R&S®SMW-K130/-K355 OneWeb User-Defined Signal Generation, OneWeb Reference Signals User Manual

1178571402
Version 09

ROHDE&SCHWARZ
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This document describes the following software options:

- R&S®SMW-K130 OneWeb User-Defined Signal Generation (1414.3788.xx)
- R&S®SMW-K355 OneWeb Reference Signals (1414.3742.xx)

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

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1178.5714.02 | Version 09 | R&S®SMW-K130/-K355

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

Contents

1 Welcome to the OneWeb option

The R&S SMW-K130/-K355 is a firmware application that adds functionality to generate signals based on the OneWeb specification. In particular, R&S SMW-K130 is used for internal user-defined signal generation of OneWeb signals.

With the provided functions, you can load predefined reference signals and generate signals out of them.

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

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

www.rohde-schwarz.com/manual/SMW200A

Installation

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

1.1 Accessing the OneWeb dialog

To open the dialog with OneWeb settings

1. In the block diagram of the R&S SMW, select "Baseband" > "OneWeb".

   A dialog box opens that displays the provided general settings.
   The signal generation is not started immediately.

2. To start signal generation, select "Reference Signals" and select one of the provided files.

3. Select "State" > "On".

1.2 What's new

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

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

- Time-based triggering, see "Time Based Trigger" on page 116 and "Trigger Time" on page 116.
- Editorial changes

1.3 Documentation overview

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

www.rohde-schwarz.com/manual/smw200a

1.3.1 Getting started manual

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

1.3.2 User manuals and help

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

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

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

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

1.3.3 Tutorials

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

1.3.4 Service manual

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

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

https://gloris.rohde-schwarz.com

1.3.5 Instrument security procedures

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

1.3.6 Printed safety instructions

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

1.3.7 Data sheets and brochures

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

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

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

1.3.8 Release notes and open source acknowledgment (OSA)

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

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

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

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

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

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

1.3.10 Videos

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

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

Figure 1-1: Product search on YouTube

1.4 Scope

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

In particular, it includes:

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

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

1.5 Notes on screenshots

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

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

2 About OneWeb option

The OneWeb option enables you to generate signals based on the OneWeb specification.

2.1 Required options

The basic equipment layout for generating signals according to the OneWeb specifications includes the options:

- Standard or wideband Baseband Generator (R&S SMW-B10/-B9)
- Baseband Main Module (R&S SMW-B13) or Wideband baseband main module (R&S SMW-B13XT)
- Option OneWeb reference signals (R&S SMW-K355)
- Option OneWeb user-defined signal (R&S SMW-K130)
- Frequency option (e.g. R&S SMW-B1003)

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

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

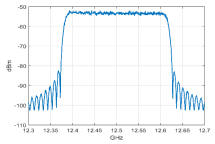
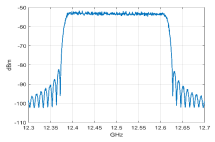
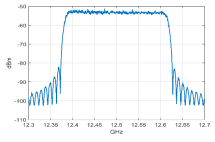
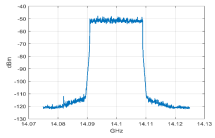
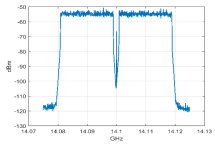
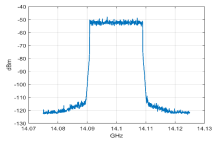
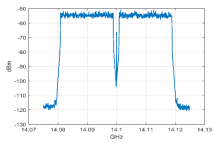
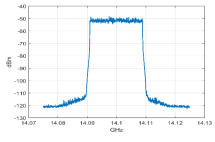
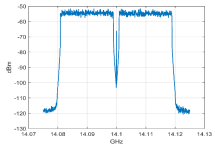
- Install the R&S WinIQSIM2 option of the digital standard, e.g. R&S SMW-K255 for playing LTE waveforms
- If supported, install the real-time option of the digital standard, e.g. R&S SMW-K55 for playing LTE waveforms

