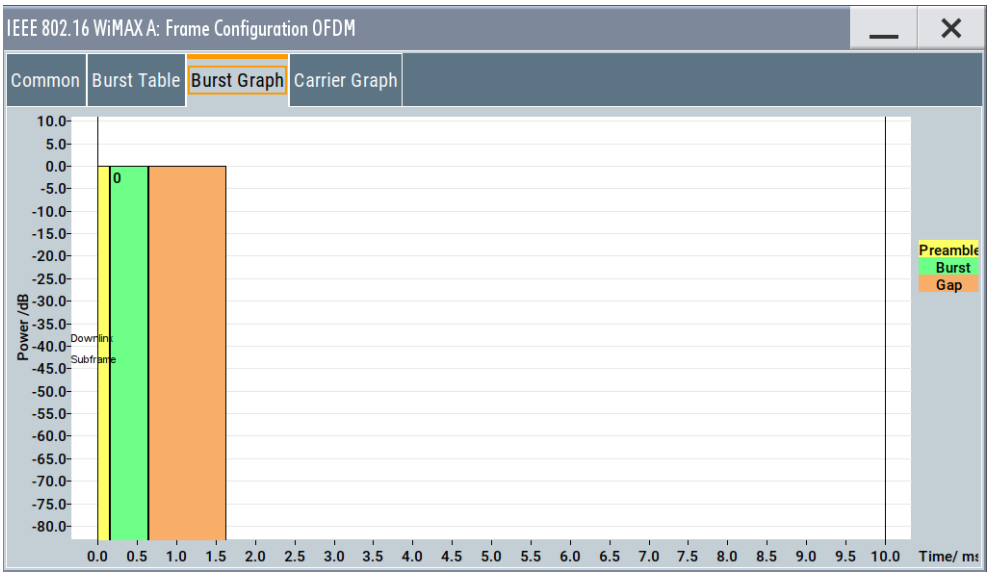
► To access this dialog, select "Burst Graph".



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 height of the bar represents the relative power. The power of the preamble is always +3 dB and of the FCH always 0 dB relative to the power of the other bursts.

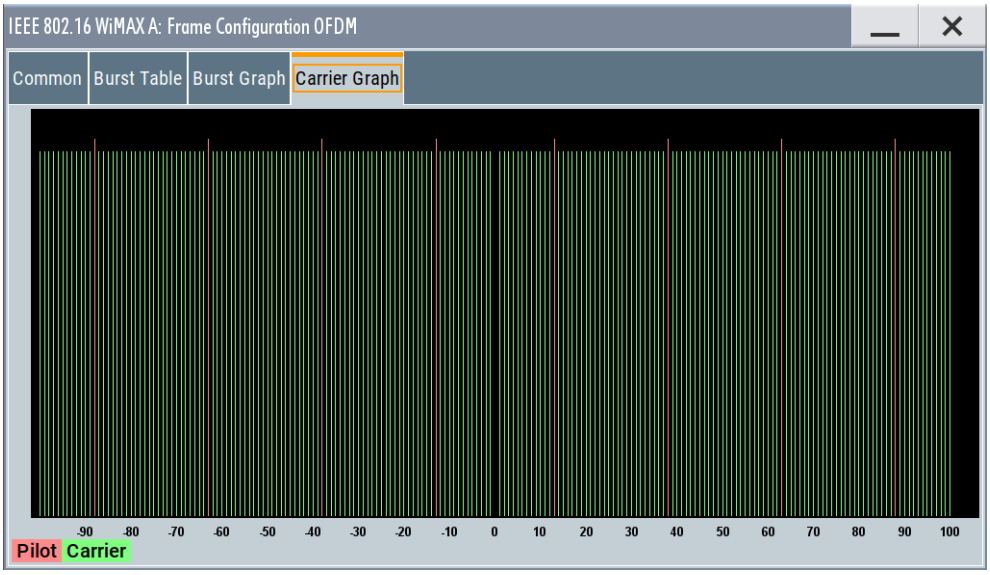
The shown frame configuration is repeated over the whole sequence length.

- 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. The following gaps are defined by the gap value specified for the associated burst in the burst table.



3.7.4 Active carrier graph OFDM

► To access this dialog, select "Carrier Graph".

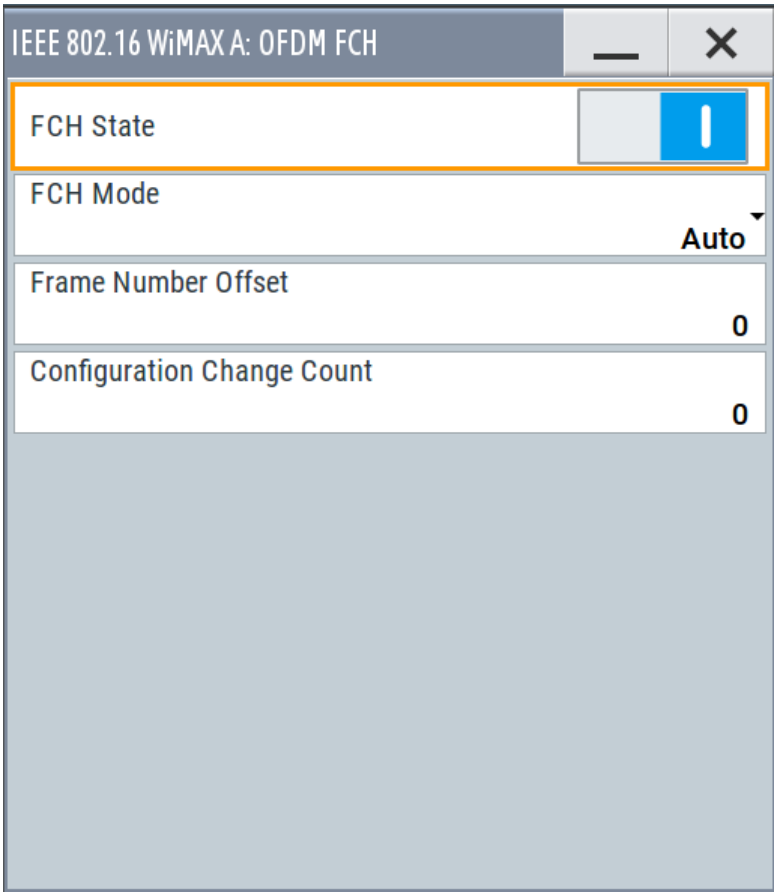


The graph shows used pilots and carriers of the current subchannelization mode. If subchannelization is activated with "No. of used Subchannels" different than 16, the graph shows the used and blanked carriers according to the setting of "Subchannel Index".

3.8 FCH configuration downlink OFDM

Access:

1. Select "General > Physical Layer Mode > OFDM".
2. Select "Link Direction > Downlink".
3. Select "Frame Configuration (OFDM) > Frame Configuration > Common".
4. Select "Configure FCH".



This dialog comprises the settings required for configuring FCH.

Provided are the following settings:

Settings:

FCH State
Activates the FCH.

Remote command:
`[:SOURce<hw>]:BB:WIMax:OFDM:FCH:STATe` on page 227

FCH Mode
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 list shows the mapping that applies in "Auto" mode:

- Base_Station_ID
  Set to the BSID value specified in the frame configuration dialog
- Frame_Number
  Set to the current frame number modulo 16. The first frame of the generated sequence has the number specified with the parameter Frame Number Offset. For the following frames, this number increases 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 2nd, 3rd and 4th 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" In "User" mode, the FCH is filled with data specified with the parameter Data Source. This enables any arbitrary data to be sent with the FCH burst.

Remote command:
`[:SOURce<hw>]:BB:WIMax:OFDM:FCH:MODE` on page 227

Frame Number Offset
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 command:
`[:SOURce<hw>]:BB:WIMax:OFDM:FCH:FNOFfset` on page 226

Configuration Change Count
Sets the configuration change count value.

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

Remote command:
`[:SOURce<hw>]:BB:WIMax:OFDM:FCH:CCC` on page 225

Data Source
Specifies the data source in User mode.

The FCH contents are filled from the selected data source.

The following standard data sources are available:
- "All 0, All 1"
  An internally generated sequence containing 0 data or 1 data.
- "PNxx"
  An internally generated pseudo-random noise sequence.
- "Pattern"
  An internally generated sequence according to a bit pattern.
  Use the "Pattern" box to define the bit pattern.
- "Data List/Select DList"
  A binary data from a data list, internally or externally generated.
  Select "Select DList" to access the standard "Select List" dialog.
  – Select the "Select Data List > navigate to the list file *.dm_iqd > Select" to select an existing data list.
  – Use the "New" and "Edit" functions to create internally new data list or to edit an existing one.
  – Use the standard "File Manager" function to transfer external data lists to the instrument.

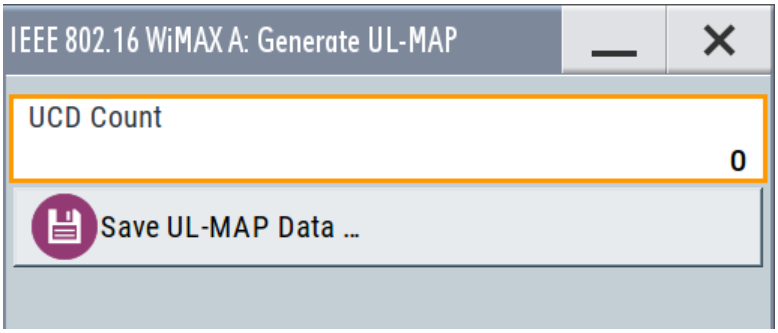
See also:
- Section "Modulation Data" in the R&S SMW user manual.
- Section "File and Data Management" in the R&S SMW user manual.
- Section "Data List Editor" in the R&S SMW user manual

Remote command:
`[:SOURce<hw>]:BB:WIMax:OFDM:FCH:DATA` on page 225
`[:SOURce<hw>]:BB:WIMax:OFDM:FCH:DATA:PATTern` on page 226
`[:SOURce<hw>]:BB:WIMax:OFDM:FCH:DATA:DSELect` on page 225

3.9 Generate UL-MAP uplink OFDM

Access:

1. Select "General > Physical Layer Mode > OFDM".
2. Select "Link Direction > Uplink".
3. Select "Frame Configuration (OFDM) > Frame Configuration > Common".
4. Select "Generate UL-MAP".



This dialog contains the parameters required for generating an UL-MAP.

Settings:

UCD Count OFDM
Sets the value for the UCD count.

Remote command:
`[:SOURce<hw>]:BB:WIMax:OFDM:UCD` on page 231

Save UL-MAP Data OFDM
Opens the "File Select" dialog for saving the current UL-MAP.

The name of the file is specified in the "Filename" 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 filename 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 following is a list of the UL-MAP 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

Generating a valid UL-MAP

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

- Switch to uplink mode
- Define the layout of the uplink subframe by setting a number of bursts and specifying the parameters above for each burst
- Select "Generate UL-MAP" and save the UL-MAP to a file
- Switch to downlink mode
- Set one downlink burst to "Burst Type UL-MAP"
- Open the "More Params" panel
- Select "UL-MAP File" and load the file created before.

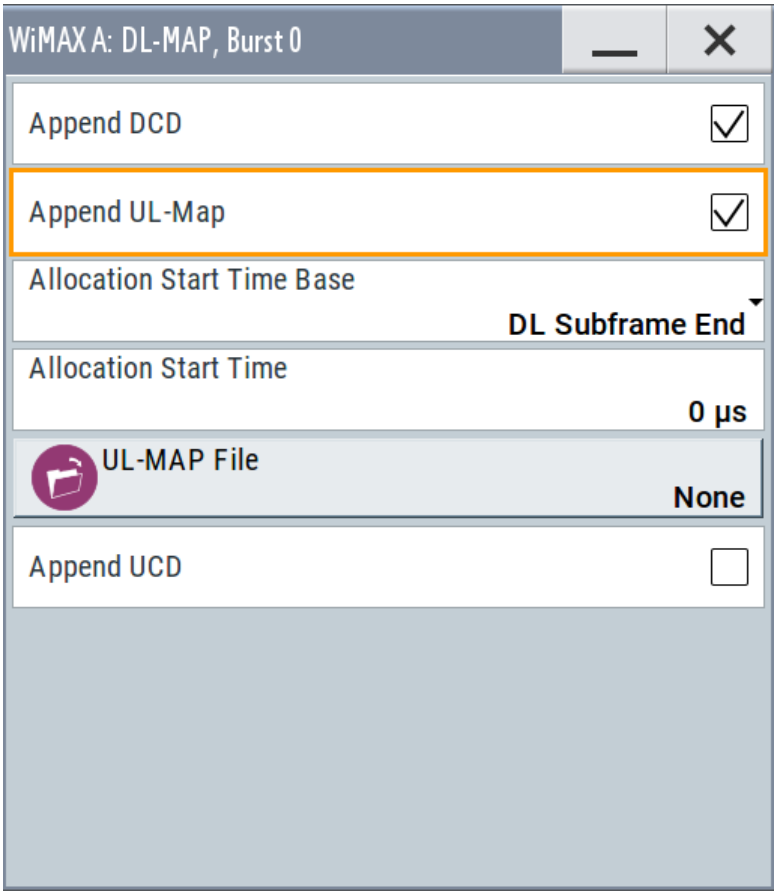
The downlink frame is then transmitting a UL-MAP that specifies the uplink structure defined in uplink mode before.

Remote command:
`[:SOURce<hw>]:BB:WIMax:OFDM:ULMap:CREate` on page 232

3.10 DL-MAP configuration downlink OFDM

Access:

1. Select "General > Physical Layer Mode > OFDM".
2. Select "Link Direction > Downlink".
3. Select "Frame Configuration (OFDM) > Frame Configuration > Burst Table".
4. Select "Burst Type > DL-MAP".
5. Select "More Parameter > Configure".



This dialog contains the parameters required for configuring DL-MAP.

Settings:

Append DCD OFDM

If activated, a 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 command:

`[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:DLMap:DCD:STATe` on page 218

Append UL-Map OFDM

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

Remote command:

`[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:DLMap:ULM:STATe` on page 218

Allocation Start Timebase OFDM
Selects the allocation start timebase, 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 Timebase = DL Subframe End", the "Allocation Start Time" of the UL-Map is set to the **end of the downlink subframe**+ the value set with the parameter Allocation Start Time OFDM.

When "Start Timebase = Frame Start", the allocation start Time of the UL-Map is set to the **beginning of the frame**+ the value set with the parameter Allocation Start Time OFDM.

Remote command:
`[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:DLMap:AMODe` on page 217

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

Remote command:
`[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:DLMap:ATIMe` on page 217

UL-MAP File OFDM
Opens the dialog for selecting the UL-Map file.

Remote command:
n.a.

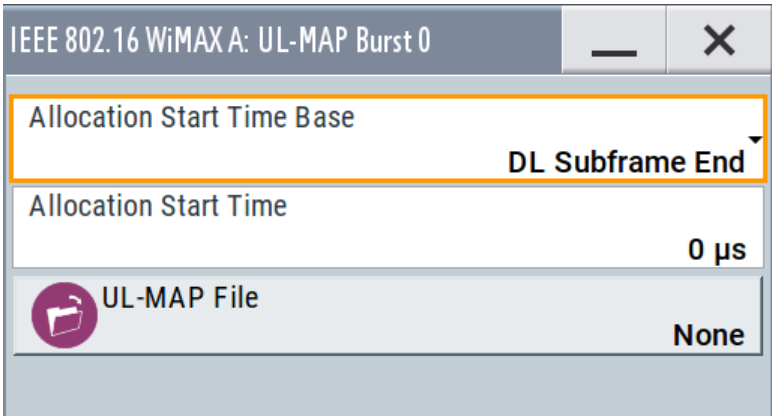
Append UCD OFDM
If activated, the UCD is appended to the DL-MAP. The UCD message is transmitted with its own MAC header and CRC, included in the same burst allocation used by the DL-MAP.

Remote command:
`[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:DLMap:UCD:STATe` on page 218

3.11 UL-MAP configuration downlink OFDM

Access:

1. Select "General > Physical Layer Mode > OFDM".
2. Select "Link Direction > Downlink".
3. Select "Frame Configuration (OFDM) > Frame Configuration > Burst Table".
4. Select "Burst Type > UL-MAP".
5. Select "More Parameter > Configure".



This dialog comprises the settings required for configuring UL-MAP.

Settings:

Allocation Start Timebase
Selects the allocation start timebase. The allocation start time field of the UL-MAP specifies the start of the uplink subframe.

If "Start Timebase = DL Subframe End", the "Allocation Start Time" of the UL-Map is set to the **end of the downlink subframe**+ the value set with the parameter Allocation Start Time.

When "Start Timebase = Frame Start", the allocation start Time of the UL-Map is set to the **beginning of the frame**+ the value set with the parameter Allocation Start Time.

Remote command:
`[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:ULMap:AMODe` on page 223

Allocation Start Time
Sets the allocation start time in the UL-MAP.

Remote command:
`[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:ULMap:ATIMe` on page 223

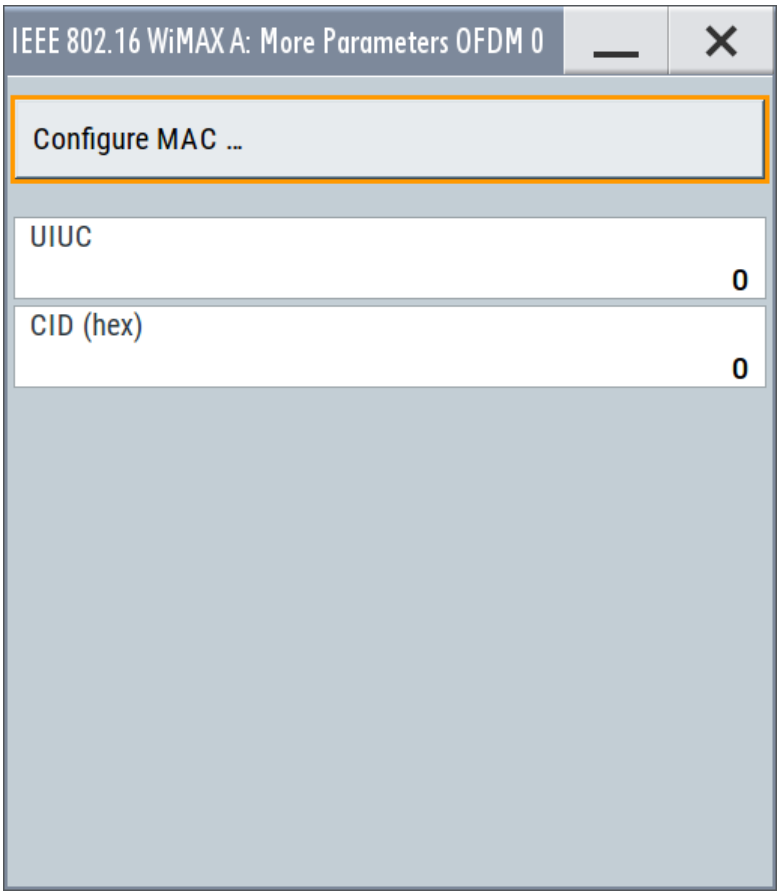
UL-MAP File
Calls the dialog for selecting the UL-map file.

Remote command:
n.a.

3.12 More parameters uplink OFDM

Access:

1. Select "General > Physical Layer Mode > OFDM".
2. Select "Link Direction > Uplink".
3. Select "Frame Configuration (OFDM) > Frame Configuration > Burst Table".
4. Select "Burst Type > Data".
5. Select "More Parameter > Configure".



This dialog contains the parameters that can be configured when "Burst Type > Data" is selected.

Settings:

Configure MAC
Accesses the dialog for configuring the MAC header panel for the selected burst. This dialog is described in Chapter 3.13, "MAC header configuration OFDM", on page 53

Remote command:
n.a.

UIUC OFDM
Sets the specific UIUC.

Remote command:
`[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:UIUC` on page 223

MAC CID
Sets the connection control identifier (CID) 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.

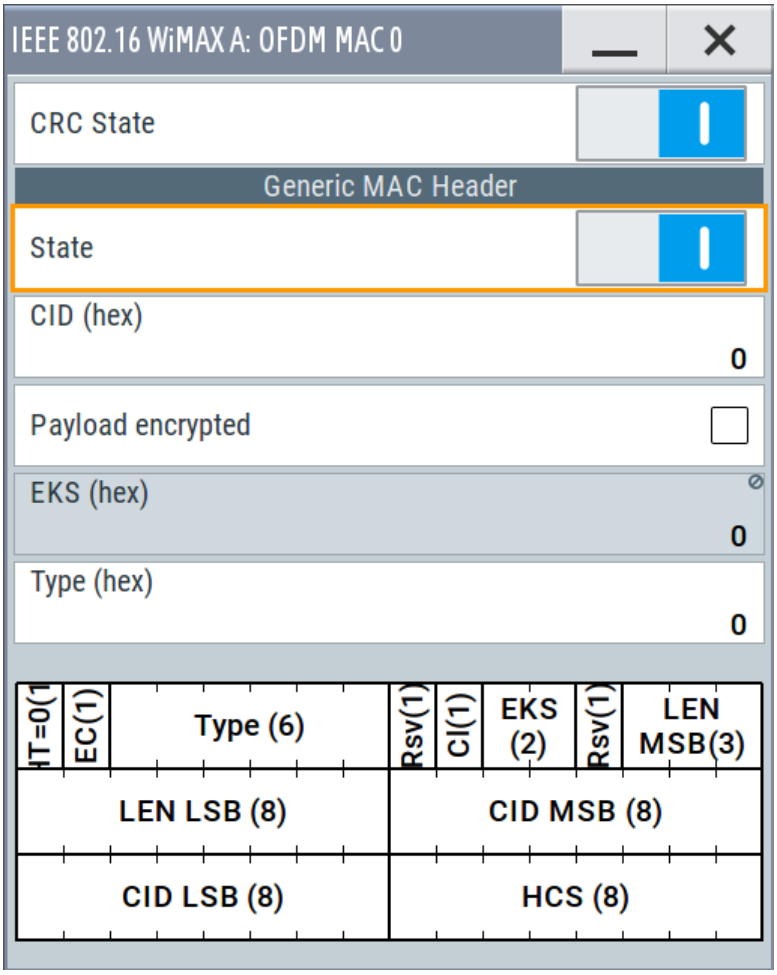
This parameter is identical to the CID set in the MAC Header settings.

Remote command:
`[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:MAC:CID` on page 219

3.13 MAC header configuration OFDM

Access:

1. Select "General > Physical Layer Mode > OFDM".
2. Select "Link Direction > Uplink".
3. Select "Frame Configuration (OFDM) > Frame Configuration > Burst Table".
4. Select "Burst Type > Data".
5. Select "More Parameter > Configure > Configure MAC".



This dialog contains the parameters to configure 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.

Settings:

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

Remote command:
`[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:MAC:CRC:STATe` on page 220

MAC Header State
Activates the generation of the generic MAC header.

Remote command:
`[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:MAC:STATe` on page 220

MAC CID
Sets the connection control identifier (CID) 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 command:
`[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:MAC:CID` on page 219

Payload encrypted
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 command:
`[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:MAC:ENCRypted:STATe` on page 220

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

Remote command:
`[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:MAC:EKS` on page 220

Mac Type
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 command:
`[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:MAC:TYPE` on page 221

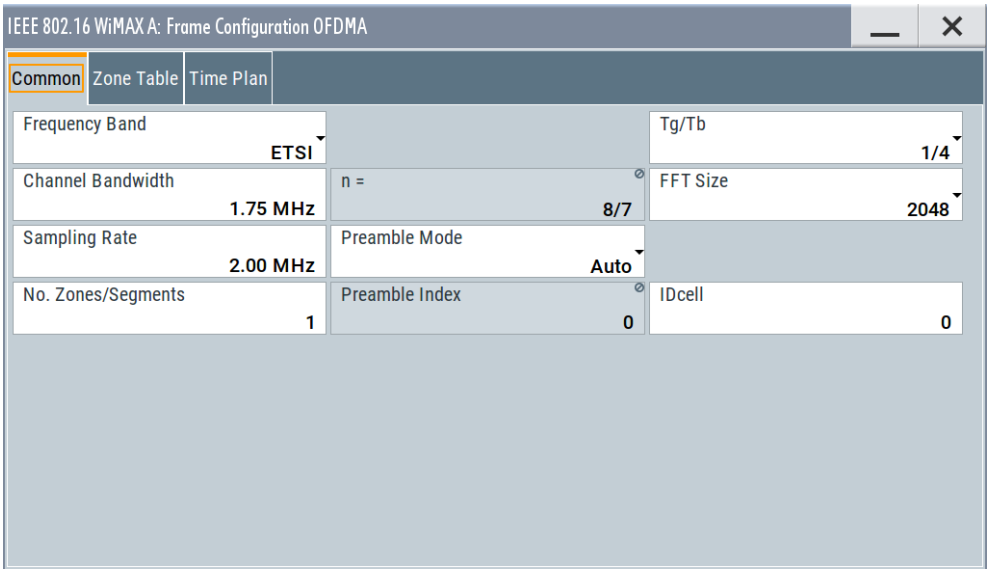
3.14 Frame configuration OFDMA

Access:

1. Select "General > Physical Layer Mode > OFDMA".
2. Select "Frame Configuration (OFDMA) > Frame Configuration".

3.14.1 Frame configuration common settings

► Select "Common".



This dialog contains the parameters required for frame configuration in OFDMA mode.

Settings:

Frequency Band OFDMA

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 ETSI applies.
The range is 1.75 MHz to 28 MHz for the channel bandwidth and 2 MHz 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 MHz to 2686 MHz.
The range is 1.50 MHz to 24 MHz for the channel bandwidth and 1.68 MHz to 26.88 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 MHz to 2320 MHz and 2345 MHz to 2360 MHz. The range is 2.5 MHz to 15 MHz for the channel bandwidth and 2.8 MHz to 16.8 MHz for the sampling rate.
"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 GHz to 5350 GHz and 5750 GHz to 5825 GHz. The range is 10 MHz to 20 MHz for the channel bandwidth and 11.2 MHz to 22 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 spectrum.
"User"	This mode is provided for choosing any other channel bandwidth / sampling rate combination. The range is 1.25 MHz to 28 MHz for the channel bandwidth and 1.4 MHz to 32 MHz for the sampling rate.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:FBANd` on page 156

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

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

- For channel bandwidth
  - A multiple of 1.75 MHz then n = 8/7
  - A multiple of 1.5 MHz then n = 28/25
  - Aa multiple of 1.25 MHz then n = 28/25
  - A multiple of 2.75 MHz then n = 28/25
  - A multiple of 2.0 MHz then n = 28/25
- Else for channel bandwidth 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 command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:BW` on page 155

Sampling Ratio n OFDMA
Indicates the sampling ratio. The sampling ratio is determined by the channel bandwidth (see Channel Bandwidth OFDMA).

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:N?` on page 158

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

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

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

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:SRATe` on page 159

Number of Zones/Segments OFDMA
Sets the number of active zones/segments in one frame.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE:COUNt` on page 160

Preamble Mode OFDMA
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 cell ID 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.
"User"	Sets the preamble index to one of the available indices from 1 to 113 specified in the "Preamble Index" field.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:PREamble:INDex:MODE` on page 159

Preamble Index OFDMA
Sets the preamble index to one of the available indices from 1 to 113 in preamble mode "user".

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:PREamble:INDex` on page 159

Tg/Tb Ratio OFDMA
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 command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:TGTB` on page 160

FFT Size OFDMA
Selects the FFT size.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:FFT` on page 156

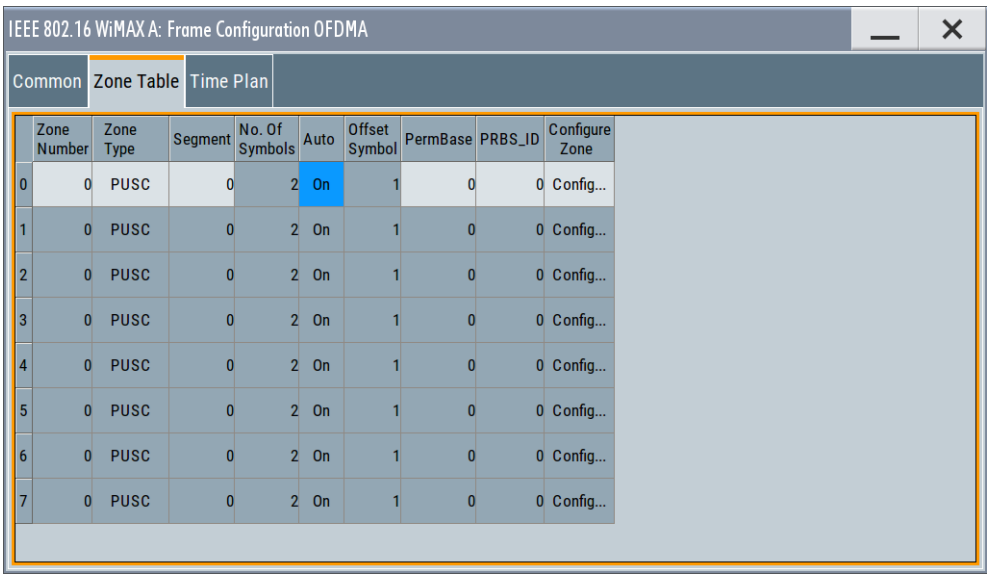
IDCell OFDMA
Sets the cell ID. The value is used in the preamble and for the permutation equations in the first downlink zone. It partly sets the subcarrier randomizer initialization vector in the first downlink zone.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:IDCell` on page 157

3.14.2 Zone table

Access:

► Select "Zone Table".



	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...

This dialog contains the parameters to configure the individual zone settings.

Settings:

Zone Index OFDMA

Displays the consecutive zone index from 0 to 7.

Remote command:
n.a.

Zone Number OFDMA

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 command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:NUMBer` on page 164

Zone Type OFDMA
Selects the type of subcarrier permutation for the zone.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:TYPE` on page 212

Segment OFDMA
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 command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SEGMent` on page 165

No. Of Symbols OFDMA
Sets the zone length in number of symbols. Zones with identical zone number have the same length, as they overlap in time.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SYMBol:COUNt` on page 174

Auto OFDMA
Activates or deactivates automatic zone length. 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 command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SYMBol:COUNt:AUTO`
on page 174

Offset Symbol OFDMA
Displays the symbol offset of the zone.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SYMBol:OFFSet?` on page 174

PermBase OFDMA
Selects the PermBase of the zone.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:PERMbase` on page 164

PRBS_ID OFDMA
Selects the PRBS_ID of the zone.

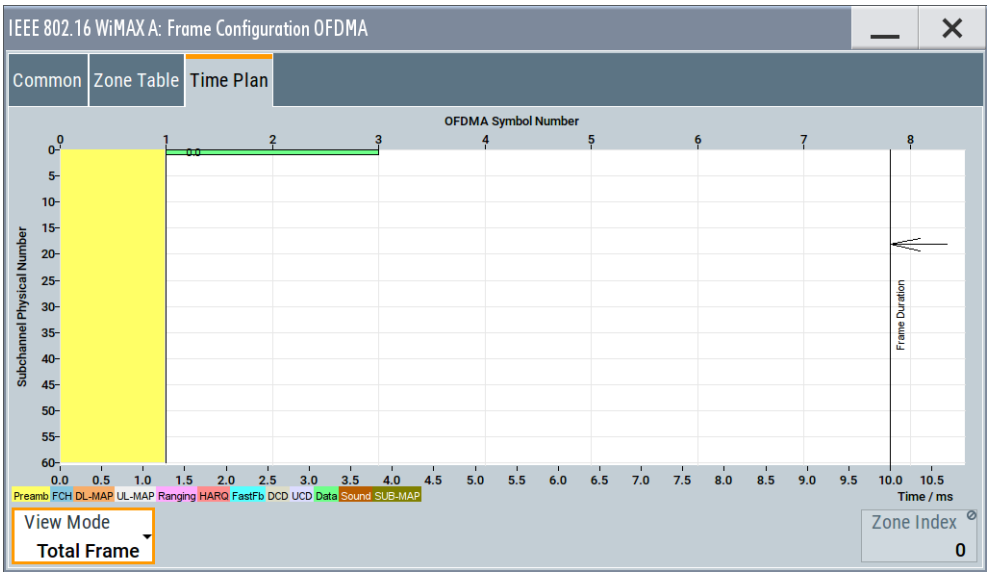
Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:PRBSid` on page 164

Configure Zone OFDMA
Calls the dialog for configuring the parameters of the zone.

