IEEE 802.16 WiMAX Digital Standard for R&S®Signal Generators

Operating Manual

1171.5277.12 ─ 16

Test & Measurement

Operating Manual

ROHDE&SCHWARZ

This document describes the following software options:

- R&S®SMBV-K49
  1415.8119.xx
- R&S®SMU-K49
  1161.0366.02
- R&S®AMU-K49
  1402.7002.02
- R&S®SMATE-K49
  1404.6803.02
- R&S®SMJ-K49
  1404.1101.02

This manual version corresponds to firmware version:
FW 3.20.281.xx and later of the R&S®SMBV100A
FW 2.20.360.142 and later of the R&S®SMU200A, R&S®SMATE200A, R&S®SMJ100A and R&S®AMU200A

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The following abbreviations are used throughout this manual: R&S®SMBV100A is abbreviated as R&S SMBV, R&S®SMU200A is abbreviated as R&S SMU, R&S®AMU200A is abbreviated as R&S AMU, R&S®SMATE200A is abbreviated as R&S SMATE, R&S®SMJ100A is abbreviated as R&S SMJ, 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 Preface

1.1 Documentation Overview

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

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

Online Help

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

Quick Start Guide

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

Operating Manuals

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

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

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

Service Manual

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

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

Release Notes

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

Web Help

The web help provides online access to the complete information on operating the R&S Signal Generator and all available options, without downloading. The content of the web help corresponds to the user manuals for the latest product version.

The web help is available on the R&S Signal Generator product page at the Downloads > Web Help area.

Application Notes

Application notes, application cards, white papers and educational notes are further publications that provide more comprehensive descriptions and background information.

The latest versions are available for download from the Rohde & Schwarz website, at http://www.rohde-schwarz.com/appnotes.

1.2 Conventions Used in the Documentation

1.2.1 Typographical Conventions

The following text markers are used throughout this documentation:

Convention	Description
"Graphical user interface elements"	All names of graphical user interface elements on the screen, such as dialog boxes, menus, options, buttons, and softkeys are enclosed by quotation marks.
KEYS	Key names are written in capital letters.

Convention	Description
`File names, commands, program code`	File names, commands, coding samples and screen output are distinguished by their font.
Input	Input to be entered by the user is displayed in italics.
Links	Links that you can click are displayed in blue font.
"References"	References to other parts of the documentation are enclosed by quotation marks.

1.2.2 Notes on Screenshots

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

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.

1.2.3 Naming of Software Options

In this operating manual, we explicitly refer to options required for specific functions of the digital standard.

The name of software options for signal generators vary in the name of the instrument, but the option name is identical. Therefore we use in this manual the placeholder R&S SMx/AMU.

Example:

Naming for an option of the vector signal generator R&S SMBV100A, e.g:

- R&S SMx/AMU-K99, stands for R&S SMBV-K99

The particular software options available for the corresponding instruments are listed on the back of the title page.

2 Introduction

The R&S SMx/AMU-K49 provides you with the ability to generate signals in accordance with the Institute of Electrical and Electronics Engineers (IEEE 802.16-2004) standard.

To playback a signal from a waveform file created by the simulation software R&S WinIQSIM2, the corresponding R&S WinIQSIM2 digital standard option must be installed.

WiMAX is a wireless metropolitan-area network technology that provides interoperable broadband wireless connectivity to fixed and portable users. It provides up to 50 kilometers of service area, allows users to get broadband connectivity without the need of direct line-of-sight to the base station, and provides total data rates up to 75 Mbps - enough bandwidth to simultaneously support hundreds of businesses and homes with a single base station.

The R&S Signal Generator generates the IEEE 802.16 WiMAX signals in the arbitrary waveform mode; the signal is first calculated and then output.

The R&S Signal Generator simulates IEEE 802.16 WiMAX at the physical level.

Supported features include:

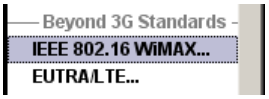
- Configuration of OFDM (orthogonal frequency division multiplexing) and OFDMA (orthogonal frequency division multiple access) physical layer mode.
- Downlink and Uplink mode.
- Pre-defined settings for receiver tests.
- All frame duration settings defined by the standard, including a "user" mode with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

Table 2-1: Parameters of the modulation system IEEE 802.16 WiMAX

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

Digital standard 802.16-2004	**meets IEEE Std 802.16™-2004/Cor2/D4 and 802.16e-2005**
Sampling rate	1.5 – 32 MHz, depending on channel bandwidth
Tg / Tb settings	¼, 1/8, 1/16, 1/32
FFT size	128, 512, 1024 or 2048
Subcarrier Permutation	PUSC, FUSC (downlink only), AMC 2x3, Sounding (uplink only)
Nr. Of bursts per frame	0 – 64
Modulation & CC rates	QPSK ½, QPSK ¾, 16-QAM ½, 16-QAM ¾, 64-QAM ½, 64-QAM 2/3, 64-QAM ¾, 64-QAM 5/6
Data	all 0 , all 1, pattern (up to 64 bit), PN 9 to PN 23, data lists
Burst power range	-80 dB - +10 dB
MAC functions	One generic MAC header + CRC available per burst
Parameters in OFDMA - WiBro Mode (identical to OFDMA)	
Duplexing	TDD
Level reference	Subframe RMS Power or preamble level (downlink only)
Frequency bands	ETSI, MMDS, WCS, U-NII, WiBro, User
Channel bandwidth	1.25 – 30 MHz, depending on selected frequency band
Sampling rate	1.5 – 32 MHz, depending on channel bandwidth
Tg / Tb settings	¼, 1/8, 1/16, 1/32
FFT size	128, 512, 1024 or 2048
Subcarrier Permutation	PUSC, FUSC (downlink only), AMC 2x3, Sounding (uplink only)
Nr. Of bursts per frame	0 – 64
Modulation & CC rates	QPSK ½, QPSK ¾, 16-QAM ½, 16-QAM ¾, 64-QAM ½, 64-QAM 2/3, 64-QAM ¾, 64-QAM 5/6
Data	all 0 , all 1, pattern (up to 64 bit), PN 9 to PN 23, data lists
Burst power range	-80 dB - +10 dB
MAC functions	One generic MAC header + CRC available per burst

3 WiMAX User Interface

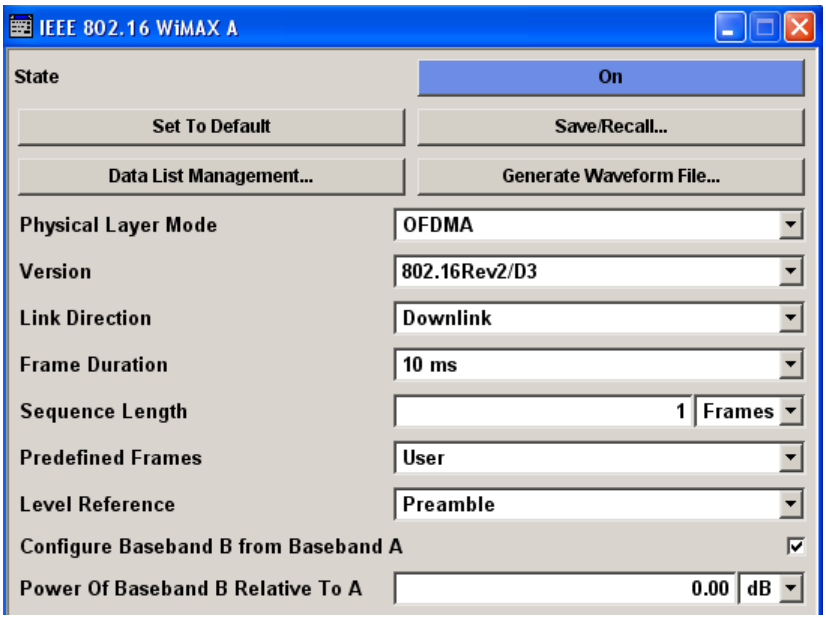


The dialog for setting the IEEE 802.16 WiMAX digital standard is either called from the baseband block or from the dialog tree under "Baseband".

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

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

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



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

3.1 General Settings for WiMAX Signals

This dialog provides access to the default and the "Save/Recall" settings, and displays the valid WiMaX version and the physical layer mode. The choice of link direction and duplexing determines which parameters are available.

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

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

Remote command:
`[:SOURce<hw>]:BB:WIMax:STATe` on page 116

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
Duplexing	TDD
Link Direction	Downlink
Frame Duration	10 ms
Sequence Length	1 frame
Predefined Frames	User
Level Reference	FCH/Burst
Clipping	Off
OFDM mode	
Frequency Band	ETSI
Channel Bandwidth	1.75 MHz
Sampling Rate	2.00 MHz
BSID (4 LSBs)	0
Tg/Tb	1/4
Nr. of used Subchannels	16 (all)
Frame Preamble	Long

Parameter	Value
FCH Configuration	On, Auto mode, Frame Number Offset = 0 and Configuration Change Count = 0
Nr. of Bursts	1
OFDMA mode	
Frequency Band	ETSI
Channel Bandwidth	1.75 MHz
Sampling Rate	2.00 MHz
n =	8/7
Tg/Tb	1/4
FFT Size	2048
Subcarrier Permutation	PUSC
Subchannel 0 ... 59 State	ON
OFDMA - WiBro mode	
Frequency Band	WiBro
Channel Bandwidth	8.75 MHz
Sampling Rate	10 MHz
n =	8/7
Tg/Tb	1/8
FFT Size	1024
Subcarrier Permutation	PUSC
Subchannel 0 … 59 State	ON
Frame Duration	5 ms

Remote command:
`[:SOURce<hw>]:BB:WIMax:PRESet` on page 114

Save/Recall
Calls the "Save/Recall" dialog.

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

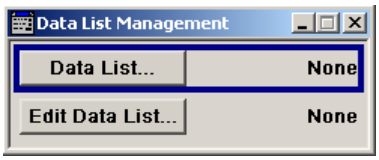
IEEE 802.16 WiMAX configurations are stored as files with the predefined file extension `*.wimax`. The file name and the directory they are stored in are user-definable.

The complete settings in the "IEEE 802.16 WiMAX" dialog are saved and recalled.

"Recall WiMAX Setting"	Opens the "File Select" window for loading a saved IEEE 802.16 WiMAX configuration. The configuration of the selected (highlighted) file is loaded by pressing the "Select" button.
"Save WiMAX Setting"	Opens the "File Select" window for saving the current IEEE 802.16 WiMAX signal configuration. The name of the file is specified in the "File name" entry field, the directory selected in the "save into" field. The file is saved by pressing the "Save" button.
"File Manager"	Calls the "File Manager". The "File Manager" is used to copy, delete, and rename files and to create new directories.

Remote command:
`[:SOURce<hw>]:BB:WIMax:SETTing:CATalog?` on page 114
`[:SOURce<hw>]:BB:WIMax:SETTing:LOAD` on page 115
`[:SOURce<hw>]:BB:WIMax:SETTing:STORe` on page 115
`[:SOURce<hw>]:BB:WIMax:SETTing:DELete` on page 115

Data List Management…
Calls 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 file name 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 160
[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:DATA:DSELect on page 160
[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:DATA on page 199
[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:DATA:DSELect on page 199
[:SOURce<hw>]:BB:WIMax:OFDM:FCH:DATA on page 208
[:SOURce<hw>]:BB:WIMax:OFDM:FCH:DATA:DSELect on page 209

Generate Waveform File…
Calls the "Generate Waveform" dialog. This dialog is used to store the current WiMAX signal as ARB signal in a waveform file.

This file can be loaded in the "ARB" dialog and processed as multicarrier or multisegment signal.

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

Remote command:
[:SOURce<hw>]:BB:WIMax:WAVeform:CREate on page 117

Physical Layer Mode
Selects the physical layer mode.

The settings of the frame are provided in the subdialog "Frame Configuration" (see Frame Configuration OFDM) 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 sub-channels. A single client or subscriber station might transmit using all of the sub-channels within the carrier space, or multiple clients might transmit with each using a portion of the total number of sub-channels simultaneously. OFDMA thus enables a more flexible use of resources. It can support nomadic and mobile operation.

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

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

- 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 112

Version
Selects the version of the standard to use.

"802.16 Rev2/D3" Selecting "802.16 Rev2/D3" ensures 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 117

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. It is recommended to 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 111

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 112

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 112

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 112

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 117

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 111

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 116

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 by the user.

Remote command:
`[:SOURce<hw>]:BB:WIMax:OFDM:FRAMe:PREDefined` on page 211
`[:SOURce<hw>]:BB:WIMax:AOFDm:FRAMe:PREDefined` on page 140

Level Reference
Selects the level reference.

"FCH / Burst (OFDM only)"
The instrument's level setting refers to the mean power of FCH (Frame Control Header) or bursts with a burst power setting of 0 dB. To obtain the absolute burst power value, the burst power value has to be added to the level value.

"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 212
`[:SOURce<hw>]:BB:WIMax:AOFDm:POWer:REFerence` on page 142

Use Baseband A+B
(Available only in path A of two-path instruments and for OFDMA and OFDMA-WIBro Physical Layer Mode)

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

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

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

Example:

1. Configure baseband A to generate one SISO zone (set the parameter "Space-Time Coding Mode" to off for this zone)

2. Configure one additional STC zone with antenna 0 (parameter "Space-Time Coding Antenna" set to Antenna 0).

3. Enable parameter "Use Baseband A+B".

4. Switch on baseband A .

4.1 Baseband B is automatically activated.

4.2 Baseband A generates preamble, SISO zone and STC zone with antenna 0.

4.3 Baseband B omits preamble and SISO zone and generates the STC zone with antenna 1.

For STC modes with 4 antennas, using antenna 0 in baseband A generates antenna 1 in baseband B. Using antenna 2 in baseband A generates antenna 3 in baseband B. A two-path instrument can either provide antennas 0 & 1 or antennas 2 & 3.

Remote command:
`[:SOURce<hw>]:BB:WIMax:PATH:COUPling[:STATe]` on page 113

Power Of Baseband B Relative to A
(Available only in path A of two-path instruments and enabled parameter Use Baseband A+B)

This parameter sets the relative power offset of path B compared to the power level of the path A.

A value of 0 dB refers to the level set in the main RF level setting of the instrument.

Negative values lower the level of baseband B, i.e. the level of Baseband A matches the main level setting, Baseband B is offset by the set amount. The level display of path B is however not changed.

Positive values lower the level of baseband A, i.e. the level of Baseband B matches the main level setting, Baseband A is offset by the set amount. The level display of path A is however not changed.

Remote command:
`[:SOURce<hw>]:BB:WIMax:PATH:COUPling[:STATe]` on page 113
`[:SOURce<hw>]:BB:WIMax:PATH:COUPling:POFFset` on page 113

Frame Configuration
Accesses the dialog for configuration of the frame.

The dialog depends on the selected physical layer mode, see chapter 3.2, "Frame Configuration OFDM", on page 24 and chapter 3.10, "Frame Configuration OFDMA", on page 41.

Remote command:
n.a.

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

The dialog is described in chapter 3.25, "Filter / Clipping Settings", on page 95

Remote command:
n.a.

Trigger/Marker
(R&S SMx and R&S AMU instruments only)

Calls the dialog for selecting the trigger source, for configuring the marker signals and for setting the time delay of an external trigger signal (see chapter 3.26, "Trigger/Marker/Clock Settings", on page 99).

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

Remote command:
n.a.

Execute Trigger
Executes trigger manually.

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

Remote command:
`[:SOURce<hw>]:BB:WIMax:TRIGger:EXECute` on page 124

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

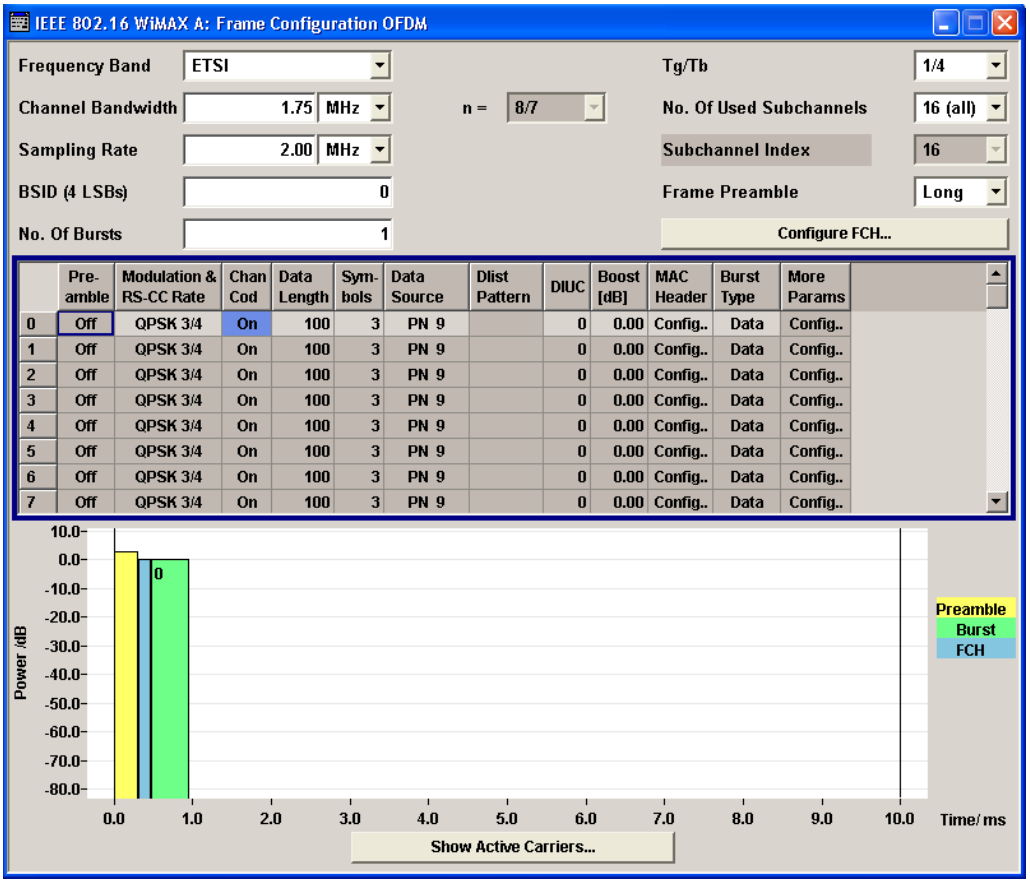
Calls the dialog for selecting the clock source and for setting a delay (see chapter 3.26.4, "Clock Settings", on page 106).