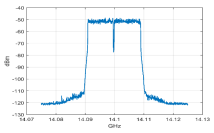
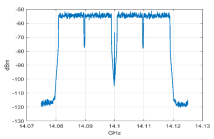
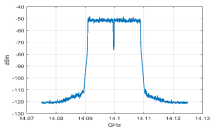
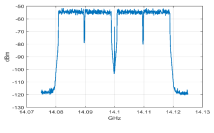
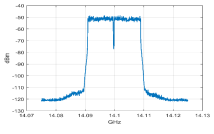
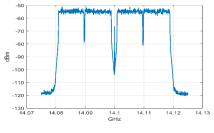
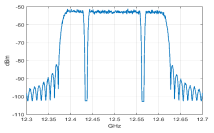
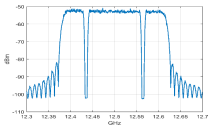
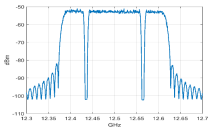
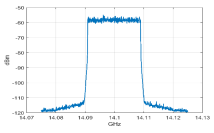
For more information, see data sheet.

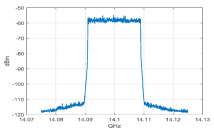
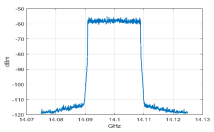
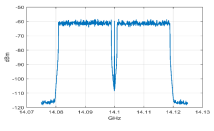
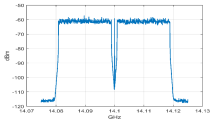
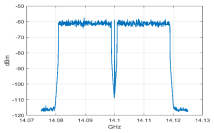
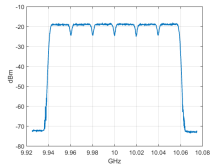
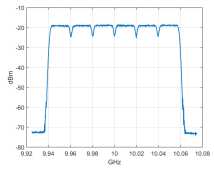
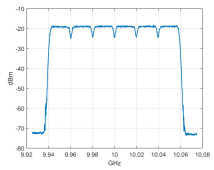
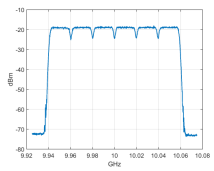
2.2 Provided reference signals

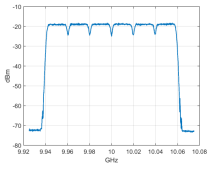
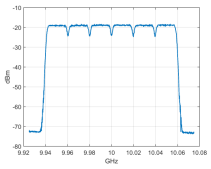
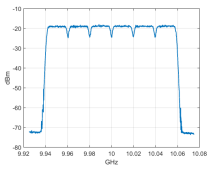
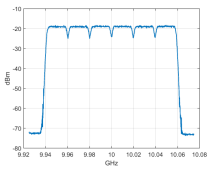
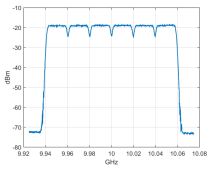
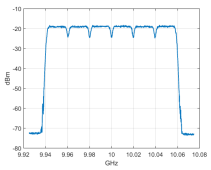
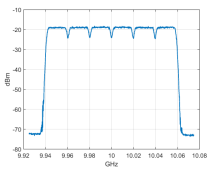
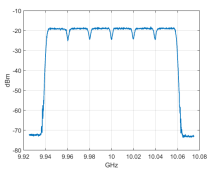
For an overview of the supported reference signals depending on the installed options, see Table 2-1.

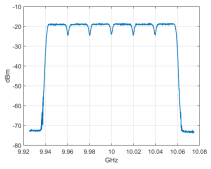
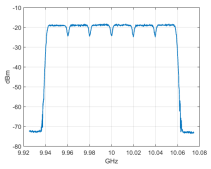
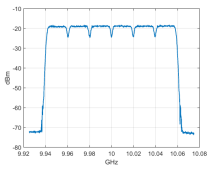
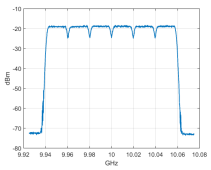
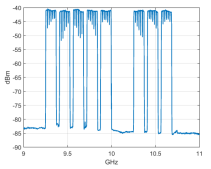
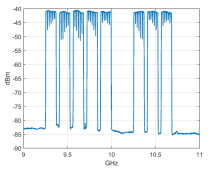
Table 2-1: Reference signals