Remote command:
n.a.

3.14.3 Time plan

► To access this dialog, select "Time Plan".



This dialog shows the time plan.

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 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 "Zone Index".

Time Plan View Mode OFDMA
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.

Remote command:
n.a.

Time Plan Zone Index OFDMA
Selects the zone index to be displayed.

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

Remote command:
n.a.

3.15 Zone configuration OFDMA

Access:

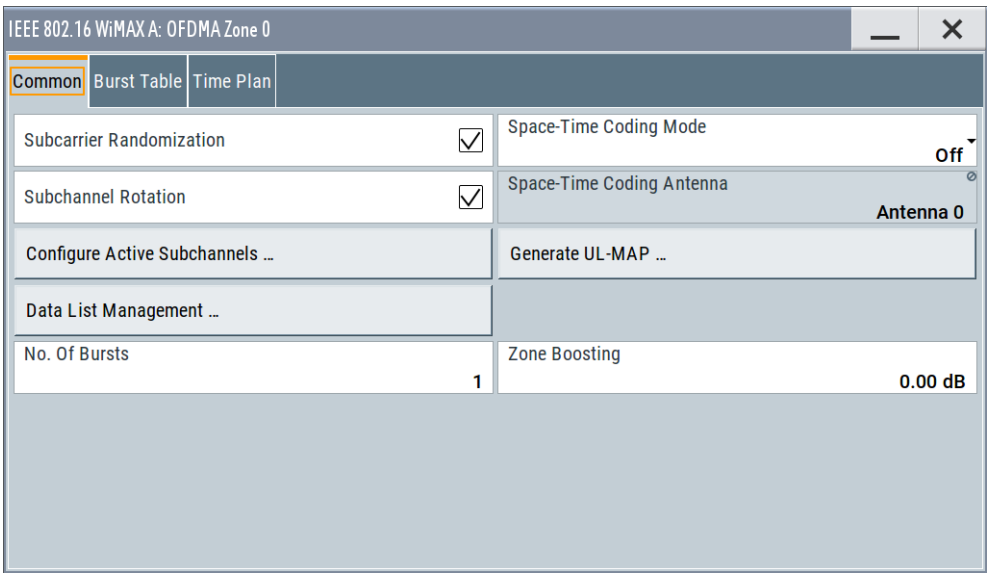
1. Select "General > Physical Layer Mode > OFDMA".
2. Select "Frame Configuration (OFDMA) > Frame Configuration > Zone Table".
3. Select "Configure Zone > Config...".

Content

3.15.1 OFDMA common zone settings

Access:

► Select "Common".



This dialog contains the common parameters required for zone configuration.

Settings:

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

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SCARrier:RANDomizer`
on page 165

Subchannel Rotation OFDMA
(Available for zone type PUSC in link direction uplink only)

Activates or deactivates the subchannel rotation.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:SUBChannel:ROTation`
on page 212

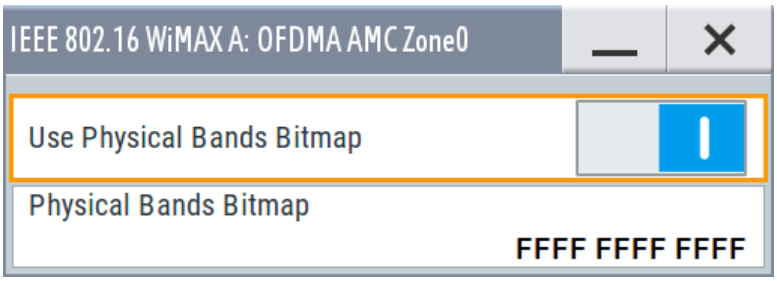
CSTD..
(Available for STC Mode CSTD only)

Calls the dialog for configuring the cyclic shift transmit diversity (seeChapter 3.17, "CSTD OFDMA", on page 79).

Remote command:
n.a.

Configure Band AMC
(Available for zone type AMC2x3 only)

Accesses the dialog for configuring band AMC mode.



Use Physical Bands Bitmap ← Configure Band AMC
Activates/deactivates band AMC mode.

If activated, the "Physical Bands Bitmap" parameter specifies the active physical bands.

If deactivated, all available physical bands are used.

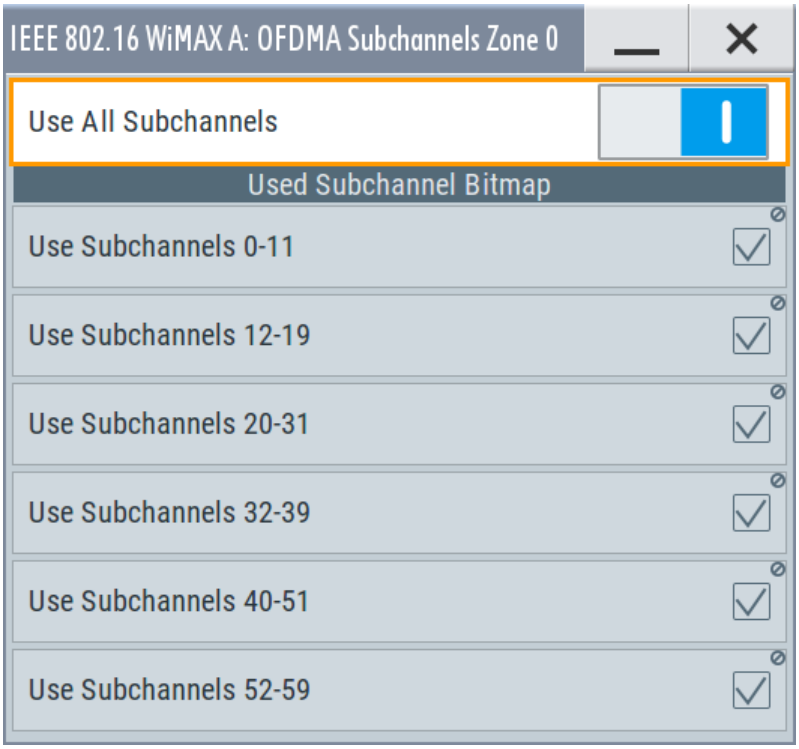
Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:AMC:BITMap[:STATe]`
on page 161

Physical Bands Bitmap ← Configure Band AMC
Sets the AMC physical bands bitmap pattern in hexadecimal input format.

The LSB (right most bit) corresponds to physical band 0 (the lowest frequency OFDMA subcarriers). Deactivated bits in this pattern deactivate the corresponding bands, i.e. they are not used for allocating bursts.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:AMC:BITMap:PATTern`
on page 161

Configure active Subchannels OFDMA
Calls the dialog for activating/deactivating subchannels.



Use All Subchannels ← Configure active Subchannels OFDMA
Activates the generation of all subchannels.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:SUBChannel:MODE`
on page 211

Use Subchannels x...y (downlink PUSC only) ← Configure active Subchannels OFDMA
Activates the generation of the selected groups of subchannels.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:SUBChannel<ch>:MAP`
on page 212

Allocated Subchannels Bitmap (uplink only) ← Configure active Subchannels OFDMA

In uplink mode, each physical subchannel can be individually activated or deactivated. Activation 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 command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:SUBChannel:PATTern` on page 211

No of Bursts OFDMA

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

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt[:COUNt]` on page 206

Space-Time Coding Mode OFDMA

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

"Off" Deactivates diversity.

"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.

"4 Antennas, Matrix A/ 4 Antennas, Matrix B/ 4 Antennas, Matrix C"
Sets the space-time coding mode to four Antennas with Matrix A, Matrix B or Matrix C encoding respectively.

"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 and UL-MAP configuration downlink OFDM.

"Collaborative Multiplexing"
Enables uplink collaborative spatial multiplexing.

"CSTD" Enables cyclic shift transmit diversity.
The CSTD parameters are set in the CSTD dialog (see CSTD OFDMA).

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:STC:MODE` on page 173

Space-Time Coding Antenna OFDMA

Sets the antenna for the space-time coding modes.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:STC:ANTenna` on page 173

Generate UL-MAP
(Available for link direction uplink only)

Accesses the dialog for generating a UL-MAP.

Remote command:
n.a.

Dedicated Pilots OFDMA
(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 bursts are active on these subchannels.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:PILDedicated` on page 164

Data List Management…
Opens the "Data List Management" dialog. This dialog is used to create and edit a data list.

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

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

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

Example: Creating and editing the data list

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

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:DATA` on page 176
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:DATA:DSELect` on page 177
`[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:DATA` on page 215
`[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:DATA:DSELect` on page 216
`[:SOURce<hw>]:BB:WIMax:OFDM:FCH:DATA` on page 225
`[:SOURce<hw>]:BB:WIMax:OFDM:FCH:DATA:DSELect` on page 225

Pilot Pattern OFDMA
Sets the pilot pattern in uplink collaborative multiplexing mode.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:STC:PILotpattern` on page 173

Zone Boosting OFDMA
Sets an additional zone boosting in dB.

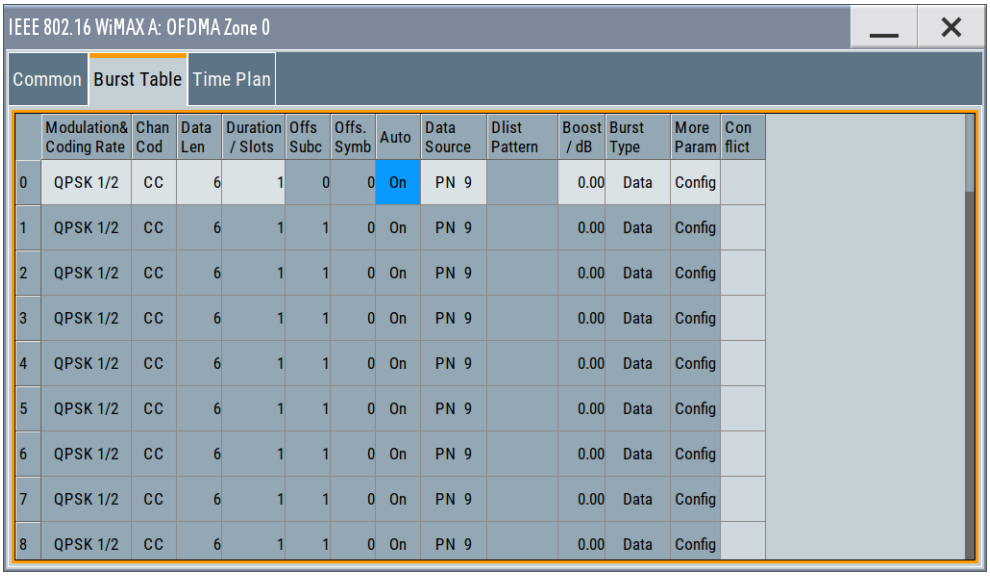
The zone boosting is applied to both the data and pilot carriers.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:BOOSt` on page 161

3.15.2 Burst table

Access:

► Select "Burst Table".



	Modulation& Coding Rate	Chan Cod	Data Len	Duration / Slots	Offs Subc	Offs. Symb	Auto	Data Source	Dlist Pattern	Boost / dB	Burst Type	More Param	Con flict
0	QPSK 1/2	CC	6	1	0	0	On	PN 9		0.00	Data	Config	
1	QPSK 1/2	CC	6	1	1	0	On	PN 9		0.00	Data	Config	
2	QPSK 1/2	CC	6	1	1	0	On	PN 9		0.00	Data	Config	
3	QPSK 1/2	CC	6	1	1	0	On	PN 9		0.00	Data	Config	
4	QPSK 1/2	CC	6	1	1	0	On	PN 9		0.00	Data	Config	
5	QPSK 1/2	CC	6	1	1	0	On	PN 9		0.00	Data	Config	
6	QPSK 1/2	CC	6	1	1	0	On	PN 9		0.00	Data	Config	
7	QPSK 1/2	CC	6	1	1	0	On	PN 9		0.00	Data	Config	
8	QPSK 1/2	CC	6	1	1	0	On	PN 9		0.00	Data	Config	

This dialog contains the individual burst parameters.

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 are provided.

Settings:

Burst Index OFDMA
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 command:
n.a.

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

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:FORMat`
on page 181

Channel Coding OFDMA
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 command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:CCODing:MODE`
on page 175

Data Length OFDMA
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. The allocated slots are specified by "No. of Subch" and "No. of Symb" in downlink mode and by the "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 command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:DATA:LENGth`
on page 177

Number of Subchannels OFDMA
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 with data so that no padding has to be applied. The allocated space is defined by "No. of Subch" and "No. of Symb".

The data length can be lowered afterwards if data bytes less than the allocated number are read from the data source.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:SUBChannel[:COUNt]` on page 201

Number of Symbols OFDMA
Enters the number of symbols for the selected burst.

If the number of subchannels is changed, the data length is adjusted to fill the allocated space with data so that no padding has to be applied. The allocated space is defined by "No. of Subch" and "No. of Symb".

The data length can be decreased afterwards if data bytes less than the allocated number are 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 command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:SYMBol[:COUNt]` on page 201

Duration-Slots OFDMA
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 command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:SLOT:COUNt` on page 200

Offset Subchannel OFDMA
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 command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:OFFSet:SUBChannel` on page 192

Offset Symbol OFDMA
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 command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:OFFSet:SYMBol` on page 193

Auto OFDMA
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 command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:OFFSet:MODE`
on page 192

Data Source OFDMA
Selects data source for the selected bursts.

The following standard data sources are available:
- "All 0, All 1"
  An internally generated sequence containing 0 data or 1 data.
- "PNxx"
  An internally generated pseudo-random noise sequence.
- "Pattern"
  An internally generated sequence according to a bit pattern.
  Use the "Pattern" box to define the bit pattern.
- "Data List/Select DList"
  A binary data from a data list, internally or externally generated.
  Select "Select DList" to access the standard "Select List" dialog.
  – Select the "Select Data List > navigate to the list file *.dm_iqd > Select" to select an existing data list.
  – Use the "New" and "Edit" functions to create internally new data list or to edit an existing one.
  – Use the standard "File Manager" function to transfer external data lists to the instrument.

See also:
- Section "Modulation Data" in the R&S SMW user manual.
- Section "File and Data Management" in the R&S SMW user manual.
- Section "Data List Editor" in the R&S SMW user manual

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:DATA`
on page 176
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:DATA:PATTern`
on page 178
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:DATA:DSELect`
on page 177

Boost OFDMA
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 command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:POWer`
on page 199

Burst Type OFDMA
Selects the burst type from data, FCH, DL-MAP, UL-MAP, Ranging, HARQ, fast feedback or SUB-MAP.

"DATA" Regular bursts are called "Data" bursts. All data sources are available for this type of burst.

"FCH" An FCH is generated at subchannel and symbol offset 0. See FCH configuration downlink OFDMA on the FCH contents.

"DL-MAP" A DL-MAP is generated, considering all active bursts of all zones. SeeDL-MAP configuration downlink OFDMA on the DL-MAP contents.

"UL-MAP" A UL-MAP is generated using the specified data list, including additional parameters from the "More Param" dialog. See UL-MAP configuration downlink OFDMA for more information on how to create UL-MAP bursts.

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

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

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

"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.

"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.

"SUB-MAP" A SUB-DL-UL-MAP message is generated.
Altogether up to three SUB-DL-UL-MAP messages can be enabled for all zones.
The SUB-DL-UL-MAP message additional parameters can be configured in the SUB-DL-UL-MAP configuration OFDMA dialog reached from the "More Param" panel.
For each data, UL-MAP, HARQ, DCD or UCD burst inclusion into one of the three available "SUB-DL-UL-MAPs" can be activated. In this case, the corresponding map carries a DL-MAP IE specifying the position of the included burst.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:TYPE`
on page 201

More Parameter OFDMA
Accesses the dialog for configuring additional parameters for the bursts.

The dialog depends on the selected burst type.

Remote command:
n.a.

Conflict OFDMA
Indicates a conflict between the settings of the bursts.

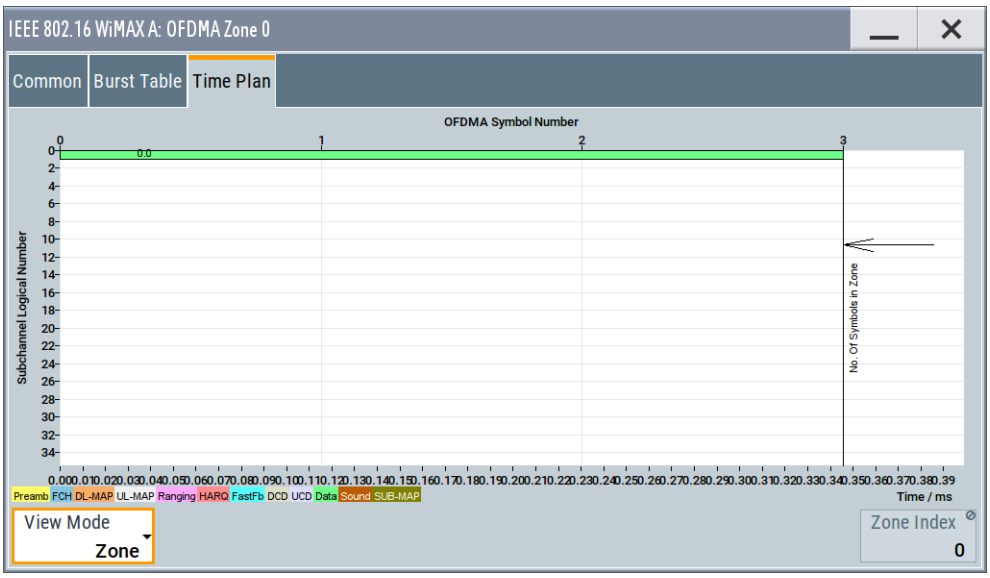
Conflicts can occur if subchannel and symbol offsets are set manually and two or more bursts overlap. Bursts can also overlap with the FCH or DL-MAP. The position of FCH and DL-MAP is fixed and cannot be changed. In uplink mode, a conflict is also indicated for bursts that do not fit into the available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

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:CONFlict[:STATe]?` on page 176

3.15.3 Time plan OFDMA

Access:

► Select "Time Plan".



The dialog is a graphical display of the OFDMA Time Plan.

3.16 Sounding zone configuration OFDMA

Access:

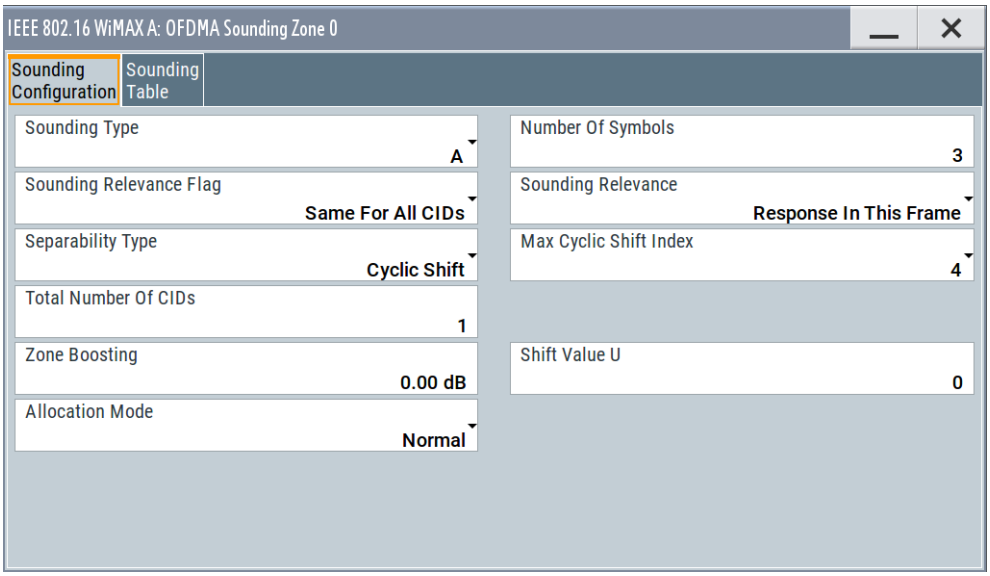
1. Select "General > Physical Layer Mode > OFDMA".
2. Select "Frame Configuration (OFDMA) > Frame Configuration > Zone Table".
3. Select "Zone Type > Sounding".
4. Select "Configure Zone > Config...".

Settings:

3.16.1 OFDMA sounding zone settings

Access:

► Select "Sounding Configuration".



This dialog contains the parameters required for sounding zone configuration in OFDMA mode.

Settings:

Sounding Type OFDMA
Selects either sounding type A or B.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SOUNding:TYPE` on page 172

Sounding Relevance Flag OFDMA
Selects whether sounding is relevant individually for each CID or for all CIDs.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SOUNding:RELevance:FLAG` on page 171

Separability Type OFDMA
(only for sounding type A)

Selects the sounding separability type.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SOUNding:SEParability`
on page 172

Total Number Of CIDs OFDMA
Sets the total number of CIDs.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SOUNding:CID:COUNt`
on page 166

Zone Boosting OFDMA
Sets an additional zone boosting in dB.

The zone boosting is applied to both the data and pilot carriers.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:BOOSt` on page 161

Allocation Mode OFDMA
(only for sounding type A)

Selects the frequency allocation mode for sounding CIDs.

"Normal"	The used sounding allocations are specified with "Number Of Freq. Bands" and "Start Freq. Band".
"Band AMC"	A "Band Bitmap" pattern determines the frequencies to be sent.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SOUNding:AMODe` on page 165

No. Of Symbols OFDMA
Sets the zone length in number of symbols. Zones with identical zone number have the same length, as they overlap in time.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SYMBol:COUNt` on page 174

Sounding Relevance OFDMA
(only if sounding relevance flag is set to "Same For All CIDs")

Selects the sounding relevance mode.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SOUNding:RELevance:MODE`
on page 172

Max Cyclic Shift Index OFDMA
(only for sounding type A and separability type cyclic shift)

Sets the value for the maximum cyclic shift index.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SOUNding:CMAXimum`
on page 170

Permutation OFDMA
(only for sounding type B)

Indicates the permutation used for this sounding zone.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SOUNding:PERMutation?` on page 171

DL PermBase OFDMA
(only for sounding type B)

Sets the value for the "DL Perm Base".

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SOUNding:DLPermbase` on page 171

Decimation Value OFDMA
(only for sounding type A and separability Type decimated subcarriers)

Sets the value for the decimation.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SOUNding:DECimation:VALue` on page 170

Decimation Offset Randomization OFDMA
(only for sounding type A and separability type decimated subcarriers)

Activates/deactivates the decimation offset randomization.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SOUNding:DECimation:RANDomization[:STATe]` on page 170

Shift Value U OFDMA
(only for sounding type A)

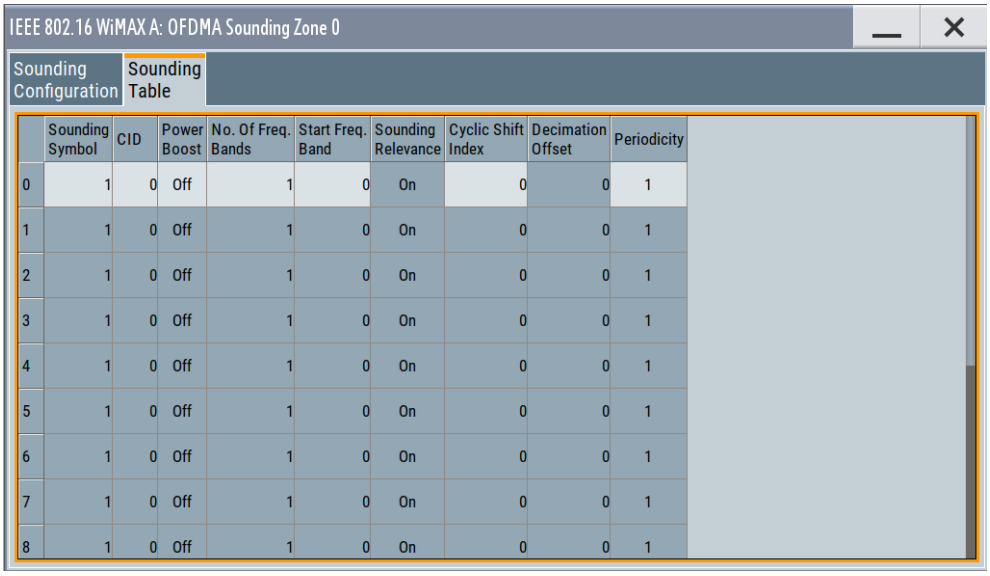
Sets the shift value (u) used for decimation offset and cyclic shift index.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SOUNding:UVAL` on page 172

3.16.2 Sounding table

Access:

► Select "Sounding table".



	Sounding Symbol	CID	Power Boost	No. Of Freq. Bands	Start Freq. Band	Sounding Relevance	Cyclic Shift Index	Decimation Offset	Periodicity
0	1	0	Off	1	0	On	0	0	1
1	1	0	Off	1	0	On	0	0	1
2	1	0	Off	1	0	On	0	0	1
3	1	0	Off	1	0	On	0	0	1
4	1	0	Off	1	0	On	0	0	1
5	1	0	Off	1	0	On	0	0	1
6	1	0	Off	1	0	On	0	0	1
7	1	0	Off	1	0	On	0	0	1
8	1	0	Off	1	0	On	0	0	1

This dialog contains the individual sounding parameters for each CID.

Settings:

Sounding Index OFDMA

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 command:
n.a.

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

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SOUNding:CID<ch0>:SYMBol` on page 169

CID OFDMA
Sets the CID (connection control identifier).

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SOUNding:CID<ch0>:CID` on page 166

Power Boost OFDMA
Activates/deactivates the power boost.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SOUNding:CID<ch0>:POWer[:STATe]` on page 168

No. Of Freq. Bands OFDMA
(only for sounding type A and normal allocation mode)

Sets the number of frequency bands used by the corresponding CID.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SOUNding:CID<ch0>:FBANd[:COUNt]` on page 168

Start Freq. Band OFDMA
(only for sounding type A and normal allocation mode)

Sets the start frequency band.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SOUNding:CID<ch0>:FBANd:STARt` on page 167

Band Bitmap OFDMA
(only for sounding type A and allocation mode set to "Band AMC")

Sets the logical band bitmap of the corresponding CID.

A "1" enables sounding transmission in the corresponding logical band, a "0" disables it.

The right-most bit (LSB) corresponds to logical band 0 (the lowest frequency subcarriers).

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SOUNding:CID<ch0>:BBITmap` on page 166

Sounding Relevance
Activates/deactivates the sounding relevance.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SOUNding:CID<ch0>:RELevance[:STATe]` on page 168

Cyclic Shift Index OFDMA
(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 command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SOUNding:CID<ch0>:CINDex` on page 167

Decimation Offset OFDMA
(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 command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SOUNding:CID<ch0>:DECoffset` on page 167

Periodicity
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 command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SOUNding:CID<ch0>:PERiodicity` on page 168

No. Of Subch
(only for sounding type B)

Sets the number of subchannels.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SOUNding:CID<ch0>:SUBChannel[:COUNt]` on page 169

Offset Subch
(only for sounding type B)

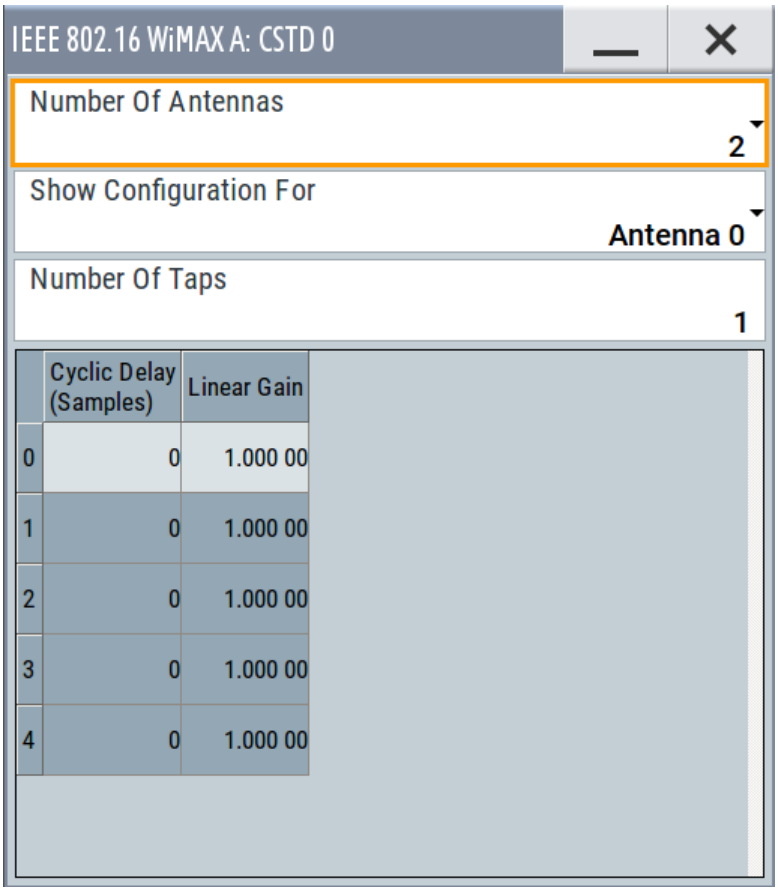
Sets the subchannel offset.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SOUNding:CID<ch0>:SUBChannel:OFFSet` on page 169

3.17 CSTD OFDMA

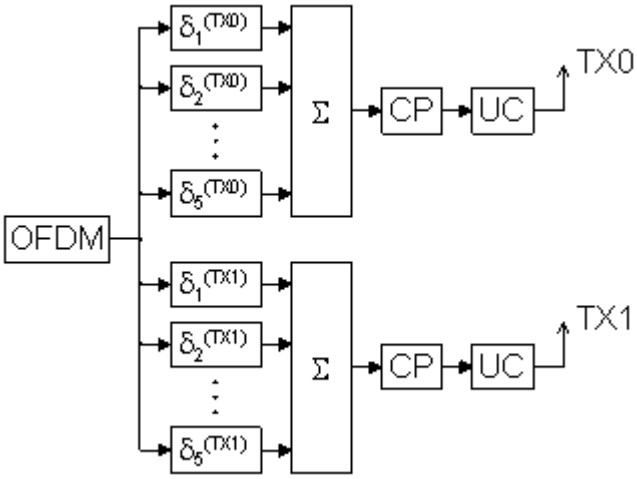
Access:

1. Select "General > Physical Layer Mode > OFDMA".
2. Select "Link Direction > Downlink".
3. Select "Frame Configuration (OFDMA) > Frame Configuration > Zone Table".
4. Select "Configure Zone > Config...".
5. Select "Common > Space-Time Coding Mode > CSTD".
6. Select "CSTD".



This dialog contains the parameters required to configure the CSTD options in OFDMA mode.

A zone with activated CSTD is encoded like a regular SISO zone (STC off). After, the IFFT a multi-tap delay line is applied to the time-domain signal. Each tap can be weighted with a different linear factor before summation of all taps. The cyclic prefix is applied on the sum output. Different cyclic-delay filters can be applied to every antenna.



The following describes the CSTD options in OFDMA mode.

Settings:

Number Of Antennas OFDMA
Sets the number of antennas used for cyclic shift transmit diversity (CSTD).

One baseband is only generating one antenna at a time.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:CSTD:ANTCount` on page 162

Show Configuration For OFDMA
Selects the antenna for which the configuration is made.

To set the antenna generated by the current baseband, set the parameter "Zone Configuration > Space-Time Coding Antenna".

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:CSTD:ANTShow` on page 162

Number Of Taps OFDMA
Sets the number of samples by which the OFDM symbols are cyclically shifted on the given tap.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:CSTD<ch0>:TAPCount`
on page 163

Cyclic Delay (Samples) OFDMA
Sets the cyclic delay with that the OFDM symbols of the selected antenna are cyclically shifted.