Remote command:
n.a.

3.2 Frame Configuration OFDM

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

The dialog shows the parameters and graph for downlink direction.



3.2.1 Frame Configuration Common Settings

Provided are the following 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 Norm by the European Telecommunications Standards Institute applies.
The range is 1.75 to 28 MHz for the channel bandwidth and 2 to 32 MHz for the sampling rate.

"MMDS" The frequency band as defined by the"Multichannel Multipoint Distribution Service" applies. The RF frequency range is 2500 to 2686 MHz.
The range is 1.50 to 24 MHz for the channel bandwidth and 1.72 to 27.52 MHz for the sampling rate.

"WCS" The frequency band as defined by the "Wireless Communication Service" applies. It is in the 2.3 GHz band of the electromagnetic spectrum from 2305 to 2320 MHz and 2345 to 2360 MHz.
The range is 2.5 to 15 MHz for the channel bandwidth and 2.88 to 17.28 MHz for the sampling rate.

"U-NII" The frequency band as defined by the "Unlicensed National Information Infrastructure" applies. It is in the 5 GHz band of the electromagnetic spectrum from 5150 to 5350 GHz and 5750 to 5825 GHz.
The range is 10 to 20 MHz for the channel bandwidth and 11.52 to 23.04 MHz for the sampling rate.

"User" This mode is provided for choosing any other channel bandwidth / sampling rate combination.
The range is 1.25 to 28 MHz for the channel bandwidth and 1.44 to 32 MHz for the sampling rate.

Remote command:
`[:SOURce<hw>]:BB:WIMax:OFDM:FBANd` on page 208

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

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

- For channel bandwidths
  - that are a multiple of 1.75 MHz then n = 8/7
  - that are a multiple of 1.5 MHz then n = 86/75
  - that are a multiple of 1.25 MHz then n = 144/125
  - that are a multiple of 2.75 MHz then n = 316/275
  - that are a multiple of 2.0 MHz then n = 57/50
- else for channel bandwidths not otherwise specified then n = 8/7

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

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

Remote command:
`[:SOURce<hw>]:BB:WIMax:OFDM:BW` on page 207

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 212

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 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 213

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 198

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 207

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 215

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 214

Subchannel Index OFDM
Selects the subchannel index in subchannelization mode.

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

Remote command:
[:SOURce<hw>]:BB:WIMax:OFDM:SUBChannel:INDex on page 214

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 213

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 212

Configure FCH OFDM
Accesses the dialog for configuring FCH mode and parameters (see chapter 3.4, "FCH Configuration Downlink OFDM", on page 33).

Remote command:
n.a.

Generate UL-MAP...
Accesses the dialog for generating the UL-Map, see chapter 3.7, "UL-MAP Configuration Downlink OFDM", on page 38.

Remote command:
n.a.

3.2.2 Burst Table

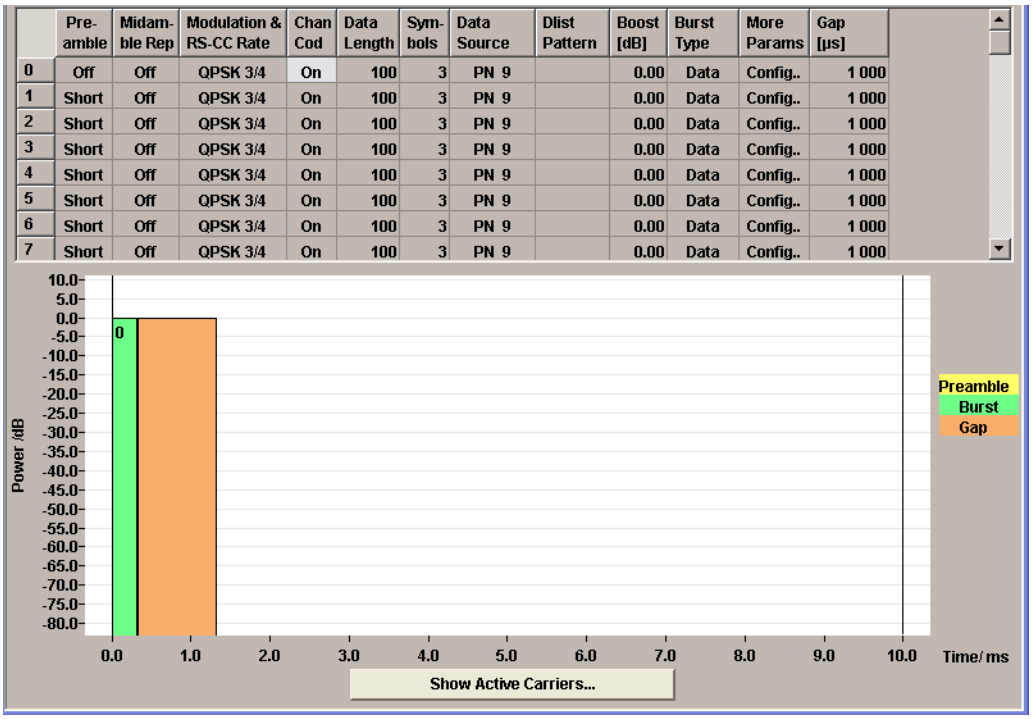
The "burst table" is located in the lower part of the dialog. The burst table is where the individual burst parameters are set. A graphic display below the table shows length, position and power of all configured bursts within the frame

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

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

Some setting parameters vary depending on the transmission direction.

The graph below shows the table in uplink 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 205

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 204

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 202

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 very high crest factors of the signal.

Remote command:
`[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:CCODing:STATe` on page 199

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 200

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 206

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 "Main Dialog > Data List Management".

Remote command:
`[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:DATA` on page 199
`[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:DATA:PATTern` on page 200
`[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:DATA:DSELect` on page 199

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 200

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 equals Level + BurstPower.

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

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

Remote command:
`[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:POWer` on page 205

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 from Data, DL-MAP, UL-MAP or Ranging.

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

"DL-MAP" A DL-MAP is generated, taking into account all active bursts.

The DL-MAP fields are filled with the following parameters:

- DCD COUNT
- Set to "Configuration Change Count" from the FCH panel
- "Base Station ID"
  Set to BSID from the Frame Configuration panel
- "CID"
  Set to CID from the MAC header panel for each burst
- "DIUC"
  Set to DIUC from the burst table for each burst
- "Preamble present"
  Set to 1 if a burst preamble is present
- "Start Time"
  Set to burst start time in OFDM symbols, relative to frame start

"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 206

More Parameter OFDM – WiMAX
Accesses the dialog for configuring additional parameters for the bursts, see chapter 3.8, "More Parameters Uplink OFDM", on page 39.

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.

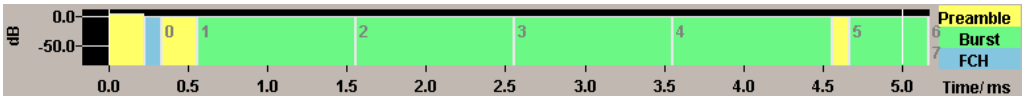
Remote command:
`[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:GAP` on page 202

3.2.3 Frame Burst Graph OFDM

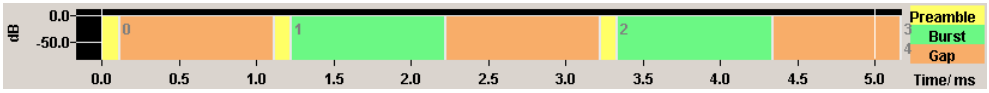
The frame graph indicates the configuration of one frame. The scaling of the X-axis is always adapted to the set frame duration. The preamble length, FCH length and the burst length are drawn to scale. The height of the bar represents the relative power. The power of the preamble is always +3 dB and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

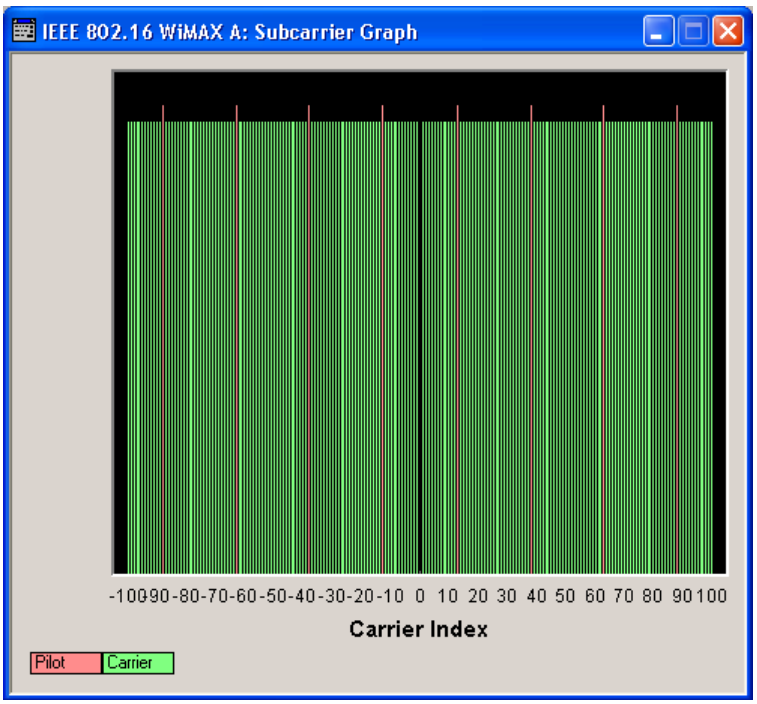


- In *uplink direction* each burst starts with a preamble. The first gap at the beginning of the frame is determined by the Downlink Subframe Duration (specified in the main dialog), the following gaps are defined by the gap value specified for the associated burst in the burst table.



3.3 Active Carrier Graph OFDM

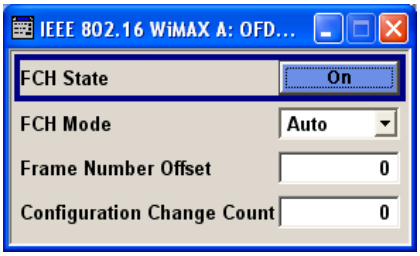
The Active Carrier graph is reached via the "Show Active Carrier" button at the Bottom of the "Frame Configuration" subdialog.



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

3.4 FCH Configuration Downlink OFDM

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



Provided are the following settings:

FCH State OFDM
Activates the FCH.

Remote command:
`[:SOURce<hw>]:BB:WIMax:OFDM:FCH:STATe` on page 211

FCH Mode OFDM
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 in Frame Number Offset below. For the following frames, this number will increase by 1 per frame
- Configuration_Change_Count
  Set to the value specified below
- Rate_ID
  The Rate ID parameter of the first burst is set according to its modulation setting
- DIUC
  The DIUC value for the second, third and fourth burst is taken from the DIUC value in the burst table
- Preamble Present
  Set to 1 when the burst preamble is activated for the corresponding burst
- Length
  Set to the calculated number of symbols of the corresponding burst
- HCS
  The Header Check Sequence is automatically calculated

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

Remote command:
`[:SOURce<hw>]:BB:WIMax:OFDM:FCH:MODE` on page 210

Frame Number Offset FCH OFDM
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 210

Configuration Change Count FCH OFDM
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 208

Data Source FCH OFDM
Specifies the data source in User mode.

The FCH contents are filled from the selected data source.

The following standard data sources are available:

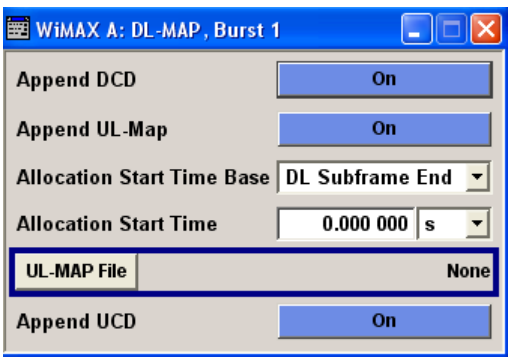
- "All 0, All 1"
  An internally generated sequence containing 0 data or 1 data.
- "PNxx"
  An internally generated pseudo-random noise sequence.
- "Pattern"
  An internally generated sequence according to a bit pattern.
  Use the "Pattern" box to define the bit pattern.
- "Data List/Select DList"
  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 "Main Dialog > Data List Management".

Remote command:
[:SOURce<hw>]:BB:WIMax:OFDM:FCH:DATA on page 208
[:SOURce<hw>]:BB:WIMax:OFDM:FCH:DATA:PATTern on page 210
[:SOURce<hw>]:BB:WIMax:OFDM:FCH:DATA:DSELect on page 209

3.5 DL-MAP Configuration Downlink OFDM

The "DL-MAP Configuration" dialog is accessed via the "More Params" button in the OFDM burst table for burst type DL-MAP. The DL-MAP is only available in OFDM downlink mode.



Provided are the following 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 201

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 202

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

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

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

Remote command:
`[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:DLMap:AMODe` on page 201

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 201

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

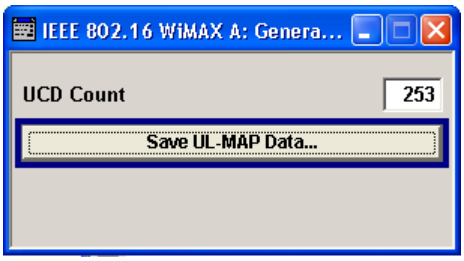
Remote command:
n.a.

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 201

3.6 Generate UL-MAP Uplink OFDM

The "Generate UL-MAP" dialog is reached via the "Generate UL-MAP..." button in the frame configuration dialog.



Provided are the following settings:

UCD Count OFDM
Sets the value for the UCD count.

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

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

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

The saved `*.dm_iqd` file is in the data list format and contains a UL-MAP that describes the current uplink subframe.

The following list shows the parameters the UL-MAP is composed of:

- 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

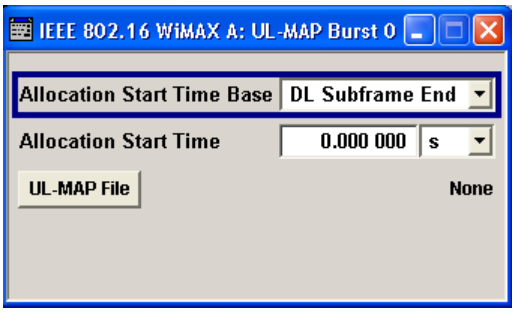
- 1. Switch to uplink mode
- 2. Define the layout of the uplink subframe by setting a number of bursts and specifying the parameters above for each burst
- 3. Select Generate UL-MAP and save the UL-MAP to a file
- 4. Switch to downlink mode
- 5. Set one of the downlink bursts to Burst Type UL-MAP
- 6.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

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

Remote command:
`[:SOURce<hw>]:BB:WIMax:OFDM:ULMap:CREate` on page 215

3.7 UL-MAP Configuration Downlink OFDM

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



Provided are the following settings:

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

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

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

Remote command:
`[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:ULMap:AMODe` on page 206

Allocation Start Time
Sets the Allocation Start Time in the UL-MAP.

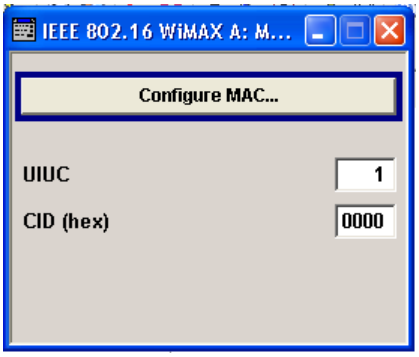
Remote command:
`[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:ULMap:ATIMe` on page 207

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

Remote command:
n.a.

3.8 More Parameters Uplink OFDM

The "More parameters" dialog is accessed via the OFDM burst table.



Provided are the following settings:

Configure MAC
Accesses the dialog for configuring the MAC header panel for the selected burst. This dialog is described in chapter 3.9, "MAC Header Configuration OFDM", on page 39

Remote command:
n.a.

UIUC OFDM
Sets the specific UIUC.

Remote command:
[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:UIUC on page 206

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.

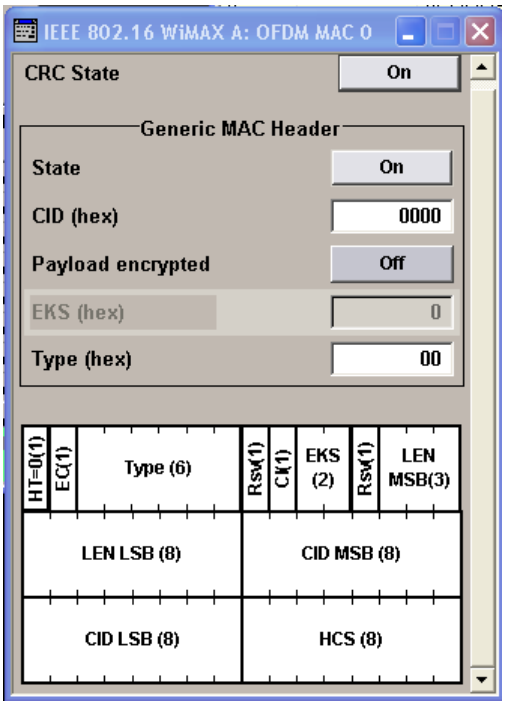
Remote command:
[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:MAC:CID on page 203

3.9 MAC Header Configuration OFDM

The "MAC" dialog is reached via the "Configure MAC"... button of the "More Parameters dialog" of the burst table.