Filename	Description	R&S SMW-B9	R&S SMW-B10	
HY11-H9878-2_2.0_FL_8psk_736399.8358.wv	Length: 1 Frame Sampling Rate:921.600MHz FL_8PSK	x		
HY11-H9878-2_2.0_FL_16qam_736399.8052.wv	Length: 1 Frame Sampling Rate:921.600MHz FL_16QAM	x		
HY11-H9878-2_2.0_FL_qpsk_736399.837.wv	Length: 1 Frame Sampling Rate:921.600MHz FL_QPSK	x		
HY11-H9951-2_2.0_RL_8PSK_1CC_1cl_736371.1831.wv	Length: 1 Frame Sampling Rate:30.720MHz RL_8PSK	x	x	
HY11-H9951-2_2.0_RL_8PSK_2CC_1cl_736371.1817.wv	Length: 1 Frame Sampling Rate:61.44MHz RL_8PSK	x	x	
HY11-H9951-2_2.0_RL_16QAM_1CC_1cl_736371.1833.wv	Length: 1 Frame Sampling Rate:30.72MHz RL_16QAM	x	x	
HY11-H9951-2_2.0_RL_16QAM_2CC_1cl_736371.1823.wv	Length: 1 Frame Sampling Rate:61.44MHz RL_16QAM	x	x	
HY11-H9951-2_2.0_RL_QPSK_1CC_1cl_736371.1827.wv	Length: 1 Frame Sampling Rate:30.72MHz RL_QPSK	x	x	
HY11-H9951-2_2.0_RL_QPSK_2CC_1cl_736371.18.wv	Length: 1 Frame Sampling Rate:61.44MHz RL_QPSK	x	x	

Filename	Description	R&S SMW-B9	R&S SMW-B10	
HY11-HA563-1_1.0_RL_8PSK_1CC_2cl_736408.2524.wv	Length: 1 Frame Sampling Rate:30.72MHz RL_8PSK	x	x	
HY11-HA563-1_1.0_RL_8PSK_2CC_2cl_736408.2531.wv	Length: 1 Frame Sampling Rate:61.44MHz RL_8PSK	x	x	
HY11-HA563-1_1.0_RL_16QAM_1CC_2cl_736408.2521.wv	Length: 1 Frame Sampling Rate:30.72MHz RL_16QAM	x	x	
HY11-HA563-1_1.0_RL_16QAM_2CC_2cl_736408.2528.wv	Length: 1 Frame Sampling Rate:61.44MHz RL_16QAM	x	x	
HY11-HA563-1_1.0_RL_QPSK_1CC_2cl_736408.2518.wv	Length: 1 Frame Sampling Rate:30.72MHz RL_QPSK	x	x	
HY11-HA563-1_1.0_RL_QPSK_2CC_2cl_736408.2527.wv	Length: 1 Frame Sampling Rate:61.44MHz RL_QPSK	x	x	
HY11-HA610-1_1.0_FLwvfm736292.5983.8psk.notch.wv	Length: 1 Frame Sampling Rate:921.600MHz FL_8PSK	x		
HY11-HA610-1_1.0_FLwvfm736292.5996.qpsk.notch.wv	Length: 1 Frame Sampling Rate:921.600MHz QPSK	x		
HY11-HA610-1_1.0_FLwvfm736345.2465.16qam.notch.wv	Length: 1 Frame Sampling Rate:921.600MHz FL_16QAM	x		
HY11-HA674-1_1.0_RL_8PSK_1CC_TDD_736523.4025.wv	Length: 1 Frame Sampling Rate:30.72MHz RL_8PSK	x	x	

Filename	Description	R&S SMW-B9	R&S SMW-B10	
HY11-HA674-1_1.0_RL_16QAM_1CC_TDD_736523.4179.wv	Length: 1 Frame Sampling Rate:30.72MHz RL_16QAM	x	x	
HY11-HA674-1_1.0_RL_QPSK_1CC_TDD_736523.4201.wv	Length: 1 Frame Sampling Rate:30.72MHz RL_QPSK	x	x	
HY11-HA674-2_1.0_RL_8PSK_2CC_TDD_736523.4383.wv	Length: 1 Frame Sampling Rate:61.44MHz RL_8PSK	x	x	
HY11-HA674-2_1.0_RL_16QAM_2CC_TDD_736523.441.wv	Length: 1 Frame Sampling Rate:61.44MHz RL_16QAM	x	x	
HY11-HA674-2_1.0_RL_QPSK_2CC_TDD_736523.4217.wv	Length: 1 Frame Sampling Rate:61.44MHz RL_QPSK	x	x	
OneWeb_RL_6Carrier_8PSK_channel1.wv	Length: 1 Frame Sampling Rate:258.774200 MHz RL_6Carrier_8PSK	x		
OneWeb_RL_6Carrier_8PSK_channel2.wv	Length: 1 Frame Sampling Rate:258.774200 MHz RL_6Carrier_8PSK	x		
OneWeb_RL_6Carrier_8PSK_channel3.wv	Length: 1 Frame Sampling Rate:258.774200 MHz RL_6Carrier_8PSK	x		
OneWeb_RL_6Carrier_8PSK_channel4.wv	Length: 1 Frame Sampling Rate:258.774200 MHz RL_6Carrier_8PSK	x		