With CSTD, each antenna sends a circularly shifted version of the same OFDM symbol. I. e. the antenna selected with the parameter "Show Configuration For" sends the same OFDM symbol as the other antennas. However, the OFDM symbol is circularly shifted by the samples set with the parameter "Cyclic Delay".

Positive values remove the specified number of samples from the end of the symbol and prepend them to the start of the symbol.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:CSTD<ch0>:CDELay<dir0>`
on page 162

Liner Gain OFDMA
Sets a linear gain factor for the corresponding tap.

The gain factors are applied to the symbols before summation fo all taps.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:CSTD<ch0>:GAIN<dir0>`
on page 162

3.18 Data configuration OFDMA

This dialog provides all parameters to configure the data in OFDMA mode.

To access the data configuration settings

Access:

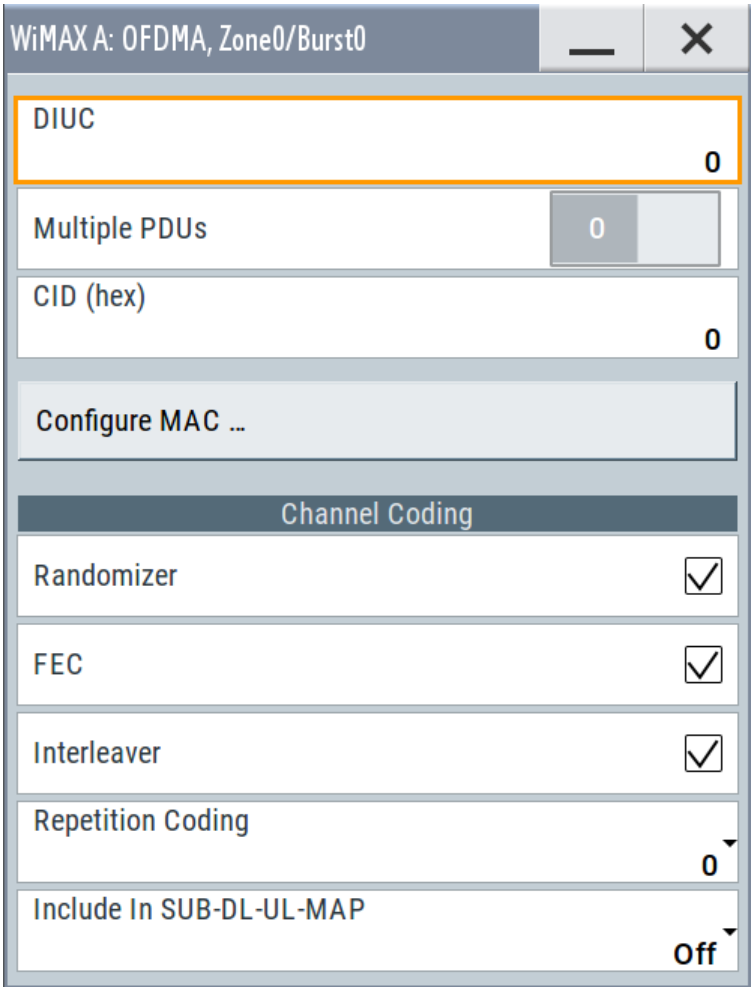
1. Select "General > Physical Layer Mode > OFDMA".
2. Select "Frame Configuration (OFDMA) > Frame Configuration > Zone Table".
3. Select "Configure Zone > Config...".
4. Select "Burst Table > Burst Type > Data".
5. Select "More Parameters > Config...".

Content:

3.18.1 OFDMA data configuration settings

Access:

► Proceed as described in "To access the data configuration settings" on page 81.



This dialog contains the parameters required to configure the data options in OFDMA mode.

Settings:

DIUC OFDMA
Sets the specific DIUC.

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

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:DIUC`
on page 178

UIUC OFDMA
(available in uplink direction)

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

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:UIUC`
on page 203

Multiple PDUs OFDMA
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).

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:PDU:STATe`
on page 193

No. Of PDUs OFDMA
Available for enabled parameter "Multiple PDUs" only

Sets the number of PDUs in the burst.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:PDU:COUNt`
on page 193

MAC CID
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 command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:MAC:CID` on page 190
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:MAC:CID` on page 186

Configure MAC
Available for disabled parameter "Multiple PDUs" only

Accesses the dialog for configuring the MAC header panel for the selected burst (see MAC header configuration OFDMA).

Remote command:
n.a.

Channel Coding Randomizer
Activates or deactivates the randomizer applied before channel coding.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:CCODing:RANDomizer` on page 175

FEC
Activates or deactivates the FEC.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:CCODing:FEC` on page 174

Interleaver
Activates or deactivates the interleaver state.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:CCODing:INTerleaver` on page 175

Repetition Coding
Activates repetition coding by specifying any value other than 0.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:CCODing:REPCoding` on page 176

Space-Time Coding Mode
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 command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:STC:MODE` on page 200

Include In SUB-DL-UL-MAP
Selects whether a DL-MAP IE is included in the specified SUB-DL-UL-MAP message for this burst.

The default value of this parameter is off. One of the three available SUB-DL-UL-MAPs can be selected to carry the DL-MAP IE for this burst.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:DLUL:INCLude` on page 179

Ranging Backoff Start
(only for burst type UCD)

Sets the start value for the ranging backoff.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:UCD:RANGing:BOSTart` on page 202

Ranging Backoff End
(only for burst type UCD)

Sets the end value for the ranging backoff.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:UCD:RANGing:BOENd` on page 202

Request Backoff Start
(only for burst type UCD)

Sets the start value for the request backoff.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:UCD:REQuest:BOSTart` on page 203

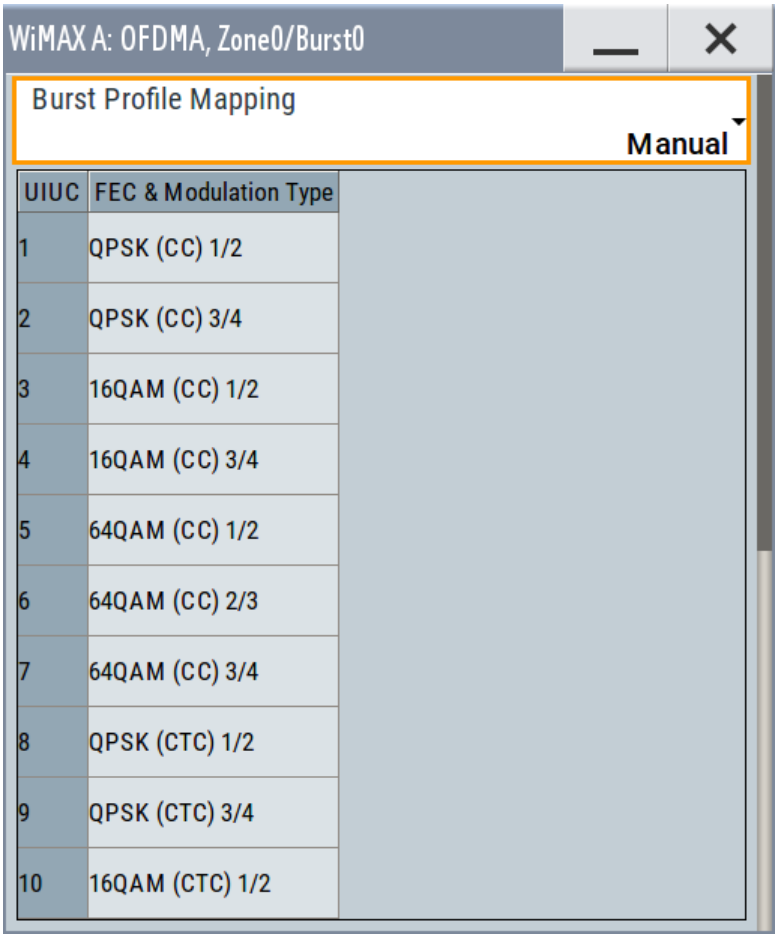
Request Backoff End
(only for burst type UCD)

Sets the end value for the request backoff.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:UCD:REQuest:BOENd` on page 202

Burst Profile Mapping
(only for burst type UCD and DCD)

Determines whether the burst profile mapping is performed automatically or manually. In manual configuration, the mapping to the UIUCs/DUICs is user-definable.



Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:PMAP` on page 197

FEC & Modulation Type ← Burst Profile Mapping
(only for burst type UCD and DCD and manual Burst Profile Mapping)

Sets the FEC and the modulation for the selected UIUC/DUIC.

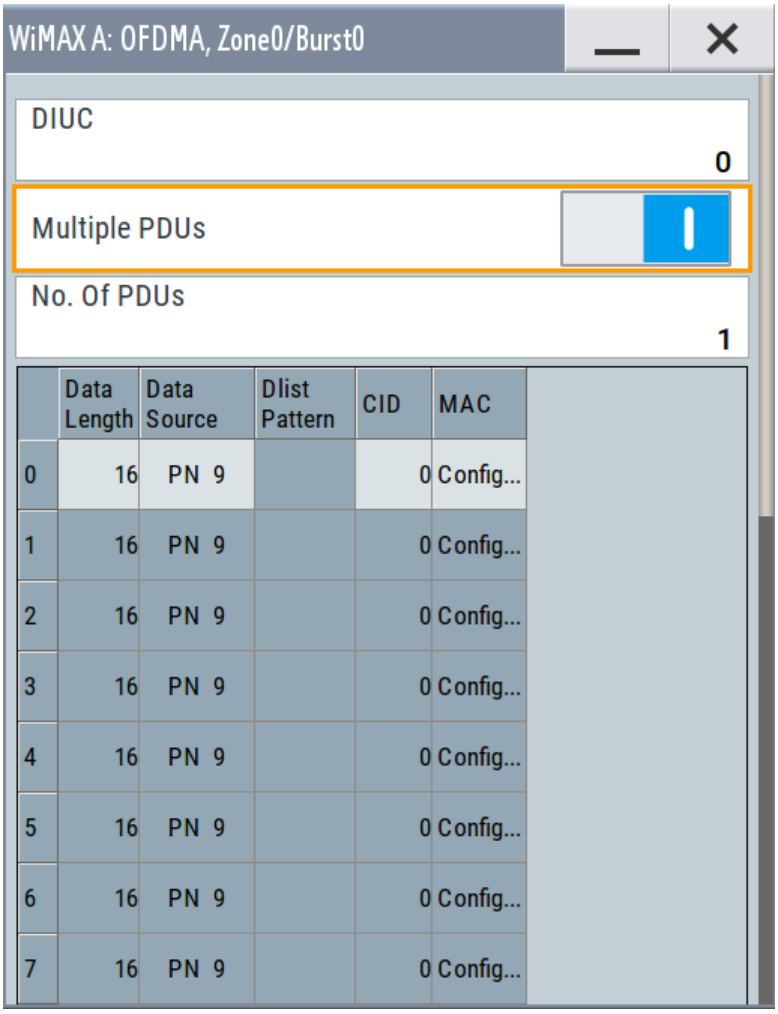
Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:PMAP:DMODulation<dir0>` on page 198
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:PMAP:UMODulation<dir0>` on page 198

3.18.2 PDU table

Access:

1. Proceed as described in "To access the data configuration settings" on page 81.

2. Activate "Multiple PDUs."



This dialog contains the parameters required to configure multiple PDU data in OFDMA mode.

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.

Settings:

Data Length PDU OFDMA

Available for enabled parameter "Multiple PDUs" only

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

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:PDU<dir0>:DLENgth` on page 195

Data Source PDU OFDMA
Available for enabled parameter "Multiple PDUs" only

Sets the PDU data source.

The following standard data sources are available:
- "All 0, All 1"
  An internally generated sequence containing 0 data or 1 data.
- "PNxx"
  An internally generated pseudo-random noise sequence.
- "Pattern"
  An internally generated sequence according to a bit pattern.
  Use the "Pattern" box to define the bit pattern.
- "Data List/Select DList"
  A binary data from a data list, internally or externally generated.
  Select "Select DList" to access the standard "Select List" dialog.
  – Select the "Select Data List > navigate to the list file *.dm_iqd > Select" to select an existing data list.
  – Use the "New" and "Edit" functions to create internally new data list or to edit an existing one.
  – Use the standard "File Manager" function to transfer external data lists to the instrument.

See also:
- Section "Modulation Data" in the R&S SMW user manual.
- Section "File and Data Management" in the R&S SMW user manual.
- Section "Data List Editor" in the R&S SMW user manual

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:PDU<dir0>:DATA` on page 194
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:PDU<dir0>:DATA:DSELect` on page 194
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:PDU<dir0>:DATA:PATTern` on page 195

MAC CID (PDU)
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 command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:PDU<dir0>[:MAC]:CID` on page 197

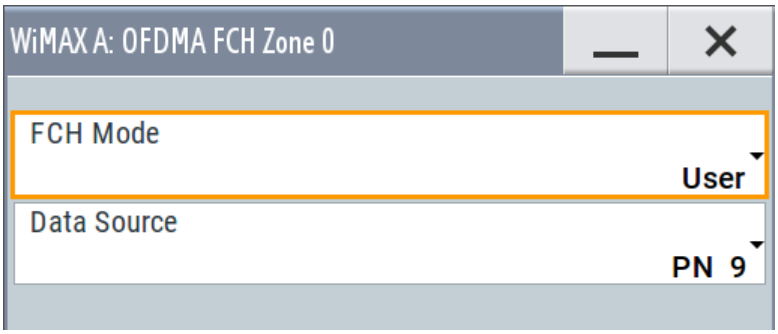
MAC Config… PDU OFDMA
Accesses the dialog for configuring the MAC header panel for the selected PDU (seePDU MAC configuration OFDMA).

Remote command:
n.a.

3.19 FCH configuration downlink OFDMA

Access:

1. Select "General > Physical Layer Mode > OFDMA".
2. Select "Link Direction > Downlink".
3. Select "Frame Configuration (OFDMA) > Frame Configuration > Zone Table".
4. Select "Configure Zone > Config...".
5. Select "Burst Table > Burst Type > FCH".
6. Select "More Parameters > Config...".



This dialog contains the parameters required to configure the FCH options in OFDMA mode.

Settings:

FCH Mode OFDMA
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 ½ and repetition coding of 4. For FFT size 128, a reduced FCH is transmitted in one slot.

"User" In "User" mode, the FCH is filled with data specified under "Data Source". It 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 ½ and repetition coding of 4. For FFT size 128, a reduced FCH of size 12 bits is transmitted in one slot.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:FCH:MODE` on page 163

Data Source OFDMA
Selects data source for the selected bursts.

The following standard data sources are available:

- "All 0, All 1"
  An internally generated sequence containing 0 data or 1 data.
- "PNxx"
  An internally generated pseudo-random noise sequence.
- "Pattern"
  An internally generated sequence according to a bit pattern.
  Use the "Pattern" box to define the bit pattern.
- "Data List/Select DList"
  A binary data from a data list, internally or externally generated.
  Select "Select DList" to access the standard "Select List" dialog.
  - Select the "Select Data List > navigate to the list file *.dm_iqd > Select" to select an existing data list.
  - Use the "New" and "Edit" functions to create internally new data list or to edit an existing one.
  - Use the standard "File Manager" function to transfer external data lists to the instrument.

See also:

- Section "Modulation Data" in the R&S SMW user manual.
- Section "File and Data Management" in the R&S SMW user manual.
- Section "Data List Editor" in the R&S SMW user manual

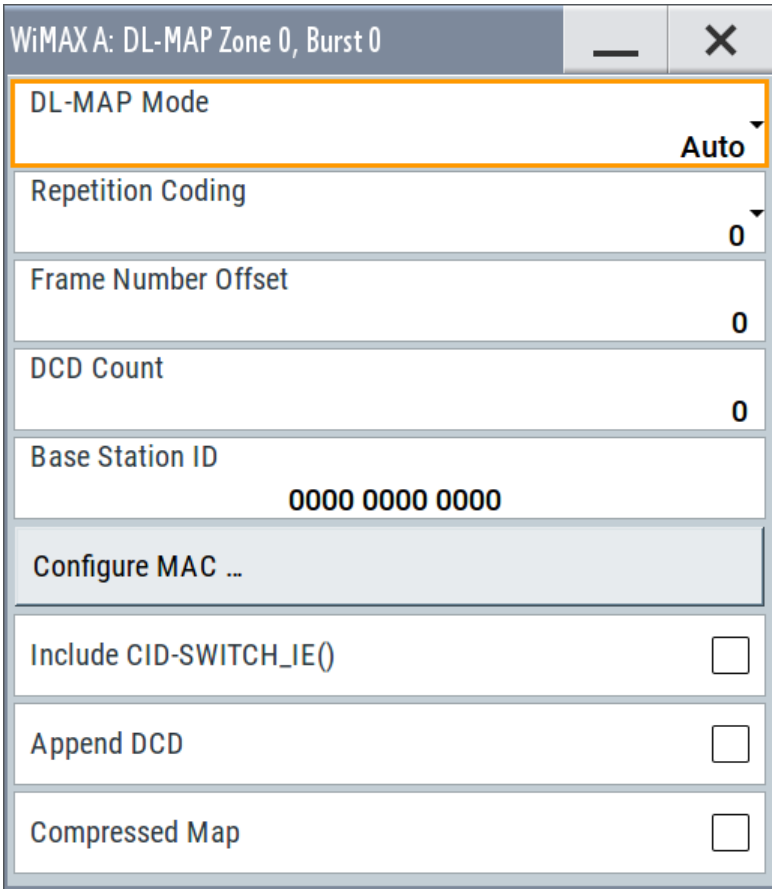
Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:DATA`
on page 176
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:DATA:PATTern`
on page 178
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:DATA:DSELect`
on page 177

3.20 DL-MAP configuration downlink OFDMA

Access:

1. Select "General > Physical Layer Mode > OFDMA".
2. Select "Link Direction > Downlink".
3. Select "Frame Configuration (OFDMA) > Frame Configuration > Zone Table".
4. Select "Configure Zone > Config...".
5. Select "Burst Table > Burst Type > DL-MAP".

6. Select "More Parameters > Config...".



This dialog contains the parameters required to configure the DL-MAP options in OFDMA mode.

Settings:

DL-MAP Mode OFDMA
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.

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

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:DLMap:MODE` on page 210

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

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:DLMap:REPCoding` on page 210

Frame Number Offset DL-MAP OFDMA
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 command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:DLMap:FNOFfset` on page 209

DCD Count DL-MAP OFDMA
Sets the DCD count value.

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

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:DLMap:DATA:DCD[:COUNt]` on page 208

Base Station ID OFDMA
Sets the Base Station ID.

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

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:DLMap:BSID` on page 207

Configure MAC OFDMA
Calls the dialog for configuring the Mac header panel for the DL-MAP (refer to Chapter 3.27, "MAC header configuration OFDMA", on page 116)

Remote command:
n.a.

Include CID-Switch_IE() OFDMA
Includes/excludes the CID-Switch_IE().

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:DLMap:IIE:STATe` on page 210

Append DCD OFDMA
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 command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:DLMap:DCD:STATe` on page 209

DCD CID OFDMA
(only if "Append DCD > 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 command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:DLMap:DCD:CID` on page 209

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

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:DLMap:COMPressed:STATe` on page 208

Append Compressed UL-Map OFDMA
(only if "Compressed Map > On")

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

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:DLMap:COMPressed:ULMap:STATe` on page 208

Allocation Start Timebase OFDMA
Selects the allocation start timebase, 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 Timebase = DL Subframe End", the "Allocation Start Time" of the UL-Map is set to the **end of the downlink subframe**+ the value set with the parameter Allocation Start Time OFDMA.

When "Start Timebase = Frame Start", the allocation start Time of the UL-Map is set to the **beginning of the frame**+ the value set with the parameter Allocation Start Time OFDMA.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:DLMap:COMPressed:AMODe` on page 207

Allocation Start Time OFDMA
Sets the allocation start time in the UL-Map, appended to the DL-Map.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:DLMap:COMPressed:ATIMe` on page 207

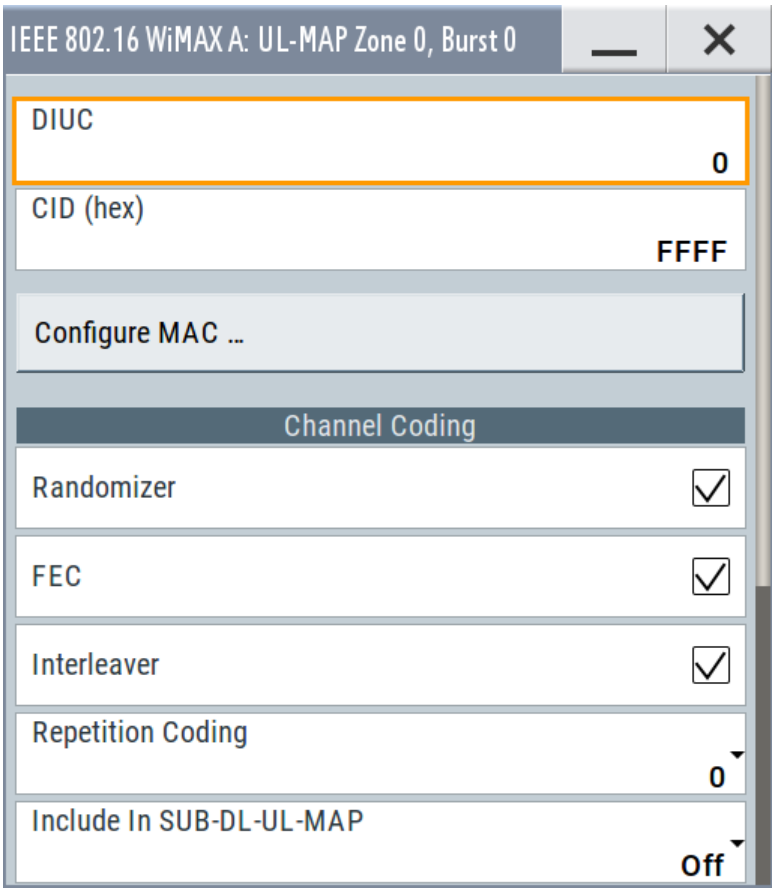
UL-MAP File OFDMA
Access the dialog for selecting the UL-MAP file.

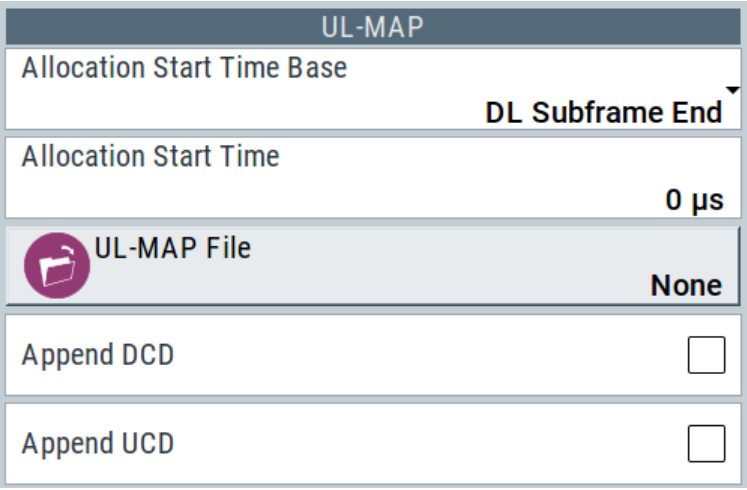
Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:DLMap:COMPressed:ULMap:DSELect` on page 208

3.21 UL-MAP configuration downlink OFDMA

Access:

1. Select "General > Physical Layer Mode > OFDMA".
2. Select "Link Direction > Downlink".
3. Select "Frame Configuration (OFDMA) > Frame Configuration > Zone Table".
4. Select "Configure Zone > Config...".
5. Select "Burst Table > Burst Type > UL-MAP".
6. Select "More Parameters > Config...".





This dialog provides the parameters required to configure the UL-MAP options in OFDMA mode.

Settings:

DIUC OFDMA

Sets the specific DIUC.

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

Remote command:

`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:DIUC`

on page 178

MAC CID
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 command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:MAC:CID` on page 190
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:MAC:CID` on page 186

Configure MAC
Accesses the dialog for configuring the MAC header panel for the selected burst. (Refer to Chapter 3.27, "MAC header configuration OFDMA", on page 116.)

Remote command:
n.a.

Channel Coding Randomizer
Activates or deactivates the randomizer applied before channel coding.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:CCODing:RANDomizer` on page 175

FEC
Activates or deactivates the FEC.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:CCODing:FEC` on page 174

Interleaver
Activates or deactivates the interleaver state.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:CCODing:INTerleaver` on page 175

Repetition Coding
Activates repetition coding by specifying any value other than 0.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:CCODing:REPCoding` on page 176

Include In SUB-DL-UL-MAP
Selects whether a DL-MAP IE is included in the specified SUB-DL-UL-MAP message for this burst.

The default value of this parameter is off. One of the three available SUB-DL-UL-MAPs can be selected to carry the DL-MAP IE for this burst.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:DLUL:INCLude` on page 179

Allocation Start Timebase
Selects the allocation start timebase. The "Allocation Start Time" field of the UL-MAP specifies the start of the uplink subframe.

If "Start Timebase = DL Subframe End", the "Allocation Start Time" of the UL-Map is set to the **end of the downlink subframe**+ the value set with the parameter Allocation Start Time.

When "Start Timebase = Frame Start", the allocation start Time of the UL-Map is set to the **beginning of the frame**+ the value set with the parameter Allocation Start Time.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:ULMap:AMODe` on page 203

Allocation Start Time
Sets the allocation start time in the UL-MAP.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:ULMap:ATIMe` on page 204

UL-MAP File
Accesses the dialog for selecting the UL-MAP file.

Remote command:
n.a.

Append DCD OFDMA
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 command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:ULMap:DCD:STATe` on page 204

DCD CID OFDMA
("Append DCD > 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 command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:ULMap:DCD:CID` on page 204

Append UCD OFDMA
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 command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:ULMap:UCD:STATe` on page 206

UCD CID OFDMA
("Append DCD > 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 command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:ULMap:UCD:CID` on page 206

Ranging Backoff Start
Sets the start value for the ranging backoff.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:ULMap:RANGing:BOSTart` on page 205

Ranging Backoff End
Sets the end value for the ranging backoff.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:ULMap:RANGing:BOENd` on page 205

Request Backoff Start
Sets the start value for the request backoff.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:ULMap:REQuest:BOSTart` on page 205

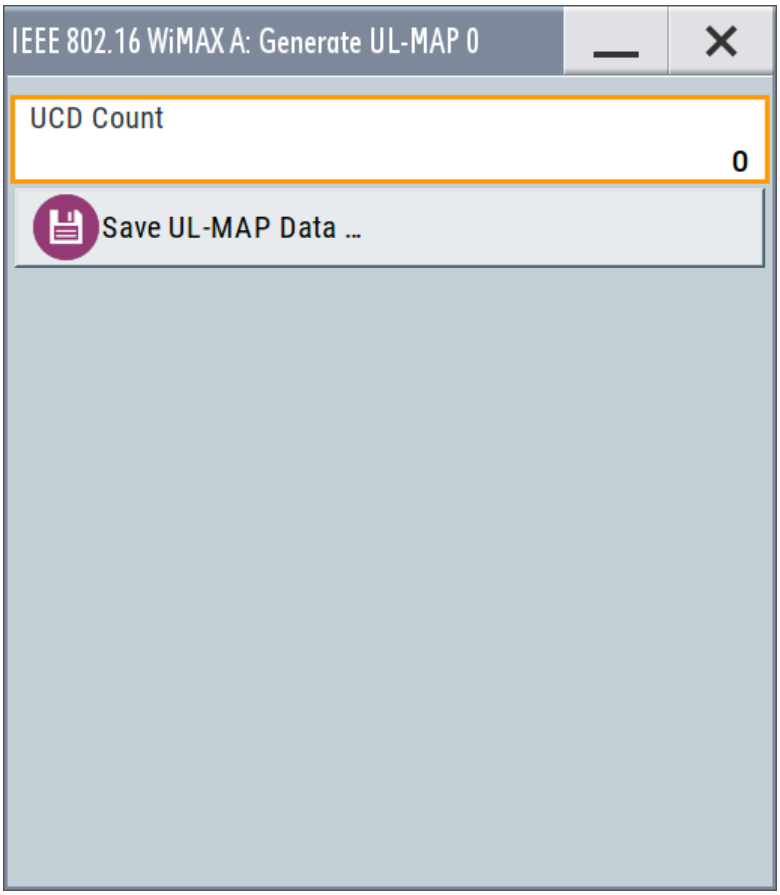
Request Backoff End
Sets the end value for the request backoff.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:ULMap:REQuest:BOENd` on page 205

3.22 Generate UL-MAP uplink OFDMA

Access:

1. Select "General > Physical Layer Mode > OFDMA".
2. Select "Link Direction > Uplink".
3. Select "Frame Configuration (OFDMA) > Frame Configuration > Zone Table".
4. Select "Configure Zone > Config...".
5. Select "Common > Generate UL-MAP".



This dialog contains the parameters required for generating an UL-MAP.

Settings:

UCD Count OFDMA
Sets the value for the UCD count.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:UCD` on page 213

Save UL-MAP Data OFDMA

Accesses the "File Select" window for saving the current UL-map.

The name of the file is specified in the "Filename" 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 filename 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 following list shows the parameters of the UL-MAP:

- 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
- 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 start time
- Subchannel offset
  Lowest subchannel used for ranging allocation
- No. OFDMA symbols
  Symbols in ranging allocation
- No. Subchannels
  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

Generating a valid UL-MAP

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

- Switch to uplink mode
- Define the layout of the uplink zone by setting a number of bursts and specifying the parameters above for each burst
- Select "Generate UL-MAP" and save the UL-MAP to a file.
- Switch to downlink mode
- Set one of the downlinks bursts to "Burst Type UL-MAP"
- Open the "More Param" panel

- Select "UL-MAP File" and load the file created before.

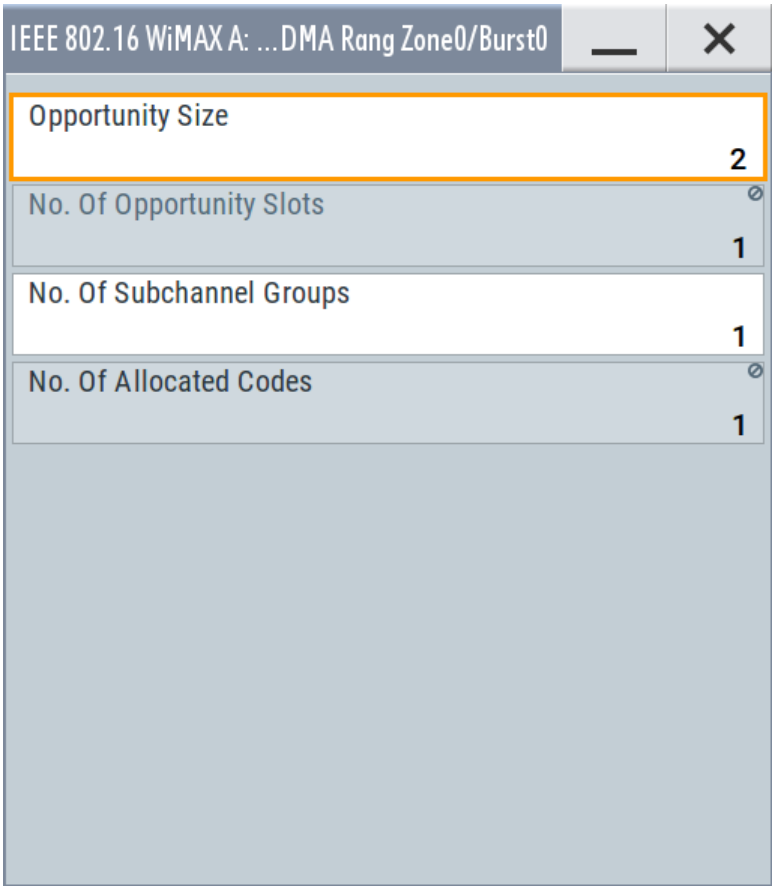
The downlink zone is then transmitting a UL-MAP that specifies the uplink structure defined in uplink mode before.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:ULMap:CREate` on page 213

3.23 Ranging uplink OFDMA

Access:

1. Select "General > Physical Layer Mode > OFDMA".
2. Select "Link Direction > Uplink".
3. Select "Frame Configuration (OFDMA) > Frame Configuration > Zone Table".
4. Select "Configure Zone > Config...".
5. Select "Burst Table > Burst Type > Ranging".
6. Select "More Parameters > Config...".