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

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



Provided are the following 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 203

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

Remote command:
`[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:MAC:STATe` on page 204

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 203

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 204

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 203

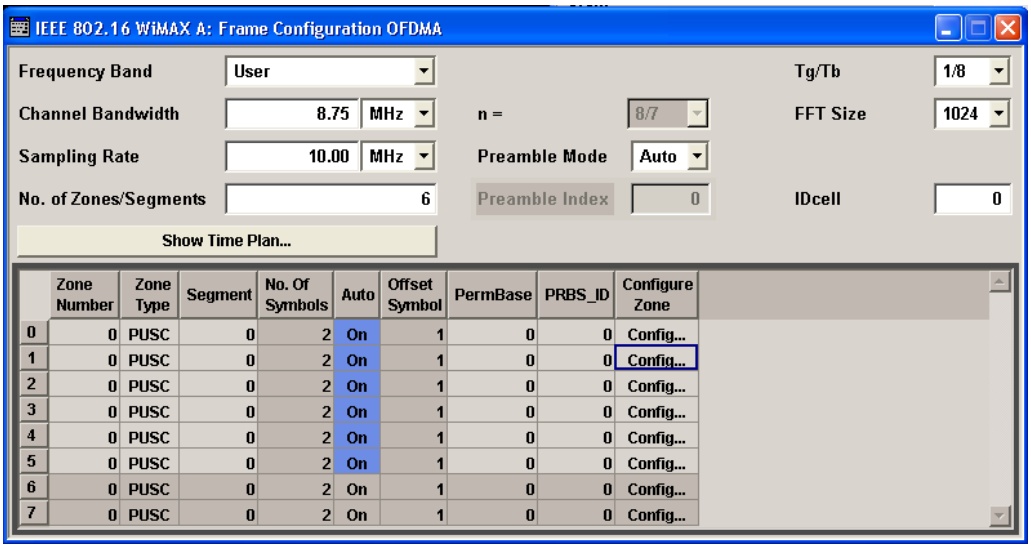
Mac Type
Specifies the MAC type.

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 204

3.10 Frame Configuration OFDMA

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



3.10.1 Frame Configuration Common Settings

Provided are the following 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 European Telecommunications Standards Institute applies.
The range is 1.75 to 28 MHz for the channel bandwidth and 2 to 32 MHz for the sampling rate.

"MMDS" The frequency band as defined by the "Multichannel Multipoint Distribution Service" applies. The RF frequency range is 2500 to 2686 MHz.
The range is 1.50 to 24 MHz for the channel bandwidth and 1.68 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 to 2320 MHz and 2345 to 2360 MHz.
The range is 2.5 to 15 MHz for the channel bandwidth and 2.8 to 16.8 MHz for the sampling rate.

"U-NII" The frequency band as defined by the "Unlicensed National Information Infrastructure" applies. It is in the 5 GHz band of the electromagnetic spectrum from 5150 to 5350 GHz and 5750 to 5825 GHz.
The range is 10 to 20 MHz for the channel bandwidth and 11.2 to 22 MHz for the sampling rate.

"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 to 28 MHz for the channel bandwidth and 1.4 to 32 MHz for the sampling rate.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:FBANd` on page 140

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

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

- For channel bandwidths
  - that are a multiple of 1.75 MHz then n = 8/7
  - that are a multiple of 1.5 MHz then n = 28/25
  - that are a multiple of 1.25 MHz then n = 28/25
  - that are a multiple of 2.75 MHz then n = 28/25
  - that are a multiple of 2.0 MHz then n = 28/25
- else for channel bandwidths not otherwise specified then n = 8/7

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

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

Remote command:
[:SOURce<hw>]:BB:WIMax:AOFDm:BW on page 139

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 142

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 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 143

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 144

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

"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 143

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 143

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 144

FFT Size OFDMA
Selects the FFT size.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:FFT` on page 140

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

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

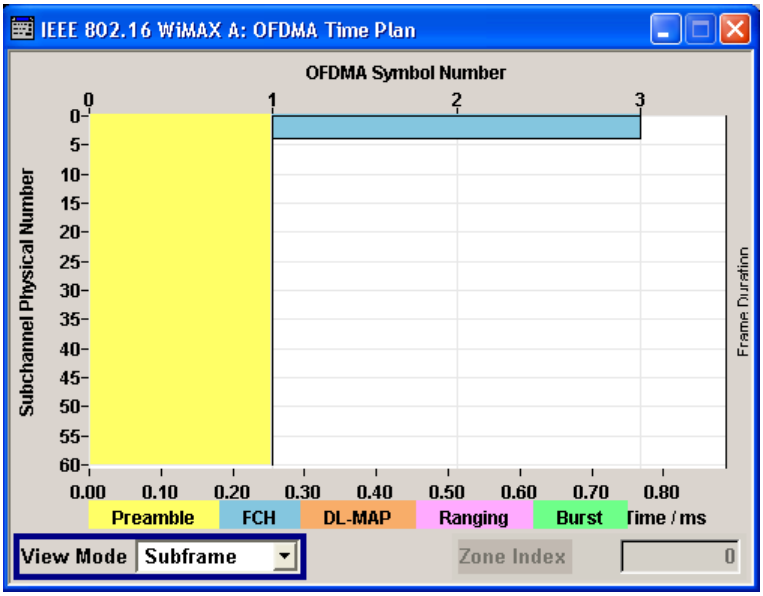
Show Time Plan OFDMA
Calls the graphical display of the OFDMA Time Plan (see chapter 3.10.2, "Time Plan", on page 44).

Remote command:
n.a.

3.10.2 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 of the diagram and the time in ms relative to frame/zone start on the bottom of the diagram. The vertical line on the right side shows the frame boundary. The y-axis indicates the physical/logical subchannel numbers.

The bursts are numbered with ZoneIndex.



Time Plan View Mode OFDMA
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.

3.10.3 Zone Table

The "Zone table" is located in the lower part of the dialog. The zone table is where the individual zone parameters are set.

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

Zone Index OFDMA
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 147

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

Remote command:
[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:TYPE on page 196

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 149

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 157

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

Remote command:
[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SYMBol:COUNt:AUTO
on page 157

Offset Symbol OFDMA
Displays the symbol offset of the zone.

Remote command:
[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SYMBol:OFFSet? on page 158

PermBase OFDMA
Selects the PermBase of the zone.

Remote command:
[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:PERMbase on page 147

PRBS_ID OFDMA
Selects the PRBS_ID of the zone.

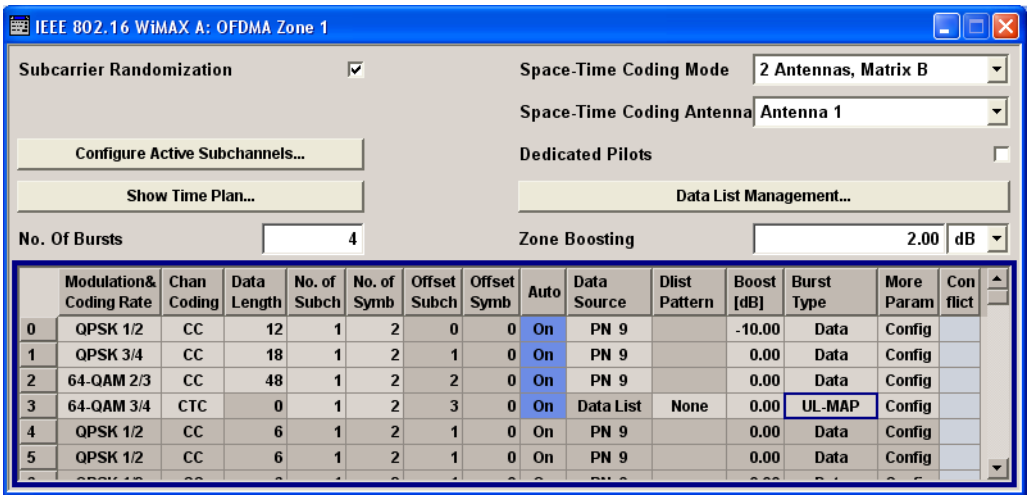
Remote command:
[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:PRBSid on page 148

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

Remote command:
n.a.

3.11 Zone Configuration OFDMA

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



3.11.1 OFDMA Common Zone Settings

Provided are the following 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 148

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 195

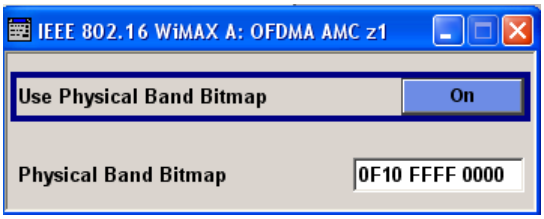
CSTD..
(Available for STC Mode CSTD only)

Calls the dialog for configuring the Cyclic Shift Transmit Diversity (seechapter 3.13, "CSTD OFDMA", on page 61).

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.

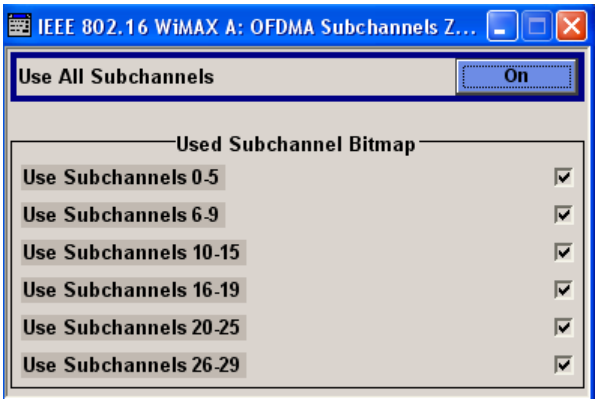
Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:AMC:BITMap[:STATe]`
on page 145

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 will not be used for allocating bursts.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:AMC:BITMap:PATTern`
on page 144

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 195

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

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:SUBChannel<ch>:MAP` on page 196

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

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

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:SUBChannel:PATTern` on page 195

Show Time Plan OFDMA
Accesses the graphical display of the OFDMA Time Plan (see chapter 3.10.2, "Time Plan", on page 44).

Remote command:
n.a.

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 190

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 4 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 157

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 156

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 or not bursts are active on these subchannels.

Remote command:
[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:PILDedicated on page 148

Data List Management…
Accesses the "Data List Management" dialog, used to create and edit a data list.

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 157

Zone Boosting OFDMA
Sets an additional zone boosting in dB.

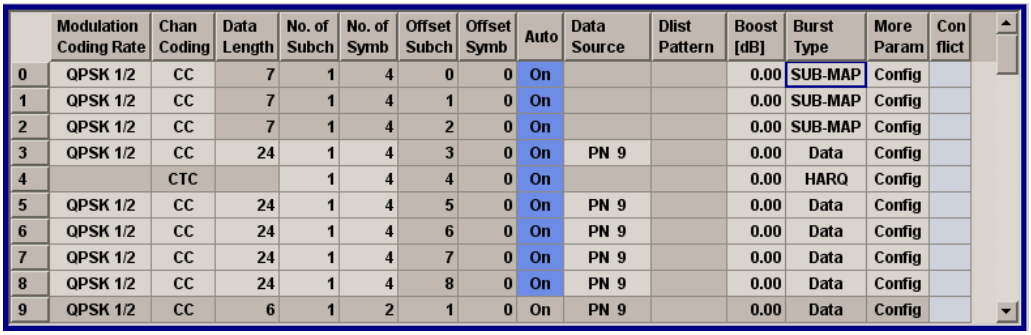
The zone boosing is applied to both the data and pilot carriers.

Remote command:
[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:BOOSt on page 145

3.11.2 Burst Table

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

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



	Modulation Coding Rate	Chan Coding	Data Length	No. of Subch	No. of Symb	Offset Subch	Offset Symb	Auto	Data Source	Dlist Pattern	Boost [dB]	Burst Type	More Param	Con flict
0	QPSK 1/2	CC	7	1	4	0	0	On			0.00	SUB-MAP	Config	
1	QPSK 1/2	CC	7	1	4	1	0	On			0.00	SUB-MAP	Config	
2	QPSK 1/2	CC	7	1	4	2	0	On			0.00	SUB-MAP	Config	
3	QPSK 1/2	CC	24	1	4	3	0	On	PN 9		0.00	Data	Config	
4		CTC		1	4	4	0	On			0.00	HARQ	Config	
5	QPSK 1/2	CC	24	1	4	5	0	On	PN 9		0.00	Data	Config	
6	QPSK 1/2	CC	24	1	4	6	0	On	PN 9		0.00	Data	Config	
7	QPSK 1/2	CC	24	1	4	7	0	On	PN 9		0.00	Data	Config	
8	QPSK 1/2	CC	24	1	4	8	0	On	PN 9		0.00	Data	Config	
9	QPSK 1/2	CC	6	1	2	1	0	On	PN 9		0.00	Data	Config	

Provided are the following 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 165

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 159

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 specified by "No. of Subch" and "No. of Symb" in downlink mode and "Duration [Slots]" in uplink mode. Thus, the Data Length can be lower than the burst's allocated number of bytes.

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

Remote command:
[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:DATA:LENGth on page 161

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 defined by "No. of Subch" and "No. of Symb" with data so that no padding has to be applied. The data length can be lowered afterwards if data bytes less than the allocated number shall be read from the data source.

Remote command:
[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:SUBChannel[:COUNt] on page 184

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

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

Remote command:
[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:SYMBol[:COUNt] on page 184

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 184

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 176

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 176

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 175

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 "Main Dialog > Data List Management".

Remote command:
[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:DATA
on page 160
[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:DATA:PATTern
on page 161
[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:DATA:DSELect
on page 160

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 182

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, taking into account 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 panel. 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 185

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.

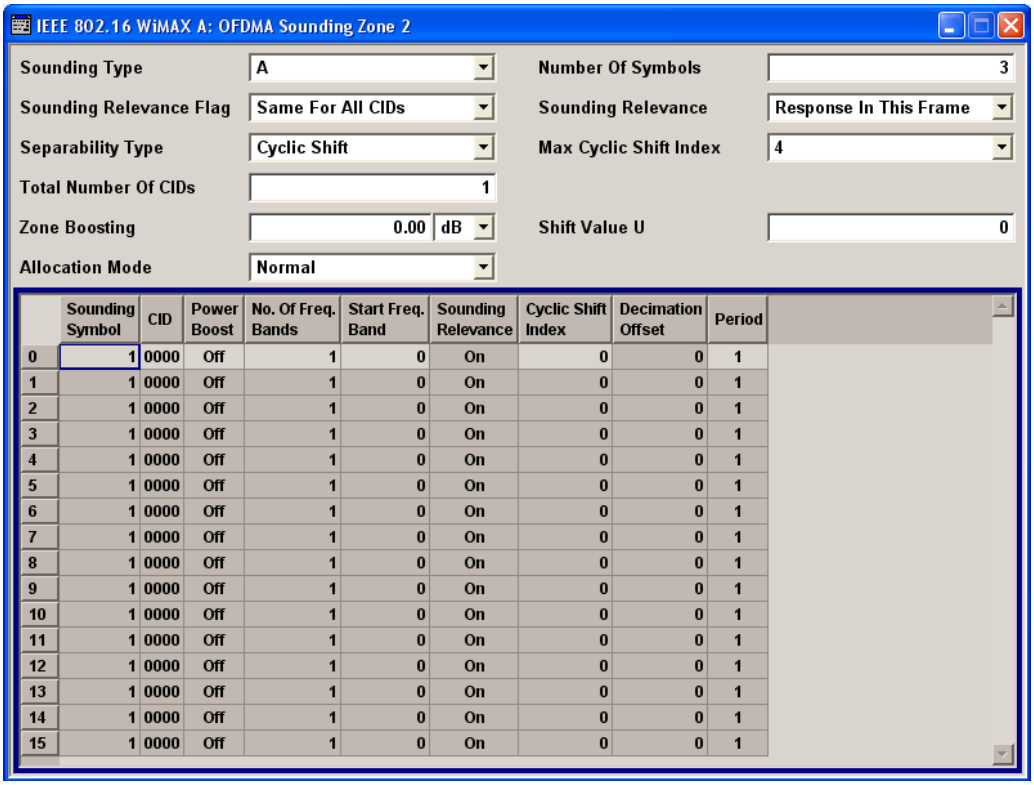
Conflict OFDMA
Indicates a conflict between the settings of the bursts.

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 159

3.12 Sounding Zone Configuration OFDMA

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



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

3.12.1 OFDMA Sounding Zone Settings

Provided are the following settings:

Sounding Type OFDMA
Selects either sounding type A or B.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SOUNding:TYPE` on page 156

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 155

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 155

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 149

Zone Boosting OFDMA
Sets an additional zone boosting in dB.