Filename	Description	R&S SMW-B9	R&S SMW-B10	
OneWeb_RL_6Carrier_8PSK_channel5.wv	Length: 1 Frame Sampling Rate:258.774200 MHz RL_6Carrier_8PSK	x		
OneWeb_RL_6Carrier_8PSK_channel6.wv	Length: 1 Frame Sampling Rate:258.774200 MHz RL_6Carrier_8PSK	x		
OneWeb_RL_6Carrier_8PSK_channel7.wv	Length: 1 Frame Sampling Rate:258.774200 MHz RL_6Carrier_8PSK	x		
OneWeb_RL_6Carrier_8PSK_channel8.wv	Length: 1 Frame Sampling Rate:258.774200 MHz RL_6Carrier_8PSK	x		
OneWeb_RL_6Carrier_QPSK_channel1.wv	Length: 1 Frame Sampling Rate:258.774200 MHz RL_6Carrier_QPSK	x		
OneWeb_RL_6Carrier_QPSK_channel2.wv	Length: 1 Frame Sampling Rate:258.774200 MHz RL_6Carrier_QPSK	x		
OneWeb_RL_6Carrier_QPSK_channel3.wv	Length: 1 Frame Sampling Rate:258.774200 MHz RL_6Carrier_QPSK	x		
OneWeb_RL_6Carrier_QPSK_channel4.wv	Length: 1 Frame Sampling Rate:258.774200 MHz RL_6Carrier_QPSK	x		

Filename	Description	R&S SMW-B9	R&S SMW-B10	
OneWeb_RL_6Carrier_QPSK_channel5.wv	Length: 1 Frame Sampling Rate:258.774200 MHz RL_6Carrier_QPSK	x		
OneWeb_RL_6Carrier_QPSK_channel6.wv	Length: 1 Frame Sampling Rate:258.774200 MHz RL_6Carrier_QPSK	x		
OneWeb_RL_6Carrier_QPSK_channel7.wv	Length: 1 Frame Sampling Rate:258.774200 MHz RL_6Carrier_QPSK	x		
OneWeb_RL_6Carrier_QPSK_channel8.wv	Length: 1 Frame Sampling Rate:258.774200 MHz RL_6Carrier_QPSK	x		
OneWeb_RL_48Carrier_8PSK.wv	Length: 1 Frame Sampling Rate:2.4GHz RL_48Carrier_QPSK	x		
OneWeb_RL_48Carrier_QPSK_v4.wv	Length: 1 Frame Sampling Rate:2.4GHz RL_48Carrier_8PSK	x		

3 OneWeb configuration and settings

Access:

► Select "Baseband" > "OneWeb".

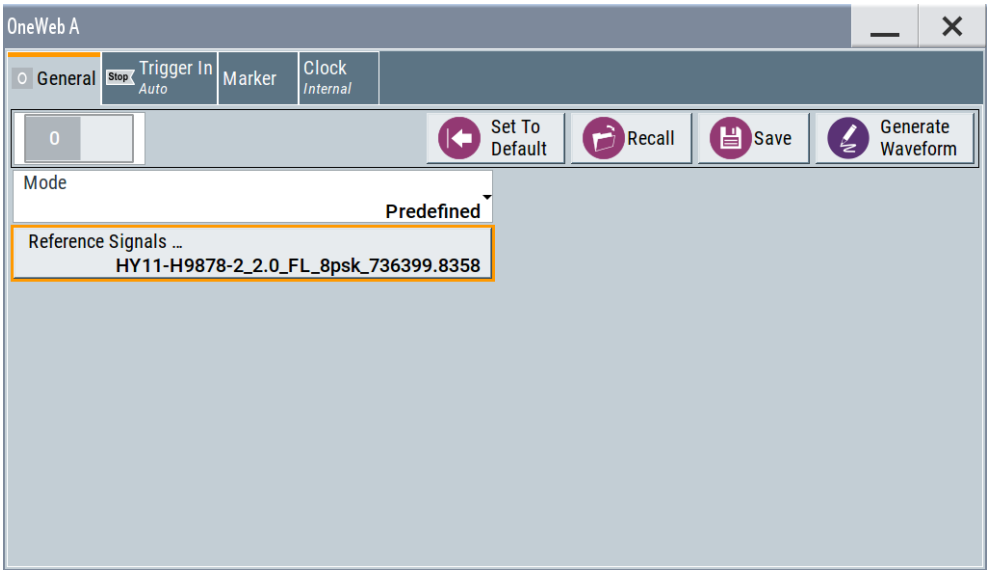
The remote commands required to define these settings are described in Chapter 5, "Remote-control commands", on page 136.