This dialog contains the parameters required to configure the Ranging options in OFDMA mode.

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.

Settings:

Opportunity Size
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 command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:RANGing:OPPortunity:SIZE` on page 199

No. Of Opportunity Slots
The number of opportunity slots defines the length of the ranging allocation:

Length of Ranging Allocation = OpportunitySize * NoOfOpportunitySlots OFDMA symbols.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:RANGing:OPPortunity:SLOTcount` on page 200

No. Of Subchannel Groups
Sets the number of subchannel groups used in the ranging allocation. In PUSC mode, six subchannels form one subchannel group.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:RANGing:SCGCount` on page 200

No. Of Allocated Codes
Displays the number of allocated codes. The number of codes is "NoOfOpportunity-Slots" * "NoOfSubchannelGroups".

Consecutive codes of opportunity sizes 3 and 4 are not accounted.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:RANGing:ACODe?` on page 199

3.24 HARQ configuration OFDMA

This dialog provides all parameters to configure the HARQ options in OFDMA mode. The selected HARQ mode determines the parameters available in the HARQ-sub burst table.

To access this dialog

Access:

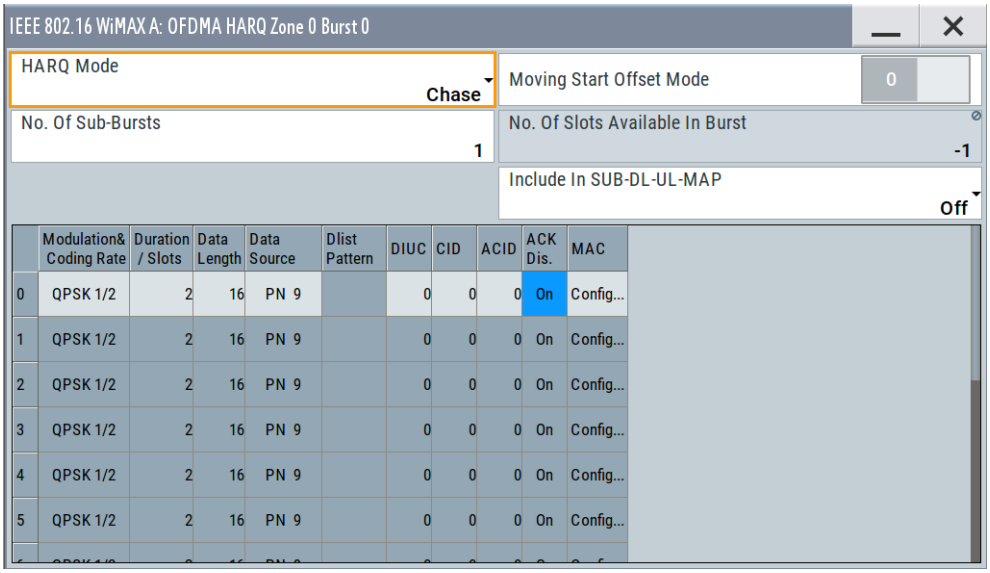
1. Select "General > Physical Layer Mode > OFDMA".
2. Select "Frame Configuration (OFDMA) > Frame Configuration > Zone Table".
3. Select "Configure Zone > Config...".
4. Select "Burst Table > Burst Type > HARQ".
5. Select "More Parameters > Config...".

Content

3.24.1 OFDMA HARQ settings

Access:

► Proceed as described in To access this dialog.



This dialog contains the parameters to configure the HARQ options in OFDMA mode. HARQ bursts are only available with CTC channel coding.

Settings:

HARQ Mode

Selects the mode of the HARQ burst.

"Chase" Selects chase combining HARQ. For each subburst, only one version of the packet is generated.

"IR" Selects incremental redundancy HARQ. For each subburst, several versions of encoded subpackets can be generated. They are identified by a subpacket ID (SPID).

Remote command:

`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ:MODE` on page 182

No. Of Sub-Bursts

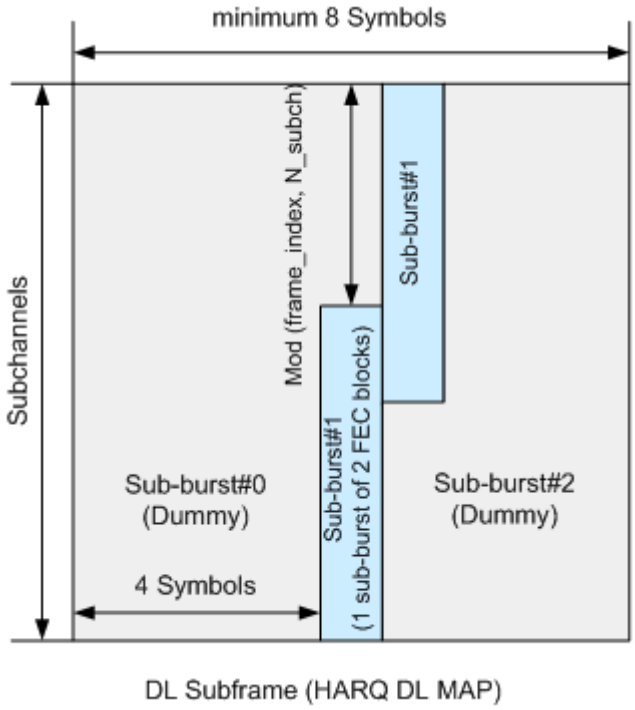
Sets the number of subbursts in the HARQ bust. Each HARQ burst allocated in the "Zone Configuration" panel can be divided into up to 15 subbursts. The length of each subburst is set by the "Duration [Slots]" parameter.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ:COUNt`
on page 182

Moving Start Offset Mode
(for HARQ Mode Chase only)

Enables/disables moving of start offset mode.

If enabled, the subburst structure resembles the specified structure required for MRCT test 9.1.24.4, according to "WiMAX Forum™ Mobile Radio Conformance Test".



To use this mode according to the WiMAX MRCT specification, perform following configuration:

- Configure exactly 3 HARQ subbursts.
  The first and third subbursts are dummy bursts with QPSK modulation.
  The second subburst is the desired subburst (with usually two FEC blocks).
- Configure the length of the first subburst such that it fills at least the first 4 symbols (e.g. 64 slots in 1024 FFT mode).
  This burst can be slightly longer than the slots available in the first four symbols.
- Configure the second subburst to the desired length.
- Configure the length of the third subburst such that it fills the remaining space.
- Enable "Moving Start Offset Mode".
- Select a desired number of frames (longer than one frame).
- **Result:**
  The instrument modifies the length of the first and third subbursts so that the second one moves it's start position with every frame. This behavior is as of the MRCT requirement *(mod(frame_index, N_subch))*.
  The dummy bursts are automatically cut off or enlarged as required.
  The DL-MAP is updated with every frame to reflect the changed conditions.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ:MSTart[:STATe]` on page 182

No. Of Slots Available In Burst
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 command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ:SLFRee?` on page 183

Include In SUB-DL-UL-MAP
Selects whether a DL-MAP IE is included in the specified SUB-DL-UL-MAP message for this burst.

The default value of this parameter is off. One of the three available SUB-DL-UL-MAPs can be selected to carry the DL-MAP IE for this burst.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:DLUL:INCLude` on page 179

3.24.2 HARQ sub-burst table

The parameters in the HARQ subburst table depend on the selected HARQ mode.

- HARQ Chase Mode

	Modulation& Coding Rate	Duration / Slots	Data Length	Data Source	Dlist Pattern	DIUC	CID	ACID	ACK Dis.	MAC
0	QPSK 1/2	2	16	PN 9		0	0	0	On	Config...
1	QPSK 1/2	2	16	PN 9		0	0	0	On	Config...
2	QPSK 1/2	2	16	PN 9		0	0	0	On	Config...
3	QPSK 1/2	2	16	PN 9		0	0	0	On	Config...
4	QPSK 1/2	2	16	PN 9		0	0	0	On	Config...
5	QPSK 1/2	2	16	PN 9		0	0	0	On	Config...

- "HARQ IR Mode"

	Packet Size /Bits	Duration / Slots	Modu-lation	Rate	Data Length	Data Source	Dlist Pattern	CID	ACID	SPID Sequence	ACK Dis.	MAC
0	144	2	16-QAM	3/8	16	PN 9		0	0	0	On	Config...
1	144	2	QPSK		16	PN 9		0	0		On	Config...
2	144	2	QPSK		16	PN 9		0	0		On	Config...
3	144	2	QPSK		16	PN 9		0	0		On	Config...
4	144	2	QPSK		16	PN 9		0	0		On	Config...
5	144	2	QPSK		16	PN 9		0	0		On	Config...

Settings:

Sub-Burst Index

Displays the consecutive subburst index from 0 to 14.

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

Remote command:
n.a.

Modulation & Coding Rate

(for "HARQ Chase Mode")

Sets the subburst modulation and coding rate.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:MODRate` on page 188

Packet Size [Bits]

(for "HARQ IR Mode")

Sets the HARQ subburst packet size (in bits).

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:PSIZe` on page 189

Duration [Slots]
Sets the duration of the subbursts in slots. The duration range is dynamic and depends on the selected link direction and packet size.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:SLOTcount` on page 189

Modulation
(for "HARQ IR Mode")

Displays the subburst modulation.

The modulation is determined by the parameters "Packet Size" and "Duration" and cannot be altered directly.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:FORMat?` on page 186

Rate
(for "HARQ IR Mode")

Displays the subburst code rate. The code rate is determined by the parameters "Packet Size" and "Duration" and cannot be altered directly

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:RATE?` on page 189

Data Length
Sets the data length of the subburst. The data length range is dynamic and depends on the packet size and the MAC header state.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:DLENgth` on page 186

Data Source
Selects data source for the selected subbursts.

The following standard data sources are available:
- "All 0, All 1"
  An internally generated sequence containing 0 data or 1 data.
- "PNxx"
  An internally generated pseudo-random noise sequence.
- "Pattern"
  An internally generated sequence according to a bit pattern.
  Use the "Pattern" box to define the bit pattern.
- "Data List/Select DList"
  A binary data from a data list, internally or externally generated.

Select "Select DList" to access the standard "Select List" dialog.
– Select the "Select Data List > navigate to the list file *.dm_iqd > Select" to select an existing data list.
– Use the "New" and "Edit" functions to create internally new data list or to edit an existing one.
– Use the standard "File Manager" function to transfer external data lists to the instrument.

See also:
- Section "Modulation Data" in the R&S SMW user manual.
- Section "File and Data Management" in the R&S SMW user manual.
- Section "Data List Editor" in the R&S SMW user manual

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:DATA` on page 184
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:DATA:PATTern` on page 185
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:DATA:DSELect` on page 185

DIUC
(for HARQ Chase Mode only)

Sets the DIUC ("Downlink Interval User Code") for the specified subburst.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:DIUC` on page 185

MAC CID
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 command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:MAC:CID` on page 190
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:MAC:CID` on page 186

ACID
Sets the HARQ channel identifier for the specified subburst.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:ACID` on page 183

SPID Sequence
(for "HARQ IR Mode")

Sets the subpacket ID sequence which is used to select the generated subpacket out of the four possible subpackets for each frame. Each SPID is identified by a number from 0 to 3. Up to eight 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 = 10 frames"

The following sequence is output: 0, 1, 2, 0, 1, 2, 0, 1, 2, 0

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:SPID` on page 190

ACK Disable
Disables ACK, i.e. the allocated subburst does not require an ACK to be transmitted .

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:ACKD` on page 184

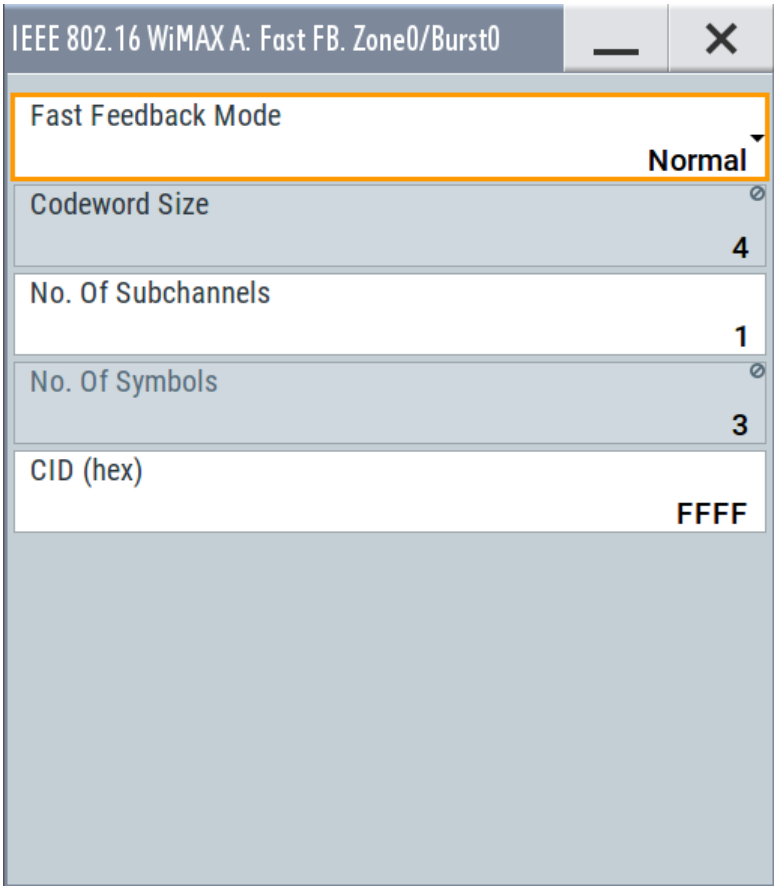
MAC
Accesses the dialog for configuring the generic MAC (Media Access Control) header of the selected subburst and for activating the checksum determination.

Remote command:
n.a.

3.25 Fast feedback configuration OFDMA

Access:

1. Select "General > Physical Layer Mode > OFDMA".
2. Select "Link Direction > Uplink".
3. Select "Frame Configuration (OFDMA) > Frame Configuration > Zone Table".
4. Select "Configure Zone > Config...".
5. Select "Burst Table > Burst Type > FastFb".
6. Select "More Parameters > Config...".



This dialog contains the parameters to configure fast feedback in OFDMA mode.

Settings:

Fast Feedback Mode
Selects the fast feedback mode.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:FFB:MODE`
on page 180

Codeword Size
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. Reading the data source is restarted from the beginning if the data source is smaller than on of the following:

- Number of bits required by the codeword size
- Number of slots in the allocation
- Configured sequence length

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:FFB:CWSize?` on page 180

No. Of Subchannels
Sets the number of subchannels. The number of slots in the fast feedback allocation is subchannels * symbols / 3.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:FFB:SUBC` on page 181

No. Of Symbols
Sets the number of symbols. The number of slots in the fast feedback allocation is subchannels * symbols / 3.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:FFB:SYMB` on page 181

MAC CID
Sets the connection control identifier (CID) 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.

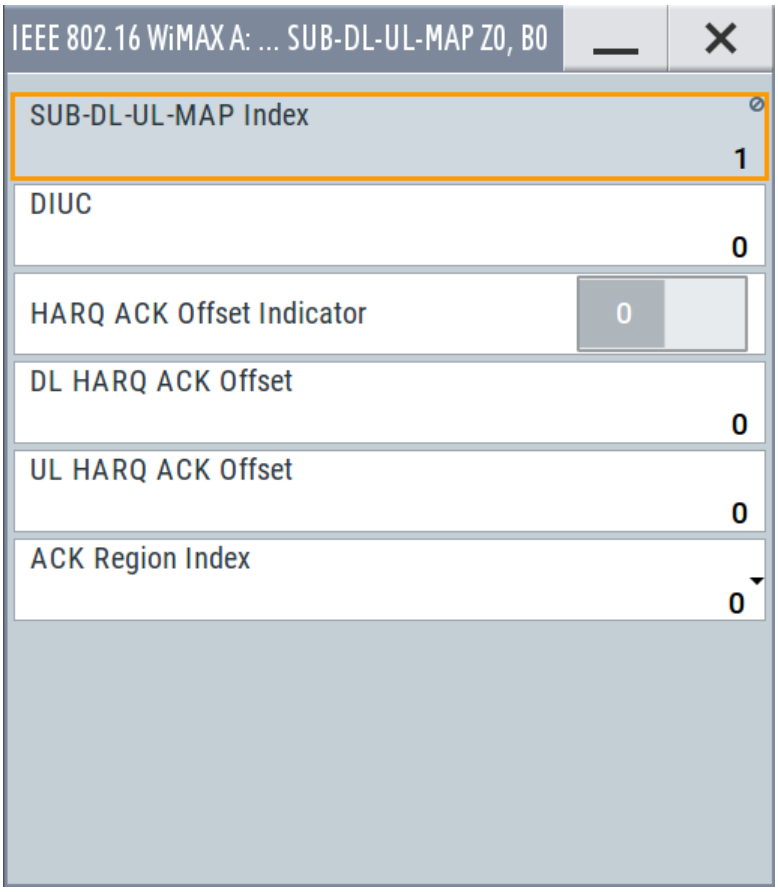
Remote command:
`[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:MAC:CID` on page 219

3.26 SUB-DL-UL-MAP configuration OFDMA

Access:

1. Select "General > Physical Layer Mode > OFDMA".
2. Select "Link Direction > Downlink".
3. Select "Frame Configuration (OFDMA) > Frame Configuration > Zone Table".

4. Select "Configure Zone > Config...".
5. Select "Burst Table > Burst Type > SUB-MAP".
6. Select "More Parameters > Config...".



This dialog contains the parameters to configure the SUB-MAP options in OFDMA mode.

Settings:

SUB-DL-UL-MAP Index

Displays the number of the SUB-DL-UL-MAP message.

Altogether up to three SUB-DL-UL-MAP messages can be enabled for all zones. The "SUB-DL-UL-MAP Index" is a consecutive number that is assigned for each configured SUB-DL-UL-MAP message.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:DLUL:MPIX?` on page 180

DIUC OFDMA
Sets the specific DIUC.

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

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:DIUC` on page 178

HARQ ACK Offset Indicator
Enables/disables the inclusion of HARQ offsets.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:DLUL:HARQ:ACKoffset:INDicator` on page 179

DL HARQ ACK Offset
Sets the ACK channel that corresponds to the first HARQ-enabled DL burst specified in this map message.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:DLUL:HARQ:ACKoffset:DL` on page 178

UL HARQ ACK Offset ← DL HARQ ACK Offset
Sets the ACK bit index in the DL HARQ ACK that corresponds to the first HARQ-enabled UL burst specified in this map message.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:DLUL:HARQ:ACKoffset:UL` on page 179

ACK Region Index
Selects whether ACK region 0 or 1 is used.

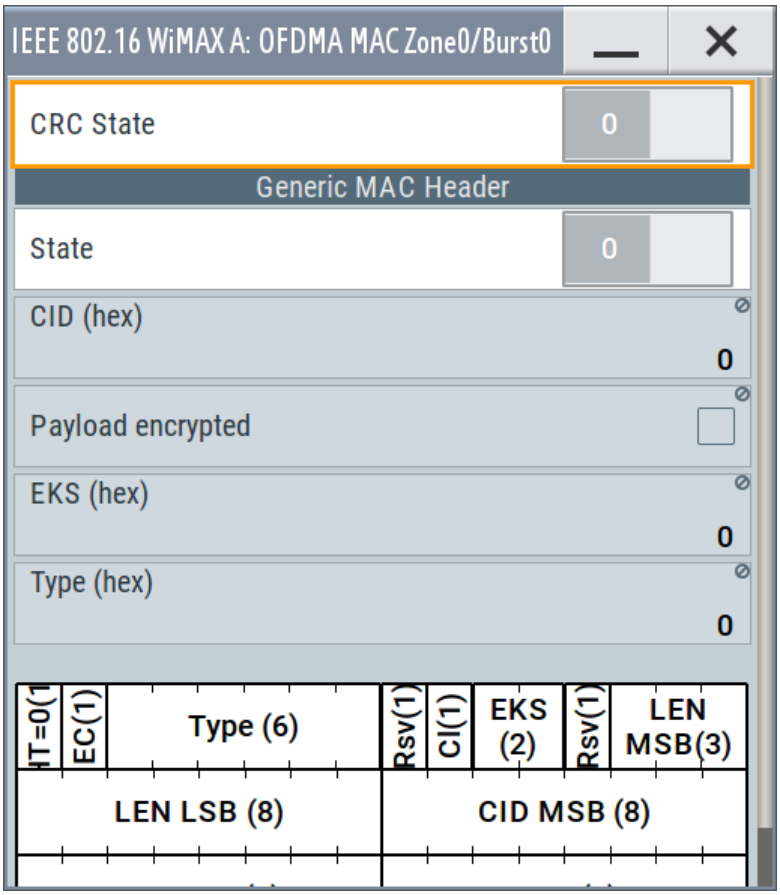
Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:DLUL:ARIX` on page 178

3.27 MAC header configuration OFDMA

Access:

1. Select "General > Physical Layer Mode > OFDMA".
2. Select "Frame Configuration (OFDMA) > Frame Configuration > Zone Table".
3. Select "Configure Zone > Config...".

4. Select "Burst Table > More Parameters > Config...".
5. Select "MAC > Config...".



This dialog contains the 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.

Settings:

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

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:MAC:CRC:STATe` on page 190
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:MAC:CRC:STATe` on page 187

MAC Header State
Activates the generation of the generic MAC header.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:MAC:STATe` on page 191
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:MAC:STATe` on page 188

MAC CID
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 command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:MAC:CID` on page 190
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:MAC:CID` on page 186

Payload encrypted
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 command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:MAC:ENCRypted:STATe` on page 191
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:MAC:ENCRypted:STATe` on page 187

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

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:MAC:EKS` on page 191
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:MAC:EKS` on page 187

Mac Type
Specifies the MAC type.

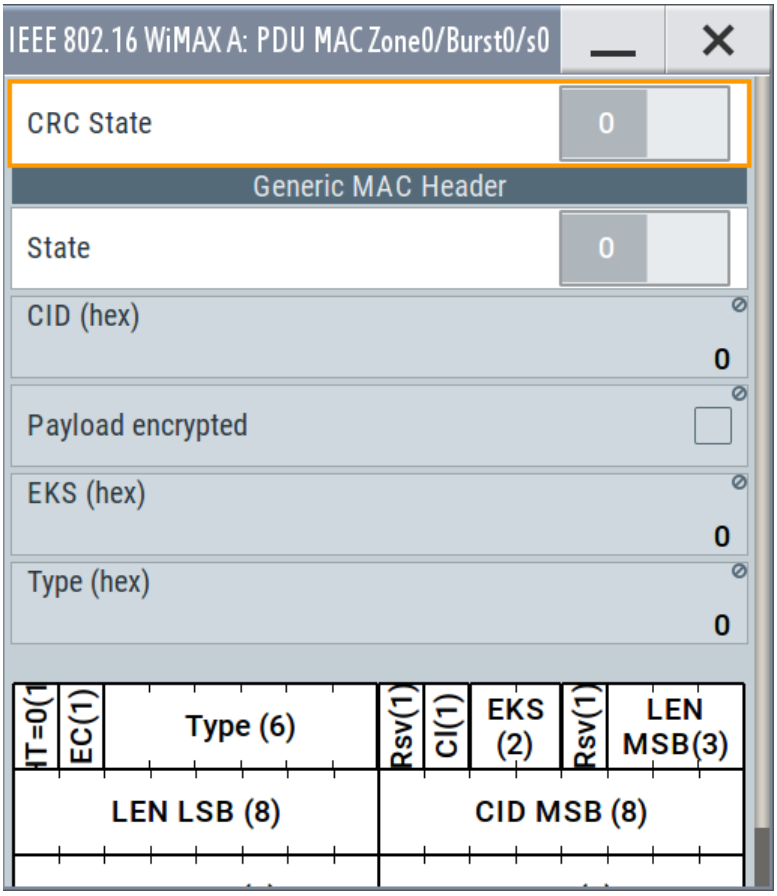
The value of the 6-bit type field is set which indicates the payload type, including the presence of subheaders.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:MAC:TYPE` on page 192
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:MAC:TYPE` on page 188

3.28 PDU MAC configuration OFDMA

Access:

1. Select "General > Physical Layer Mode > OFDMA".
2. Select "Frame Configuration (OFDMA) > Frame Configuration > Zone Table".
3. Select "Configure Zone > Config...".
4. Select "Burst Table > Burst Type > Data".
5. Select "More Parameters > Config...".
6. Select "Multiple PDUS > On > MAC > Config...".



This dialog contains the 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.

Settings:

CRC State (PDU)

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

Remote command:

`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:PDU<dir0>:MAC:CRC:STATe` on page 195

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

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:PDU<dir0>:MAC:STATe` on page 196

MAC CID (PDU)
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 command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:PDU<dir0>[:MAC]:CID` on page 197

Payload encrypted (PDU)
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 command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:PDU<dir0>:MAC:ENCRypted:STATe` on page 196

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

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:PDU<dir0>:MAC:EKS` on page 196

Mac Type (PDU)
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 command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:PDU<dir0>:MAC:TYPE` on page 197

3.29 Filter / clipping settings

Access:

► Select "Baseband > IEEE 802.16 WiMAX > General > Filter/Clipping...".

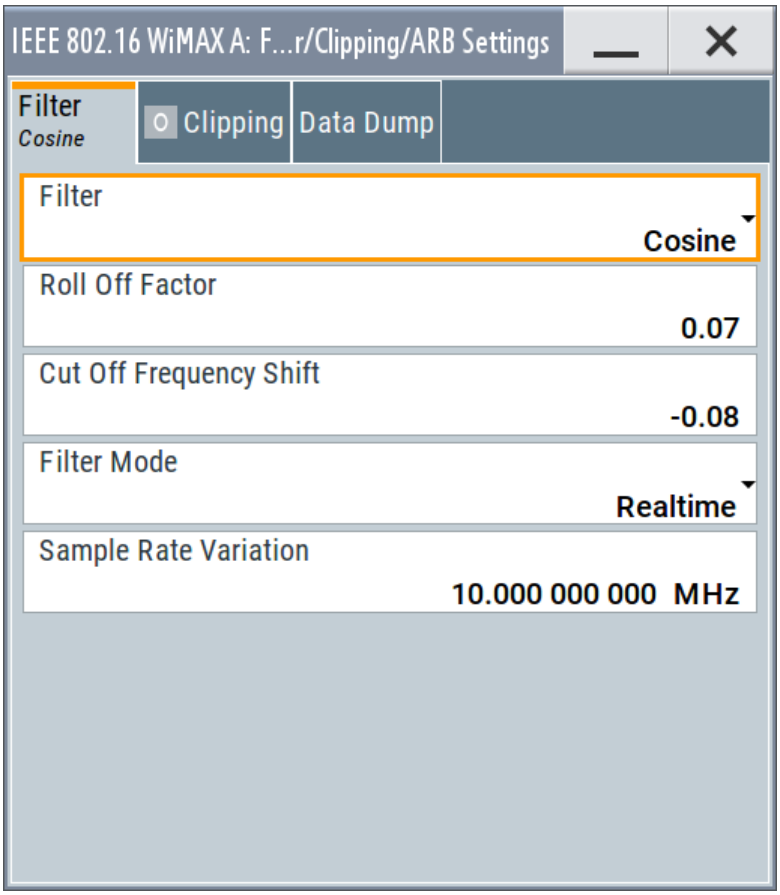
The dialog contains the settings required to configure the baseband filter and to enable clipping.

Settings:

3.29.1 Filter settings

Access:

► Select "Filter".



This dialog contains the parameters for configuring the baseband filter.

Settings:

Filter
Selects the baseband filter.

Remote command:
[:SOURce<hw>]:BB:WIMax:FILTer:TYPE on page 137

Rolloff Factor or BxT
Sets the filter parameter.

The filter parameter ("Roll off Factor" or "BxT") depends on the currently selected filter type. This parameter is preset to the default for each of the predefined filters.

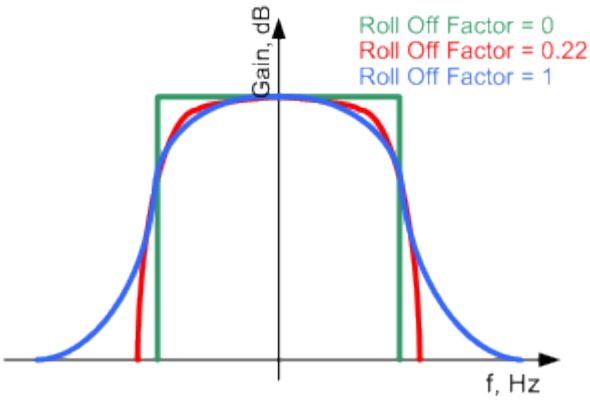


Figure 3-1: Example of the frequency response of a filter with different rolloff factors

For the default cosine filter, a rolloff factor of 0.07 is used.

Remote command:
[:SOURce<hw>]:BB:WIMax:FILTer:PARameter:APCO25 on page 137
[:SOURce<hw>]:BB:WIMax:FILTer:PARameter:COSine on page 137
[:SOURce<hw>]:BB:WIMax:FILTer:PARameter:GAUSs on page 138
[:SOURce<hw>]:BB:WIMax:FILTer:PARameter:PGAuss on page 139
[:SOURce<hw>]:BB:WIMax:FILTer:PARameter:RCOSine on page 139
[:SOURce<hw>]:BB:WIMax:FILTer:PARameter:SPHase on page 140

Cutoff Frequency Shift
(for filter parameter "Cosine")

The cutoff frequency is a filter characteristic that defines the frequency at the 3 dB down point. The "Cut Off Frequency Shift" affects this frequency in the way that the filter flanks are "moved" and the transition band increases by "Cut Off Frequency Shift"*"Sample Rate".

- A "Cut Off Frequency Shift" = -1 results in a very narrow-band filter
- Increasing the value up to 1 makes the filter more broad-band
- By "Cut Off Frequency Shift" = 0, the -3 dB point is at the frequency determined by the half of the selected "Sample Rate".

Tip: Use this parameter to adjust the cutoff frequency and reach spectrum mask requirements.

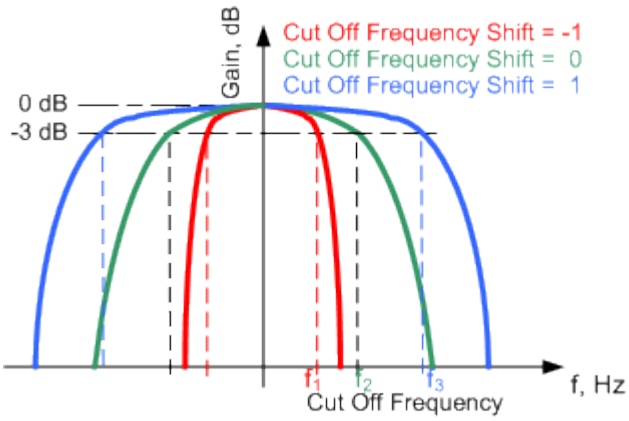


Figure 3-2: Example of the frequency response of a filter with different cutoff frequency shift

Remote command:
`[:SOURce<hw>]:BB:WIMax:FILTer:PARameter:COSine:COFS` on page 138

Cutoff Frequency Factor
Sets the value for the cutoff frequency factor. The cutoff frequency of the filter can be adjusted to reach spectrum mask requirements.

Remote command:
`[:SOURce<hw>]:BB:WIMax:FILTer:PARameter:LPASs` on page 138
`[:SOURce<hw>]:BB:WIMax:FILTer:PARameter:LPASSEVM` on page 139

Filter Mode
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.

"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 command:
`[:SOURce<hw>]:BB:WIMax:FILTer:MODE` on page 137

Sample Rate Variation
Sets the sample rate of the signal.