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

Remote command:
[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:BOOSt on page 145

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 149

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 157

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 155

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 153

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 155

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 154

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 154

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 154

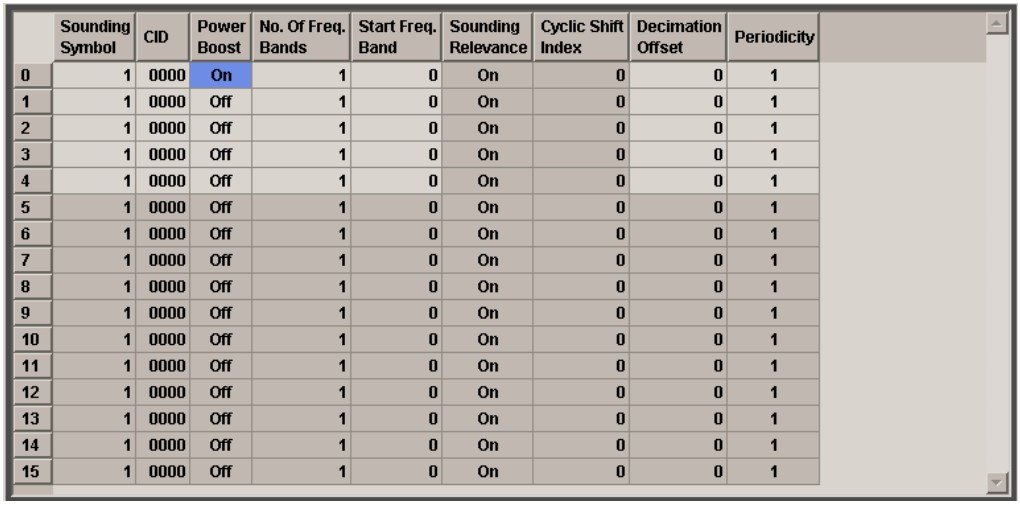
Shift Value U OFDMA
(only for sounding type A)

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 156

3.12.2 Sounding Table

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



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

Sounding Index OFDMA
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 153

CID OFDMA
Sets the CID (connection control identifier).

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SOUNding:CID<ch0>:CID` on page 150

Power Boost OFDMA
Activates/deactivates the power boost.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SOUNding:CID<ch0>:POWer[:STATe]` on page 152

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 151

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 151

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 150

Sounding Relevance
Activates/deactivates the sounding relevance.

Remote command:
[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SOUNding:CID<ch0>:RELevance[:STATe] on page 152

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 150

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 151

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 152

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 153

Offset Subch
(only for Sounding Type B)

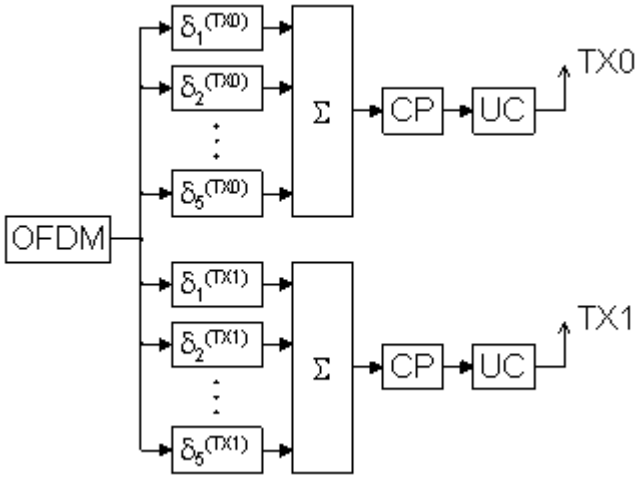
Sets the subchannel offset.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SOUNding:CID<ch0>:SUBChannel:OFFSet` on page 152

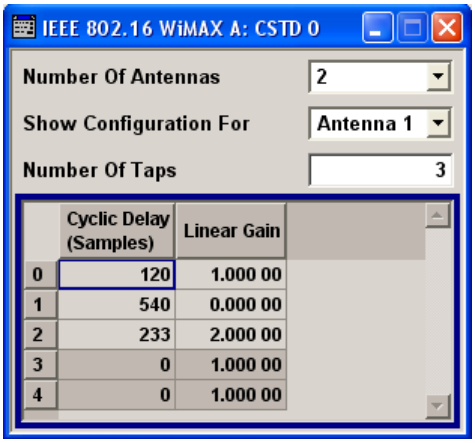
3.13 CSTD OFDMA

The "CSTD" dialog is reached via the "CSTD" button in the OFDMA zone configuration dialog. The CSTD is only available in downlink for STC Mode set to CSTD.

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.



Provided are the following 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 145

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

This parameter selects which antenna to configure with the parameters below. The antenna actually generated by the current baseband is selected with "Space-Time Coding Antenna" in the zone configuration dialogue.

Remote command:
n.a.

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 146

Cyclic Delay (Samples) OFDMA
Sets the cyclic delay with that the OFDM symbols of the selected antenna will be 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" will send the same OFDM symbol as the other antennas, but 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 146

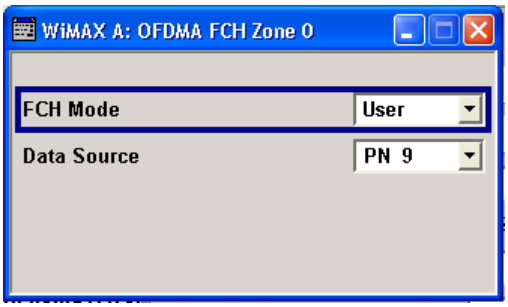
Liner Gain OFDMA
Sets a linear gain factor for the corresponding tap.

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 146

3.14 FCH Configuration Downlink OFDMA

The "FCH Configuration" dialog is accessed via the "More Param" button in the OFDMA burst table. It contains the parameters required to configure the FCH options in OFDMA mode. The FCH is only available in downlink mode.



Provided are the following 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. This enables any arbitrary data to be sent with the FCH burst. 24 bits are read from the data source, these bits are repeated once to form 48 bits. The FCH is transmitted with QPSK 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 147

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 "Main Dialog > Data List Management".

Remote command:

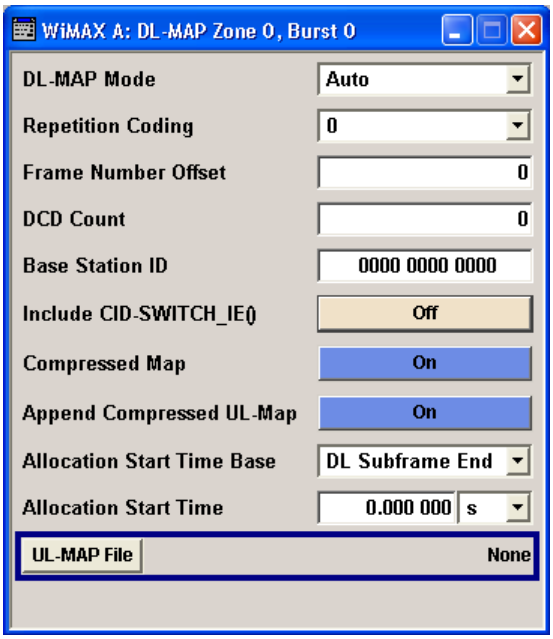
[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:DATA
on page 160

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:DATA:PATTern
on page 161

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:DATA:DSELect
on page 160

3.15 DL-MAP Configuration Downlink OFDMA

The DL-MAP "Configuration" dialog is accessed via the "More Param" button in the OFDMA burst table. The DL-MAP is only available in OFDMA downlink mode.



Provided are the following 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. This 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 194

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 194

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 193

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 192

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 190

Configure MAC OFDMA
Calls the dialog for configuring the Mac header panel for the DL-MAP (Refer to chapter 3.23, "MAC Header Configuration OFDMA", on page 90)

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 193

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 193

DCD CID OFDMA
(only if Append DCD is ON)

Enters the value for the DCD CID.

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

Remote command:
[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:DLMap:DCD:CID on page 192

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 191

Append Compressed UL-Map OFDMA
(only if Compressed Map is 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 192

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

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

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

Remote command:
[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:DLMap:COMPressed:AMODe
on page 190

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 191

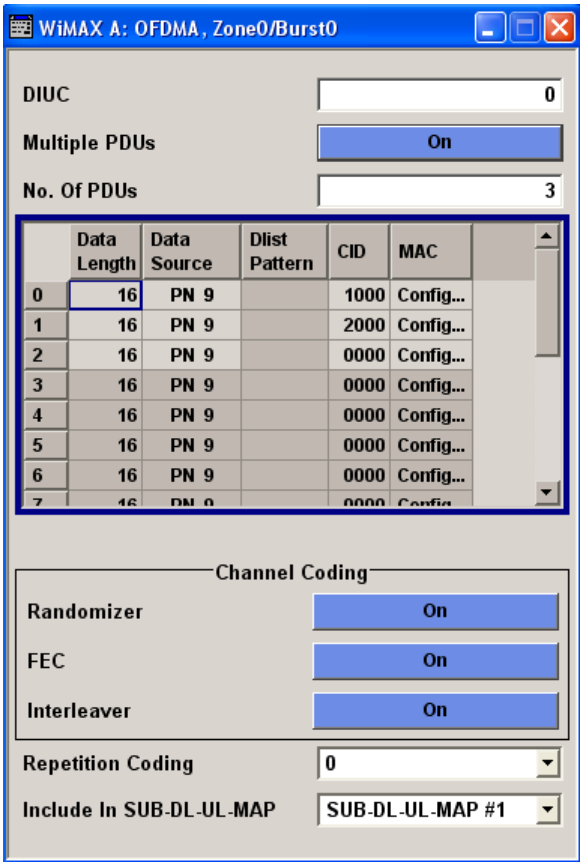
UL-MAP File OFDMA
Access the dialog for selecting the UL-MAP file.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:DLMap:COMPressed:ULMap:DSELect` on page 191

3.16 Data Configuration OFDMA

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

The "Data Configuration" dialog is accessed via the "More Param" button in the OFDMA burst table.



3.16.1 OFDMA Data Configuration Settings

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

Provided are the following 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 161

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 186

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 177

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 176

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 174
[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:MAC:CID on page 170

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 159

FEC
Activates or deactivates the FEC.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:CCODing:FEC` on page 158

Interleaver
Activates or deactivates the interleaver state.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:CCODing:INTerleaver` on page 158

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 159

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 184

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 163

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 185

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 185

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 186

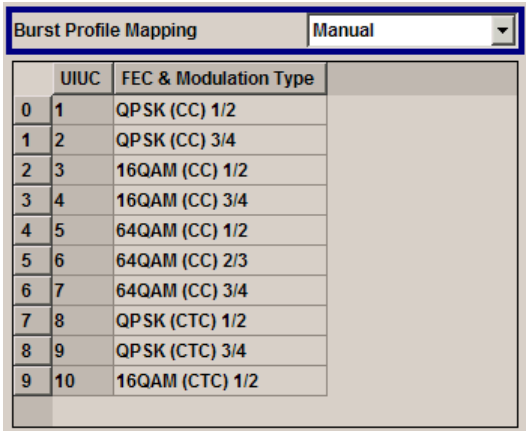
Request Backoff End
(only for burst type UCD)

Sets the end value for the request backoff.

Remote command:
[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:UCD:REQuest:BOENd on page 186

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 181

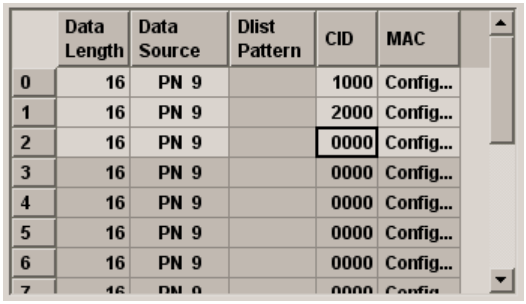
FEC & Modulation Type ← Burst Profile Mapping
(only for burst type UCD and DCD and manual Burst Profile Mapping)

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 181
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:PMAP:UMODulation<dir0>` on page 181

3.16.2 PDU Table

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



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

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.

Provided are the following 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 178

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 "Main Dialog > Data List Management".

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:PDU<dir0>:DATA` on page 177
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:PDU<dir0>:DATA:DSELect` on page 178
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:PDU<dir0>:DATA:PATTern` on page 178

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.

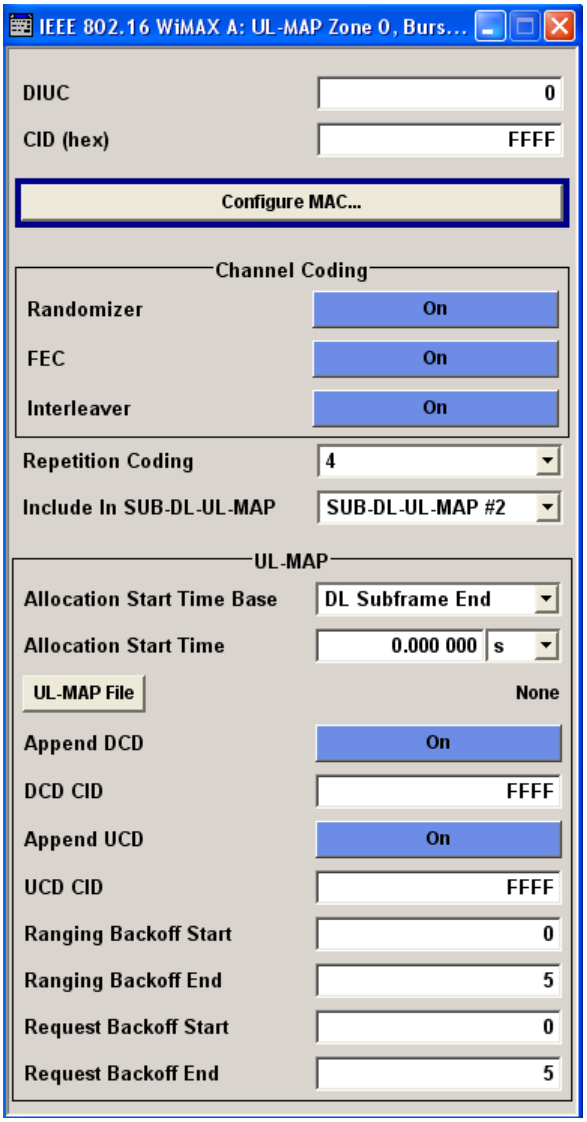
Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:PDU<dir0>[:MAC]:CID` on page 180

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.

3.17 UL-MAP Configuration Downlink OFDMA

The "UL-MAP" Configuration dialog is accessed via the "More Param" button in the OFDMA burst table. The DL-MAP is only available in OFDMA downlink mode.



Provided are the following 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 161

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 174
[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:MAC:CID on page 170

Configure MAC
Acesses the dialog for configuring the MAC header panel for the selected burst. (Refer to chapter 3.23, "MAC Header Configuration OFDMA", on page 90.)

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 159

FEC
Activates or deactivates the FEC.

Remote command:
[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:CCODing:FEC on page 158

Interleaver
Activates or deactivates the interleaver state.

Remote command:
[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:CCODing:INTerleaver on page 158

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 159

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 163

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

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

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

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:ULMap:AMODe` on page 187

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 187

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 188

DCD CID OFDMA
(only if Append DCD is ON)

Enters the value for the DCD CID.

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

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:ULMap:DCD:CID` on page 187

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 190

UCD CID OFDMA
(only if Append DCD is ON)

Enters the value for the UCD CID.

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

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:ULMap:UCD:CID` on page 189

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 188

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 188

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

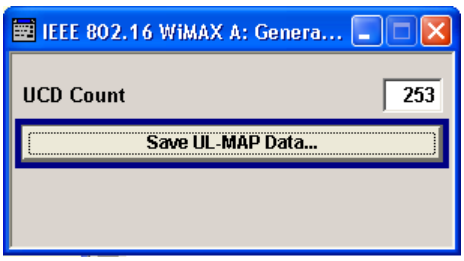
Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:ULMap:REQuest:BOSTart` on page 189

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 189

3.18 Generate UL-MAP Uplink OFDMA

The "Generate UL-MAP" dialog is accessed via the "Generate UL-MAP".. button in the zone configuration dialog.



Provided are the following settings:

UCD Count OFDMA
Sets the value for the UCD count.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:UCD` on page 196

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

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

The saved `*.dm_iqd` file is in data list format and contains a UL-MAP that describes the current uplink zone.

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

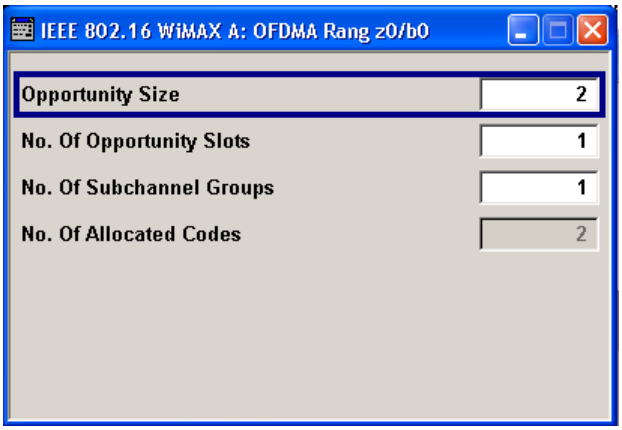
The downlink zone is then transmitting a UL-MAP that specifies the uplink structure defined in uplink mode before.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:ULMap:CREate` on page 197

3.19 Ranging Uplink OFDMA

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

The "Ranging" dialog is accessed via the "More Param" button in the OFDMA burst table in uplink mode. It contains the parameters required to configure the ranging options in OFDMA mode.



Provided are the following 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 183

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 183

No. Of Subchannel Groups
Sets the number of subchannel groups used in the ranging allocation. In PUSC mode, 6 subchannels form one subchannel group.