Settings:

3.1 General settings

Access:

► Select "Baseband" > "OneWeb" > "General".



This dialog comprises the standard general settings.

Settings:

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

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:STATe` on page 138

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

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:PRESet` on page 138

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

The filename and the directory, in which the settings are stored, are user-definable; the file extension is predefined.

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

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:SETTing:CATalog?` on page 139
`[:SOURce<hw>]:BB:ONEWeb:SETTing:LOAD` on page 139
`[:SOURce<hw>]:BB:ONEWeb:SETTing:STORe` on page 139

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

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

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:WAVeform:CREate` on page 139

Mode
Indicates that predefined configurations can be loaded.

"Predefined" Option: R&S SMW-K355
You can load predefined configuration files, see Predefined mode settings.

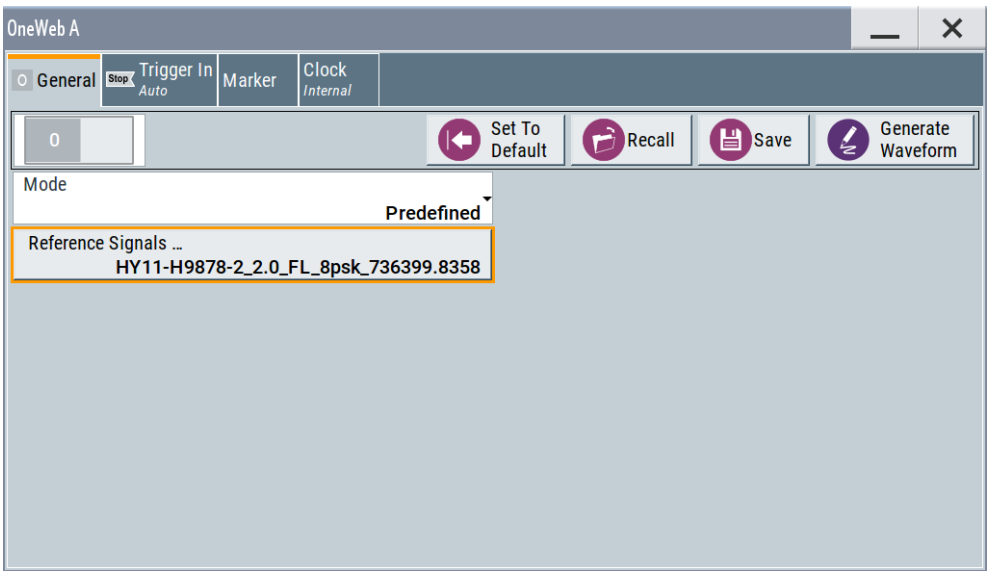
"User-Defined" Option: R&S SMW-K130
Allows the configuration of the frame structure for different link directions in OneWeb system, see Chapter 3.3, "User-defined mode settings", on page 20.
For uplink configuration, see Chapter 3.7, "Uplink frame configuration", on page 73, Chapter 3.7, "Uplink frame configuration", on page 73 and Chapter 3.8, "User equipment configuration", on page 94.
For downlink configuration, see Chapter 3.4, "General downlink settings", on page 21 and Chapter 3.5, "Downlink frame configuration", on page 29.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:CMOD` on page 140

3.2 Predefined mode settings

Access:

1. Select "Baseband" > "Beyond 3G Standards" > "OneWeb".
2. Select "Mode" > "Predefined".



In this mode, you can load the predefined reference signals.

Settings:

Reference Signal
Selects and loads a predefined reference signal.