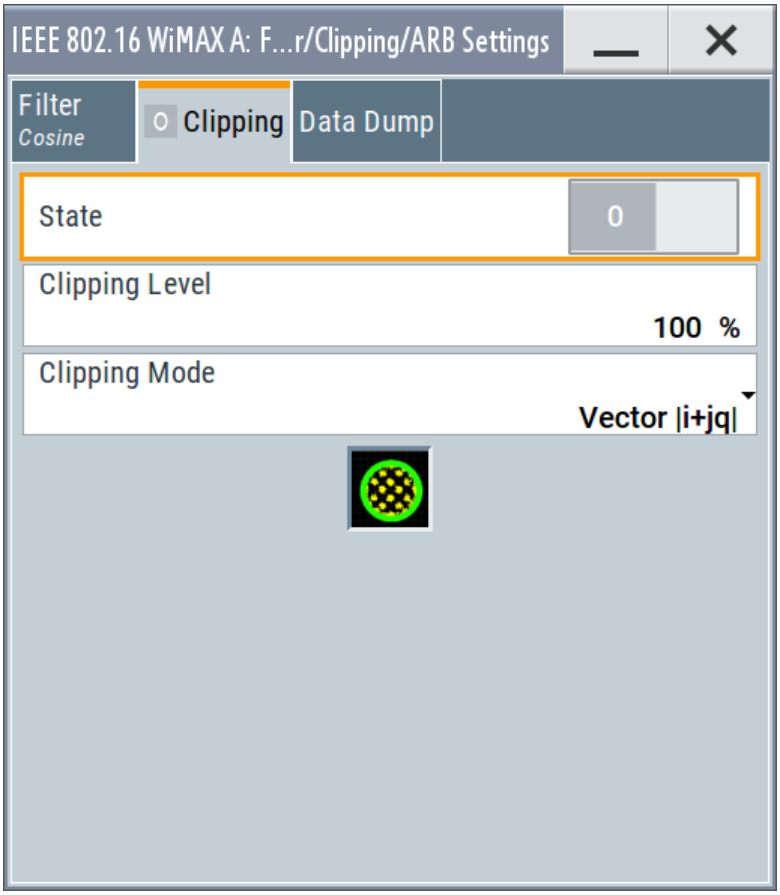
A variation of this parameter only affects the ARB clock rate; all other signal parameters remain unchanged. If the sampling rate in the frame configuration dialog is changed, this parameter is reset to the chosen sampling rate.

Remote command:
`[:SOURce<hw>]:BB:WIMax:SRATe:VARiation` on page 140

3.29.2 Clipping settings

Access:

► Select "Clipping".



This dialog comprises the settings for clipping.

Settings:

Clipping State
Switches baseband clipping on and off.

Baseband clipping is a simple and effective way of reducing the crest factor of the signal. Since clipping is done before to filtering, the procedure does not influence the spectrum. The EVM however increases.

Remote command:
`[:SOURce<hw>]:BB:WIMax:CLIPping:STATe` on page 136

Clipping Level
Sets the limit for clipping.

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

Remote command:
`[:SOURce<hw>]:BB:WIMax:CLIPping:LEVel` on page 135

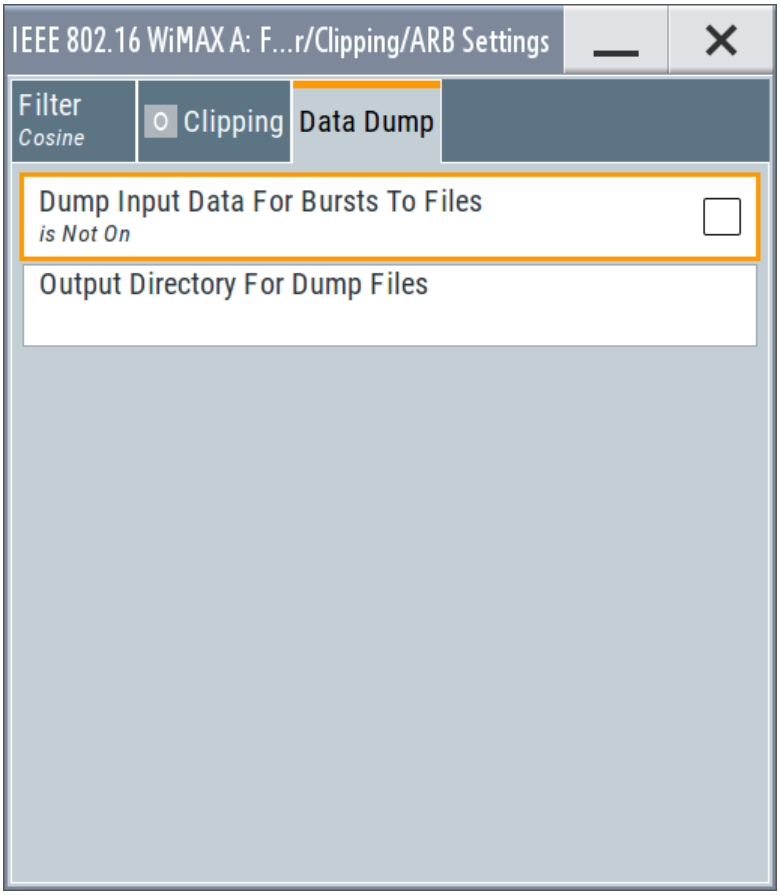
Clipping Mode
Selects the clipping method. The dialog displays a graphical illustration on how this two methods work.

- "Vector | i + jq |"
  The limit is related to the amplitude | i + q |. The I and Q components are mapped together, the angle is retained.
- "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 command:
`[:SOURce<hw>]:BB:WIMax:CLIPping:MODE` on page 136

3.29.3 Data dump

► To access this dialog, select "Data Dump".



This dialog contains the parameters to configure data dump.

Provided are the following settings:

Dump Input Data for Bursts to Files
Activates burst input data dump.

The data that is fed into the channel coding of each burst. It is output into 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 command:
`[:SOURce<hw>]:BB:WIMax:BDUMp:STATe` on page 135

Output directory for Dump Files
Defines the directory the instrument stores the dumped burst data files in.

If the field is empty, the firmware directory is used (such as `..\Program Files\Rohde&Schwarz\SMx\Firmware`).

Remote command:
`[:SOURce<hw>]:BB:WIMax:BDUMp:DIRectory` on page 135

4 Remote-control commands

The following commands are required to perform signal generation with the IEEE 802.16 WiMAX options in a remote environment. We assume that the R&S SMW has already been set up for remote operation in a network as described in the R&S SMW documentation. Knowledge about the remote control operation and the SCPI command syntax is assumed.

Conventions used in SCPI command descriptions

For a description of the conventions used in the remote command descriptions, see section "Remote Control Commands" in the R&S SMW user manual.

The `SOURce:BB:WIMax` 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.

Common suffixes

The following common suffixes are used in remote commands:

Suffix	Value range	Description
`ENTity<ch>`	1 .. 4	entity in a multiple entity configuration with separate base-band sources `ENTity3|4` require option R&S SMW-K76
`SOURce<hw>`	[1] to 4	available baseband signals only `SOURce1` possible, if the keyword `ENTity` is used
`OUTPut<ch>`	1 to 3	available markers
`BURSt<ch0>`	0...63	available bursts
`CID<ch0>`	0...15	available connection control identifiers (CIDs) for "Physical Layer Mode > OFDMA"
`HARQ<dir0>`	0...14	available subbursts in the 2D region for "Physical Layer Mode > OFDMA"
`PDU<dir0>`	0...16	available PDUs in the burst for "Physical Layer Mode > OFDMA"
`ZONE<st0>`	0...7	available zones for "Physical Layer Mode > OFDMA"

Using SCPI command aliases for advanced mode with multiple entities

You can address multiple entities configurations by using the SCPI commands starting with the keyword `SOURce` or the alias commands starting with the keyword `ENTity`.

Note that the meaning of the keyword `SOURce<hw>` changes in the second case.

For details, see section "SCPI Command Aliases for Advanced Mode with Multiple Entities" in the R&S SMW user manual.

The following commands specific to the IEEE 802.16 WiMAX standard are described here:

4.1 General commands

[:SOURce<hw>]:BB:WIMax:DUPLexing <Duplexing>

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

Parameters:
<Duplexing> TDD | FDD
*RST: TDD

Example: `BB:WIM:DUPL FDD`
selects frequency division duplexing.

Manual operation: See "Duplexing" on page 20

[:SOURce<hw>]:BB:WIMax:FRAMe:BURSt:DELay <Delay>

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.

Parameters:
<Delay> float
Range: 0 s to 1E6 s>
Increment: 1 µs
*RST: 0 s

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.

Manual operation: See "Initial Delay of Burst 1" on page 32

[:SOURce<hw>]:BB:WIMax:FRAMe:TIME <Time>

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.

Parameters:
<Time> MS2 | MS2D5 | MS4 | MS5 | MS8 | MS10 | MS12D5 | MS20 | CONTinuous | USER
*RST: MS10

Example: `BB:WIM:FRAM:TIME MS12D5`
selects a frame length of 12.5 ms.

Manual operation: See "Frame Duration" on page 31

[:SOURce<hw>]:BB:WIMax:FRAMe:TIME:USER <User>

The command sets the frame duration to a freely selectable value.

Parameters:

<User> float

Range: 0 s to 0.1 s
Increment: 1E-6 s
*RST: 0.01s

Manual operation: See "User Frame Duration" on page 31

[:SOURce<hw>]:BB:WIMax:LINK <Link>

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`).

Parameters:

<Link> FORWard | REVerse | UP | DOWN

*RST: FORWard

Example: `BB:WIM:LINK DOWN`
the transmission direction selected is base station to subscriber station. The signal corresponds to that of a base station.

Manual operation: See "Link Direction" on page 21

[:SOURce<hw>]:BB:WIMax:MODE <Mode>

Selects the Physical Layer Mode.

Parameters:

<Mode> OFDM | AOFDm | WIBRo | AAI

AOFDm
Orthogonal Frequency Division Multiple Access (OFDMA)

*RST: OFDM

Example: `BB:WIM:MODE OFDM`
Selects physical layer mode OFDM.

Manual operation: See "Physical Layer Mode" on page 19

[:SOURce<hw>]:BB:WIMax:PRESet

Sets the parameters of the digital standard to their default values (`*RST` values specified for the commands).

Not affected is the state set with the command `SOURce<hw>:BB:WIMax:STATe`.

Example: `SOURce1:BB:WIMax:PRESet`

Usage: Event

Manual operation: See "Set to Default" on page 17

[:SOURce<hw>]: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`. Only files with the file extension `*.wimax` are listed.

Return values:
<Catalog> string

Example: `MMEM:CDIR "/var/user/temp/wimax"`
Sets the default directory to /var/user/temp/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.

Usage: Query only

Manual operation: See "Save/Recall" on page 19

[:SOURce<hw>]:BB:WIMax:SETTing:DELete <Filename>

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 can be omitted. Only files with the file extension `*.wimax` are deleted.

Setting parameters:
<Filename> string

Example: `BB:WIM:SETT:DEL 'ofdm'`
Deletes file `ofdm`.

Usage: Setting only

Manual operation: See "Save/Recall" on page 19

[:SOURce<hw>]:BB:WIMax:SETTing:LOAD <Filename>

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 can be omitted. Only files with the file extension `*.wimax` are loaded.

Setting parameters:
<Filename> string

Example: `BB:WIM:SETT:LOAD 'ofdm'`
Loads file `ofdm`.

Usage: Setting only

Manual operation: See "Save/Recall" on page 19

[:SOURce<hw>]:BB:WIMax:SETTing:STORe <Filename>

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. Enter only the file name. IEE 802.16 WIMAX settings are stored as files with the specific file extensions `*.wimax`.

Setting parameters:

<Filename> string

Example: `BB:WIM:SETT:STOR 'ofdm_tdd'`
Stores the current settings into file `ofdm_tdd`.

Usage: Setting only

Manual operation: See "Save/Recall" on page 19

[:SOURce<hw>]:BB:WIMax:SLENgth <SLength>

Sets 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.

Parameters:

<SLength> integer

Range: 1 to MAX
*RST: 1

Example: `BB:WIM:SLEN 4`
selects the generation of 4 frames.

Manual operation: See "Sequence Length" on page 32

[:SOURce<hw>]:BB:WIMax:STATe <State>

Activates the standard and deactivates all the other digital standards and digital modulation modes in the same path.

Parameters:

<State> 1 | ON | 0 | OFF

*RST: 0

Example: `SOURce1:BB:WIMax:STATe ON`

Manual operation: See "State" on page 17

[:SOURce<hw>]:BB:WIMax:SUBFrame:TIME <Time>

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.

Parameters:

<Time> float

Range: 0 ms to 20 ms
Increment: 0.001ms
*RST: 0 ms

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 2 ms.

Manual operation: See "Downlink Subframe Duration" on page 31

[:SOURce<hw>]:BB:WIMax:WAVeform:CREate <Filename>

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.

Setting parameters:

<Filename> string

Example: `MMEM:CDIR "/var/user/temp/waveform"`
sets the default directory to /var/user/temp/waveform.
`BB:WIM:WAV:CRE "wimax_1"`
creates the waveform file `wimax_1.wv` in the default directory.

Usage: Setting only

Manual operation: See "Generate Waveform File…" on page 19

[:SOURce<hw>][:BB]:WIMax:SVERsion <SVersion>

Selects the version of the standard to use.

Parameters:

<SVersion> VC1 | VC2D4 | VC3

*RST: VC1

Manual operation: See "Version" on page 20

4.2 Filter and clipping commands

[:SOURce<hw>]:BB:WIMax:BDUMp:DIRectory <Directory>

Defines the directory the dumped burst date files are to be stored in.

If no directory is specified, the dumped files are stored in the firmware directory.

Parameters:
<Directory> string

Example: see `[:SOURce<hw>]:BB:WIMax:BDUMp:STATe` on page 135

Manual operation: See "Output directory for Dump Files" on page 127

[:SOURce<hw>]:BB:WIMax:BDUMp:STATe <State>

Activates burst input data dump.

Parameters:
<State> 1 | ON | 0 | OFF
*RST: 0

Example: `SOURce1:BB:WIMax:BDUMp:DIRirectory "/var/user/temp/dump"`
sets the directory for OFDMA burst input dump.
`SOURce1:BB:WIMax:BDUMp:STATe ON`
activates burst input data dump.

Manual operation: See "Dump Input Data for Bursts to Files" on page 127

[:SOURce<hw>]:BB:WIMax:CLIPping:LEVel <Level>

Sets the limit for level clipping.

Parameters:

<Level> integer

Range: 1 to 100
*RST: 100

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.

Manual operation: See "Clipping Level" on page 126

[:SOURce<hw>]:BB:WIMax:CLIPping:MODE <Mode>

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

Parameters:

<Mode> VECTor | SCALar

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

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

*RST: VECTor

Example: `BB: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.

Manual operation: See "Clipping Mode" on page 126

[:SOURce<hw>]:BB:WIMax:CLIPping:STATe <State>

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`.

Parameters:

<State> 1 | ON | 0 | OFF

*RST: OFF

Example: `BB:WIM:CLIP:STAT ON`
activates level clipping.

Manual operation: See "Clipping State" on page 125

[:SOURce<hw>]:BB:WIMax:FILTer:TYPE <Type>

The command selects the filter type.

Parameters:

<Type> RCOSine | COSine | GAUSs | LGAuss | CONE | COF705 | COEQualizer | COFequalizer | C2K3x | APCO25 | SPHase | RECTangle | PGAuss | LPASs | DIRac | ENPShape | EWPShape | LPASSEVM

*RST: GAUSs

Example: `BB:WIM:FILT:TYPE RCOS`
sets the filter type root cosine.

Manual operation: See "Filter" on page 122

[:SOURce<hw>]:BB:WIMax:FILTer:MODE <Mode>

Sets the filter mode.

Parameters:

<Mode> REALtime | OFFLine

REALtime
The filter is applied to a signal in real-time mode.

OFFLine
The filter is applied to a signal in offline mode.

*RST: REALtime

Example: `BB:WIM:FILT:MODE REAL`
the filter is applied to a signal in real-time mode.

Manual operation: See "Filter Mode" on page 124

[:SOURce<hw>]:BB:WIMax:FILTer:PARameter:APCO25 <Apco25>

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

Parameters:

<Apco25> float

Range: 0.05 to 0.99
Increment: 0.01
*RST: 0.20

Example: `BB:WIM:FILT:PAR:APCO25 0.04`
the roll-off factor is set to 0.04.

Manual operation: See "Rolloff Factor or BxT" on page 123

[:SOURce<hw>]:BB:WIMax:FILTer:PARameter:COSine <Cosine>

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

Parameters:

<Cosine> float

Range: 0.00 to 1.0
Increment: 0.01
*RST: OFDM: 0.1; OFDMA: 0.1 (sampling frequency below 20 MHz); OFDMA: 0.07 (sampling frequency 20 MHz and above)

Example: `BB:WIM:FILT:PAR:COS 0.04`
the roll-off factor is set to 0.04.

Manual operation: See "Rolloff Factor or BxT" on page 123

[:SOURce<hw>]:BB:WIMax:FILTer:PARameter:COSine:COFS <Cofs>

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.

Parameters:

<Cofs> float

Range: -1 to 1
Increment: 0.01
*RST: OFDM: -0.1; OFDMA: 0.0 (sampling frequency below 20 MHz); OFDMA:- 0.08 (sampling frequency 20 MHz and above)

Example: `BB:WIM:FILT:PAR:COS:COFS 0.04`
the "cut of frequency shift" value is set to 0.04.

Manual operation: See "Cutoff Frequency Shift" on page 123

[:SOURce<hw>]:BB:WIMax:FILTer:PARameter:GAUSs <Gauss>

The command sets the BxT for the Gauss filter type (FSK).

Parameters:

<Gauss> float

Range: 0.15 to 2.5
Increment: 0.01
*RST: 0.50

Example: `BB:WIM:FILT:PAR:GAUS 0.5`
'the BxT is set to 0.5.

Manual operation: See "Rolloff Factor or BxT" on page 123

[:SOURce<hw>]:BB:WIMax:FILTer:PARameter:LPASs <LPass>

The command sets the cutoff frequency factor for the Lowpass (ACP optimization) filter type. The value range depends on the set symbol rate.

0.05 x symbol rate … 2 x symbol rate

Parameters:

<LPass> float

Range: 0.05 to 2.0
Increment: 0.01
*RST: 0.50

Example: `BB:WIM:FILT:PAR:LPAS 0.5`
The cut of frequency factor is set to 0.5.

Manual operation: See "Cutoff Frequency Factor" on page 124

[:SOURce<hw>]:BB:WIMax:FILTer:PARameter:LPASSEVM <LPassEvm>

The command sets the cutoff frequency factor for the Lowpass (EVM optimization) filter type. The value range depends on the set symbol rate.

0.05 x symbol rate … 2 x symbol rate

Parameters:

<LPassEvm> float

Range: 0.05 to 2.0
Increment: 0.01
*RST: 0.5

Example: `BB:WIM:FILT:PAR:LPASSEVM 0.5`
The cut of frequency factor is set to 0.5.

Manual operation: See "Cutoff Frequency Factor" on page 124

[:SOURce<hw>]:BB:WIMax:FILTer:PARameter:PGAuss <PGauss>

The command sets the BxT for the Gauss filter type (pure).

Parameters:

<PGauss> float

Range: 0.00 to 2.5
Increment: 0.01
*RST: 0.50

Example: `BB:WIM:FILT:PAR:PGA 0.5`
the BxT is set to 0.5.

Manual operation: See "Rolloff Factor or BxT" on page 123

[:SOURce<hw>]:BB:WIMax:FILTer:PARameter:RCOSine <RCosine>

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

Parameters:

<RCosine> float

Range: 0 to 1.0
Increment: 0.01
*RST: 0.22

Example: `BB:WIM:FILT:PAR:RCOS 0.4`
the roll-off factor is set to 0.4.

Manual operation: See "Rolloff Factor or BxT" on page 123

[:SOURce<hw>]:BB:WIMax:FILTer:PARameter:SPHase <SPhase>

The command sets the BxT for the Split Phase filter type.

Parameters:

<SPhase> float

Range: 0.15 to 2.5
Increment: 0.01
*RST: 2.00

Example: `BB:WIM:FILT:PAR:SPH 2`
the BxT is set to 2.0.

Manual operation: See "Rolloff Factor or BxT" on page 123

[:SOURce<hw>]:BB:WIMax:SRATe:VARiation <Variation>

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.

Parameters:

<Variation> float

Range: 400 Hz to 10 MHz
Increment: 0.001 Hz
*RST: 2 MHz
Default unit: Hz (c/s)

Example: `BB:WIM:SRAT:VAR 4000000`
sets the output sample rate to 4 Mcps.

Manual operation: See "Sample Rate Variation" on page 124

4.3 Trigger commands

[:SOURce<hw>]:BB:WIMax[:TRIGger]:SEQuence <Sequence>

Selects the trigger mode.

Parameters:

<Sequence> AUTO | RETRigger | AAUTo | ARETrigger | SINGle

*RST: AUTO

Example:

`SOURce1:BB:WIMax:TRIGger:SEQuence AAUT`
sets the armed auto trigger mode

Manual operation: See "Mode" on page 22

[:SOURce<hw>]:BB:WIMax:TRIGger:SOURce <Source>

Selects the trigger signal source and determines the way the triggering is executed. Provided are:

- Internal triggering by a command (`INTernal`)
- External trigger signal via one of the local or global connectors
  - `EGT1|EGT2`: External global trigger
  - `EGC1|EGC2`: External global clock
  - `ELTRigger`: External local trigger
  - `ELCLock`: External local clock
- Internal triggering by a signal from the other basebands (`INTA|INTB`)
- `OBASeband|BEXTernal|EXTernal`: Setting only
  Provided only for backward compatibility with other Rohde & Schwarz signal generators.
  The R&S SMW accepts these values and maps them automatically as follows:
  `EXTernal = EGT1, BEXTernal = EGT2, OBASeband = INTA or INTB`
  (depending on the current baseband)

Parameters:

<Source> INTB | INTernal | OBASeband | EGT1 | EGT2 | EGC1 | EGC2 | ELTRigger | INTA | ELCLock | BEXTernal | EXTernal | BBSY

*RST: INTernal

Example:

```
SOURce1:BB:WIMax:TRIGger:SEQuence ARET
SOURce1:BB:WIMax:TRIGger:SOURce EGT1
SOURce1:BB:WIMax:TRIGger:EXTernal:SYNChronize:OUTPut 1
SOURce1:BB:WIMax:TRIGger:EXTernal:INHibit 100
SOURce1:BB:WIMax:TRIGger:EXTernal:DELay 10
```

Manual operation: See "Source" on page 24

[:SOURce<hw>]:BB:WIMax:TRIGger:ARM:EXECute

Stops signal generation; a subsequent trigger event restarts signal generation.

Example:

```
SOURce1:BB:WIMax:TRIGger:SOURce INT
SOURce1:BB:WIMax:TRIGger:SEQuence ARETrigger
SOURce1:BB:WIMax:TRIGger:EXEcute
// executes a trigger, signal generation starts
SOURce1:BB:WIMax:TRIGger:ARM:EXECute
// signal generation stops
SOURce1:BB:WIMax:TRIGger:EXEcute
// executes a trigger, signal generation starts again
```

Usage: Event

Manual operation: See "Arm" on page 24

[:SOURce<hw>]:BB:WIMax:TRIGger:EXECute

Executes a trigger.

Example: See `[:SOURce<hw>]:BB:WIMax:TRIGger:ARM:EXECute` on page 142

Usage: Event

Manual operation: See "Execute Trigger" on page 24

[:SOURce<hw>]:BB:WIMax:TRIGger:EXTernal:SYNChronize:OUTPut <Output>

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

Parameters:

<Output> 1 | ON | 0 | OFF

*RST: 1

Example:

```
SOURce1:BB:WIMax:TRIGger:SOURce EXTernal
SOURce1:BB:WIMax:TRIGger:EXTernal:SYNChronize:OUTPut ON
```

Manual operation: See "Sync. Output to External Trigger/Sync. Output to Trigger" on page 25

[:SOURce<hw>]:BB:WIMax:TRIGger:OBASeband:DELay <Delay>

When triggering via the other basebands, delays the trigger event compared to the one in the other baseband.

Parameters:

<Delay> float

Range: 0 to 2147483647
Increment: 0.01
*RST: 0

Example:

```
SOURce1:BB:WIMax:TRIGger:SOURce INTB
SOURce1:BB:WIMax:TRIGger:OBASeband:DELay 100
```

Manual operation: See "External Delay/Trigger Delay" on page 26

[:SOURce<hw>]:BB:WIMax:TRIGger:OBASeband:INHibit <Inhibit>

For triggering via the other path, specifies the duration by which a restart is inhibited.

Parameters:

<Inhibit> integer

Range: 0 to 67108863
*RST: 0

Example:

```
SOURce1:BB:WIMax:TRIGger:SEQuence ARET
SOURce1:BB:WIMax:TRIGger:SOURce INTB
SOURce1:BB:WIMax:TRIGger:OBASeband:INHibit 100
SOURce1:BB:WIMax:TRIGger:OBASeband:DELay 10
```

Manual operation: See "External Inhibit/Trigger Inhibit" on page 25

[:SOURce<hw>]:BB:WIMax:TRIGger:RMODe?

Queries the signal generation status.

Return values:

<RMode> STOP | RUN

*RST: STOP

Example:

```
SOURce1:BB:WIMax:TRIGger:RMODe?
```

Usage: Query only

Manual operation: See "Running/Stopped" on page 23

[:SOURce<hw>]:BB:WIMax:TRIGger:TIME:DATE <Year>, <Month>, <Day>

Sets the date for a time-based trigger signal. For trigger modes single or armed auto, you can activate triggering at this date via the following command:

`SOURce<hw>:BB:<DigStd>:TRIGger:TIME:STATe`

`<DigStd>` is the mnemonic for the digital standard, for example, `ARB`. Time-based triggering behaves analogously for all digital standards that support this feature.

Parameters:

<Year> integer
Range: 1980 to 9999

<Month> integer
Range: 1 to 12

<Day> integer
Range: 1 to 31

Example: See example "Configure a time-based trigger signal" in the subchapter "Trigger Commands" of the chapter "SOURce:BB:ARB subsystem" in the R&S SMW user manual.

Manual operation: See "Trigger Time" on page 24

[:SOURce<hw>]:BB:WIMax:TRIGger:TIME:TIME <Hour>, <Minute>, <Second>

Sets the time for a time-based trigger signal. For trigger modes single or armed auto, you can activate triggering at this time via the following command:

`SOURce<hw>:BB:<DigStd>:TRIGger:TIME:STATe`

`<DigStd>` is the mnemonic for the digital standard, for example, `ARB`. Time-based triggering behaves analogously for all digital standards that support this feature.

Parameters:

<Hour> integer
Range: 0 to 23

<Minute> integer
Range: 0 to 59

<Second> integer
Range: 0 to 59

Example: See example "Configure a time-based trigger signal" in the subchapter "Trigger Commands" of the chapter "SOURce:BB:ARB subsystem" in the R&S SMW user manual.

Manual operation: See "Trigger Time" on page 24

[:SOURce<hw>]:BB:WIMax:TRIGger:TIME[:STATe] <State>

Activates time-based triggering with a fixed time reference. If activated, the R&S SMW triggers signal generation when its operating system time matches a specified time.

Specify the trigger date and trigger time with the following commands:

`SOURce<hw>:BB:<DigStd>:TRIGger:TIME:DATE`

`SOURce<hw>:BB:<DigStd>:TRIGger:TIME:TIME`

`<DigStd>` is the mnemonic for the digital standard, for example, `ARB`. Time-based triggering behaves analogously for all digital standards that support this feature.

Parameters:

<State> 1 | ON | 0 | OFF

*RST: 0

Example: See example "Configure a time-based trigger signal" in the subchapter "Trigger Commands" of the chapter "SOURce:BB:ARB subsystem" in the R&S SMW user manual.

Manual operation: See "Time Based Trigger" on page 23

[:SOURce<hw>]:BB:WIMax:TRIGger:SLENgth <SLength>

Defines the length of the signal sequence that is output in the `SINGle` trigger mode.

Parameters:

<SLength> integer

Range: 1 to INT_MAX

*RST: 1

Example:

```
SOURce1:BB:WIMax:TRIGger:SEQuence SING
SOURce1:BB:WIMax:TRIGger:SLUNit CHIP
SOURce1:BB:WIMax:TRIGger:SLENgth 200
```

Manual operation: See "Signal Duration" on page 23

[:SOURce<hw>]:BB:WIMax:TRIGger:SLUNit <SlUnit>

Defines the unit for the entry of the signal sequence length.

Parameters:

<SlUnit> FRAMe | CHIP | SEQuence

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.

*RST: SEQuence

Example: See `[:SOURce<hw>]:BB:WIMax:TRIGger:SLENgth` on page 145

Manual operation: See "Signal Duration Unit" on page 23

[:SOURce<hw>]:BB:WIMax:TRIGger[:EXTernal]:DELay <Delay>

Sets the trigger delay.

Parameters:

<Delay> float

Range: 0 to 2147483647
Increment: 0.01
*RST: 0
Default unit: samples

Example: See `[:SOURce<hw>]:BB:WIMax:TRIGger:SOURce` on page 141

Manual operation: See "External Delay/Trigger Delay" on page 26

[:SOURce<hw>]:BB:WIMax:TRIGger[:EXTernal]:INHibit <Inhibit>

Specifies the duration by which a restart is inhibited.

Parameters:

<Inhibit> integer

Range: 0 to 21.47*sampRate
*RST: 0

Example: See `[:SOURce<hw>]:BB:WIMax:TRIGger:SOURce` on page 141

Manual operation: See "External Inhibit/Trigger Inhibit" on page 25

[:SOURce<hw>]:BB:WIMax:TRIGger:TIME:DATE <Year>, <Month>, <Day>

Sets the date for a time-based trigger signal. For trigger modes single or armed auto, you can activate triggering at this date via the following command:

`SOURce<hw>:BB:<DigStd>:TRIGger:TIME:STATe`

`<DigStd>` is the mnemonic for the digital standard, for example, `ARB`. Time-based triggering behaves analogously for all digital standards that support this feature.

Parameters:

<Year> integer

Range: 1980 to 9999

<Month> integer

Range: 1 to 12

<Day> integer
Range: 1 to 31

Example: See example "Configure a time-based trigger signal" in the subchapter "Trigger Commands" of the chapter "SOURce:BB:ARB subsystem" in the R&S SMW user manual.

Manual operation: See "Trigger Time" on page 24

[:SOURce<hw>]:BB:WIMax:TRIGger:TIME:TIME <Hour>, <Minute>, <Second>

Sets the time for a time-based trigger signal. For trigger modes single or armed auto, you can activate triggering at this time via the following command:

`SOURce<hw>:BB:<DigStd>:TRIGger:TIME:STATe`

`<DigStd>` is the mnemonic for the digital standard, for example, `ARB`. Time-based triggering behaves analogously for all digital standards that support this feature.

Parameters:

<Hour> integer
Range: 0 to 23

<Minute> integer
Range: 0 to 59

<Second> integer
Range: 0 to 59

Example: See example "Configure a time-based trigger signal" in the subchapter "Trigger Commands" of the chapter "SOURce:BB:ARB subsystem" in the R&S SMW user manual.

Manual operation: See "Trigger Time" on page 24

[:SOURce<hw>]:BB:WIMax:TRIGger:TIME[:STATe] <State>

Activates time-based triggering with a fixed time reference. If activated, the R&S SMW triggers signal generation when its operating system time matches a specified time.

Specify the trigger date and trigger time with the following commands:

`SOURce<hw>:BB:<DigStd>:TRIGger:TIME:DATE`

`SOURce<hw>:BB:<DigStd>:TRIGger:TIME:TIME`

`<DigStd>` is the mnemonic for the digital standard, for example, `ARB`. Time-based triggering behaves analogously for all digital standards that support this feature.

Parameters:

<State> 1 | ON | 0 | OFF
*RST: 0

Example: See example "Configure a time-based trigger signal" in the subchapter "Trigger Commands" of the chapter "SOURce:BB:ARB subsystem" in the R&S SMW user manual.