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

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

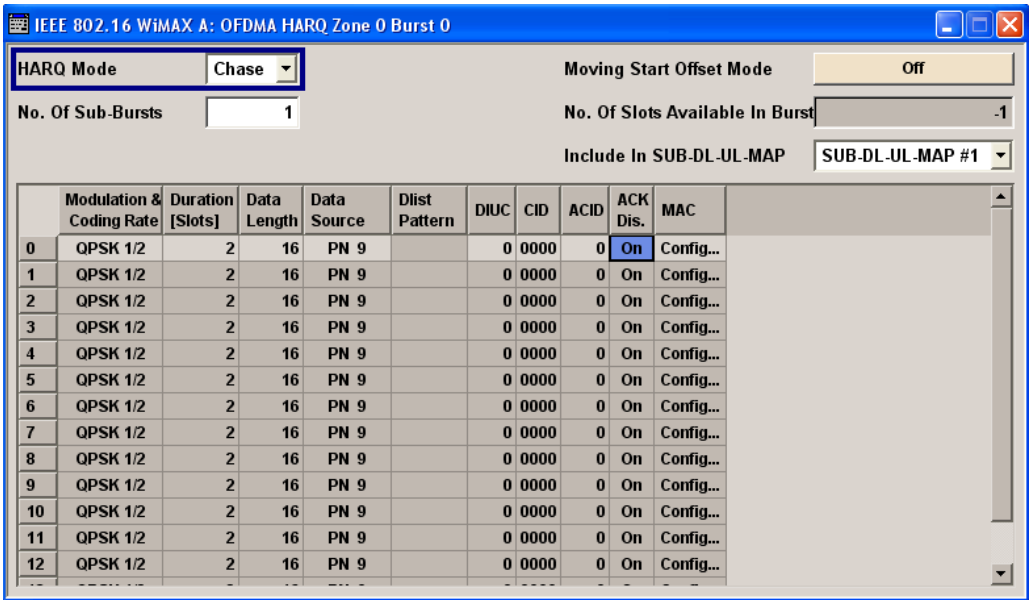
Consecutive codes of opportunity sizes 3 and 4 are not taken into account.

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

3.20 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.

The "HARQ Configuration" dialog is accessed via the "More Param" button in the OFDMA burst table. HARQ bursts are only available with CTC channel coding.



3.20.1 OFDMA HARQ Settings

Provided are the following settings:

HARQ Mode
Selects the mode of the HARQ burst.

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

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

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ:MODE`
on page 165

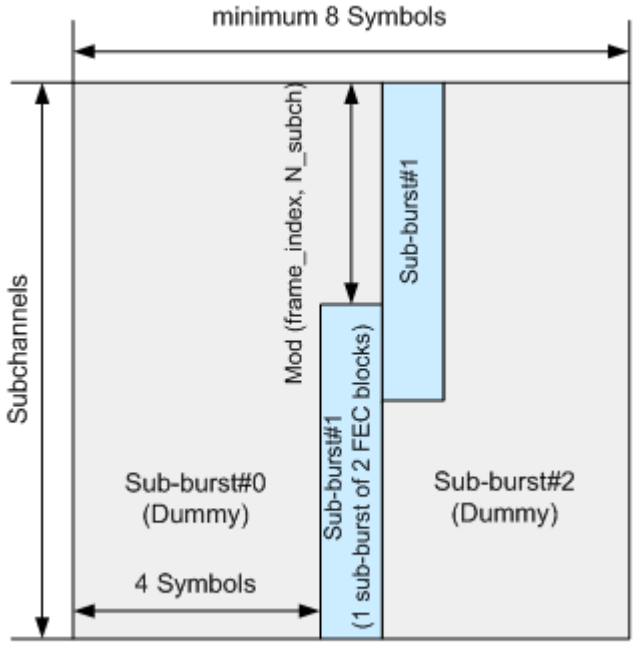
No. Of Sub-Bursts
Sets the number of sub-bursts in the HARQ bust. Each HARQ burst allocated in the Zone Configuration panel can be divided into up to 15 sub-bursts. The length of each sub-burst is set by the "Duration [Slots]" parameter.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ:COUNt`
on page 165

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 ForumTM Mobile Radio Conformance Test".



DL Subframe (HARQ DL MAP)

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

- 1. 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 2 FEC blocks).
- 2. 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 4 symbols.
- 3. Configure the second subburst to the desired length
- 4. Configure the length of the third subburst such that it fills the remaining space.
- 5. Enable Moving Start Offset Mode
- 6. Select a desired number of frames (longer than 1 frame).
- **Result:**
  The Signal Generator automatically modifies the length of the first and third subbursts such that the second one moves it's start position with every frame according to the MRCT requirement (mod(frame_index, N_subch)).
  The dummy bursts will be 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 166

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 166

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 163

3.20.2 HARQ Sub-burst Table

The parameters in the HARQ sub-burst 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	64-QAM 5/6	2	16	PN 9		0	0000	3	On	Config...
1	QPSK 1/2	2	16	PN 9		0	0000	0	On	Config...
2	QPSK 1/2	2	16	PN 9		0	0000	0	On	Config...
3	QPSK 1/2	2	16	PN 9		0	0000	0	On	Config...

- HARQ IR Mode

	Packet Size[Bits]	Duration [Slots]	Modulation	Rate	Data Length	Data Source	Dlist Pattern	CID	ACID	SPID Sequence	ACK Dis.	MAC
0	144	2	16-QAM	3/8	16	PN 9		0000	3	0	On	Config...
1	144	2	16-QAM	3/8	16	PN 9		0000	0	0	On	Config...
2	144	2	16-QAM	3/8	16	PN 9		0000	0	0	On	Config...
3	144	2	QPSK		16	PN 9		0000	0		On	Config...

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

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

Remote command:
n.a.

Modulation & Coding Rate
(for HARQ Chase Mode only)

Sets the sub-burst modulation and coding rate.

Remote command:
[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:MODRate on page 172

Packet Size [Bits]
(for HARQ IR Mode only)

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

Remote command:
[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:PSIZe on page 172

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

Remote command:
[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:SLOTcount on page 173

Modulation
(for HARQ IR Mode only)

Displays the sub-burst 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 170

Rate
(for HARQ IR Mode only)

Displays the sub-burst 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 173

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

Remote command:
[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:DLENgth on page 169

Data Source
Selects data source for the selected sub-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 "Main Dialog > Data List Management".

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:DATA` on page 167
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:DATA:PATTern` on page 169
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:DATA:DSELect` on page 168

DIUC
(for HARQ Chase Mode only)

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

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:DIUC` on page 169

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 174
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:MAC:CID` on page 170

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

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:ACID` on page 167

SPID Sequence
(for HARQ IR Mode only)

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

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

Example:

SPID sequence: 0,1,2

Sequence Length set in the main panel: 10 frames.

The following sequence is output:

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

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:SPID` on page 173

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

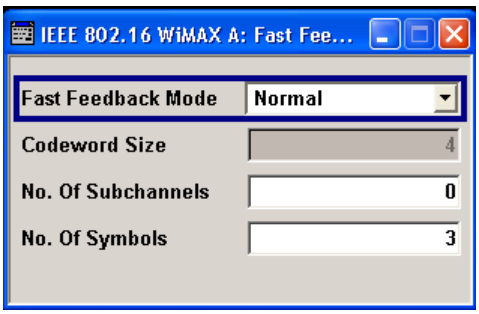
Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:ACKD` on page 167

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

Remote command:
n.a.

3.21 Fast Feedback Configuration OFDMA

The "Fast Feedback Configuration" dialog is accessed via the More "Param button" in the OFDMA burst table.



Provided are the following settings:

Fast Feedback Mode
Selects the fast feedback mode.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:FFB:MODE`
on page 164

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. If the length of the data source is smaller than the number of bits required by codeword size, number of slots in the allocation and configured sequence length, reading the data source is restarted from the beginning.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:FFB:CWSize?`
on page 164

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

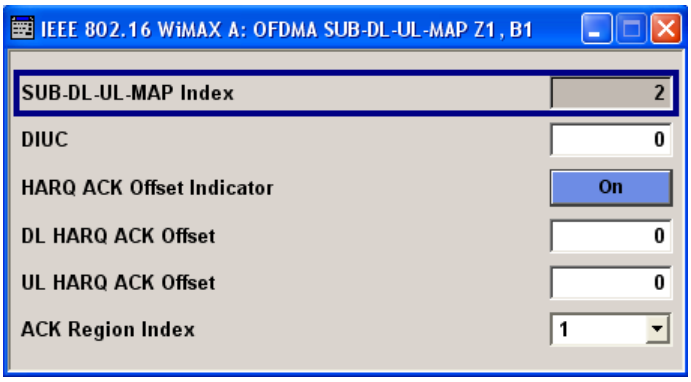
Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:FFB:SUBC`
on page 164

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 164

3.22 SUB-DL-UL-MAP Configuration OFDMA

The "SUB-DL-UL-MAP Configuration" dialog is accessed via the "More Param" button in the OFDMA burst table.



Provided are the following 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 163

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 161

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 162

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 162

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 163

ACK Region Index
Selects whether ACK region 0 or 1 will be used.

Remote command:
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:DLUL:ARIX` on page 162

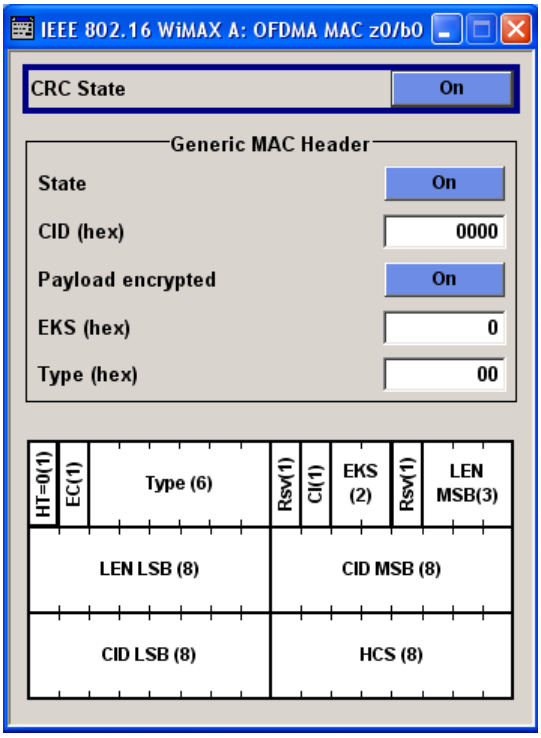
3.23 MAC Header Configuration OFDMA

The "MAC" dialog is accessed via the "Configure MAC ..." button located in the "More Param" panel.

This dialog is also used to configure the generich MAC header for HARQ. The"HARQ MAC" dialog is reached via the "Config"... button located in the sub-burst table (see chapter 3.20, "HARQ Configuration OFDMA", on page 81).

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

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



CRC State
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 174
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:MAC:CRC:STATe` on page 170

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 175
`[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:MAC:STATe` on page 171

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 174
[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:MAC:CID on page 170

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 174
[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:MAC:ENCRypted:STATe on page 171

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 174
[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:MAC:EKS on page 171

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.

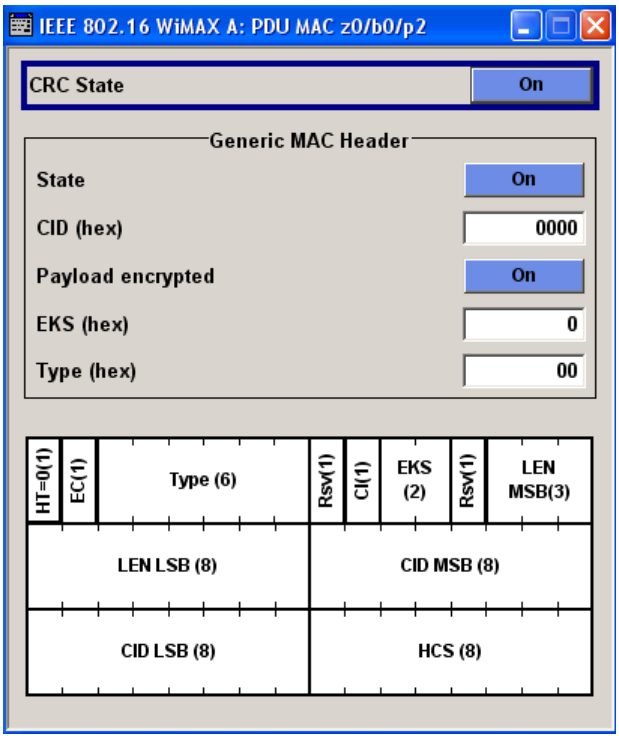
Remote command:
[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:MAC:TYPE on page 175
[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:MAC:TYPE on page 172

3.24 PDU MAC Configuration OFDMA

The "PDU MAC" dialog is reached via the "Configure MAC" button located in the "PDU Table".

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

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



Provided are the following 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 179

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 180

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 180

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 179

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 179

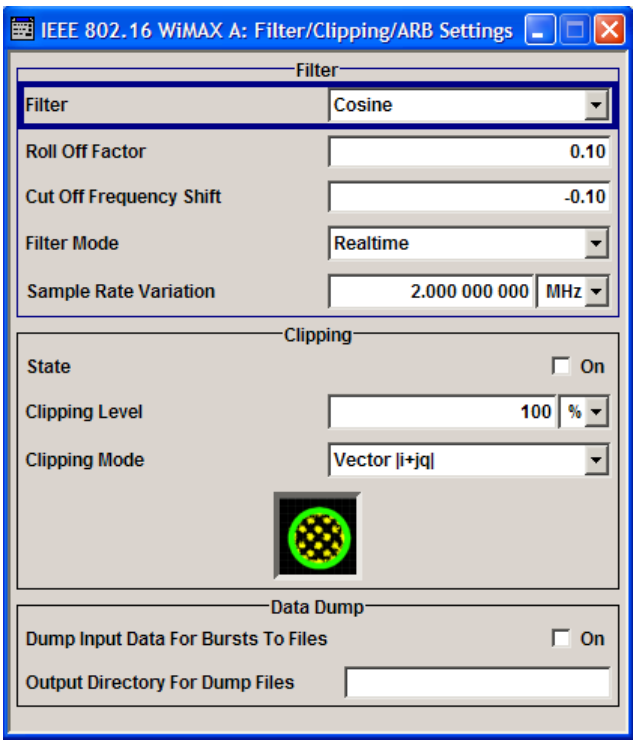
Mac Type (PDU)
Specifies the MAC type.

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 180

3.25 Filter / Clipping Settings

► To access this dialog, select "Main dialog > Filter/Clipping Settings".



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

3.25.1 Filter Settings

Provided are the following settings:

Filter
Selects the baseband filter.

Remote command:
`[:SOURce<hw>]:BB:WIMax:FILTer:TYPE` on page 120

Roll Off Factor or BxT
Sets the filter parameter.

The filter parameter offered ("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.

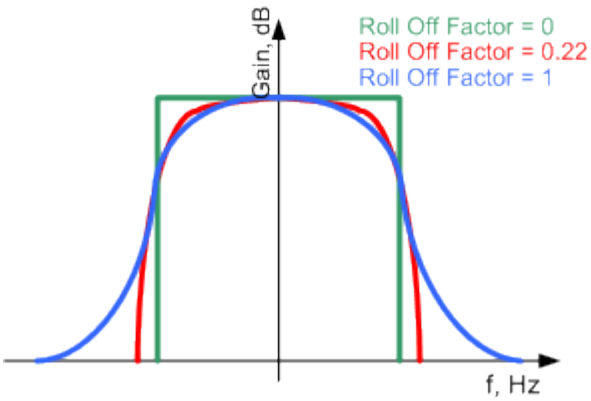


Fig. 3-1: Example of the frequency response of a filter with different Roll Off Factors

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

Remote command:

`[:SOURce<hw>]:BB:WIMax:FILTer:PARameter:APCO25` on page 120
`[:SOURce<hw>]:BB:WIMax:FILTer:PARameter:COSine` on page 120
`[:SOURce<hw>]:BB:WIMax:FILTer:PARameter:GAUSs` on page 121
`[:SOURce<hw>]:BB:WIMax:FILTer:PARameter:PGAuss` on page 122
`[:SOURce<hw>]:BB:WIMax:FILTer:PARameter:RCOSine` on page 122
`[:SOURce<hw>]:BB:WIMax:FILTer:PARameter:SPHase` on page 123

Cut Off Frequency Shift
(available for filter parameter Cosine only)

The cut off 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 cut off frequency and reach spectrum mask requirements.

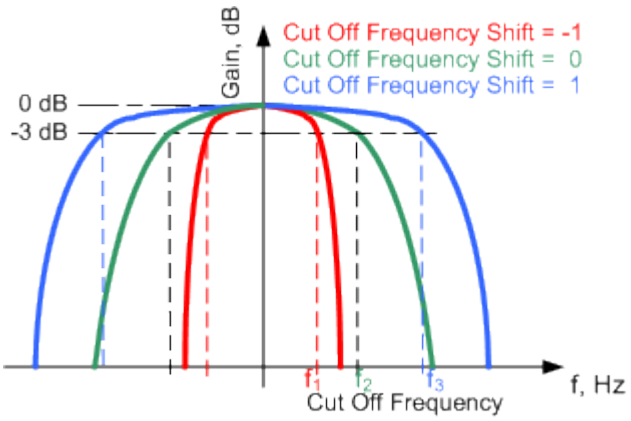


Fig. 3-2: Example of the frequency response of a filter with different Cut Off Frequency Shift

Remote command:
`[:SOURce<hw>]:BB:WIMax:FILTer:PARameter:COSine:COFS` on page 121

Cut Off Frequency Factor
Sets the value for the cut off frequency factor. The cut off frequency of the filter can be adjusted to reach spectrum mask requirements.