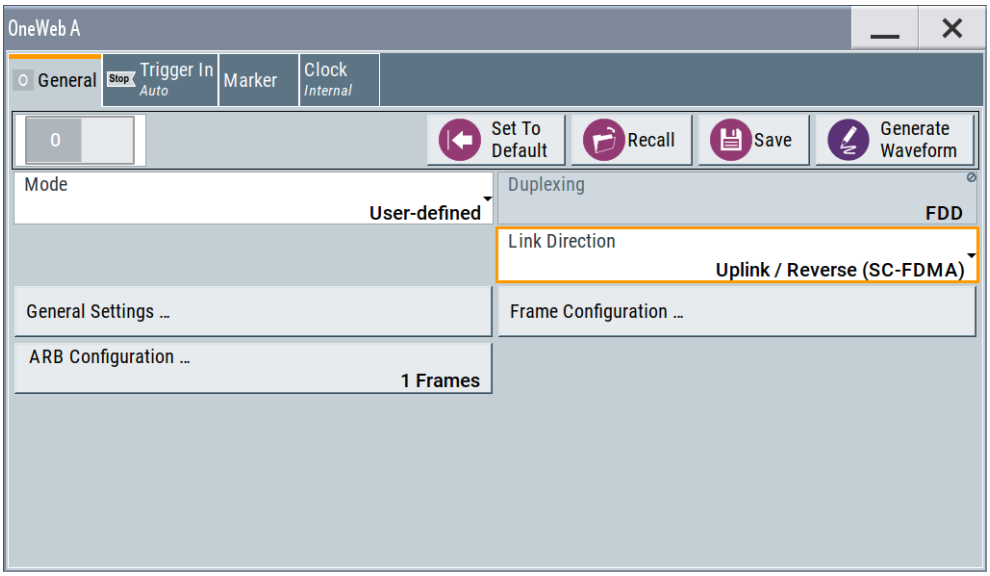
For details, see Chapter 2, "About OneWeb option", on page 11.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:REFSignal` on page 140

3.3 User-defined mode settings

Access:

1. Select "Baseband" > "Beyond 3G Standards" > "OneWeb".
2. Select "Mode" > "User-defined".



In this mode, you can define the uplink and downlink signals for OneWeb.
Note: For uplink signal, only "ARB configuration..." is supported.
For downlink signal, the "Filter/Clipping/ARB..." is supported.

Settings:

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

Only FDD is supported in both uplink and downlink directions.

Remote command:
[:SOURce<hw>]:BB:ONEWeb:DUPLexing? on page 138

Link Direction
Selects the transmission direction.

"Downlink / Forward (SC-TDM)"
The transmission direction selected is ground station to user terminal. The signal corresponds to that of a ground station.

"Uplink / Reverse (SC-FDMA)"
The transmission direction selected is user terminal to ground station. The signal corresponds to that of a user terminal.

Remote command:
[:SOURce<hw>]:BB:ONEWeb:LINK on page 138

General DL Settings/General UL Settings
Accesses the "General DL Settings / General UL Settings" dialog for configuring the OneWeb system.

For description of the available settings, refer to Chapter 3.4, "General downlink settings", on page 21 and Chapter 3.6, "General uplink settings", on page 57 respectively.

Remote command:
n.a.

Frame Configuration
Accesses the "Frame Configuration" dialog for configuring the allocation of the resource blocks to the different users, and the configuration of the users.

The available settings depend on the selected link direction. For description, refer to Chapter 3.5, "Downlink frame configuration", on page 29 and Chapter 3.7, "Uplink frame configuration", on page 73 respectively.

Remote command:
n.a.

Filter/Clipping/ARB Settings
Accesses the dialog for setting baseband filtering, clipping, and the sequence length of the arbitrary waveform component, see Chapter 3.12, "Filter/clipping/ARB settings", on page 122.

Remote command:
n.a.

3.4 General downlink settings

Option: R&S SMW-K130

Access:

1. Select "General > Link Direction > Downlink / Forward (SC-TDM)".

2. Select "General Settings "

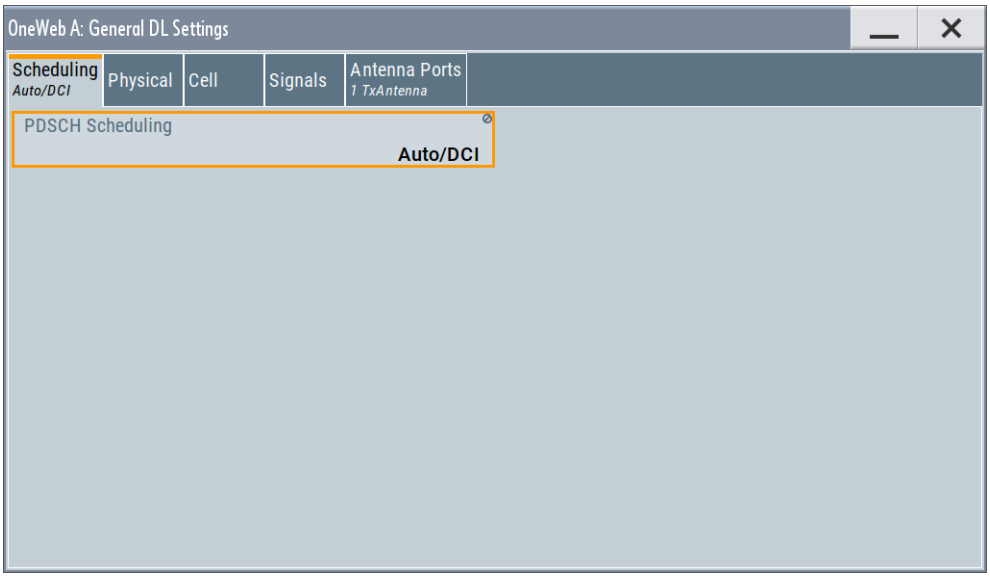
   This dialog allows configuring the OneWeb system for transmission direction downlink.

Settings:

3.4.1 PDSCH scheduling settings

Access:

1. Select "General > Link Direction > Downlink /Forward (SC-TDM)".
2. Select "General DL Settings > Scheduling".



   The "PDSCH scheduling" is fixed to Auto/DCI mode.

Remote command:

`[:SOURce<hw>]:BB:ONEWeb:DL:CONF:MODE?` on page 156

Overview of the scheduling methods

In the R&S SMW, there are different approaches to configure and schedule the different PDSCH allocations:

- According to the configuration made for the DCIs ("Auto/DCI")

This mode assures a OneWeb signal and the PDSCH allocations are configured automatically according to the configuration of the PDCCH DCIs.
There are however limitations in the configuration flexibility, especially regarding the power setting, see "Limitations and interdependencies in the Auto/DCI and Auto Sequence modes" on page 23.

Limitations and interdependencies in the Auto/DCI and Auto Sequence modes

The generation of a compliant signal requires some limitations in the configuration flexibility, especially regarding the power setting:

- The value of the parameter Reference Signal Power is fixed to 0dB.
- The PDSCH Power of each allocation belonging to a user is set as configured with the parameter Power for the corresponding user in the "Configure User" dialog.
- All four users are activated with enabled Scrambling and Channel Coding.
- Not all combinations of DCI Table, Users and UE_ID/n_RNTI are allowed, see Table 3-1.

Table 3-1: DCI Formats dependencies

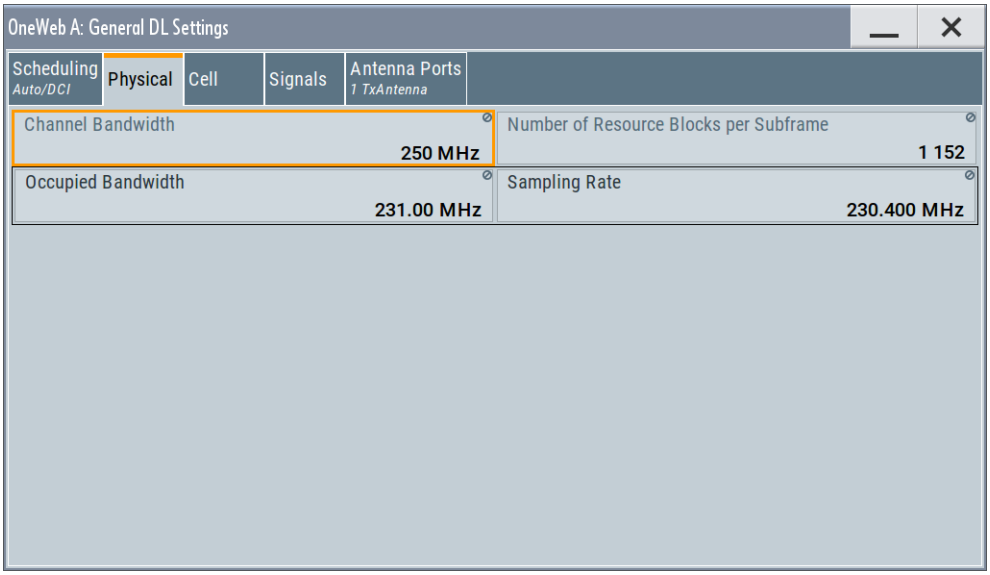
User	UE ID/n_RNTI	DCI Format
User x	As defined for the corresponding user	0, 1OW, 1A, 2OW, 3, 3A, 3OW
P-RNTI	65534	1A
SI-RNTI	65535	1A
RA-RNTI	As defined with the parameter "General DL Setting" > RA_RNTI	1A