Manual operation: See "Time Based Trigger" on page 23

4.4 Marker commands

Example: Conguring a marker signal

```
SOURce1:BB:WIMax:TRIGger:OUTPut1:MODE PULS
// sets a pulse marker
SOURce1:BB:WIMax:TRIGger:OUTPut1:PULSe:DIVider 2
SOURce1:BB:WIMax:TRIGger:OUTPut1:PULSe:FREQuency?
// 33000

SOURce1:BB:WIMax:TRIGger:OUTPut1:MODE PATTern
// sets a bit pattern marker
SOURce1:BB:WIMax:TRIGger:OUTPut1:PATTern #H2,2

SOURce1:BB:WIMax:TRIGger:OUTPut1:MODE RAT
SOURce1:BB:WIMax:TRIGger:OUTPut1:ONTime 1
SOURce1:BB:WIMax:TRIGger:OUTPut1:OFFTime 1
// defines the on/off ratio

SOURce1:BB:WIMax:TRIGger:OUTPut3:MODE REST
SOURce1:BB:WIMax:TRIGger:OUTPut3:FOFFset 0
SOURce1:BB:WIMax:TRIGger:OUTPut3:ROFFset 100

// Configure marker 2 delay.
SOURce1:BB:WIMax:TRIGger:OUTPut2:DELay 160
```

Commands:

[:SOURce<hw>]:BB:WIMax:TRIGger:OUTPut<ch>:MODE <Mode>

Sets the marker mode.

Parameters:

<Mode> RESTart | FRAMe | FACTive | PULSe | PATTern | RATio

*RST: RESTart

Example: See Example"Conguring a marker signal" on page 148

Manual operation: See "Mode" on page 27

[:SOURce<hw>]:BB:WIMax:TRIGger:OUTPut<ch>:ONTime <Ontime>
[:SOURce<hw>]:BB:WIMax:TRIGger:OUTPut<ch>:OFFTime <Offtime>

Sets the number of samples during which the marker output is on or off.

Parameters:

<Offtime> integer

Range: 1 to 16777215
*RST: 1

Example: See Example"Conguring a marker signal" on page 148

Manual operation: See "Mode" on page 27

[:SOURce<hw>]:BB:WIMax:TRIGger:OUTPut<ch>:ROFFset <ROffset>
[:SOURce<hw>]:BB:WIMax:TRIGger:OUTPut<ch>:FOFFset <FOffset>

Sets the fall offset in number of samples.

Parameters:

<FOffset> integer

Range: -640000 to 640000
*RST: 0

Example: See Example"Conguring a marker signal" on page 148

Manual operation: See "Rise Offset/Fall Offset" on page 28

[:SOURce<hw>]:BB:WIMax:TRIGger:OUTPut<ch>:PATTern <Pattern>, <BitCount>

Defines the bit pattern used to generate the marker signal.

Parameters:

<Pattern> numeric

0 = marker off, 1 = marker on

*RST: #B10

<BitCount> integer

Range: 1 to 64
*RST: 2

Example: See Example"Conguring a marker signal" on page 148.

Manual operation: See "Mode" on page 27

[:SOURce<hw>]:BB:WIMax:TRIGger:OUTPut<ch>:PULSe:DIVider <Divider>

Sets the divider for Pulse marker mode (`PULSe`).

Parameters:

<Divider> integer

Range: 2 to 1024
*RST: 2

Example: See Example"Conguring a marker signal" on page 148

Manual operation: See "Mode" on page 27

[:SOURce<hw>]:BB:WIMax:TRIGger:OUTPut<ch>:PULSe:FREQuency?

Queries the pulse frequency of the pulsed marker signal `PULSe`.

Return values:

<Frequency> float

Range: 2 to 1024
Increment: 1E-3
*RST: 2

Example: See Example"Conguring a marker signal" on page 148

Usage: Query only

Manual operation: See "Mode" on page 27

[:SOURce<hw>]:BB:WIMax:TRIGger:OUTPut<ch>:DELay <Delay>

Defines the delay between the signal on the marker outputs and the start of the signals.

Parameters:

<Delay> float

Range: 0 to 16777215
Increment: 1E-3
*RST: 0

Example: See Example"Conguring a marker signal" on page 148

Manual operation: See "Delay" on page 28

4.5 Clock commands

[:SOURce<hw>]:BB:WIMax:CLOCk:MODE <Mode>

Sets the type of externally supplied clock.

Parameters:

<Mode> SAMPle

*RST: SAMP

Example: `SOURce1:BB:WIMax:CLOCk:MODE SAMP`

Manual operation: See "Clock Mode" on page 30

[:SOURce<hw>]:BB:WIMax:CLOCk:SOURce <Source>

Selects the clock source:

- `INTernal`: Internal clock reference
- `ELCLock`: External local clock
- `EXTernal = ELCLock`: Setting only
  Provided for backward compatibility with other Rohde & Schwarz signal generators

Parameters:

<Source> INTernal | ELCLock | EXTernal

*RST: INTernal

Example: `SOURce1:BB:WIMax:CLOCk:SOURce INT`

Manual operation: See "Clock Source" on page 29

4.6 OFDMA physical layer commands

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`

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.

[:SOURce<hw>]:BB:WIMax:AOFDm:BW <Bw>

Sets the channel bandwidth.

Parameters:

<Bw> float

DL: the allowed values depend on the selected frequency band (`[:SOURce<hw>]:BB:WIMax:AOFDm:FBANd`)
UL: the full range between 1.25 MHz 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.

Range: 1.25E6 to 28E6
Increment: 0.05E6
*RST: 1.75E6

Example: `BB:WIM:AOFD:FBAN ETSI`
Selects frequency band according to ETSI specifications.
`BB:WIM:AOFD:BW 15E6`
Sets the channel bandwidth to 28 MHz.

Manual operation: See "Channel Bandwidth OFDMA" on page 57

[:SOURce<hw>]:BB:WIMax:AOFDm:FBANd <FBand>

The command selects the available frequency band for the carrier frequencies.

Parameters:
<FBand> ETSI | MMDS | WCS | UNII | USER | WIBRo

ETSI
European Telecommunications Standards Institute

MMDS
Multichannel Multipoint Distribution Service

WCS
Wireless Communication Service

UNII
Unlicensed National Information Infrastructure

WIBRo
Telecommunications Technology Association of Korea

*RST: ETSI

Example: `BB:WIM:AOFD:FBAN ETSI`
selects frequency band according to ETSI specifications.

Manual operation: See "Frequency Band OFDMA" on page 56

[:SOURce<hw>]:BB:WIMax:AOFDm:FFT <Fft>

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.

Parameters:
<Fft> FFT128 | FFT512 | FFT1024 | FFT2048

*RST: FFT2048

Example: `BB:WIM:AOFD:FFT FFT2048`
sets the FFT size to 2048.

Manual operation: See "FFT Size OFDMA" on page 58

[:SOURce<hw>]:BB:WIMax:AOFDm:FRAMe:PREDefined <Predefined>

The command selects predefined setting for the frames.

All commands concerning the frame configuration are preset

Parameters:

<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

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.

*RST: USER

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.

Manual operation: See "Predefined Frames" on page 32

[:SOURce<hw>]:BB:WIMax:AOFDm:IDCell <Idcell>

Sets the cell ID.

Parameters:

<Idcell> integer

Range: 0 to 31
*RST: 0

Example: `BB:WIM:AOFD:IDC 4`
Sets ID cell 4.

Manual operation: See "IDCell OFDMA" on page 58

[:SOURce<hw>]:BB:WIMax:AOFDm:N?

The command queries the factor n (sampling ratio). The sampling ratio is determined by the channel bandwidth (see "Channel Bandwidth OFDMA" on page 57).

Return values:

<N> N8D7 | N86D75 | N144D125 | N316D275 | N57D50 | N28D25

*RST: N8D7

Example: `BB:WIM:AOFD:N?`
queries the factor n.
`Response: N8D7`
the factor n is 8/7.

Usage: Query only

Manual operation: See "Sampling Ratio n OFDMA" on page 57

[:SOURce<hw>]:BB:WIMax:AOFDm:POWer:REFerence <Reference>

The command selects the level reference.

Parameters:

<Reference> RMS | PREamble | WOPRamble | STCZones

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).

*RST: PREamble

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.

Manual operation: See "Power Reference" on page 32

[:SOURce<hw>]:BB:WIMax:AOFDm:PREamble:INDex <Index>

In downlink and in User mode, selects the preamble index for the generation of a downlink frame preamble.

Parameters:
<Index> integer

Range: 0 to 113
*RST: 0

Example: `BB:WIM:LINK DOWN`
selects downlink transmission.
`BB:WIM:AOFD:PRE:IND 10`
selects preamble 10.

Manual operation: See "Preamble Index OFDMA" on page 58

[:SOURce<hw>]:BB:WIMax:AOFDm:PREamble:INDex:MODE <Mode>

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`).

Parameters:
<Mode> AUTO | USER

*RST: AUTO

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.

Manual operation: See "Preamble Mode OFDMA" on page 58

[:SOURce<hw>]:BB:WIMax:AOFDm:SRATe <SRate>

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 MHz 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.

Parameters:

<SRate> float

Range: 1.44E6 to 32E6
Increment: 1E3
*RST: 2E6

Example: `BB:WIM:AOFD:SRAT 2E6`
Sets a sampling rate of 2 MHz.

Manual operation: See "Sampling Rate OFDMA" on page 57

[:SOURce<hw>]:BB:WIMax:AOFDm:TGTB <Tgtb>

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.

Parameters:

<Tgtb> TGTB1D4 | TGTB1D8 | TGTB1D16 | TGTB1D32

*RST: TGTB1D4

Example: `BB:WIM:AOFD:TGTB TGTB1D8`
sets a ratio of 1 to 8.

Manual operation: See "Tg/Tb Ratio OFDMA" on page 58

[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE:COUNt <Count>

The command sets the number of active zones in one frame. The burst configuration is performed for each zone separately.

Parameters:

<Count> integer

Range: 1 to 8
*RST: 1

Example: `BB:WIM:AOFD:ZONE:COUN 2`
two zones are defined.

Manual operation: See "Number of Zones/Segments OFDMA" on page 58

[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:AMC:BITMap:PATTern <Pattern>, <BitCount>

Sets the AMC physical bands bitmap pattern in hexadecimal input format.

The LSB (right most bit) corresponds to physical band 0 (the lowest frequency OFDMA subcarriers). Deactivated bits in this pattern deactivate the corresponding bands, they are not used for allocating bursts.

Parameters:

<Pattern> numeric

Range: #H000000000000 to #HFFFFFFFFFFFF
*RST: #HFFFFFFFFFFFF

<BitCount> integer

Range: 48 to 48
*RST: 48

Example: `BB:WIM:AOFD:ZONE0:AMC:BITM:STAT ON`
Enables Band AMC mode
`SOUR:BB:WIM:AOFD:ZONE0:AMC:BITM:PATT #H0F10FFFF0000,48`
Sets the AMC physical bands bitmap pattern

Manual operation: See "Physical Bands Bitmap" on page 63

[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:AMC:BITMap[:STATe] <State>

Activates/deactivates Band AMC mode.

If activated, the command `SOUR:BB:WIM:AOFD:ZONE0:AMC:BITM:PATT` specifies the active physical bands. If deactivated, all available physical bands are used.

Parameters:

<State> 1 | ON | 0 | OFF

*RST: OFF

Example: `BB:WIM:AOFD:ZONE0:AMC:BITM:STAT ON`
enables Band AMC mode

Manual operation: See "Use Physical Bands Bitmap" on page 63

[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:BOOSt <Boost>

Sets an additional zone boosting in dB. The zone boosting is applied to both the data and pilot carriers.

Parameters:

<Boost> float

Range: -80 to 20
Increment: 0.01
*RST: 0

Example: `BB:WIM:AOFD:ZONE0:BOOS -33`
Sets th zone boost to - 33dB.

Manual operation: See "Zone Boosting OFDMA" on page 67

[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:CSTD:ANTCount <AntCount>

Sets the number of antennas used for cyclic shift transmit diversity (CSTD). One baseband is only generating one antenna at a time.

Parameters:
<AntCount> A1 | A2 | A4
*RST: A1

Example: `BB:WIM:AOFD:ZONE0:CSTD:ANTC A2`
Two antennas are selected for CSTD.

Manual operation: See "Number Of Antennas OFDMA" on page 80

[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:CSTD:ANTShow <AntennaGui>

Selects the antenna for which the configuration is made.

Parameters:
<AntennaGui> ANT0 | ANT1 | ANT2 | ANT3
*RST: ANT0

Example: `SOURce1:BB:WIMax:AOFDm:ZONE1:CSTD:ANTShow ANT0`

Manual operation: See "Show Configuration For OFDMA" on page 80

[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:CSTD<ch0>:CDELay<dir0> <CDelay>

Sets the number of samples by which the OFDM symbols are cyclically shifted on the given tap.

Parameters:
<CDelay> integer
Range: -2048 to 2048
*RST: 0

Example: `BB:WIM:AOFD:ZONE0:CSTD1:CDEL1 256`
The cyclic delay applied to antenna 1 in the tap 1 is set to 256.

Manual operation: See "Cyclic Delay (Samples) OFDMA" on page 80

[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:CSTD<ch0>:GAIN<dir0> <Gain>

Sets a linear gain factor for the corresponding tap. The gain factors are applied to the symbols before summation fo all taps.

The antenna, for which the configuration is made, is distinguished with the numerical suffix at CSTD.

The tap, for which the configuration is made, is distinguished with the numerical suffix at `GAIN`.

Parameters:

<Gain> float

Range: 0.00 to 2.00
Increment: 1E-5
*RST: 0.00

Example: `BB:WIM:AOFD:ZONE0:CSTD1:GAIN1 0.2`
the linear gain of antenna 1 in the tap 1 is set to 0.2

Manual operation: See "Liner Gain OFDMA" on page 81

[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:CSTD<ch0>:TAPCount <TapCount>

Sets the number of taps available for the selected antenna.

The antenna, for which the configuration is made, is distinguished with the numerical suffix at CSTD.

Parameters:

<TapCount> integer

Range: 1 to 5
*RST: 1

Example: `BB:WIM:AOFD:ZONE0:CSTD1:TAPC 3`
selects 3 taps for configuration

Manual operation: See "Number Of Taps OFDMA" on page 80

[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:FCH:MODE <Mode>

Selects the mode for generating the FCH.

Parameters:

<Mode> AUTO | USER

AUTO
The DLFP fields, which form the FCH, are filled automatically with parameters specified at different locations.

USER
the FCH is filled with data specified under Data Source. This enables any arbitrary data to be sent with the FCH burst.

*RST: AUTO

Example: `BB:WIM:AOFD:ZONE0:FCH:MODE AUTO`
selects FCH mode AUTO.

Manual operation: See "FCH Mode OFDMA" on page 89

[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:NUMBer <Number>

Selects the zone number.

Parameters:
<Number> integer
Range: 0 to 7
*RST: 0

Example: `BB:WIM:AOFD:ZONE0:NUMB 4`
assigns number 4 to zone 1.

Manual operation: See "Zone Number OFDMA" on page 59

[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:PERMbase <PermBase>

Selects the PermBase of the zone.

Parameters:
<PermBase> integer
Range: 0 to 69
*RST: 0

Example: `BB:WIM:AOFD:ZONE0:PERM 5`

Manual operation: See "PermBase OFDMA" on page 60

[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:PILDedicated <PilDedicated>

The command activates/deactivates dedicated pilots. If deactivated, the pilot symbols are broadcast.

Note: This feature is available only for zone type AMC and PUSC with link direction Downlink.

Parameters:
<PilDedicated> 1 | ON | 0 | OFF
*RST: OFF

Example: `BB:WIM:AOFD:ZONE0:PILD ON`
Activates dedicated pilot symbols for the specified zone.

Manual operation: See "Dedicated Pilots OFDMA" on page 66

[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:PRBSid <Prbsid>

Selects the PRBS_ID of the zone.

Parameters:
<Prbsid> integer
Range: 0 to 3
*RST: 0

Example: `BB:WIM:AOFD:ZONE0:PRBS 2`

Manual operation: See "PRBS_ID OFDMA" on page 60

[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SCARrier:RANDomizer <Randomizer>

The command activates / deactivates the subcarrier randomization for OFDMA configurations.

Parameters:

<Randomizer> 1 | ON | 0 | OFF

*RST: ON

Example: `BB:WIM:AOFD:ZONE0:SCAR:RAND OFF`
Deactivates the subcarrier randomization.

Manual operation: See "Subcarrier Randomization OFDMA" on page 63

[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SEGMent

Selects the zone segment for OFDMA configurations.

Parameters:

 integer

Range: 0 to 2
*RST: 0

Example: `BB:WIM:AOFD:ZONE:SEGM 1`
selects one segment for zone 1.

Manual operation: See "Segment OFDMA" on page 60

[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SOUNding:AMODe <AMode>

"(only for Sounding Type A)"

Selects the frequency allocation mode for sounding CIDs.

Parameters:

<AMode> NORMal | AMC

NORMal
NORMalThe used sounding allocations are specified with th commands
`SOUR:BB:WIM:AOFD:ZONE:SOUN:CID:FBAN:COUN` and
`SOUR:BB:WIM:AOFD:ZONE:SOUN:CID:FBAN:STAR`.

AMC
AMCA Band Bitmap pattern (set with the command `SOUR:BB:WIM:AOFD:ZONE:SOUN:CID:BBIT`) determines the frequencies to be sent.

*RST: NORMal

Example: `BB:WIM:AOFD:ZONE:SOUN:AMOD AMC`
sets AMC allocation mode

Manual operation: See "Allocation Mode OFDMA" on page 74

[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SOUNding:CID:COUNt <Count>

The command sets the total number of CIDs.

Parameters:

<Count> integer

Range: 1 to 16
*RST: 1

Example: `BB:WIM:AOFD:ZONE:SOUN:CID5:COUN 1`
sets the number of total CIDs to 1.

Manual operation: See "Total Number Of CIDs OFDMA" on page 74

[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SOUNding:CID<ch0>:BBITmap <BBitmap>

"(only for Sounding Type A and Band AMC Allocation Mode)"

Sets the logical band bitmap of the corresponding CID.

A "1" enables sounding transmission in the corresponding logical band, a "0" disables it. The right-most bit (LSB) corresponds to logical band 0 (the lowest frequency subcarriers).

Parameters:

<BBitmap> integer

*RST: 0

Example: `BB:WIM:AOFD:ZONE:SOUN:CID5:BBIT #HFFE,12`
sets band bitmap for CID15.

Manual operation: See "Band Bitmap OFDMA" on page 77

[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SOUNding:CID<ch0>:CID <Cid>

Sets the CID (connection control identifier).

Parameters:

<Cid> integer

Range: 0 to #HFFFF
*RST: 0

Example: `BB:WIM:AOFD:ZONE:SOUN:CID5:CID FFFF`
sets the connection control identifier to #HFFFF.

Manual operation: See "CID OFDMA" on page 77

[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SOUNding:CID<ch0>:CINDex <CIndex>

(only for Sounding Type A)

Sets the value for the cyclic shift index.

Parameters:

<CIndex> integer

The maximum value depends on the setting for the maximum cyclic shift index (`SOUR:BB:WIM:AOFD:ZONE<0...7>:SOUN:CMAX`).

Range: 0 to 31
*RST: 0

Example: `BB:WIM:AOFD:ZONE:SOUN:CID5:CIND 3`
sets the value for the cyclic shift index to 3.

Manual operation: See "Cyclic Shift Index OFDMA" on page 78

[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SOUNding:CID<ch0>:DECoffset <DecOffset>

(only for Sounding Type A)

Sets the decimation offset.

Parameters:

<DecOffset> integer

The maximum value depends on the setting for the decimation value (`SOUR:BB:WIM:AOFD:ZONE<0...7>:SOUN:DEC:VAL`).

Range: 0 to 127
*RST: 0

Example: `BB:WIM:AOFD:ZONE:SOUN:CID5:DEC 10`
sets the decimation offset to 10..

Manual operation: See "Decimation Offset OFDMA" on page 78

[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SOUNding:CID<ch0>:FBANd:STARt <Start>

(only for Sounding Type A)

Sets the start frequency band.

Parameters:

<Start> integer

Range: 0 to 1E9
*RST: 0

Example: `BB:WIM:AOFD:ZONE:SOUN:CID5:FBAN:STAR 1`
sets the value for the start frequency band to 1.

Manual operation: See "Start Freq. Band OFDMA" on page 77

[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SOUNding:CID<ch0>:FBANd[:COUNt] <Count>

(only for Sounding Type A)

Sets the number of frequency bands.

Parameters:

<Count> integer

Range: 1 to 1E9
*RST: 1

Example: `BB:WIM:AOFD:ZONE:SOUN:CID5:FBAN:COUN 2`
sets the number of frequency band to 2.

Manual operation: See "No. Of Freq. Bands OFDMA" on page 77

[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SOUNding:CID<ch0>:PERiodicity <Periodicity>

The command sets the value for the periodicity.

Parameters:

<Periodicity> PER0 | PER1 | PER2 | PER4 | PER8 | PER16 | PER32 | PER64

*RST: PER0

Example: `BB:WIM:AOFD:ZONE:SOUN:CID5:PER2`
sets the value for the periodicity to 2.

Manual operation: See "Periodicity" on page 78

[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SOUNding:CID<ch0>:POWer[:STATe] <State>

The command activates/deactivates the power boost.

Parameters:

<State> 1 | ON | 0 | OFF

*RST: OFF

Example: `BB:WIM:AOFD:ZONE:SOUN:CID5:POW:STAT ON`
activates the power boost.

Manual operation: See "Power Boost OFDMA" on page 77

[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SOUNding:CID<ch0>:RELevance[:STATe] <State>

Activates/deactivates the sounding relevance.

Parameters:
<State> 1 | ON | 0 | OFF
*RST: 1

Example: `BB:WIM:AOFD:ZONE:SOUN:CID5:REL:STAT ON`
activates the sounding relevance.

Manual operation: See "Sounding Relevance" on page 77

[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SOUNding:CID<ch0>:SUBChannel:OFFSet <Offset>

(only for Sounding Type B)

Sets the subchannel offset.

Parameters:
<Offset> integer
Range: 0 to 1E9
*RST: 0

Example: `BB:WIM:AOFD:ZONE:SOUN:CID5:SUBC:OFFS 3`
sets the subchannel offset to 3.

Manual operation: See "Offset Subch" on page 78

[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SOUNding:CID<ch0>:SUBChannel[:COUNt] <Count>

(only for Sounding Type B)

Sets the number of subchannels.

Parameters:
<Count> integer
Range: 1 to 1E9
*RST: 1

Example: `BB:WIM:AOFD:ZONE:SOUN:CID5:SUBC:COUN 3`
sets the number of subchannels to 3.

Manual operation: See "No. Of Subch" on page 78

[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SOUNding:CID<ch0>:SYMBol <Symbol>

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`)

Parameters:
<Symbol> integer
Range: 1 to 10000
*RST: 1

Example: `BB:WIM:AOFD:ZONE:SOUN:CID5:SYMB 5`
sets the number of sounding symbols to 5.

Manual operation: See "Sounding Symbol OFDMA" on page 77

[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SOUNding:CMAXimum <CMaximum>

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

The command sets the value for the maximum cyclic shift index.

Parameters:
<CMaximum> MC4 | MC8 | MC16 | MC32 | MC9 | MC18
*RST: MC4

Example: `BB:WIM:AOFD:ZONE:SOUN:CMAX MC4`
sets the value for the maximum cyclic shift to 4.

Manual operation: See "Max Cyclic Shift Index OFDMA" on page 74

[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SOUNding:DECimation: RANDomization[:STATe] <State>

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

The command activates/deactivates the decimation offset randomization.

Parameters:
<State> 1 | ON | 0 | OFF
*RST: OFF

Example: `BB:WIM:AOFD:ZONE:SOUN:DEC:RAND STAT ON`
activates decimation offset randomization.

Manual operation: See "Decimation Offset Randomization OFDMA" on page 75

[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SOUNding:DECimation:VALue <Value>

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

The command sets the value for the decimation.

Parameters:
<Value> DEC2 | DEC4 | DEC5 | DEC8 | DEC16 | DEC32 | DEC64 | DEC128
*RST: DEC2

Example: `BB:WIM:AOFD:ZONE:SOUN:DEC:VAL DEC16`
sets the value for the decimation to 16.

Manual operation: See "Decimation Value OFDMA" on page 75

[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SOUNding:DLPermbase <DlPermBase>

(only for Sounding Type B)

The command sets the value for the DL PermBase.

Parameters:

<DlPermBase> integer

Range: 0 to 63
*RST: 0

Example: `BB:WIM:AOFD:ZONE:SOUN:DLP 16`
sets the value for the decimation to 16.

Manual operation: See "DL PermBase OFDMA" on page 75

[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SOUNding:PERMutation?

"(only for Sounding Type B)"

The command queries the permutation used for the selected sounding zone.

Return values:

<Permutation> PUSC

*RST: PUSC

Example: `BB:WIM:AOFD:ZONE:SOUN:PERM?`
queries the permutation

Usage: Query only

Manual operation: See "Permutation OFDMA" on page 75

[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SOUNding:RELevance:FLAG <Flag>

The command selects whether sounding is relevant individually for each CID or for all CIDs.

Parameters:

<Flag> SAME | INDividual

*RST: SAME

Example: `BB:WIM:AOFD:ZONE:SOUN:REL:FLAG SAME`
sounding is relevant for all CIDs.

Manual operation: See "Sounding Relevance Flag OFDMA" on page 73

[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SOUNding:RELevance:MODE <Mode>

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

The command selects the sounding relevance mode.

Parameters:

<Mode> THIS | NEXT

*RST: THIS

Example: `BB:WIM:AOFD:ZONE:SOUN:REL:MODE THIS`
selects the sounding relevance mode THIS.

Manual operation: See "Sounding Relevance OFDMA" on page 74

[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SOUNding:SEParability <Separability>

"(only for Sounding Type A)"

The command selects the sounding separability type.

Parameters:

<Separability> CYCLic | DECimated

*RST: CYCLic

Example: `BB:WIM:AOFD:ZONE:SOUN:SEP CYCL`
selects the separability mode cyclic.

Manual operation: See "Separability Type OFDMA" on page 73

[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SOUNding:TYPE <Type>

The command selects either sounding type A or B.

Parameters:

<Type> A | B

*RST: A

Example: `BB:WIM:AOFD:ZONE:SOUN:TYPE A`
selects sounding type A.

Manual operation: See "Sounding Type OFDMA" on page 73

[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SOUNding:UVAL <UVal>

"(only for Sounding Type A)"

Sets the shift value (u) used for decimation offset and cyclic shift index.

Parameters:
<UVal> integer
Range: 0 to 127
*RST: 0

Example: `BB:WIM:AOFD:ZONE:SOUN:UVAL 3`
sets the shift parameter U

Manual operation: See "Shift Value U OFDMA" on page 75

[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:STC:ANTenna <Antenna>

The command selects the antenna for the space-time coding modes.

Parameters:
<Antenna> ANT0 | ANT1 | ANT2 | ANT3
*RST: ANT0

Example: `BB:WIM:AOFD:ZONE:STC:ANT ANT4`
Selects antenna 4 for space time coding.

Manual operation: See "Space-Time Coding Antenna OFDMA" on page 65

[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:STC:MODE <Mode>

The command sets the space-timing coding mode (2 antennas, matrix A or B; 4 antennas, matrix A, B or C; Collaborative Multiplexing or CSTD) or switches diversity off.

Parameters:
<Mode> OFF | MA2antenna | MB2antenna | BURSt | COLLaborative | CSTD | MA4antenna | MB4antenna | MC4antenna
*RST: OFF

Example: `BB:WIM:AOFD:ZONE:STC:MODE MA2`
selects space time coding mode with two antennas and matrix A in zone 1.

Manual operation: See "Space-Time Coding Mode OFDMA" on page 65

[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:STC:PILotpattern <PilotPattern>

(only for Space-Time Coding Mode Collaborative Multiplexing)

Sets the pilot pattern in uplink Collaborative Multiplexing mode.

Parameters:
<PilotPattern> A | B
*RST: A

Example: `BB:WIM:AOFD:ZONE:STC:PIL A`
sets the pilot pattern to A.

Manual operation: See "Pilot Pattern OFDMA" on page 66

[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SYMBol:COUNt <Count>

Selects the number of symbols in UL zone for OFDMA configurations. The duration of uplink bursts cannot exceed the specified number of symbols.

Parameters:

<Count> integer

Range: 1 to 10000
*RST: 2

Example: `BB:WIM:AOFD:ZONE:SYMB:COUN 3`
Selects three symbols for zone 1.

Manual operation: See "No. Of Symbols OFDMA" on page 60

[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SYMBol:COUNt:AUTO <Auto>

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.

Parameters:

<Auto> 1 | ON | 0 | OFF

*RST: OFF

Example: `BB:WIM:AOFD:ZONE:SYMB:AUTO ON`
activates automatic symbol count for zone 1.

Manual operation: See "Auto OFDMA" on page 60

[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SYMBol:OFFSet?

Queries the symbol offset of the zone.

Return values:

<Offset> integer

Range: 0 to 1E9
*RST: 0

Example: `BB:WIM:AOFD:ZONE:SYMB:OFFS?`
queries the symbol count offset in zone 1.

Usage: Query only

Manual operation: See "Offset Symbol OFDMA" on page 60

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:CCODing:FEC <Fec>

The command switches channel coding FEC parameter on or off.

Parameters:
<Fec> 1 | ON | 0 | OFF
*RST: ON

Example: `BB:WIM:AOFD:ZONE0:BURS:CCOD:FEC ON`
activates channel coding FEC parameter for burst 1.

Manual operation: See "FEC" on page 84

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:CCODing: INTerleaver <Interleaver>

The command switches channel coding interleaver on or off.

Parameters:
<Interleaver> 1 | ON | 0 | OFF
*RST: ON

Example: `BB:WIM:AOFD:ZONE:BURS:CCOD:INT ON`
activates channel coding interleaver for burst 1.

Manual operation: See "Interleaver" on page 84

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:CCODing:MODE <Mode>

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 high crest factors of the signal.

Parameters:
<Mode> OFF | CC | CTC
*RST: CC

Example: `BB:WIM:AOFD:ZONE0:BURS2:CCOD:MODE OFF`
Deactivates channel coding for burst 1.

Manual operation: See "Channel Coding OFDMA" on page 68

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:CCODing: RANDomizer <Randomizer>

The command switches channel coding randomizer on or off.

Parameters:
<Randomizer> 1 | ON | 0 | OFF
*RST: ON

Example: `BB:WIM:AOFD:ZONE:BURS:CCOD:RAND ON`
activates channel coding randomizer for burst 1.

Manual operation: See "Channel Coding Randomizer" on page 84

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:CCODing: REPCoding <Repcoding>

The command selects the channel coding repetition coding.

Parameters:

<Repcoding> REP0 | REP2 | REP4 | REP6

*RST: REP0

Example: `BB:WIM:AOFD:ZONE0:BURS:CCOD:REPC REP0`
deactivates repetition coding.

Manual operation: See "Repetition Coding" on page 84

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>: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.

Return values:

<State> 1 | ON | 0 | OFF

*RST: OFF

Example: `BB:WIM:AOFD:ZONE0:BURS2:CONF?`
Queries if there exists a conflict between the activated OFDMA bursts.
`Response: 0`
There exists not conflict between the activated OFDMA bursts.

Usage: Query only

Manual operation: See "Conflict OFDMA" on page 72

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:DATA <Data>

The command determines the data source for the specified bursts.

Parameters:

<Data> PN9 | PN11 | PN15 | PN16 | PN20 | PN21 | PN23 | DLISt | ZERO | ONE | PATTern

PNxx
The pseudo-random sequence generator is used as the data source. Different random sequence lengths can be selected.

DLISt
A data list is used. The data list is selected with the command `:BB: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`.

*RST: PN9

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.

Manual operation: See "Data List Management…" on page 66
See "Data Source OFDMA" on page 70

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:DATA:DSELect <DSelect>

The command selects the data list for the DLISt data source selection.