Remote command:
`[:SOURce<hw>]:BB:WIMax:FILTer:PARameter:LPASs` on page 121
`[:SOURce<hw>]:BB:WIMax:FILTer:PARameter:LPASSEVM` on page 122

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 120

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 123

3.25.2 Clipping Settings

Provided are the following settings:

Clipping State
Switches baseband clipping on and off.

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

Remote command:
`[:SOURce<hw>]:BB:WIMax:CLIPping:STATe` on page 119

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 118

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

"Vector | i + q |" 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 119

3.25.3 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 is output to files named `data_frameXXXX_zoneY_burstZZ.dat`, where `XXXX` specifies the frame number, `Y` the zone index and `ZZ` the burst index. The files contain all data including MAC header and CRC in ASCII hex format, MSB left. Read the files from left to right.

Remote command:
`[:SOURce<hw>]:BB:WIMax:BDUMp:STATe` on page 118

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`).

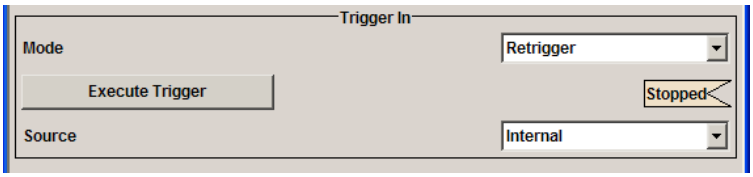
Remote command:
`[:SOURce<hw>]:BB:WIMax:BDUMp:DIRectory` on page 118

3.26 Trigger/Marker/Clock Settings

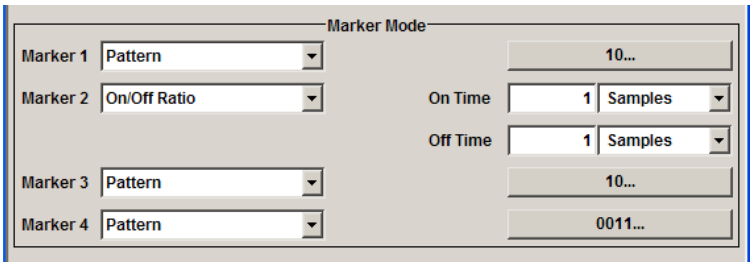
The trigger, clock, and marker delay functions are available for R&S SMx and R&S AMU instruments only.

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

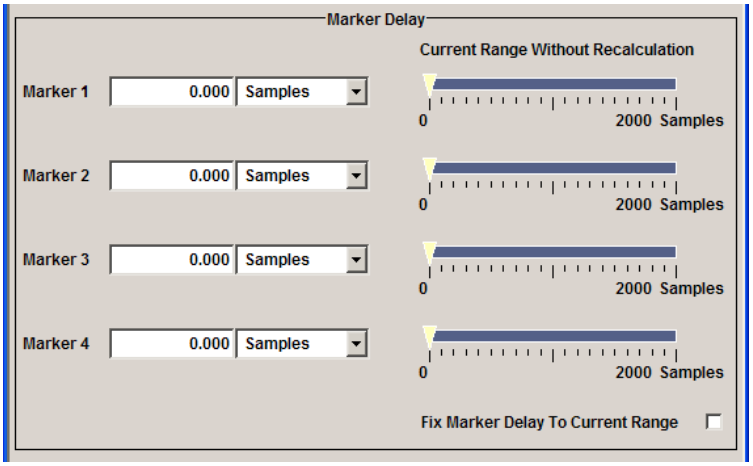
The "Trigger In" section is where the trigger for the signal is set. Various parameters will be provided for the settings, depending on which trigger source - internal or external - is selected. The current status of signal generation ("Running" or "Stopped") is indicated for all trigger modes.



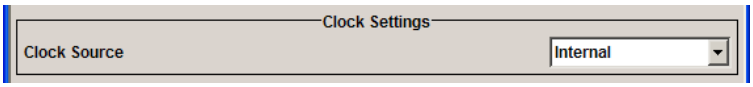
The "Marker Mode" section is where the marker signals at the MARKER output connectors are configured.



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



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



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

3.26.1 Trigger In

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

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

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

- "Auto"
  The signal is generated continuously.
- "Retrigger"
  The signal is generated continuously. A trigger event (internal or external) causes a restart.
- "Armed_Auto"

The signal is generated only when a trigger event occurs. Then the signal is generated continuously.
An "Arm" stops the signal generation. A subsequent trigger event (internal with 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 with 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 128

Signal Duration Unit
Defines the unit for the entry of the length of the signal sequence to be output in the Single trigger mode. Available units are frame, chip or sequence length (SL).

Remote command:
`[:SOURce<hw>]:BB:WIMax:TRIGger:SLUNit` on page 127

Signal Duration
Enters the length of the signal sequence to be output in the "Single" trigger mode.

Use this parameter to deliberately output part of the signal, an exact sequence of the signal, or a defined number of repetitions of the signal.

Remote command:
`[:SOURce<hw>]:BB:WIMax:TRIGger:SLENgth` on page 126

Running/Stopped
For 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 126

Arm
For trigger modes "Armed Auto" and "Armed Retrigger", stops the signal generation until subsequent trigger event occurs.

Remote command:
`[:SOURce<hw>]:BB:WIMax:TRIGger:ARM:EXECute` on page 124

Execute Trigger
Executes trigger manually.

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

Remote command:
[:SOURce<hw>]:BB:WIMax:TRIGger:EXECute on page 124

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

- "Internal"
  The trigger event is executed by "Execute Trigger".
- "Internal (Baseband A/B)"
  (two-path instruments)
  The trigger event is the trigger signal from the second path
- "External (Trigger 1/2)"
  The trigger event is the active edge of an external trigger signal, supplied at the TRIGGER 1/2 connector.
  Use the "Global Trigger/Clock Settings" dialog to define the polarity, the trigger threshold and the input impedance of the trigger signal.

Remote command:
[:SOURce<hw>]:BB:WIMax:TRIGger:SOURce on page 127

Sync. Output to External Trigger
(enabled for Trigger Source External)

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

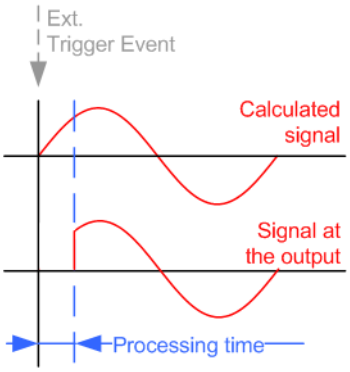
For R&S SMBV instruments:

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

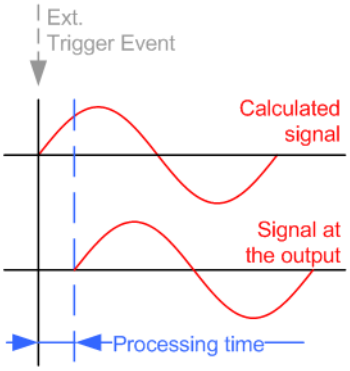
Table 3-1: Typical Applications

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

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



"Off" The signal output begins after elapsing of the processing time and starts with sample 0, i.e. the complete signal is outputted.
This mode is recommended for triggering of short signal sequences with signal duration comparable with the processing time of the instrument.



Remote command:
`[:SOURce<hw>]:BB:WIMax:TRIGger:EXTernal:SYNChronize:OUTPut` on page 125

Trigger Delay
Delays the trigger event of the signal from:
- the external trigger source
- the other path

Use this setting to:
- synchronize the instrument with the device under test (DUT) or other external devices

Remote command:
`[:SOURce<hw>]:BB:WIMax:TRIGger[:EXTernal<ch>]:DELay` on page 128
`[:SOURce<hw>]:BB:WIMax:TRIGger:OBASeband:DELay` on page 125

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

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

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

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

Remote command:
`[:SOURce<hw>]:BB:WIMax:TRIGger[:EXTernal<ch>]:INHibit` on page 128
`[:SOURce<hw>]:BB:WIMax:TRIGger:OBASeband:INHibit` on page 125

3.26.2 Marker Mode

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

The R&S SMBV supports only two markers.

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

"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. The pulse frequency is defined by entering a divider. The frequency is derived by dividing the sample rate by the divider. The input box for the divider opens when "Pulse" is selected, and the resulting pulse frequency is displayed below it.

Remote command:
`[:SOURce<hw>]:BB:WIMax:TRIGger:OUTPut<ch>:PULSe:DIVider` on page 132
`[:SOURce<hw>]:BB:WIMax:TRIGger:OUTPut<ch>:PULSe:FREQuency?` on page 132

"Pattern "	A marker signal that is defined by a bit pattern is generated. The pattern has a maximum length of 32 bits and is defined in an input field which opens when pattern is selected.

Remote command:
`[:SOURce<hw>]:BB:WIMax:TRIGger:OUTPut<ch>:PATTern` on page 131

"ON/OFF Period" A regular marker signal that is defined by an ON/OFF ratio is generated. A period lasts one ON and OFF cycle.
The "ON Time" and "OFF Time" are each expressed as a number of samples and are set in an input field which opens when ON/OFF ratio is selected.

Remote command:
[:SOURce<hw>]:BB:WIMax:TRIGger:OUTPut<ch>:ONTime on page 131
[:SOURce<hw>]:BB:WIMax:TRIGger:OUTPut<ch>:OFFTime on page 131

Remote command:
[:SOURce<hw>]:BB:WIMax:TRIGger:OUTPut<ch>:MODE on page 130

Rise Offset
Sets the value for the rise offset. The rising ramp of the marker is shifted by the set value in samples. Positive values shift the rising ramp to later positions; negative values shift it to earlier positions.

The value range is -64000 to 64000.

Remote command:
[:SOURce<hw>]:BB:WIMax:TRIGger:OUTPut<ch>:ROFFset on page 131

Fall Offset
Sets the value for the fall offset. The falling ramp of the marker is shifted by the set value in samples. Positive values shift the falling ramp to later positions; negative values shift it to earlier positions.

The value range is -64000 to 64000.

Remote command:
[:SOURce<hw>]:BB:WIMax:TRIGger:OUTPut<ch>:FOFFset on page 131

3.26.3 Marker Delay

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

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

The R&S SMBV supports only two markers.

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

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

Remote command:
`[:SOURce<hw>]:BB:WIMax:TRIGger:OUTPut<ch>:DELay` on page 129

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

The delay can be defined by moving the setting mark.

Remote command:
`[:SOURce<hw>]:BB:WIMax:TRIGger:OUTPut<ch>:DELay:MINimum?`
on page 130
`[:SOURce<hw>]:BB:WIMax:TRIGger:OUTPut<ch>:DELay:MAXimum?`
on page 130

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

Remote command:
`[:SOURce<hw>]:BB:WIMax:TRIGger:OUTPut:DELay:FIXed` on page 129

3.26.4 Clock Settings

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

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

Sync. Mode
(for R&S SMBV only)

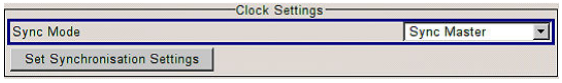
Selects the synchronization mode.

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

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

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

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



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

Remote command:
[:SOURce<hw>]:BB:WIMax:CLOCk:SYNChronization:MODE on page 134

Set Synchronization Settings
(for R&S SMBV only)

Performs automatically adjustment of the instrument's settings required for the synchronization mode, selected with the parameter "Synchronization Mode".

Remote command:
[:SOURce<hw>]:BB:WIMax:CLOCk:SYNChronization:EXECute on page 134

Clock Source
Selects the clock source.

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

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

Remote command:
[:SOURce<hw>]:BB:WIMax:CLOCk:SOURce on page 133

Clock Mode
Enters the type of externally supplied clock.

"Sample" A sample clock is supplied via the CLOCK connector.

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

Remote command:
[:SOURce<hw>]:BB:WIMax:CLOCk:MODE on page 133

Clock Multiplier
Enters the multiplication factor for clock type "Multiple".

Remote command:
[:SOURce<hw>]:BB:WIMax:CLOCk:MULTiplier on page 133

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

Remote command:
CLOCk:INPut:FREQuency?

3.26.5 Global Settings

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

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

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

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

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

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

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 Signal Generator has already been set up for remote operation in a network as described in the R&S Signal Generator 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 Signal Generator operating 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
`SOURce<hw>`	[1]|2	available baseband signals
`OUTPut<ch>`	1 .. 4	available markers R&S SMBV supports two markers
`EXTernal<ch>`	1|2	external trigger connectors
`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 sub-bursts 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"

Placeholder <root>

For commands that read out or save files in the default directory, the default directory is set using command `MMEM:CDIRectory`. The examples in this description use the place holder `<root>` in the syntax of the command.

- `D:\` - for selecting the internal hard disk of a Windows instrument
- `E:\` - for selecting the memory stick which is inserted at the USB interface of a Windows instrument
- `/var/user/` - for selecting the internal flash card of a Linux instrument
- `/usb/` - for selecting the memory stick which is inserted at the USB interface of a Linux instrument.

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

In particular, this includes:

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

For a description of such tasks, see the R&S Signal Generator operating 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 21

[: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 21

[: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 21

[: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:PATH:COUPling:POFFset <POffset>

(Available only in path A of two-path instruments and for enabld parameter Use Baseband A+B)

Sets the relative power offset of path B compared to the power level of the path A.

A value of 0 dB refers to the level set in the main RF level setting of the instrument.

Negative values lower the level of baseband B, i.e. the level of Baseband A matches the main level setting, Baseband B is offset by the set amount.

Positive values lower the level of baseband A, i.e. the level of Baseband B matches the main level setting, Baseband A is offset by the set amount.

Parameters:

<POffset> float

Range: -80.00 dB to 20.00 dB
Increment: 0.01
*RST: 0.00 dB

Example: `BB:WIM:PATH:COUP:STAT ON`
enables control of both paths via the WiMAX menu.
`BB:WIM:PATH:COUP:POFF -5dB`
sets the power offset
`:POW?`
queries the power level of path A
`SOUR2:POW?`
queries the power level of path BResponse: -30 dB
`Response: -30 dB`
Result: The current power level of path A is -30 dB; the current power level of path B is -35 dB

Manual operation: See "Power Of Baseband B Relative to A" on page 23

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

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

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

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

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

For STC modes with 4 antennas, using antenna 0 in baseband A generates antenna 1 in baseband B. Using antenna 2 in baseband A generates antenna 3 in baseband B. A two-path instrument can either provide antennas 0 & 1 or antennas 2 & 3.

Parameters:

<State> 0 | 1 | OFF | ON

*RST: OFF

Example: `BB:WIM:MODE AOFD`
selects physical layer mode OFDMA.
`BB:WIM:AOFD:ZONE0:STC:MODE OFF`
configure baseband A to generate one SISO zone
`BB:WIM:AOFD:ZONE1:STC:MODE MA2`
Configure baseband A to generate one additional STC zone.
`BB:WIM:AOFD:ZONE1:STC:ANT0`
Sets Antenna 0 for this STC zone.
`BB:WIM:PATH:COUP:STAT ON`
enables control of both paths via the WiMAX menu.
`BB:WIM:STAT ON`
Switch on baseband A; Baseband B is automatically activated.

Manual operation: See "Use Baseband A+B" on page 22

[: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 16

[: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` will be listed.

Return values:

<Catalog> string

Example: `MMEM:CDIR "<root>wimax"`
sets the default directory to <root>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 17

[: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 may be omitted. Only files with the file extension `*.wimax` will be deleted.

Setting parameters:
<Filename> string

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

Usage: Setting only

Manual operation: See "Save/Recall" on page 17

[: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 may be omitted. Only files with the file extension `*.wimax` will be loaded.

Setting parameters:
<Filename> string

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

Usage: Setting only

Manual operation: See "Save/Recall" on page 17

[: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. Only the file name has to be entered. 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 17

[:SOURce<hw>]:BB:WIMax:SETTing:STORe:FAST <Fast>

Determines whether the instrument performs an absolute or a differential storing of the settings.

Enable this function to accelerate the saving process by saving only the settings with values different to the default ones.

Note: This function is not affected by the "Preset" function.

However, in some test setups, e.g while analyzing the generated WiMAX signal with R&S FSQ eqquipped with former FW version, it is required to disable the fast save option.

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

[: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 21

[: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> 0 | 1 | OFF | ON
*RST: 0

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

Manual operation: See "State" on page 16

[: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 21

[: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 "<root>waveform"`
sets the default directory to <root>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/Clipping Settings

[: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 118

Manual operation: See "Output directory for Dump Files" on page 99

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

Activates burst input data dump.

Parameters:

<State> 0 | 1 | OFF | ON

*RST: 0

Example: `SOURce1:BB:WIMax:BDUMp:DIRirectory "<root>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 98

[: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 98

[: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 98

[: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> 0 | 1 | OFF | ON

*RST: OFF

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

Manual operation: See "Clipping State" on page 98

[: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 95

[: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 97

[: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 "Roll Off Factor or BxT" on page 95

[: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 "Roll Off Factor or BxT" on page 95

[: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 "Cut Off Frequency Shift" on page 96

[: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 "Roll Off Factor or BxT" on page 95

[:SOURce<hw>]:BB:WIMax:FILTer:PARameter:LPASs <LPass>

The command sets the cut off 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 "Cut Off Frequency Factor" on page 97

[:SOURce<hw>]:BB:WIMax:FILTer:PARameter:LPASSEVM <LPassEvm>

The command sets the cut off 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 "Cut Off Frequency Factor" on page 97

[: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 "Roll Off Factor or BxT" on page 95

[: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 "Roll Off Factor or BxT" on page 95

[: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 "Roll Off Factor or BxT" on page 95

[: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 97

4.3 Trigger Settings

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

EXTernal<ch>

The numeric suffix to EXTernal<ch> distinguishes between the external trigger via the TRIGGER 1 (suffix 1) and TRIGGER 2 (suffix 2) connector.

[:SOURce<hw>]:BB:WIMax:TRIGger:ARM:EXECute

The command stops signal generation for trigger modes Armed_Auto and Armed_Retrigger. A subsequent internal or external trigger event restart signal generation.

Example: BB:WIM:TRIG:SOUR INT
sets internal triggering.
BB:WIM:TRIG:SEQ ARET
sets Armed_Retrigger mode, i.e. every trigger event causes signal generation to restart.
BB:WIM:TRIG:EXEC
executes a trigger, signal generation is started.
BB:WIM:TRIG:ARM:EXEC
signal generation is stopped.
BB:WIM:TRIG:EXEC
executes a trigger, signal generation is started again.

Usage: Event

Manual operation: See "Arm" on page 101

[:SOURce<hw>]:BB:WIMax:TRIGger:EXECute

The command executes a trigger. The internal trigger source must be selected using the command :BB:WIM:TRIG:SOUR INT and a trigger mode other than AUTO must be selected using the command :BB:WIM:TRIG:SEQ.

Example: `BB:WIM:TRIG:SOUR INT`
sets internal triggering.
`BB:WIM:TRIG:SEQ RETR`
sets Retrigger mode, i.e. every trigger event causes signal generation to restart.
`BB:WIM:TRIG:EXEC`
executes a trigger.

Usage: Event

Manual operation: See "Execute Trigger" on page 24

[:SOURce<hw>]:BB:WIMax:TRIGger:EXTernal:SYNChronize:OUTPut <Output>

(enabled for "Trigger Source" External)

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

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

Example: `BB:WIM:TRIG:SOUR EXT`
sets external triggering.
`BB:WIM:TRIG:EXT:SYNC:OUTP ON`
enables synchrounous output to external trigger

Manual operation: See "Sync. Output to External Trigger" on page 102

[:SOURce<hw>]:BB:WIMax:TRIGger:OBASeband:DELay <Delay>

The command specifies the trigger delay (expressed as a number of samples) for triggering by the trigger signal from the second path.

Parameters:
<Delay> float
Range: 0 samples to 2^32-1 samples
Increment: 0.01 sample
*RST: 0 samples

Example: `BB:WIM:TRIG:SOUR OBAS`
sets for path A the internal trigger executed by the trigger signal from the second path (path B).
`BB:WIM:TRIG:OBAS:DEL 50`
sets a delay of 50 samples for the trigger.

Manual operation: See "Trigger Delay" on page 103

[:SOURce<hw>]:BB:WIMax:TRIGger:OBASeband:INHibit <Inhibit>

Specifies the number of samples by which a restart is to be inhibited following a trigger event. This command applies only for triggering by the second path.

Parameters:

<Inhibit> integer

Range: 0 to 67108863
*RST: 0

Example: `BB:WIM:TRIG:SOUR OBAS`
sets for path A the internal trigger executed by the trigger signal from the second path (path B).
`BB:WIM:TRIG:INH 200`
sets a restart inhibit for 200 samples following a trigger event.

Manual operation: See "Trigger Inhibit" on page 104

[:SOURce<hw>]:BB:WIMax:TRIGger:RMODe?

Queries the current status of signal generation for all trigger modes with WIMax modulation on.

Return values:

<RMode> STOP | RUN

*RST: STOP

Example: `SOUR:BB:WIM:TRIG:MODE ARET`
selects the Armed_Retrigger mode.
`SOUR:BB:WIM:TRIG:RMOD?`
queries the current status of signal generation.
`Response: RUN`
the signal is generated, an external trigger was executed.

Usage: Query only

Manual operation: See "Running/Stopped" on page 101

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

Defines the length of the signal sequence to be output in the "Single" trigger mode (`SOUR:BB:WIMax:SEQ SING`).

Parameters:

<SLength> integer

Range: 1 to INT_MAX
*RST: 1

Example: `BB:WIM:SEQ SING`
sets trigger mode Single.
`SOUR:BB:WIMax:TRIG:SLUNit CHIP`
sets the unit
`BB:WIM:TRIG:SLEN 200`
sets a sequence length of 200 chips. The first 200 chips of the current frame will be output after the next trigger event.

Manual operation: See "Signal Duration" on page 101

[:SOURce<hw>]:BB:WIMax:TRIGger:SLUNit <SlUnit>

The command defines the unit for the entry of the length of the signal sequence (`SOUR:BB:WIMax:TRIG:SLEN`) to be output in the "Single" trigger mode (`SOUR:BB:WIMax:SEQ SING`).

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: `SOUR:BB:WIM:SEQ SING`
sets trigger mode Single.
`SOUR:BB:WIM:TRIG:SLUN FRAM`
sets unit Frame length for the entry of sequence length.
`SOUR:BB:WIM:TRIG:SLEN 2`
sets a sequence length of 2 frame. Two frames will be output after the next trigger event.

Manual operation: See "Signal Duration Unit" on page 101

[:SOURce<hw>]:BB:WIMax:TRIGger:SOURce <Source>

Selects the trigger source.

Parameters:

<Source> INTernal|OBASeband|BEXTernal|EXTernal

INTernal
manual trigger or `*TRG`.
EXTernal|BEXTernal
trigger signal on the TRIGGER 1/2 connector.
OBASeband
trigger signal from the other path

*RST: INTernal

Example: `SOURce1:BB:WIMax:TRIGger:SOURce EXTernal`
sets external triggering via the TRIGGER 1 connector.

Manual operation: See "Trigger Source" on page 102

[:SOURce<hw>]:BB:WIMax:TRIGger[:EXTernal<ch>]:DELay <Delay>

The command specifies the trigger delay (expressed as a number of samples) for external triggering. The numeric suffix to EXTernal distinguishes between the external trigger via the TRIGGER 1 (suffix 1) and TRIGGER 2 (suffix 2) connector.

Parameters:

<Delay> float

Range: 0 samples to 65535 samples
Increment: 0.01 sample
*RST: 0 samples

Example: `BB:WIM:TRIG:SOUR EXT`
sets an external trigger via the TRIGGER 1 connector.
`BB:WIM:TRIG:DEL 50`
sets a delay of 50 samples for the trigger.

Manual operation: See "Trigger Delay" on page 103

[:SOURce<hw>]:BB:WIMax:TRIGger[:EXTernal<ch>]:INHibit <Inhibit>

Specifies the number of samples by which a restart is to be inhibited following an external trigger event.

Parameters:

<Inhibit> integer

Range: 0 to 67108863
*RST: 0

Example: `BB:WIM:TRIG:SOUR EXT`
`BB:WIM:TRIG:INH 200`
sets a restart inhibit for 200 samples following a trigger event.

Manual operation: See "Trigger Inhibit" on page 104

[:SOURce<hw>]:BB:WIMax[:TRIGger]:SEQuence <Sequence>

Selects the trigger mode.

Parameters:

<Sequence> AUTO | RETRigger | AAUTo | ARETrigger | SINGle

*RST: AUTO

Example: `BB:WIM:SEQ AAUT`
sets the "Armed_auto" trigger mode; the device waits for the first trigger (e.g. with `*TRG`) and then generates the signal continuously.

Manual operation: See "Trigger Mode" on page 100

4.4 Marker Settings

This section lists the remote control commands, necessary to configure the markers.

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

OUTPut<ch>

The numeric suffix to OUTPut distinguishes between the available markers.

Only two markers are available for the R&S SMBV, i.e. the allowed values for the suffix are 1 or 2.

[:SOURce<hw>]:BB:WIMax:TRIGger:OUTPut:DELay:FIXed <Fixed>

The command restricts the marker delay setting range to the dynamic range. In this range the delay can be set without restarting the marker and signal. If a delay is entered in setting ON but is outside this range, the maximum possible delay is set and an error message is generated.

Parameters:

<Fixed> 0 | 1 | OFF | ON
*RST: OFF

Example: BB:WIM:TRIG:OUTP:DEL:FIX ON
restricts the marker signal delay setting range to the dynamic range.

Manual operation: See "Fix marker delay to current range" on page 106

[:SOURce<hw>]:BB:WIMax:TRIGger:OUTPut<ch>:DELay <Delay>

The command defines the delay between the signal on the marker outputs and the start of the signal, expressed in terms of samples. Command :BB:WIMax:TRIGger:OUTPut:DELay:FIXed can be used to restrict the range of values to the dynamic range, i.e. the range within which a delay of the marker signals can be set without restarting the marker and signal.

Parameters:

<Delay> float

Range: 0 to 16777215
Increment: 1E-3
*RST: 0

Example: `BB:WIM:TRIG:OUTP:DEL 1600`
sets a delay of 1600 samples for the corresponding marker signal.

Manual operation: See "Marker x Delay" on page 105

[:SOURce<hw>]:BB:WIMax:TRIGger:OUTPut<ch>:DELay:MINimum?
[:SOURce<hw>]:BB:WIMax:TRIGger:OUTPut<ch>:DELay:MAXimum?

The command queries the maximum marker delay for setting `:BB:WIMax:TRIG:OUTP:DEL:FIX ON`.

Return values:

<Maximum> float

Range: 0 samples to 2^24-1 samples
Increment: 0.001 samples
*RST: 2000 samples

Example: `BB:WIM:TRIG:OUTP:DEL:FIX ON`
restricts the marker signal delay setting range to the dynamic range.
`BB:WIM:TRIG:OUTP:DEL:MAX`
queries the maximum of the dynamic range.
`Response: 2000`
the maximum for the marker delay setting is 2000 samples.

Usage: Query only

Manual operation: See "Current Range without Recalculation" on page 106

[:SOURce<hw>]:BB:WIMax:TRIGger:OUTPut<ch>:MODE <Mode>

Sets the marker mode.

Parameters:

<Mode> RESTart | FRAMe | FACTive | PULSe | PATTern | RATio | TRIGger

TRIGger
A received internal or external trigger signal is output at the marker connector.

*RST: RESTart

Example: `BB:WIM:TRIG:OUTP:MODE FRAMe`
selects the frame marker for the corresponding marker signal.

Manual operation: See "Marker Mode" on page 104

[:SOURce<hw>]:BB:WIMax:TRIGger:OUTPut<ch>:ONTime <Ontime>
[:SOURce<hw>]:BB:WIMax:TRIGger:OUTPut<ch>:OFFTime <Offtime>

Sets the number of samples in a period (ON time + OFF time) during which the marker signal in setting`SOURce:BB:WIMax:TRIGger:OUTPut:MODE RATio` on the marker outputs is OFF.

Parameters:

<Offtime> integer

Range: 1 to 16777215
*RST: 1

Example: `BB:WIM:TRIG:OUTP2:OFFT 200`
sets an OFF time of 200 samples for marker signal 2.

Manual operation: See "Marker Mode" on page 104

[:SOURce<hw>]:BB:WIMax:TRIGger:OUTPut<ch>:ROFFset <ROffset>
[:SOURce<hw>]:BB:WIMax:TRIGger:OUTPut<ch>:FOFFset <FOffset>

Sets the fall offset for on/off ratio marker in number of samples.

Parameters:

<FOffset> integer

Range: -640000 to 640000
*RST: 0

Example: `BB:WIM:TRIG:OUTP2:FOFF 200`
sets a fall offset of 20 samples for marker signal 2.

Manual operation: See "Fall Offset" on page 105

[:SOURce<hw>]:BB:WIMax:TRIGger:OUTPut<ch>:PATTern <Pattern>

Sets the bit pattern used to generate the marker signal in the setting `SOURce:BB:WIMax:TRIGger:OUTPut:MODE PATTern`. 0 is marker off, 1 is marker on.

Parameters:

<Pattern> 64 bits

Range: #B0,1 to #B111..1,64
*RST: #B10,2

Example: `BB:WIM:TRIG:OUTP:PATT #B000000011111111,15`
sets a bit pattern.
`BB:WIM:TRIG:OUTP:MODE PATT`
activates the marker signal according to a bit pattern for the corresponding marker signal.

Manual operation: See "Marker Mode" on page 104

[:SOURce<hw>]:BB:WIMax:TRIGger:OUTPut<ch>:PULSe:DIVider <Divider>

Sets the divider for Pulse marker mode (`SOUR:BB:WIM:TRIG:OUTP:MODE PULSe`). The resulting pulse frequency is derived by dividing the symbol rate by the divider.

Parameters:

<Divider> integer

Range: 2 to 1024
*RST: 2

Example: `BB:WIM:TRIG:OUTP:PULS:DIV 2`
sets the divider to 2 for the corresponding marker signal.
`BB:WIM:TRIG:OUTP:FREQ?`
queries the resulting pulse frequency of the marker signal.
`Response: 66 000`
the resulting pulse frequency is 66 kHz.

Manual operation: See "Marker Mode" on page 104

[:SOURce<hw>]:BB:WIMax:TRIGger:OUTPut<ch>:PULSe:FREQuency?

The command queries the pulse frequency of the pulsed marker signal in the setting `SOURce:BB:WIMax:TRIGger:OUTPut:MODE PULSe`. The pulse frequency is derived by dividing the symbol rate by the divider.

Return values:

<Frequency> float

Range: 2 to 1024
Increment: 1E-3
*RST: 2

Example: `BB:WIM:TRIG:OUTP2:PULS:DIV 2`
sets the divider marker signal for the corresponding marker signal to the value 2.
`BB:WIM:TRIG:OUTP2:MODE PULS`
enables the pulsed marker signal.
`BB:WIM:TRIG:OUTP2:PULS:FREQ?`
queries the pulse frequency of the marker signal.
`Response: 33 000`
the resulting pulse frequency is 33 kHz

Usage: Query only

Manual operation: See "Marker Mode" on page 104

4.5 Clock Settings

This section lists the remote control commands, necessary to configure the clock.

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

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

Sets the type of externally supplied clock.

For two-path instruments, the only numerical suffix allowed for SOURce is 1, since the external clock source is permanently allocated to path A.

Parameters:

<Mode> SAMPle | MSAMple

*RST: SAMP

Example: `BB:WIM:CLOC:MODE SAMP`
selects clock type "SAMPle", i.e. the supplied clock is a sample clock.

Manual operation: See "Clock Mode" on page 107

[:SOURce<hw>]:BB:WIMax:CLOCk:MULTiplier <Multiplier>

Specifies the multiplier for clock type "Multiplied" (`:BB:WIMax:CLOCk:MODE MSAMple`) in the case of an external clock source.

For two-path instruments, the only numerical suffix allowed for `SOURce` is 1, since the external clock source is permanently allocated to path A.

Parameters:

<Multiplier> integer

Range: 1 to 64
*RST: 4

Example: `SOURce1:BB:WIMax:CLOCk:SOURce EXT`
selects the external clock source.
`SOURce1:BB:WIM:CLOCk:MODE MSAMple`
selects clock type
`SOURce1:BB:WIMax:CLOCk:MULTiplier 12`
the multiplier for the external clock rate is 12.

Manual operation: See "Clock Multiplier" on page 107

[:SOURce<hw>]:BB:WIMax:CLOCk:SOURce <Source>

The command selects the clock source.

For two-path instruments, selecting `EXTernal` is only possible for path A, since the external clock source is permanently allocated to path A. Selection `AINternal` is only possible for path B.

Parameters:

<Source> INTernal | EXTernal | AINTernal

INTernal
The internal clock reference is used.

EXTernal
The external clock reference is supplied to the CLOCK connector.

AINTernal
The clock source of path A is used for path B.

*RST: INTernal

Example: `BB:WIM:CLOC:MODE INT`
specifies that a sample clock is supplied via the CLOCK connector.

Manual operation: See "Clock Source" on page 107

[:SOURce<hw>]:BB:WIMax:CLOCk:SYNChronization:EXECute

Performs automatically adjustment of the instrument's settings required for the synchronization mode, set with the command `BB:WIM:CLOC:SYNC:MODE`.

Example: `BB:WIM:CLOC:SYNC:MODE MAST`
the instrument is configured to work as a master one.
`BB:WIM:CLOC:SYNC:EXEC`
all synchronization's settings are adjusted accordingly.

Usage: Event

Manual operation: See "Set Synchronization Settings" on page 107

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

Selects the synchronization mode.

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

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

Parameters:

<Mode> NONE | MASTer | SLAVe

NONE
The instrument is working in stand-alone mode.

MASTer
The instrument provides all connected instrument with its synchronization (including the trigger signal) and reference clock signal.

SLAVe
The instrument receives the synchronization and reference clock signal from another instrument working in a master mode.

*RST: NONE

Example: `BB:WIM:CLOC:SYNC:MODE MAST`
the instrument is configured to work as a master one.

Manual operation: See "Sync. Mode" on page 106

4.6 OFDMA Physical Layer Settings

The `SOURce:BB:WIMax:AOFDm` systems contain commands for setting the characteristics of signals with OFDMA and OFDMA-WiBro physical layer.

The commands of this system only take effect if the OFDMA physical layer mode is selected:

- `SOURce:BB:WIMax:MODE AOFDMa` or
- `SOURce:BB:WIMax:MODE WIBRo`

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 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 42

[: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 42

[: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 44

[: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 22

[:SOURce<hw>]:BB:WIMax:AOFDm:IDCell <Idcell>

Sets the IDcell.

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 44

[: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 42).