The lists are stored as files with the fixed file extensions `*.dm_iqd` in a directory of the user's choice. The directory applicable to the following commands is defined with the command `MMEMory:CDIR`. To access the files in this directory, you only have to give the file name, without the path and the file extension.

Parameters:
<DSelect> string

Example: `BB:WIM:AOFD:ZONE0:BURS:DATA DLIS`
selects the Data Lists data source.
`MMEM:CDIR "/var/user/temp/Lists"`
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 and must have the file extension `*.dm_iqd`

Manual operation: See "Data List Management…" on page 66
See "Data Source OFDMA" on page 70

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:DATA:LENGth <Length>

Sets the data length in bytes.

Parameters:
<Length> integer

Range: 0 to 3E4
*RST: 6

Example: `BB:WIM:AOFD:ZONE0:BURS0:DATA:LENG 256`
sets a data length of 256.

Manual operation: See "Data Length OFDMA" on page 68

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:DATA:PATTern <Pattern>, <BitCount>

Sets the bit pattern.

Parameters:

<Pattern> numeric
*RST: #B0

<BitCount> integer
Range: 1 to 64
*RST: 1

Example: `BB:WIM:AOFD:ZONE0:BURS:DATA:PATT #H3F,8`

Manual operation: See "Data Source OFDMA" on page 70

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:DIUC <Diuc>

Sets the specific interval usage code. The code is used to initialize the randomizer and is transmitted in the FCH.

Parameters:

<Diuc> integer
Range: 0 to 15
*RST: 0

Example: `BB:WIM:AOFD:ZONE:BURS2:DIUC 12`
sets Interval Usage Code12 for burst 2.

Manual operation: See "DIUC OFDMA" on page 83

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:DLUL:ARIX <Arix>

Selects whether ACK region 0 or 1 is used.

Parameters:

<Arix> IX0 | IX1
*RST: IX0

Example: `BB:WIM:AOFD:ZONE1:BURS2:DLUL:ARIX IX1`
Sets ARQ Region Index 1.

Manual operation: See "ACK Region Index" on page 116

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:DLUL:HARQ:ACKoffset:DL <Dl>

Sets the ACK channel that corresponds to the first HARQ-enabled DL burst specified in this map message.

Parameters:

<DI> integer

Range: 0 to 255
*RST: 0

Example: `BB:WIM:AOFD:ZONE1:BURS2:DLUL:HARQ:ACK:DL 10`
sets the DL HARQ ACK offset.

Manual operation: See "DL HARQ ACK Offset" on page 116

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:DLUL:HARQ:ACKoffset:INDicator <Indicator>

Enables/disables the inclusion of HARQ ACK offsets.

Parameters:

<Indicator> 1 | ON | 0 | OFF

*RST: ON

Example: `BB:WIM:AOFD:ZONE1:BURS2:DLUL:HARQ:ACK:IND ON`
sets the HARQ ACK offset indicator.

Manual operation: See "HARQ ACK Offset Indicator" on page 116

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:DLUL:HARQ:ACKoffset:UL <UI>

Sets the ACK bit index in the DL HARQ ACK that corresponds to the first HARQ-enabled UL burst specified in this map message.

Parameters:

<UI> integer

Range: 0 to 255
*RST: 0

Example: `BB:WIM:AOFD:ZONE1:BURS2:DLUL:HARQ:ACK:UL 10`
sets the UL HARQ ACK offset.

Manual operation: See "UL HARQ ACK Offset" on page 116

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:DLUL:INCLude <Include>

Selects whether a DL-MAP IE is included in the specified SUB-DL-UL-MAP message for this burst.

The default value of this parameter is off. One of the three available SUB-DL-UL-MAPs can be selected to carry the DL-MAP IE for this burst.

Parameters:

<Include> OFF | INC1 | INC2 | INC3

*RST: OFF

Example: `BB:WIM:AOFD:ZONE1:BURS2:DLUL:INCL INC2`
The DL-MAP IE is included in the second SUB-DL-UL-MAP message.

Manual operation: See "Include In SUB-DL-UL-MAP" on page 85

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:DLUL:MPIX?

Queries the number of the SUB-DL-UL-MAP message.

Altogether up to three SUB-DL-UL-MAP messages can be enabled for all zones. The SUB-DL-UL-MAP Index is a consecutive number that is assigned for each configured SUB-DL-UL-MAP message.

Return values:
<MpIndex> integer
Range: 1 to 3
*RST: 1

Example: `BB:WIM:AOFD:ZONE1:BURS2:DLUL:MPIX?`
queries the consecutive number of the SUB-DL-UL-MAP message.
`Response: 2`

Usage: Query only

Manual operation: See "SUB-DL-UL-MAP Index" on page 115

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:FFB:CWSize?

Queries the codeword size.

Return values:
<CwSize> integer
Range: 0 to DBL_MAX
*RST: 0

Example: `BB:WIM:AOFD:ZONE0:BURS2:FFB:CWS?`
queries the codeword size.

Usage: Query only

Manual operation: See "Codeword Size" on page 113

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:FFB:MODE <Mode>

The command selects the fast feedback mode.

Parameters:
<Mode> NORMal | ENHanced | ENHMimo | ACK
*RST: NORMal

Example: `BB:WIM:AOFD:ZONE0:BURS2:FFB:MODE NORM`
selects the fast feedback mode "normal".

Manual operation: See "Fast Feedback Mode" on page 113

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:FFB:SUBC <Subc>

Sets the number of subchannels.

Parameters:

<Subc> integer

Range: 1 to DBL_MAX
*RST: 1

Example: `BB:WIM:AOFD:ZONE0:BURS2:FFB:SUBC 25`
sets the number of subchannels to 25.

Manual operation: See "No. Of Subchannels" on page 114

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:FFB:SYMB <Symb>

The command sets the number of symbols.

Parameters:

<Symb> float

Range: 3 to MAX
Increment: 3
*RST: 3

Example: `BB:WIM:AOFD:ZONE0:BURS2:FFB:SYMB 6`
sets the number of symbols to 6.

Manual operation: See "No. Of Symbols" on page 114

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:FORMat <Format>

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.

QAM5D6X64 is only available for Channel Coding CTC.

Parameters:

<Format> QPSK1D2 | QPSK3D4 | QAM1D2X16 | QAM3D4X16 | QAM1D2X64 | QAM2D3X64 | QAM3D4X64 | QAM5D6X64

*RST: AOFDm: QPSK1D2

Example: `BB:WIM:AOFD:ZONE0:BURS:FORM QAM3D4X64`
Selects modulation type 64QAM and a channel coding rate of 3.4 Msample for burst 1.

Manual operation: See "Modulation and Coding Rate OFDMA" on page 68

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ:COUNt <Count>

Sets the number of subbursts in the 2D region.

Parameters:

<Count> integer

Range: 0 to 15
*RST: 0

Example: `BB:WIM:AOFD:ZONE0:BURS2:HARQ:COUN 10`
Sets the number of subbursts to 10.

Manual operation: See "No. Of Sub-Bursts" on page 106

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ:MODE <Mode>

The command selects the mode of the HARQ burst.

Parameters:

<Mode> CHASe | IR

*RST: CHASe

Example: `BB:WIM:AOFD:ZONE0:BURS2:HARQ:MODE CHAS`
sets the HARQ mode to chase.

Manual operation: See "HARQ Mode" on page 106

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ:MSTart[:STATe] <State>

Enables/disables Moving Start Offset Mode.

If enabled, the subburst structure resembles the specified structure required for RCT test 9.1.24.4.

Parameters:

<State> 1 | ON | 0 | OFF

*RST: OFF

Example:

```
SOUR:BB:WIM:MODE:AOFD
SOUR:BB:WIM:AOFD:FBAN USER
SOUR:BB:WIM:AOFD:BW 10MHz
SOUR:BB:WIM:AOFD:FFT FFT1024
SOUR:BB:WIM:AOFD:ZONE:COUN 2
SOUR:BB:WIM:AOFD:ZONE1:NUMB 1
SOUR:BB:WIM:AOFD:ZONE1:STC:MODE MA2
SOUR:BB:WIM:AOFD:ZONE1:BURS0:TYPE HARQ
SOUR:BB:WIM:AOFD:ZONE1:BURS0:SUBC:COUN 30
SOUR:BB:WIM:AOFD:ZONE1:BURS0:SYMB:COUN 8
SOUR:BB:WIM:AOFD:TONE1:BURS0:HARQ:MODE CHAS
SOUR:BB:WIM:AOFD:ZONE1:BURS0:HARQ:COUN 3
SOUR:BB:WIM:AOFD:ZONE1:BURS0:HARQ0:SLOT 64
SOUR:BB:WIM:AOFD:ZONE1:BURS0:HARQ0:DLEN 382
SOUR:BB:WIM:AOFD:ZONE1:BURS0:HARQ1:SLOT 20
SOUR:BB:WIM:AOFD:ZONE1:BURS0:HARQ1:DLEN 118
SOUR:BB:WIM:AOFD:ZONE1:BURS0:HARQ2:SLOT 32
SOUR:BB:WIM:AOFD:ZONE1:BURS0:HARQ3:DLEN 166
SOUR:BB:WIM:AOFD:ZONE0:BURS0:HARQ:MST:STAT ON
SOUR:BB:WIM:SLEN 10
SOUR:BB:WIM:STAT ON
```

enables moving of start offset mode.

Manual operation: See "Moving Start Offset Mode" on page 107

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ:SLFRee?

The command queries the remaining number of slots available for the burst.

Return values:

<SlFree> integer

Range: 0 to DBL_MAX
*RST: 0

Example:

```
BB:WIM:AOFD:ZONE0:BURS2:HARQ:SLFR?
```

queries the remaining number of slots available for the burst.

Usage: Query only

Manual operation: See "No. Of Slots Available In Burst" on page 108

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:ACID <Acid>

Sets the HARQ channel identifier for the specified subburst.

Parameters:

<Acid> integer

Range: 0 to 15
*RST: 0

Example: `BB:WIM:AOFD:ZONE0:BURS2:HARQ5:ACID 12`
Sets the subburst ACID to 12.

Manual operation: See "ACID" on page 111

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:ACKD <Ackd>

Disables ACK, i.e. the allocated subburst does not require an ACK to be transmitted .

Parameters:

<Ackd> 1 | ON | 0 | OFF

*RST: ON

Example: `BB:WIM:AOFD:ZONE0:BURS2:HARQ5:ACKD ON`
disables ACK.

Manual operation: See "ACK Disable" on page 112

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:DATA <Data>

The command sets the data source for the specified subburst.

Parameters:

<Data> PN9 | PN11 | PN15 | PN16 | PN20 | PN21 | PN23 | DLISt | ZERO | ONE | PATTern

PNxx
The pseudo-random sequence generator is used as the data source. Different random sequence lengths can be selected.

DLISt
A data list is used. The data list is selected with the command `:BB: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 com-
mand `:BB:WIMax:AOFD:ZONE:BURS:DATA:PATTern`.

*RST: PN9

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.

Manual operation: See "Data Source" on page 110

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:DATA:DSELect <DSelect>

Selects the data list for the DLISt data source selection.

The lists are stored as files with the fixed file extensions `*.dm_iqd` in a directory of the user's choice. The directory applicable to the following commands is defined with the command `MMEMory:CDIR`. To access the files in this directory, you only have to give the file name, without the path and the file extension.

Parameters:

<DSelect> string

Example: `BB:WIM:AOFD:ZONE0:BURS2:HARQ6:DATA DLIS`
selects the Data Lists data source.
`MMEM:CDIR "/var/user/temp/Lists"`
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 and must have the file extension `*.dm_iqd`

Manual operation: See "Data Source" on page 110

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:DATA:PATTern <Pattern>, <BitCount>

Sets the bit pattern.

Parameters:

<Pattern> numeric
*RST: #H0

<BitCount> integer
Range: 1 to 64
*RST: 1

Example: `BB:WIM:AOFD:ZONE0:BURS2:HARQ6:DATA:PATT #B0,1`

Manual operation: See "Data Source" on page 110

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:DIUC <Diuc>

(for HARQ Chase Mode only)

Sets the DIUC (Downlink Interval User Code) for the specified subburst. The code is used to initialize the randomizer and is transmitted in the FCH.

Parameters:

<Diuc> integer
Range: 0 to 15
*RST: 0

Example: `BB:WIM:AOFD:ZONE0:BURS2:HARQ:MODE CHAS`
Sets the HARQ mode to chase.
`BB:WIM:AOFD:ZONE0:BURS2:HARQ6:DIUC5`
Sets the Interval Usage Code 5 for subburst 6.

Manual operation: See "DIUC" on page 111

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>: DLENgth <DLength>

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

Parameters:
<DLength> integer
Range: 0 to 1E9
*RST: 16

Example: `BB:WIM:AOFD:ZONE0:BURS2:HARQ4:DLEN 10`
Sets the data length of the subburst to 10.

Manual operation: See "Data Length" on page 110

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>: FORMat?

(for HARQ IR Mode only)

Queries the subburst modulation.

Return values:
<Format> NONE | QPSK | QAM16 | QAM64
*RST: QPSK

Example: `BB:WIM:AOFD:ZONE0:BURS2:HARQ:MODE IR`
Sets the HARQ mode to IR.
`BB:WIM:AOFD:ZONE0:BURS2:HARQ5:FORM?`
Queries the subburst modulation.

Usage: Query only

Manual operation: See "Modulation" on page 110

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>: MAC:CID <Cid>

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.

Parameters:

<Cid> integer

Range: 0 to #HFFFF
*RST: 0

Example: `BB:WIM:AOFD:ZONE0:BURS2:HARQ5:MAC:CID #H33`
Sets the CID for subburst 5 to 33.

Manual operation: See "MAC CID" on page 83

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:MAC:CRC:STATe <State>

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

Parameters:

<State> 1 | ON | 0 | OFF

*RST: 0

Example: `BB:WIM:AOFD:BURS2:HARQ5:MAC:CRC:STAT ON`
Activates the checksum determination for the specified subburst.

Manual operation: See "CRC State" on page 117

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:MAC:EKS <Eks>

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

Parameters:

<Eks> integer

Range: 0 to 3
*RST: 0

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.

Manual operation: See "EKS" on page 118

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:MAC:ENCRypted:STATe <State>

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.

Parameters:

<State> 1 | ON | 0 | OFF

*RST: 0

Example: `BB:WIM:AOFD:BURS2:HARQ5:MAC:ENCR:STAT ON`
Enables payload encryption for subburst 5.
`BB:WIM:AOFD:BURS2:HARQ5:MAC:EKS 2`
Sets the EKS.

Manual operation: See "Payload encrypted" on page 118

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:MAC:STATe <State>

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

Parameters:
<State> 1 | ON | 0 | OFF
*RST: OFF

Example: `BB:WIM:AOFD:BURS2:HARQ5:MAC:STAT ON`
Enables generation of the generic MAC header for subburst 5.

Manual operation: See "MAC Header State" on page 118

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:MAC:TYPE <Type>

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

Parameters:
<Type> integer
Range: 0 to #H3F
*RST: 0

Example: `BB:WIM:AOFD:BURS2:HARQ5:MAC:TYPE #H3F`
Sets the type field of the MAC header of subburst 5.

Manual operation: See "Mac Type" on page 118

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:MODRate <ModRate>

(for HARQ Chase Mode only)

Sets the subburst modulation and coding rate.

Parameters:
<ModRate> QPSK_12 | QPSK_34 | QAM16_12 | QAM16_34 | QAM64_12 | QAM64_23 | QAM64_34 | QAM64_56
*RST: QPSK_12

Example: `BB:WIM:AOFD:ZONE0:BURS2:HARQ:MODE CHAS`
Sets the HARQ mode to chase.
`BB:WIM:AOFD:ZONE0:BURS2:HARQ:MODR QPSK_34`
Sets the modulation and coding rate.

Manual operation: See "Modulation & Coding Rate" on page 109

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:PSIZe <PSize>

(for HARQ IR Mode only)

The command sets the HARQ subburst packet size (in bits).

Parameters:

<PSize> PS48 | PS96 | PS144 | PS192 | PS288 | PS384 | PS480 | PS960 | PS1K92 | PS2K88 | PS3K84 | PS4K8 | PS9K6 | PS14K4 | PS19K2 | PS24K

*RST: PS144

Example: `BB:WIM:AOFD:ZONE0:BURS2:HARQ:MODE IR`
Sets the HARQ mode to IR.
`BB:WIM:AOFD:ZONE0:BURS2:HARQ5:PSIZ PS144`
Sets the packet size to 144 bit.

Manual operation: See "Packet Size [Bits]" on page 109

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:RATE?

(for HARQ IR Mode only)

Queries the subburst code rate.

Return values:

<Rate> string

Example: `BB:WIM:AOFD:ZONE0:BURS2:HARQ:MODE IR`
Sets the HARQ mode to IR.
`BB:WIM:AOFD:ZONE0:BURS2:HARQ5:RATE?`
Queries the subburst rate.

Usage: Query only

Manual operation: See "Rate" on page 110

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:SLOTcount <SlotCount>

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

Parameters:
<SlotCount> integer
Range: 1 to 1E9
*RST: 2

Example: `BB:WIM:AOFD:ZONE0:BURS2:HARQ5:SLOT 1`
Sets the duration of subburst 5 to one slot.

Manual operation: See "Duration [Slots]" on page 110

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:SPID <Spid>

(for HARQ IR Mode only)

The command sets the subpacket ID, which is used to identify the four subpackets generated from an encoder packet.

Parameters:
<Spid> string
*RST: 0

Example: `BB:WIM:AOFD:ZONE0:BURS2:HARQ:MODE IR`
Sets the HARQ mode to incremental redundancy.
`BB:WIM:AOFD:ZONE0:BURS2:HARQ5:SPID 1,2,3`
Sets the SPID sequence.

Manual operation: See "SPID Sequence" on page 111

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:MAC:CID <Cid>

Sets the CID (Connection Control Identifier) of the medium access control layer (MAC).

Parameters:
<Cid> integer
Range: 0 to #HFFFF
*RST: 0

Example: `BB:WIM:AOFD:ZONE0:BURS2:MAC:CID #HE7`
sets the CID for burst 2 to 231.

Manual operation: See "MAC CID" on page 83

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:MAC:CRC:STATe <State>

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

Parameters:
<State> 1 | ON | 0 | OFF
*RST: OFF

Example: `BB:WIM:AOFD:BURS2:MAC:CRC:STAT ON`
activates the checksum determination for burst 2.

Manual operation: See "CRC State" on page 117

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:MAC:EKS <Eks>

Sets the EKS (Encryption Key Sequence) value in the MAC header.

The payload encryption itself is not performed by the signal generator.

Parameters:
<Eks> integer
Range: 0 to 3
*RST: 0

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.

Manual operation: See "EKS" on page 118

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:MAC:ENCRypted:STATe <State>

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.

Parameters:
<State> 1 | ON | 0 | OFF
*RST: OFF

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.

Manual operation: See "Payload encrypted" on page 118

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:MAC:STATe <State>

The command enables/disables generation of the generic MAC header for the selected burst.

Parameters:
<State> 1 | ON | 0 | OFF
*RST: OFF

Example: `BB:WIM:AOFD:BURS2:MAC:STAT ON`
enables generation of the generic MAC header for burst 2.

Manual operation: See "MAC Header State" on page 118

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:MAC:TYPE <Type>

Specifies the MAC type.

Parameters:

<Type> integer

Range: 0 to #H3F
*RST: 0

Example: `BB:WIM:AOFD:BURS2:MAC:TYPE #H3F`
sets the type field of the MAC header of burst 2.

Manual operation: See "Mac Type" on page 118

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:OFFSet:MODE <Mode>

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.

Parameters:

<Mode> USER | AUTO

*RST: AUTO

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`.

Manual operation: See "Auto OFDMA" on page 69

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:OFFSet:SUBChannel <SubChannel>

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`).

Parameters:

<SubChannel> integer

Range: 0 to 1E9
*RST: Burst0: 7; All other bursts: 0

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.

Manual operation: See "Offset Subchannel OFDMA" on page 69

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:OFFSet:SYMBol <Symbol>

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`).

Parameters:
<Symbol> integer
Range: 0 to 10000
*RST: 0

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.

Manual operation: See "Offset Symbol OFDMA" on page 69

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:PDU:COUNt <Count>

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`).

Parameters:
<Count> integer
Range: 0 to 16
*RST: 1

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.

Manual operation: See "No. Of PDUs OFDMA" on page 83

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:PDU:STATe <State>

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.

Parameters:

<State> 1 | ON | 0 | OFF

*RST: OFF

Example: `BB:WIM:AOFD:ZONE0:BURS2:PDU:STAT ON`
activates multiple PDUs.

Manual operation: See "Multiple PDUs OFDMA" on page 83

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:PDU<dir0>:DATA <Data>

The command sets the data source for the specified PDU.

Parameters:

<Data> PN9 | PN11 | PN15 | PN16 | PN20 | PN21 | PN23 | DLISt | ZERO | ONE | PATTern

PNxx
The pseudo-random sequence generator is used as the data source. Different random sequence lengths can be selected.

DLISt
A data list is used. The data list is selected with the command `:BB: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 com-
mand `:BB:WIMax:AOFD:ZONE:BURS:PDU:DATA:PATTern`.

*RST: PN9

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.

Manual operation: See "Data Source PDU OFDMA" on page 88

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:PDU<dir0>:DATA:DSELect <DSelect>

The command selects the data list for the DLISt data source selection.

The lists are stored as files with the fixed file extensions `*.dm_iqd` in a directory of the user's choice. The directory applicable to the following commands is defined with the command `MMEMory:CDIR`. To access the files in this directory, you only have to give the file name, without the path and the file extension.

Parameters:

<DSelect> string

Example: `BB:WIM:AOFD:ZONE0:BURS2:PDU6:DATA DLIS`
selects the Data Lists data source.
`MMEM:CDIR "/var/user/temp/Lists"`
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 and must have the file extension `*.dm_iqd`.

Manual operation: See "Data Source PDU OFDMA" on page 88

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:PDU<dir0>:DATA:PATTern <Pattern>, <BitCount>

Sets the bit pattern.

Parameters:

<Pattern> numeric
*RST: #H0

<BitCount> integer
Range: 1 to 64
*RST: 1

Example: `BB:WIM:AOFD:ZONE0:BURS2:PDUQ6:DATA:PATT #B0,1`

Manual operation: See "Data Source PDU OFDMA" on page 88

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:PDU<dir0>:DLENgth <DLength>

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

Parameters:

<DLength> integer
Range: 0 to 3E4
*RST: 16

Example: `BB:WIM:AOFD:ZONE0:BURS2:HARQ4:DLEN 10`
Sets the data length of the subburst to 10.

Manual operation: See "Data Length PDU OFDMA" on page 87

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:PDU<dir0>:MAC:CRC:STATe <State>

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

Parameters:
<State> 1 | ON | 0 | OFF
*RST: 0

Example: `BB:WIM:AOFD:BURS2:PDU5:MAC:CRC:STAT ON`
activates the checksum determination for the specified PDU.

Manual operation: See "CRC State (PDU)" on page 120

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:PDU<dir0>:MAC:EKS <Eks>

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

Parameters:
<Eks> integer
Range: 0 to 3
*RST: 0

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.

Manual operation: See "EKS (PDU)" on page 121

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:PDU<dir0>:MAC:ENCRypted:STATe <State>

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.

Parameters:
<State> 1 | ON | 0 | OFF
*RST: 0

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.

Manual operation: See "Payload encrypted (PDU)" on page 121

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:PDU<dir0>:MAC:STATe <State>

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

Parameters:
<State> 1 | ON | 0 | OFF
*RST: OFF

Example: `BB:WIM:AOFD:BURS2:PDU5:MAC:STAT ON`
enables generation of the generic MAC header for PDU5.

Manual operation: See "MAC Header State (PDU)" on page 121

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:PDU<dir0>:MAC:TYPE <Type>

Specifies the MAC type.

Parameters:
<Type> integer
Range: 0 to 0x3F
*RST: 0

Example: `BB:WIM:AOFD:BURS2:PDU5:MAC:TYPE #H3F`
sets the type field of the MAC header of PDU5.

Manual operation: See "Mac Type (PDU)" on page 121

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:PDU<dir0>[:MAC]:CID <Cid>

Sets the CID (Connection Control Identifier) of the medium access control layer (MAC).

Parameters:
<Cid> integer
Range: 0 to #HFFFF
*RST: 0

Example: `BB:WIM:AOFD:ZONE0:BURS2:PDU5:MAC:CID #H33`
sets the CID for PDU5 to 33.

Manual operation: See "MAC CID (PDU)" on page 88

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:PMAP <PMap>

(only for burst type UCD and DCD)

Determines whether the burst profile mapping is performed automatically or manually. In manual configuration, the mapping of the FEC & Modulation Type to the UIUCs/DUICs is defined by the user.

Parameters:
<PMap> AUTO | MANual
*RST: AUTO

Example: `BB:WIM:AOFD:ZONE0:BURS2:PMAP MAN`
enables manual mapping

Manual operation: See "Burst Profile Mapping" on page 85

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:PMAP:DMODulation<dir0> <DModulation>

(only for burst type DCD and manual Burst Profile Mapping)

Sets the FEC and the modulation for the selected DUIC.

Parameters:

<DModulation> MQPSKCC12 | MQPSKCC34 | M16QAMCC12 | M16QAMCC34 | M64QAMCC12 | M64QAMCC23 | M64QAMCC34 | MQPSKCTC12 | MQPSKCTC34 | M16QAMCTC12 | M16QAMCTC34 | M64QAMCTC12 | M64QAMCTC23 | M64QAMCTC34 | M64QAMCTC56

*RST: MQPSKCC12

Example: `BB:WIM:AOFD:ZONE0:BURS2:PMAP MAN`
enables manual mapping
`BB:WIM:AOFD:ZONE0:BURS2:PMAP:DMOD0 MQPSKCC12`
selects QPSK (CC) 1/2 modulation and coding scheme for DUIC#0

Manual operation: See "FEC & Modulation Type" on page 86

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:PMAP:UMODulation<dir0> <UModulation>

(only for burst type UCD and manual Burst Profile Mapping)

Sets the FEC and the modulation for the selected UUIC.

Parameters:

<UModulation> MQPSKCC12 | MQPSKCC34 | M16QAMCC12 | M16QAMCC34 | M64QAMCC12 | M64QAMCC23 | M64QAMCC34 | MQPSKCTC12 | MQPSKCTC34 | M16QAMCTC12 | M16QAMCTC34 | M64QAMCTC12 | M64QAMCTC23 | M64QAMCTC34 | M64QAMCTC56

*RST: MQPSKCC12

Example: `BB:WIM:AOFD:ZONE0:BURS2:PMAP MAN`
enables manual mapping
`BB:WIM:AOFD:ZONE0:BURS2:PMAP:UMOD1 MQPSKCC12`
selects QPSK (CC) 1/2 modulation and coding scheme for UUIC#1

Manual operation: See "FEC & Modulation Type" on page 86

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:POWer <Power>

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.

Parameters:

<Power> float

Range: -80.0 dB to 10.0 dB
Increment: 0.01 dB
*RST: 0.0 dB

Example: `BB:WIM:AOFD:ZONE0:BURS2:POW -2dB`
sets the burst power to -2 dB.

Manual operation: See "Boost OFDMA" on page 70

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:RANGing:ACODe?

Queries the number of allocated codes for OFDMA ranging.

Burst Type Ranging is available in uplink only.

Return values:

<ACode> integer

Range: 0 to DBL_MAX
*RST: 1

Example: `BB:WIM:AOFD:ZONE0:BURS2:RANG:ACOD`
Queries the number of allocated codes.

Usage: Query only

Manual operation: See "No. Of Allocated Codes" on page 105

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:RANGing:OPPortunity:SIZE <Size>

Sets the ranging opportunity size.

Parameters:

<Size> integer

Range: 1 to 4
*RST: 2

Example: `BB:WIM:AOFD:ZONE0:BURS2:RANG:OPP:SIZE 2`
Sets an opportunity size of 2.

Manual operation: See "Opportunity Size" on page 104

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:RANGing: OPPortunity:SLOTcount <SlotCount>

Sets the number of ranging opportunity slots.

Parameters:

<SlotCount> integer

Range: 1 to 1E9
*RST: 1

Example: `BB:WIM:AOFD:ZONE0:BURS2:RANG:OPP:SLOT 2`
sets a number of 2 opportunity slots.

Manual operation: See "No. Of Opportunity Slots" on page 104

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:RANGing: SCGCount <ScgCount>

Sets the number of ranging sub channel groups.

Burst Type Ranging is available in uplink only.

Parameters:

<ScgCount> integer

Range: 1 to 10
*RST: 1

Example: `BB:WIM:AOFD:ZONE0:BURS2:RANG:SCGC 2`
sets a number of 2 opportunity subchannel groups.

Manual operation: See "No. Of Subchannel Groups" on page 104

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:SLOT:COUNt <Count>

Sets the number of slots for the selected burst.

Parameters:

<Count> integer

Range: 1 to 1000
*RST: 1

Example: `BB:WIM:AOFD:ZONE0:BURS2:SLOT:COUN 12`
sets 2 slots for burst 2.

Manual operation: See "Duration-Slots OFDMA" on page 69

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:STC:MODE <Mode>

The command sets the space-timing coding mode.

Parameters:

<Mode> MA2antenna | MB2antenna

*RST: MA2antenna

Example: `BB:WIM:AOFD:ZONE:BURS3:STC:MODE MA2`
selects space time coding mode with two antennas and matrix A in zone 1.

Manual operation: See "Space-Time Coding Mode" on page 84

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:SUBChannel[:COUNt] <Count>

Sets the number of subchannels for the selected burst.

Parameters:

<Count> integer

Range: 1 to 1E9
*RST: 1

Example: `BB:WIM:AOFD:ZONE0:BURS2:SUBC:COUN 16`
sets 16 subchannels for burst 2.

Manual operation: See "Number of Subchannels OFDMA" on page 68

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:SYMBol[:COUNt] <Count>

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.

Parameters:

<Count> integer

Range: 1 to 1000
*RST: 2

Example: `BB:WIM:AOFD:ZONE0:BURS2:SYMB:COUN 12`
sets 12 symbols for burst 2.

Manual operation: See "Number of Symbols OFDMA" on page 68

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:TYPE <Type>

The command selects the burst type.

Available burst types for **downlink**: DATA | FCH | DLMap | ULMap | HARQ | DCD | UCD | SUBMap

Available burst types for **uplink**: DATA | RANGing | HARQ | FASTfeedback

Parameters:

<Type> DATA | FCH | DLMap | RANGing | ULMap | HARQ | FASTfeedback | DCD | UCD | SUBMap

*RST: DATA

Example: `BB:WIM:AOFD:ZONE0:BURS2:TYPE DATA`
selects burst type DATA.

Manual operation: See "Burst Type OFDMA" on page 70

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:UCD:RANGing: BOENd <BoEnd>

(only for burst type UCD)

Sets the end value for the ranging backoff.

Parameters:

<BoEnd> integer

Range: 0 to 15
*RST: 5

Example: `BB:WIM:AOFD:ZONE0:BURS2:UCD:RANG:BOEN 10`
sets the end value for the ranging backoff to 10.

Manual operation: See "Ranging Backoff End" on page 85

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:UCD:RANGing: BOSTart <BoStart>

(only for burst type UCD)

Sets the start value for the ranging backoff.

Parameters:

<BoStart> integer

Range: 0 to 15
*RST: 0

Example: `BB:WIM:AOFD:ZONE0:BURS2:UCD:RANG:BOST 10`
sets the start value for the ranging backoff to 10.

Manual operation: See "Ranging Backoff Start" on page 85

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:UCD:REQuest: BOENd <BoEnd>

(only for burst type UCD)

Sets the end value for the request backoff.

Parameters:
<BoEnd> integer
Range: 0 to 15
*RST: 5

Example: `BB:WIM:AOFD:ZONE0:BURS2:UCD:REQ:BOEN 10`
sets the end value for the request backoff to 10.

Manual operation: See "Request Backoff End" on page 85

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:UCD:REQuest:BOSTart <BoStart>

(only for burst type UCD)

Sets the start value for the request backoff.

Parameters:
<BoStart> integer
Range: 0 to 15
*RST: 0

Example: `BB:WIM:AOFD:ZONE0:BURS2:UCD:REQ:BOST 10`
sets the start value for the request backoff to 10.

Manual operation: See "Request Backoff Start" on page 85

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:UIUC <Uiuc>

Sets uplink interval usage code. The UIUC is used for the UL-MAP, if generated.

Parameters:
<Uiuc> integer
Range: 0 to 15
*RST: 1

Example: `BB:WIM:AOFD:ZONE0:BURS2:UIUC 2`
sets uplink interval usage code 2.

Manual operation: See "UIUC OFDMA" on page 83

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:ULMap:AMODe <AMode>

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.

Parameters:
<AMode> DLSFend | FRAMestart
*RST: DLSFend

Example: `BB:WIM:AOFD:ZONE0:BURS2:ULM:AMOD DLSF`
sets the allocation start time base to DL subframe end.

Manual operation: See "Allocation Start Timebase" on page 99

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:ULMap:ATIMe <ATime>

The command sets the UL-MAP Allocation Start Time.

This command is available for link direction downlink only.

Parameters:

<ATime> float

Range: 0 to frame duration
Increment: 1E-6
*RST: 0

Example: `BB:WIM:AOFD:ZONE0:BURS2:ULM:ATIM 4`
sets the allocation start time to 2.

Manual operation: See "Allocation Start Time" on page 99

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:ULMap:DCD:CID <Cid>

Sets the value for the DCD CID.

Parameters:

<Cid> integer

Range: 0 to #HFFFF
*RST: #HFFFF

Example: `BB:WIM:AOFD:ZONE0:BURS2:ULM:DCD:CID #H456`
enters the value for the DCD CID.

Manual operation: See "DCD CID OFDMA" on page 99

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:ULMap:DCD:STATe <State>

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.

Parameters:

<State> 1 | ON | 0 | OFF

*RST: OFF

Example: `BB:WIM:AOFD:ZONE0:BURS2:ULM:DCD:STAT ON`
appends the DCD to the UL-Map.

Manual operation: See "Append DCD OFDMA" on page 99

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:ULMap:RANGing:BOENd <BoEnd>

Sets the end value for the ranging backoff.

Parameters:

<BoEnd> integer

Range: 0 to 15
*RST: 5

Example: `BB:WIM:AOFD:ZONE0:BURS2:ULM:RANG:BOEN 10`
sets the end value for the ranging backoff to 10.

Manual operation: See "Ranging Backoff End" on page 100

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:ULMap:RANGing:BOSTart <BoStart>

Sets the start value for the ranging backoff.

Parameters:

<BoStart> integer

Range: 0 to 15
*RST: 0

Example: `BB:WIM:AOFD:ZONE0:BURS2:ULM:RANG:BOST 10`
sets the start value for the ranging backoff to 10.

Manual operation: See "Ranging Backoff Start" on page 100

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:ULMap:REQuest:BOENd <BoEnd>

Sets the end value for the request backoff.

Parameters:

<BoEnd> integer

Range: 0 to 15
*RST: 5

Example: `BB:WIM:AOFD:ZONE0:BURS2:ULM:REQ:BOEN 10`
sets the end value for the request backoff to 10.

Manual operation: See "Request Backoff End" on page 100

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:ULMap:REQuest:BOSTart <BoStart>

Sets the start value for the request backoff.

Parameters:
<BoStart> integer
Range: 0 to 15
*RST: 0

Example: `BB:WIM:AOFD:ZONE0:BURS2:ULM:REQ:BOST 10`
sets the start value for the request backoff to 10.

Manual operation: See "Request Backoff Start" on page 100

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:ULMap:UCD:CID <Cid>

Sets the value for the UCD CID.

Parameters:
<Cid> integer
Range: 0 to #HFFFF
*RST: #HFFFF

Example: `BB:WIM:AOFD:ZONE0:BURS2:ULM:UCD:CID #H456`
enters the value for the UCD CID.

Manual operation: See "UCD CID OFDMA" on page 100

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:ULMap:UCD:STATe <State>

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.

Parameters:
<State> 1 | ON | 0 | OFF
*RST: OFF

Example: `BB:WIM:AOFD:ZONE0:BURS2:ULM:UCD:STAT ON`
appends the DCD to the UL-Map.

Manual operation: See "Append UCD OFDMA" on page 100

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt[:COUNt] <Count>

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

Parameters:
<Count> integer
Range: 0 to 64
*RST: 1

Example: `BB:WIM:AOFD:ZONE0:BURS2:COUN 2`
two bursts are sent in one frame.

Manual operation: See "No of Bursts OFDMA" on page 65

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:DLMap:BSID <Bsid>

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`).

Parameters:

<Bsid> integer

Range: #H000000000000,48 to #HFFFFFFFFFFFF,48
*RST: #H000000000000,48

Example: `BB:WIM:AOFD:ZONE0:DLM:BSID 2`
the base station id is 2.

Manual operation: See "Base Station ID OFDMA" on page 94

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:DLMap:COMPressed:AMODe <AMode>

Selects the Allocation Start Time base.

Parameters:

<AMode> DLSFend | FRAMestart

*RST: DLSFend

Example: `BB:WIM:AOFD:ZONE0:DLM:COMP:AMOD DLSF`
sets the start time base to DL Subframe End.

Manual operation: See "Allocation Start Timebase OFDMA" on page 95

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:DLMap:COMPressed:ATIMe <ATime>

The command sets the Allocation Start Time in the DL-Map.

Parameters:

<ATime> float

Range: 0 to frame duration
Increment: 1E-6
*RST: 0
Default unit: s

Example: `BB:WIM:AOFD:ZONE0:DLM:COMP:ATIM 2`
sets the Allocation Start Time to 2 s.

Manual operation: See "Allocation Start Time OFDMA" on page 95

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:DLMap:COMPressed:STATe <State>

The command activates/deactivates that a compressed map is generated instead of a normal map.

Parameters:

<State> 1 | ON | 0 | OFF
*RST: OFF
Default unit: s

Example: `BB:WIM:AOFD:ZONE0:DLM:COMP:STAT ON`
generates a compressed map.

Manual operation: See "Compressed Map OFDMA" on page 95

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:DLMap:COMPressed:ULMap:DSELect <DSelect>

The command selects the UL-Map file.

Parameters:

<DSelect> string
Default unit: s

Example: `BB:WIM:AOFD:ZONE0:DLM:COMP:ULM:DSEL 'ul-map_zone_1'`
selects the UL-Map file `ul-map_zone_1`.

Manual operation: See "UL-MAP File OFDMA" on page 96

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:DLMap:COMPressed:ULMap:STATe <State>

The command activates/deactivates that a compressed UL-Map is appended to the DL-Map.

Parameters:

<State> 1 | ON | 0 | OFF
*RST: OFF
Default unit: s

Example: `BB:WIM:AOFD:ZONE0:DLM:COMP:ULM:STAT ON`
appends the compressed map to the DL-Map.

Manual operation: See "Append Compressed UL-Map OFDMA" on page 95

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:DLMap:DATA:DCD[:COUNt] <Count>

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`).

Parameters:

<Count> integer

Range: 0 to 255
*RST: 0

Example: `BB:WIM:ZONE:AOFD:DLM:DCD 2`
sets the DCD count to 2.

Manual operation: See "DCD Count DL-MAP OFDMA" on page 94

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:DLMap:DCD:CID <Cid>

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.

Parameters:

<Cid> integer

Range: 0 to #HFFFF
*RST: #HFFFF
Default unit: s

Example: `BB:WIM:AOFD:ZONE0:DLM:DCD:CID #H456`
enters the value for the DCD CID.

Manual operation: See "DCD CID OFDMA" on page 95

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:DLMap:DCD:STATe <State>

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.

Parameters:

<State> 1 | ON | 0 | OFF

*RST: OFF

Example: `BB:WIM:AOFD:ZONE0:DLM:DCD:STAT ON`
appends the DCD to the DL-Map.

Manual operation: See "Append DCD OFDMA" on page 94

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:DLMap:FNOFfset <FnOffset>

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).

Parameters:
<FnOffset> integer

Range: 0 to 16777215
*RST: 0

Example: `BB:WIM:AOFD:ZONE0:DLM:FNOF 12`
sets a frame number offset of 2 frames.

Manual operation: See "Frame Number Offset DL-MAP OFDMA" on page 94

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:DLMap:IIE:STATe <State>

The command includes/excludes the CID-Switch_IE().

Parameters:
<State> 1 | ON | 0 | OFF

*RST: ON

Example: `BB:WIM:AOFD:ZONE0:DLM:IIE:STAT ON`
includes the CID-Switch_IE() to the DL-Map.

Manual operation: See "Include CID-Switch_IE() OFDMA" on page 94

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:DLMap:MODE <Mode>

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.

Parameters:
<Mode> AUTO | USER

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.

*RST: AUTO

Example: `BB:WIM:AOFD:ZONE0:DLM:MODE AUTO`
The DL-MAP is filled automatically.

Manual operation: See "DL-MAP Mode OFDMA" on page 92

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:DLMap:REPCoding <RepCoding>

The command activates/deactivates repetition coding. Setting RCO deactivates, all other settings activate repetition coding.

Parameters:
<RepCoding> RC0 | RC2 | RC4 | RC6
*RST: RC0

Example: `BB:WIM:AOFD:ZONE0:DLM:REPC RC2`
activates repetition coding.

Manual operation: See "DL-MAP Repetition Coding OFDMA" on page 94

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:DLMap:SLOTcount?

Return values:
<SlotCount> integer
Range: 0 to INT_MAX
*RST: 0

Usage: Query only

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:SCARrier:PERMutation <Permutation>

Parameters:
<Permutation> FUSC | PUSC | AMC2X3 | SOUNding
*RST: PUSC

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:SUBChannel:MODE <Mode>

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`.

Parameters:
<Mode> USER | ALL
*RST: ALL

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.

Manual operation: See "Use All Subchannels" on page 64

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:SUBChannel:PATTern <Pattern>, <BitCount>

In uplink, sets the 'allocated subchannel bitmap'.

Parameters:

<Pattern> numeric

Range: #H0000 0000 0000 0000 00 to #HFFFF FFFF FFFF FFFF FF

*RST: #HFFFF FFFF FFFF FFFF 3F

<BitCount> integer

Range: 72 to 72

*RST: 72

Example: `BB:WIM:AOFD:ZONE0:SUBC:PATT #HFFFFFFFFFFFFFFFF3F,72`

Manual operation: See "Allocated Subchannels Bitmap (uplink only)" on page 65

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:SUBChannel:ROTation <Rotation>

The command activates or deactivates the subchannel rotation.

This command is available for zone type PUSC in uplink only.

Parameters:

<Rotation> 1 | ON | 0 | OFF

*RST: ON

Example: `SOUR:BB:WIM:AOFD:ZONE0:SUBC:ROT ON`
activates the subchannel rotation.

Manual operation: See "Subchannel Rotation OFDMA" on page 63

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:SUBChannel<ch>:MAP <Map>

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`).

Parameters:

<Map> 1 | ON | 0 | OFF

*RST: ON

Example: `BB:WIM:AOFD:ZONE0:SUBC2:MAP ON`
activates subchannel set 2 (i.e. subchannels 6 ... 9

Manual operation: See "Use Subchannels x...y (downlink PUSC only)" on page 64

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:TYPE <Type>

The command queries the symbol offset of the zone.

Parameters:
<Type> FUSC | PUSC | AMC2X3 | SOUNding
*RST: PUSC

Example: `BB:WIM:AOFD:ZONE:SYMB:OFFS`
queries the symbol count offset in zone 1.

Manual operation: See "Zone Type OFDMA" on page 60

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:UCD <Ucd>

Sets the value for the UCD count.

Parameters:
<Ucd> integer
Range: 0 to 255
*RST: 0

Example: `BB:WIM:AOFD:ZONE0:UCD 255`
sets the value for the UCD count to 255.

Manual operation: See "UCD Count OFDMA" on page 101

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:ULMap:CREate <Filename>

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 files are stored with the extension `*.dm_iqd`.

This command is available in uplink only.

Setting parameters:
<Filename> string

Example: `BB:WIM:AOFD:ZONE1:ULM:CRE 'ul-map_zone1'`
Save the current UL-map to the file `ul-map_zone1`

Usage: Setting only

Manual operation: See "Save UL-MAP Data OFDMA" on page 102

4.7 OFDM physical layer commands

The `SOURce:BB:WIMax:OFDM` system contains 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`

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.

[:SOURce<hw>]:BB:WIMax:OFDM:BSID <Bsid>

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.

Parameters:

<Bsid> integer

Range: 0 to 15
*RST: 0

Example: `BB:WIM:OFDM:BSID 2`
the base station id is 2.

Manual operation: See "BSID OFDM" on page 36

[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:CCODing:STATe <State>

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 high crest factors of the signal.

Parameters:

<State> 1 | ON | 0 | OFF

*RST: ON

Example: `BB:WIM:OFDM:BURS:CCOD:STAT ON`
Activates channel coding for burst 1.

Manual operation: See "Channel Coding OFDM" on page 38

[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:DATA <Data>

The command determines the data source for the specified bursts.

Parameters:

<Data> PN9 | PN11 | PN15 | PN16 | PN20 | PN21 | PN23 | DLISt | ZERO | ONE | PATTern

PNxx
The pseudo-random sequence generator is used as the data source. Different random sequence lengths can be selected.

DLISt
A data list is used. The data list is selected with the command `:BB: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`.

*RST: PN9

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.

Manual operation: See "Data Source OFDM" on page 39
See "Data List Management…" on page 66

[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:DATA:DSELect <DSelect>

The command selects the data list for the DLISt data source selection.

The lists are stored as files with the fixed file extensions `*.dm_iqd` in a directory of the user's choice. The directory applicable to the following commands is defined with the command `MMEMory:CDIR`. To access the files in this directory, you only have to give the file name, without the path and the file extension.

Parameters:
<DSelect> string

Example: `BB:WIM:OFDM:BURS:DATA DLIS`
selects the Data Lists data source.
`MMEM:CDIR "/var/user/temp/Lists"`
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 and must have the file extension `*.dm_iqd`.

Manual operation: See "Data Source OFDM" on page 39
See "Data List Management…" on page 66

[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:DATA:PATTern <Pattern>, <BitCount>

Sets the bit pattern.

Parameters:
<Pattern> numeric

*RST: #B0

<BitCount> integer

Range: 1 to 64
*RST: 1

Example: `BB:WIM:OFDM:BURS:DATA:PATT #H3F,8`

Manual operation: See "Data Source OFDM" on page 39

[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:DIUC <Diuc>

Sets the specific interval usage code.

Parameters:
<Diuc> integer

Range: 0 to 15
*RST: 0

Example: `BB:WIM:OFDM:BURS2:DIUC 12`
sets Interval Usage Code12 for burst 2.

Manual operation: See "DIUC OFDM" on page 40

[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:DLENgth <DLength>

The command sets the data length in bytes.

Parameters:
<DLength> integer

Range: 0 to 3E4
*RST: 100

Example: `BB:WIM:OFDM:BURS:DLEN 256`
sets a data length of 256.

Manual operation: See "Data Length OFDM" on page 39

[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:DLMap:AMODe <AMode>

Selects the Allocation Start Time base.

Parameters:
<AMode> DLSFend | FRAMestart

*RST: DLSFend

Example: `BB:WIM:OFDM:BURS1:DLM:AMOD DLSF`
sets the start time base to DL Subframe End.

Manual operation: See "Allocation Start Timebase OFDM" on page 50

[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:DLMap:ATIMe <ATime>

Sets the Allocation Start Time in the DL-Map.

Parameters:

<ATime> float

Range: 0 to dynamic
Increment: 1E-6
*RST: 0

Example: `BB:WIM:OFDM:BURS1:DLM:ATIM 2`
sets the Allocation Start Time to 2 s.

Manual operation: See "Allocation Start Time OFDM" on page 50

[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:DLMap:DCD:STATe <State>

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.

Parameters:

<State> 1 | ON | 0 | OFF

*RST: OFF

Example: `BB:WIM:OFDM:BURS1:DLM:DCD:STAT ON`
appends the DCD to the DL-Map.

Manual operation: See "Append DCD OFDM" on page 49

[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:DLMap:UCD:STATe <State>

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.

Parameters:

<State> 1 | ON | 0 | OFF

*RST: OFF

Example: `BB:WIM:OFDM:BURS2:DLM:UCD:STAT ON`
appends the UCD to the DL-Map.

Manual operation: See "Append UCD OFDM" on page 50

[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:DLMap:ULM:STATe <State>

The command activates/deactivates that a UL-Map is appended to the DL-Map.

Parameters:

<State> 1 | ON | 0 | OFF

*RST: OFF

Example: `BB:WIM:OFDM:BURS1:DLM:ULM:STAT ON`
appends the UL-Map to the DL-Map.

Manual operation: See "Append UL-Map OFDM" on page 49

[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:FORMat <Format>

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.

Parameters:

<Format> BPSK1D2 | QPSK1D2 | QPSK3D4 | QAM1D2X16 | QAM3D4X16 | QAM2D3X64 | QAM3D4X64

*RST: QPSK3D4

Example: `BB:WIM:OFDM:BURS:FORM QAM3D4X64`
Selects modulation type 64QAM and a channel coding rate of 3.4 Msample for burst 1.

Manual operation: See "Modulation and RS-CC Rate OFDM" on page 38

[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:GAP <Gap>

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.

Parameters:

<Gap> float

Range: 0 µs to 1 000 000 µs
Increment: 1 µs
*RST: 1000 µs
Default unit: s

Example: `BB:WIM:LINK UP`
Sets transmission direction uplink.
`BB:WIM:OFDM:BURS2:GAP 0.003`
Sets the gap between burst 2 ms and 3 ms to 3 ms.

Manual operation: See "Gap OFDM" on page 41

[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:MAC:CID <Cid>

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

Parameters:

<Cid> integer

Range: 0 to #HFFFF
*RST: 0

Example: `BB:WIM:OFDM:BURS2:MAC:CID #HE7`
sets the CID for burst 2 to 231.

Manual operation: See "MAC CID" on page 53

[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:MAC:CRC:STATe <State>

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

Parameters:

<State> 1 | ON | 0 | OFF

*RST: OFF

Example: `BB:WIM:OFDM:BURS2:MAC:CRC:STAT ON`
activates the checksum determination for burst 2.

Manual operation: See "CRC State" on page 54

[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:MAC:EKS <Eks>

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

Parameters:

<Eks> integer

Range: 0 to 3

*RST: 0

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.

Manual operation: See "EKS" on page 55

[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:MAC:ENCRypted:STATe <State>

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.

Parameters:

<State> 1 | ON | 0 | OFF

*RST: OFF

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.

Manual operation: See "Payload encrypted" on page 55

[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:MAC:STATe <State>

The command enables/disables generation of the generic MAC header for the selected burst.

Parameters:
<State> 1 | ON | 0 | OFF
*RST: OFF

Example: `BB:WIM:OFDM:BURS2:MAC:STAT ON`
enables generation of the generic MAC header for burst 2.

Manual operation: See "MAC Header State" on page 55

[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:MAC:TYPE <Type>

Specifies the MAC type.

Parameters:
<Type> integer
Range: 0 to #H3F
*RST: 0

Example: `BB:WIM:OFDM:BURS2:MAC:TYPE #H3F`
sets the type field of the MAC header of burst 2.

Manual operation: See "Mac Type" on page 55

[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:MIDamble <MidAmble>

Activates/deactivates midamble repetition.

Parameters:
<MidAmble> OFF | REP5 | REP9 | REP17
*RST: OFF

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.

Manual operation: See "Midamble Repetition OFDM" on page 38

[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:MODE <Mode>

Parameters:
<Mode> NORM | DLMap | ULMap
*RST: NORM

[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:POWer <Power>

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.

Parameters:

<Power> float

Range: -80.0 dB to 10.0 dB
Increment: 0.01 dB
*RST: 0.0 dB

Example: `BB:WIM:OFDM:BURS2:POW -2 dB`
sets the burst power to -2 dB.

Manual operation: See "Boost OFDM" on page 40

[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:PREamble:MODE <Mode>

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.

Parameters:

<Mode> OFF | LONG | SHORt

*RST: OFF

Example: `BB:WIM:OFDM:BURS2:PRE:MODE LONG`
enables generation of the long preamble for burst 2.

Manual operation: See "Preamble OFDM" on page 38

[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:SYMBol[:COUNt] <Count>

Sets the number of symbols for the selected burst.

Parameters:

<Count> integer

Range: 1 to 1E9
*RST: 3

Example: `BB:WIM:OFDM:BURS2:SYMB:COUN 12`
sets 12 symbols for burst 2.

Manual operation: See "Number of Symbols OFDM" on page 39

[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:TYPE <Type>

The command selects the burst type.

Available burst types for downlink: DATA | ULMap | DLMap

Available burst types for uplink: DATA | RANGing

Parameters:
<Type> DLMap | ULMap | RANGing | DATA
*RST: DATA

Example: `BB:WIM:OFDM:BURS2:TYPE DATA`
selects burst type DATA.

Manual operation: See "Burst Type OFDM" on page 40

[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:UIUC <Uiuc>

Sets uplink interval usage code.

Parameters:
<Uiuc> integer
Range: 0 to 15
*RST: 0

Example: `BB:WIM:OFDM:BURS2:UIUC 2`
sets uplink interval usage code 2.

Manual operation: See "UIUC OFDM" on page 53

[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:ULMap:AMODe <Amode>

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.

Parameters:
<Amode> DLSFend | FRAMestart
*RST: 0

Example: `BB:WIM:OFDM:BURS2:ULM:AMOD DLSF`
sets the start time base to DL Subframe End.

Manual operation: See "Allocation Start Timebase" on page 51

[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:ULMap:ATIMe <ATime>

Sets the UL-MAP Allocation Start Time.

This command is available for link direction downlink only.

Parameters:
<ATime> float
Range: 0 to max
Increment: 1E-6
*RST: 0

Example: `BB:WIM:OFDM:BURS2:ULM:ATIM 4`
sets the allocation start time to 2.

Manual operation: See "Allocation Start Time" on page 51

[:SOURce<hw>]:BB:WIMax:OFDM:BURSt[:COUNt] <Count>

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.

Parameters:

<Count> integer

Range: 0 to 64
*RST: 1

Example: `BB:WIM:OFDM:BURS:COUN 2`
two bursts are sent in one frame.

Manual operation: See "No. of Bursts OFDM" on page 36

[:SOURce<hw>]:BB:WIMax:OFDM:BW <Bw>

Sets the channel bandwidth.

Parameters:

<Bw> float

See `[:SOURce<hw>]:BB:WIMax:AOFDm:BW` on page 155

Range: 1.25E6 to 28E6
Increment: 0.05E6
*RST: 1.75E6

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.

Manual operation: See "Channel Bandwidth OFDM" on page 35

[:SOURce<hw>]:BB:WIMax:OFDM:FBANd <FBand>

Selects the available frequency band for the carrier frequencies.

Parameters:

<FBand> ETSI | MMDS | WCS | UNII | USER

see `[:SOURce<hw>]:BB:WIMax:AOFDm:FBANd` on page 156

*RST: ETSI

Example: `BB:WIM:OFDM:FBAN ETSI`
selects frequency band according to ETSI specifications.

Manual operation: See "Frequency Band OFDM" on page 34

[:SOURce<hw>]:BB:WIMax:OFDM:FCH:CCC <Ccc>

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`).

Parameters:

<Ccc> integer

Range: 0 to 255
*RST: 0

Example: `BB:WIM:OFDM:FCH:CCC 4`
sets configuration change count value to 4.

Manual operation: See "Configuration Change Count" on page 45

[:SOURce<hw>]:BB:WIMax:OFDM:FCH:DATA <Data>

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:

<Data> PN9 | PN11 | PN15 | PN16 | PN20 | PN21 | PN23 | DLISt | ZERO | ONE | PATTern

PNxx
The pseudo-random sequence generator is used as the data source. Different random sequence lengths can be selected.

DLISt
A data list is used. The data list is selected with the command `:BB: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`.

*RST: PN9

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.

Manual operation: See "Data Source" on page 46
See "Data List Management…" on page 66

[:SOURce<hw>]:BB:WIMax:OFDM:FCH:DATA:DSELect <DSelect>

The command selects the data list for the DLISt data source selection.

The lists are stored as files with the fixed file extensions `*.dm_iqd` in a directory of the user's choice. The directory applicable to the following commands is defined with the command `MMEMory:CDIR`. To access the files in this directory, you only have to give the file name, without the path and the file extension.

This command is available only in "User" mode (`SOURce:BB:WIMax:OFDM:FCH:MODE AUTO`).

Parameters:

<DSelect> string

Example: `BB:WIM:OFDM:FCH:DATA DLIS`
selects the Data Lists data source.
`MMEM:CDIR "/var/user/temp/Lists"`
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 and must have the file extension `*.dm_iqd`.

Manual operation: See "Data Source" on page 46
See "Data List Management…" on page 66

[:SOURce<hw>]:BB:WIMax:OFDM:FCH:DATA:PATTern <Pattern>, <BitCount>

Sets the bit pattern.

Parameters:

<Pattern> numeric
*RST: #B0

<BitCount> integer
Range: 1 to 64
*RST: 1

Example: `SOURce:BB:WIMax:OFDM:FCH:MODE AUTO`
`BB:WIM:OFDM:BURS:DATA:PATT #H3F,8`

Manual operation: See "Data Source" on page 46

[:SOURce<hw>]:BB:WIMax:OFDM:FCH:FNOFfset <FnOffset>

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.

Parameters:

<FnOffset> integer
Range: 0 to 15
*RST: 0

Example: `BB:WIM:OFDM:FCH:FNOF 4`
sets a frame number offset of 4.

Manual operation: See "Frame Number Offset" on page 45

[:SOURce<hw>]:BB:WIMax:OFDM:FCH:MODE <Mode>

Selects the mode for generating the FCH.

Parameters:

<Mode> AUTO | USER

AUTO
The DLFP fields, which form the FCH, are filled automatically with parameters specified at different locations.

USER
The FCH is filled with data specified under Data Source. This enables any arbitrary data to be sent with the FCH burst.

*RST: AUTO

Example: `BB:WIM:OFDM:FCH:MODE AUTO`
Selects FCH mode AUTO.

Manual operation: See "FCH Mode" on page 44

[:SOURce<hw>]:BB:WIMax:OFDM:FCH:STATe <State>

The command switches the FCH on or off.

Parameters:

<State> 1 | ON | 0 | OFF

*RST: ON

Example: `BB:WIM:OFDM:FCH:STAT OFF`
switches off generation of FCH.

Manual operation: See "FCH State" on page 44

[:SOURce<hw>]:BB:WIMax:OFDM:FFT?

The command queries the size of the fast fourier transform. For OFDM channels, the size is fixed to 256. For OFDMA configuration, the possible configurations of the sub-channel map depend on the selected FFT size.

Return values:

<Fft> FFT256

*RST: OFDMA FFT2048; OFDM: FFT256

Example: `BB:WIM:OFDM:FFT`
queries the FFT size.
`Response: FFT256`
the FFT size is 256.

Usage: Query only

[:SOURce<hw>]:BB:WIMax:OFDM:FRAMe:PREDefined <Predefined>

The command selects predefined setting for the frames.

All commands concerning the frame configuration are preset

Parameters:

<Predefined> USER | FBPSK12SHORT | FBPSK12MID | FBPSK12LONG | FQPSK12SHORT | FQPSK12MID | FQPSK12LONG | FQPSK34SHORT | FQPSK34MID | FQPSK34LONG | F16QAM12SHORT | F16QAM12MID | F16QAM12LONG | F16QAM34SHORT | F16QAM34MID | F16QAM34LONG | F64QAM23SHORT | F64QAM23MID | F64QAM23LONG | F64QAM34SHORT | F64QAM34MID | F64QAM34LONG

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.

*RST: USER

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.

Manual operation: See "Predefined Frames" on page 32

[:SOURce<hw>]:BB:WIMax:OFDM:FRAMe[:NUMBer] <Number>

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.

Parameters:

<Number> integer

Range: 0 to 15
*RST: 0

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.

Manual operation: See "Frame Number OFDM" on page 37

[:SOURce<hw>]: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").

Return values:

<N> N8D7 | N86D75 | N144D125 | N316D275 | N57D50 | N28D25

*RST: N8D7

Example: `BB:WIM:OFDM:N`
queries the factor n.
`Response: "N8D7"`
the factor n is 8/7.

Usage: Query only

Manual operation: See "Sampling Ratio n OFDM" on page 35

[:SOURce<hw>]:BB:WIMax:OFDM:POWer:REFerence <Reference>

The command selects the level reference.

Parameters:

<Reference> BURSt | PREamble

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.

*RST: BURSt

Example: `BB:WIM:OFDM:POW:REF BURS`
the instruments level setting refers to the mean power of FCH or bursts with a burst power setting of 0 dB.

Manual operation: See "Power Reference" on page 32

[:SOURce<hw>]:BB:WIMax:OFDM:PREamble:MODE <Mode>

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.

Parameters:

<Mode> OFF | LONG | SHORt

*RST: LONG

Example: `BB:WIM:OFDM:PRE:MODE SHOR`
enables generation of a short preamble for the frame.

Manual operation: See "Frame Preamble OFDM" on page 36

[:SOURce<hw>]:BB:WIMax:OFDM:SRATe <SRate>

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 `[:SOURce<hw>]:BB:WIMax:OFDM:FBANd`). 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 MHz 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.

Parameters:

<SRate> float

Range: 1.44E6 to 32E6
Increment: 0.001E6
*RST: 2E6

Example: `BB:WIM:OFDM:SRAT 2E6`
Sets a sampling rate of 2 MHz.

Manual operation: See "Sampling Rate OFDM" on page 35

[:SOURce<hw>]:BB:WIMax:OFDM:SUBChannel:INDex <Index>

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.

Parameters:

<Index> SUBC1 | SUBC2 | SUBC3 | SUBC4 | SUBC5 | SUBC6 | SUBC7 | SUBC8 | SUBC9 | SUBC10 | SUBC11 | SUBC12 | SUBC13 | SUBC14 | SUBC15 | SUBC16 | SUBC17 | SUBC18 | SUBC19 | SUBC20 | SUBC21 | SUBC22 | SUBC23 | SUBC24 | SUBC25 | SUBC26 | SUBC27 | SUBC28 | SUBC29 | SUBC30 | SUBC31

*RST: SUBC16

Example: `BB:WIM:OFDM:SUBC:IND SUBC4`
selects subchannel set 4 to be used.

Manual operation: See "Subchannel Index OFDM" on page 36

[:SOURce<hw>]:BB:WIMax:OFDM:SUBChannel[:COUNt] <Count>

The command selects the number of subchannels for 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.

Parameters:

<Count> SC1 | SC2 | SC4 | SC8 | SC16

*RST: SC16

Example: `BB:WIM:OFDM:SUBC:COUN SC4`
Selects four subchannels to be used.

Manual operation: See "No. of Used Subchannels OFDM" on page 36

[:SOURce<hw>]:BB:WIMax:OFDM:TGTB <Tgtb>

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.

Parameters:

<Tgtb> TGTB1D4 | TGTB1D8 | TGTB1D16 | TGTB1D32

*RST: TGTB1D4

Example: `BB:WIM:OFDM:TGTB TGTB1D8`
sets a ratio of 1 to 8.

Manual operation: See "Tg/Tb Ratio OFDM" on page 36

[:SOURce<hw>]:BB:WIMax:OFDM:UCD <Ucd>

Sets the value for the UCD count.

This command is available in uplink only.

Parameters:

<Ucd> integer

Range: 0 to 255
*RST: 0

Example: `BB:WIM:OFDM:UCD 255`
sets the value for the UCD count to 255.

Manual operation: See "UCD Count OFDM" on page 47

[:SOURce<hw>]:BB:WIMax:OFDM:ULMap:CREate <Filename>

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 files are stored with the extension `*.dm_iqd`.

This command is available in uplink only.

Setting parameters:

<Filename> string

Example: `BB:WIM:OFDM:ULM:CRE 'ul-map_zone1'`
Saves the current UL-map to the file `ul-map_zone1`.

Usage: Setting only

Manual operation: See "Save UL-MAP Data OFDM" on page 47

List of commands

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