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 43

[: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 "Level Reference" on page 22

[: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 43

[: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 43

[: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 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 43

[: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 43

[: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 43

[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:AMC:BITMap:PATTern <Pattern>

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 will not be used for allocating bursts.

Parameters:

<Pattern> 48 bits

Range: #H000000000000,48 to #HFFFFFFFFFFFF,48
*RST: #HFFFFFFFFFFFF,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 48

[: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> 0 | 1 | OFF | ON

*RST: OFF

Example: `BB:WIM:AOFD:ZONE0:AMC:BITM:STAT ON`
enables Band AMC mode

Manual operation: See "Use Physical Bands Bitmap" on page 48

[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:BOOSt <Boost>

Sets an additional zone boosting in dB. The zone boosing 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 50

[: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 62

[: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 63

[: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 63

[: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 63

[: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 63

[: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 45

[: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 46

[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:PILDedicated <PilDedicated>

The command activates/deactivates dedicated pilots. If deactivated, the pilot symbol are broadcast.

Note: This feature is available only for zone type AMC and PUSC with link direction Downlink.

Parameters:

<PilDedicated> 0 | 1 | OFF | ON

*RST: OFF

Example: `BB:WIM:AOFD:ZONE0:PILD ON`
activates dedicted pilot symbols for the specified zone.

Manual operation: See "Dedicated Pilots OFDMA" on page 50

[: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 46

[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SCARrier:RANDomizer <Randomizer>

The command activates / deactivates the subcarrier redomization for OFDMA configurations.

Parameters:

<Randomizer> 0 | 1 | OFF | ON

*RST: ON

Example: `BB:WIM:AOFD:ZONE0:SCAR:RAND OFF`
deactivates the subcarrier randomization.

Manual operation: See "Subcarrier Randomization OFDMA" on page 47

[: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 46

[: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 57

[: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 57

[: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 60

[: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 59

[: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 60

[: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 60

[: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 60

[: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 59

[: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 61

[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SOUNding:CID<ch0>:POWer[:STATe] <State>

The command activates/deactivates the power boost.

Parameters:

<State> 0 | 1 | OFF | ON

*RST: OFF

Example: `BB:WIM:AOFD:ZONE:SOUN:CID5:POW:STAT ON`
activates the power boost.

Manual operation: See "Power Boost OFDMA" on page 59

[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:SOUNding:CID<ch0>:RELevance[:STATe] <State>

Activates/deactivates the sounding relevance.

Parameters:

<State> 0 | 1 | OFF | ON

*RST: 1

Example: `BB:WIM:AOFD:ZONE:SOUN:CID5:REL:STAT ON`
activates the sounding relevance.

Manual operation: See "Sounding Relevance" on page 60

[: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 61

[: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 61

[: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 59

[: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 57

[: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> 0 | 1 | OFF | ON

*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 58

[: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 58

[: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 58

[: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 57

[: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 56

[: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 57

[: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 56

[: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 56

[: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 58

[:SOURce<hw>]:BB:WIMax:AOFDm:ZONE<st0>:STC:ANTenna <Antenna>

The command selects the 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 50

[: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 49

[: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 50

[: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 can not exceed the specified number of symbols.

Parameters:

<Count> integer

Range: 1 to 10000
*RST: 2

Example: `BB:WIM:AOFD:ZONE:SYMB:COUN 3`
selects 3 symbols for zone 1.

Manual operation: See "No. Of Symbols OFDMA" on page 46

[: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> 0 | 1 | OFF | ON
*RST: OFF

Example: `BB:WIM:AOFD:ZONE:SYMB:AUTO ON`
activates automatic symbol count for zone 1.

Manual operation: See "Auto OFDMA" on page 46

[: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 46

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:CCODing:FEC <Fec>

The command switches channel coding FEC parameter on or off.

Parameters:

<Fec> 0 | 1 | OFF | ON
*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 71

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:CCODing: INTerleaver <Interleaver>

The command switches channel coding interleaver on or off.

Parameters:

<Interleaver> 0 | 1 | OFF | ON
*RST: ON

Example: `BB:WIM:AOFD:ZONE:BURS:CCOD:INT ON`
activates channel coding interleaver for burst 1.

Manual operation: See "Interleaver" on page 71

[: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 very 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 51

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:CCODing:RANDomizer <Randomizer>

The command switches channel coding randomizer on or off.

Parameters:

<Randomizer> 0 | 1 | OFF | ON

*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 71

[: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 71

[: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> 0 | 1 | OFF | ON
*RST: OFF

Example: `BB:WIM:AOFD:ZONE0:BURS2:CONF?`
queries if there exist a conflict between the activated OFDMA bursts.
`Response: 0`
there exists not conflict between the activated OFDMA bursts.

Usage: Query only

Manual operation: See "Conflict OFDMA" on page 55

[: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 18

[: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 "<root>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 18

[: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 51

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:DATA:PATTern <Pattern>

Sets the bit pattern for the PATTern selection. The maximum length is 64 bits.

Parameters:
<Pattern> 64 bits
Range: #B0,1 to #B111..1,64
*RST: #B0,1

Example: `BB:WIM:AOFD:ZONE0:BURS:DATA:PATT #H3F,8`
defines the bit pattern.

Manual operation: See "Data Source OFDMA" on page 53

[: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 70

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:DLUL:ARIX <Arix>

Selects whether ACK region 0 or 1 will be 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 90

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:DLUL:HARQ:ACKoffset:DL <DI>

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 89

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:DLUL:HARQ:ACKoffset:INDicator <Indicator>

Enables/disables the inclusion of HARQ ACK offsets.

Parameters:
<Indicator> 0 | 1 | OFF | ON
*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 89

[: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 90

[: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 will be included in the second SUB-DL-UL-MAP message.

Manual operation: See "Include In SUB-DL-UL-MAP" on page 71

[: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 89

[: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 88

[: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 88

[: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 88

[: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 88

[: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, convoutional coding and interleaving.

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

QAM5D6X64 is only available for Channel Coding CTC.

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 Msamples for burst 1.

Manual operation: See "Modulation and Coding Rate OFDMA" on page 51

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ:COUNt <Count>

Sets the number of sub-bursts 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 sub-bursts to 10.

Manual operation: See "No. Of Sub-Bursts" on page 82

[: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 82

[: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> 0 | 1 | OFF | ON

*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 82

[: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 84

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:ACID <Acid>

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

Parameters:
<Acid> integer
Range: 0 to 15
*RST: 0

Example: `BB:WIM:AOFD:ZONE0:BURS2:HARQ5:ACID 12`
sets the sub-burst ACID to 12.

Manual operation: See "ACID" on page 87

[: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> 0 | 1 | OFF | ON
*RST: ON

Example: `BB:WIM:AOFD:ZONE0:BURS2:HARQ5:ACKD ON`
disables ACK.

Manual operation: See "ACK Disable" on page 87

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:DATA <Data>

The command sets the data source for the specified sub-burst.

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 command `: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 85

[: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 "<root>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 85

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:DATA:PATTern <Pattern>

Sets the bit pattern for the PATTern selection. The maximum length is 64 bits.

Parameters:

<Pattern> 64 bits

Range: #H0,1 to #H111..1,64
*RST: #H0,1

Example: `BB:WIM:AOFD:ZONE0:BURS2:HARQ6:DATA:PATT #B0,1`
defines the bit pattern.

Manual operation: See "Data Source" on page 85

[: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 sub-burst. 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 sub-burst 6.

Manual operation: See "DIUC" on page 86

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:DLENgth <DLength>

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

Parameters:

<DLength> integer

Range: 0 to 1E9
*RST: 16

Example: `BB:WIM:AOFD:ZONE0:BURS2:HARQ4:DLEN 10`
sets the data length of the sub-burst to 10.

Manual operation: See "Data Length" on page 85

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:FORMat?

(for HARQ IR Mode only)

Queries the sub-burst 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 sub-burst modulation.

Usage: Query only

Manual operation: See "Modulation" on page 85

[: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 sub-burst 5 to 33.

Manual operation: See "MAC CID" on page 70

[: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> 0 | 1 | OFF | ON

*RST: 0

Example: `BB:WIM:AOFD:BURS2:HARQ5:MAC:CRC:STAT ON`
activates the checksum determination for the specified sub-burst.

Manual operation: See "CRC State" on page 91

[: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 92

[: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> 0 | 1 | OFF | ON

*RST: 0

Example: `BB:WIM:AOFD:BURS2:HARQ5:MAC:ENCR:STAT ON`
enables payload encryption for sub-burst 5.
`BB:WIM:AOFD:BURS2:HARQ5:MAC:EKS 2`
sets the EKS.

Manual operation: See "Payload encrypted" on page 92

[: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> 0 | 1 | OFF | ON

*RST: OFF

Example: `BB:WIM:AOFD:BURS2:HARQ5:MAC:STAT ON`
enables generation of the generic MAC header for sub-burst 5.

Manual operation: See "MAC Header State" on page 91

[: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 sub-burst 5.

Manual operation: See "Mac Type" on page 92

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:MODRate <ModRate>

(for HARQ Chase Mode only)

Sets the sub-burst 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 84

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:PSIZe <PSize>

(for HARQ IR Mode only)

The command sets the HARQ sub-burst 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 85

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:RATE?

(for HARQ IR Mode only)

Queries the sub-burst 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 sub-burst rate.

Usage: Query only

Manual operation: See "Rate" on page 85

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:SLOTcount <SlotCount>

Sets the duration of the sub-bursts in slots. The duration range is dynamic and depends of 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 sub-burst 5 to one slot.

Manual operation: See "Duration [Slots]" on page 85

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:HARQ<dir0>:SPID <Spid>

(for HARQ IR Mode only)

The command sets the sub-packet ID, which is used to identify the four sub-packets 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 87

[: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 70

[: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> 0 | 1 | OFF | ON

*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 91

[: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 92

[: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> 0 | 1 | OFF | ON

*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 92

[: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> 0 | 1 | OFF | ON

*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 91

[: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 92

[: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 53

[: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 52

[: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 53

[: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 70

[: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> 0 | 1 | OFF | ON

*RST: OFF

Example: `BB:WIM:AOFD:ZONE0:BURS2:PDU:STAT ON`
activates multiple PDUs.

Manual operation: See "Multiple PDUs OFDMA" on page 70

[: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 command `: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 73

[: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 "<root>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 73

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:BURSt<ch0>:PDU<dir0>:DATA:PATTern <Pattern>

Sets the bit pattern for the PATTern selection. The maximum length is 64 bits.

Parameters:
<Pattern> 64 bits

Example: `BB:WIM:AOFD:ZONE0:BURS2:PDUQ6:DATA:PATT #B0,1`
defines the bit pattern.

Manual operation: See "Data Source PDU OFDMA" on page 73

[: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 sub-burst to 10.

Manual operation: See "Data Length PDU OFDMA" on page 73

[: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> 0 | 1 | OFF | ON

*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 93

[: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 94

[: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> 0 | 1 | OFF | ON

*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 94

[: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> 0 | 1 | OFF | ON
*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 93

[: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 94

[: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 74

[: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 72

[: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 73

[: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 73

[: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 54

[: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 code.

Usage: Query only

Manual operation: See "No. Of Allocated Codes" on page 81

[: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 a opportunity size of 2.

Manual operation: See "Opportunity Size" on page 81

[: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 81

[: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 81

[: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 52

[: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 71

[: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 52

[: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 52

[: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 54

[: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 72

[: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 71

[: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 72

[: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 72

[: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 70

[: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 Time Base" on page 77

[: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 77

[: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 77

[: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> 0 | 1 | OFF | ON

*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 77

[: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 78

[: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 78

[: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 78

[: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 78

[: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 78

[: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> 0 | 1 | OFF | ON

*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 78

[: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 49

[: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 67

[: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 Time Base OFDMA" on page 68

[: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 68

[: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> 0 | 1 | OFF | ON

*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 68

[: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 69

[: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> 0 | 1 | OFF | ON
*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 68

[: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 67

[: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 68

[: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> 0 | 1 | OFF | ON
*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 68

[: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 67

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:DLMap:IIE:STATe <State>

The command includes/excludes the CID-Switch_IE().

Parameters:
<State> 0 | 1 | OFF | ON
*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 67

[: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 65

[: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 67

[: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 48

[:SOURce<hw>]:BB:WIMax:AOFDm[:ZONE<st0>]:SUBChannel:PATTern <Pattern>

Setss the 'allocated subchannel bitmap'.

This command is available in uplink only.

Parameters:

<Pattern> 72 bits

Range: #H0000 0000 0000 0000 00,72 to #HFFFF FFFF FFFF FFFF FF,72

*RST: #HFFFF FFFF FFFF FFFF 3F,72

Example: `BB:WIM:AOFD:ZONE0:SUBC:PATT #HFFFFFFFFFFFFFFFF3F,72`
determines the allocated subchannel bitmap.

Manual operation: See "Allocated Subchannels Bitmap (uplink only)" on page 49

[: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> 0 | 1 | OFF | ON
*RST: ON

Example: `SOUR:BB:WIM:AOFD:ZONE0:SUBC:ROT ON`
activates the subchannel rotation.

Manual operation: See "Subchannel Rotation OFDMA" on page 47

[: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> 0 | 1 | OFF | ON
*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 49

[: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 46

[: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 79

[: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 file 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 79

4.7 OFDM Physical Layer Settings

The `SOURce:BB:WIMax:OFDM` system contain commands for setting the characteristics of signals with OFDM physical layer.

The commands of this system only take effect if the OFDM physical layer mode is selected:

- `SOURce:BB:WIMax:MODE OFDM`

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 26

[: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 very high crest factors of the signal.

Parameters:

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

Example: `BB:WIM:OFDM:BURS:CCOD:STAT ON`
activates channel coding for burst 1.

Manual operation: See "Channel Coding OFDM" on page 29

[: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 List Management..." on page 18

[: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 "<root>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 List Management…" on page 18

[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:DATA:PATTern <Pattern>

Sets the bit pattern for the PATTern selection. The maximum length is 64 bits.

Parameters:
<Pattern> 64 bits
Range: #B0,1 to #B111..1,64
*RST: #B0,1

Example: `BB:WIM:OFDM:BURS:DATA:PATT #H3F,8`
defines the bit pattern.

Manual operation: See "Data Source OFDM" on page 30

[: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 31

[: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 29

[: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 Time Base OFDM" on page 36

[: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 36

[: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> 0 | 1 | OFF | ON

*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 36

[: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> 0 | 1 | OFF | ON
*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 36

[: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> 0 | 1 | OFF | ON
*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 36

[:SOURce<hw>]:BB:WIMax:OFDM:BURSt<ch0>:FORMat <Format>

Selects the modulation and channel coding rate. Channel coding includes randomization, reed solomoon coding, convoutional coding and interleaving.

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

Parameters:

<Format> BPSK1D2 | QPSK1D2 | QPSK3D4 | QAM1D2X16 | QAM3D4X16 | QAM2D3X64 | QAM3D4X64
*RST: BPSK1D2

Example: `BB:WIM:OFDM:BURS:FORM QAM3D4X64`
selects modulation type 64QAM and a channel coding rate of 3.4 Msamples for burst 1.

Manual operation: See "Modulation and RS-CC Rate OFDM" on page 29

[: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 and 3 to 3 ms.

Manual operation: See "Gap OFDM" on page 32

[: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 39

[: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> 0 | 1 | OFF | ON
*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 40

[: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 41

[: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> 0 | 1 | OFF | ON

*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 41

[: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> 0 | 1 | OFF | ON

*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 40

[: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 41

[: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 29

[: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 31

[: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 29

[: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 30

[: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 31

[: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 39

[: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 Time Base" on page 38

[: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 38

[: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 27

[:SOURce<hw>]:BB:WIMax:OFDM:BW <Bw>

Sets the channel bandwidth.

Parameters:

<Bw> float

See `[:SOURce<hw>]:BB:WIMax:AOFDm:BW` on page 139

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 26

[: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 140
*RST: ETSI

Example: `BB:WIM:OFDM:FBAN ETSI`
selects frequency band according to ETSI specifications.

Manual operation: See "Frequency Band OFDM" on page 25

[: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 FCH OFDM" on page 34

[: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 List Management…" on page 18

[: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 "<root>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 List Management…" on page 18

[:SOURce<hw>]:BB:WIMax:OFDM:FCH:DATA:PATTern <Pattern>

Sets the bit pattern for the PATTern selection. The maximum length is 64 bits.

This command is available only in "User" mode (`SOURce:BB:WIMax:OFDM:FCH:MODE AUTO`).

Parameters:

<Pattern> 64 bits

Range: #B0,1 to #B111..1,64
*RST: #B0,1

Example: `BB:WIM:OFDM:BURS:DATA:PATT #H3F,8`
defines the bit pattern.

Manual operation: See "Data Source FCH OFDM" on page 35

[: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 FCH OFDM" on page 34

[: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 OFDM" on page 34

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

The command switches the FCH on or off.

Parameters:

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

Example: `BB:WIM:OFDM:FCH:STAT OFF`
switches off generation of FCH.

Manual operation: See "FCH State OFDM" on page 33

[: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 22

[: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 27

[: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 26

[: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 "Level Reference" on page 22

[: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 27

[: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 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 26

[: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 27

[:SOURce<hw>]:BB:WIMax:OFDM:SUBChannel[:COUNt] <Count>

The command selects the number of subchannels für OFDM configurations.

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

Parameters:

<Count> SC1 | SC2 | SC4 | SC8 | SC16

*RST: SC16

Example: `BB:WIM:OFDM:SUBC:COUN SC4`
selects 4 subchannels to be used.

Manual operation: See "No. of Used Subchannels OFDM" on page 27

[: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 27

[: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 37

[: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 file 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 37

List of Commands

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