3.4.2 Physical settings

Access:

1. Select "General > Link Direction > Downlink / Forward (SC-TDM)".

2. Select "General DL Settings > Physical".



In this dialog, the channel bandwidth respectively the number of resource blocks per subframe is selected. The other parameters are fixed and read-only.

Settings:

Channel Bandwidth
Displays the channel bandwidth.

The "Sampling Rate" and "Occupied Bandwidth" are therefore determined by the parameter "Number of Resource Blocks Per Subframe".

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:DL:BW?` on page 157

Number of Resource Blocks Per Subframe
Displays the number of used resource blocks for the selected "Channel Bandwidth".

The number of resource blocks are fixed to 1152.

The sampling rate and the occupied bandwidth are determined by the parameter "Number of Resource Blocks Per Subframe".

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:DL:NORB?` on page 157

Occupied Bandwidth
Displays the occupied bandwidth, calculated from the parameter "Number of Resource Blocks Per Subframe".

Remote command:
[:SOURce<hw>]:BB:ONEWeb:DL:OCCBandwidth? on page 157

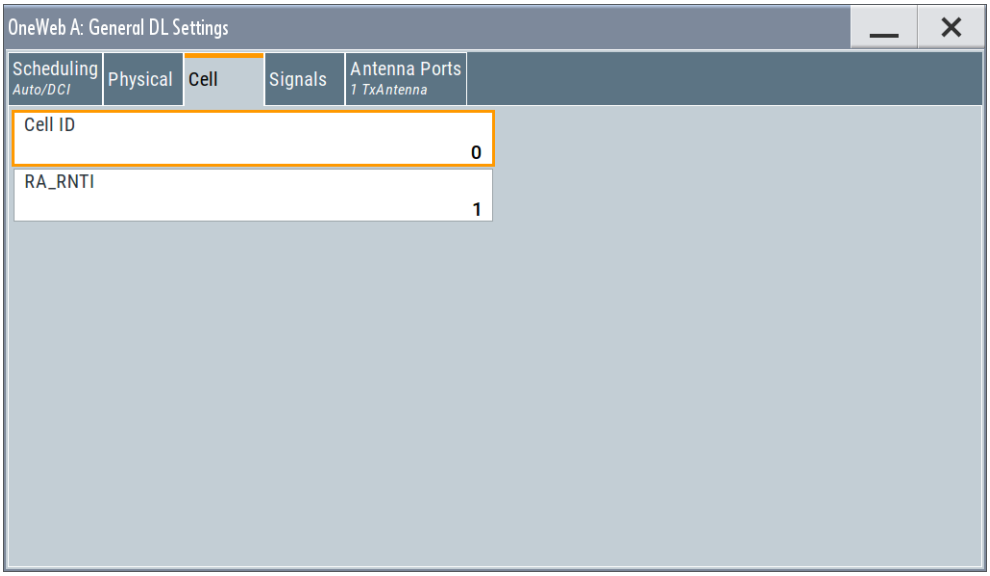
Sampling Rate
Displays the sampling rate, calculated from the parameter "Number of Resource Blocks Per Subframe".

Remote command:
[:SOURce<hw>]:BB:ONEWeb:DL:SRATe? on page 158

3.4.3 Cell-specific settings

Access:

1. Select "General > Link Direction > Downlink / Forward (SC-TDM)".
2. Select "General DL Settings > Cell".



The "Cell-Specific Settings" section comprises the physical layer cell identity settings and the random-access response identity for user.

Settings:

Cell ID
Sets the cell identity.

There are 256 unique physical layer cell identities (Cell ID).

The Cell ID determinates:
- The downlink reference signal pseudo-random sequence
- The pseudo-random sequence used for scrambling

Remote command:
[:SOURce<hw>]:BB:ONEWeb:DL[:PLCI]:CID on page 158

RA_RNTI
Sets the random-access response identity RA-RNTI for the users.

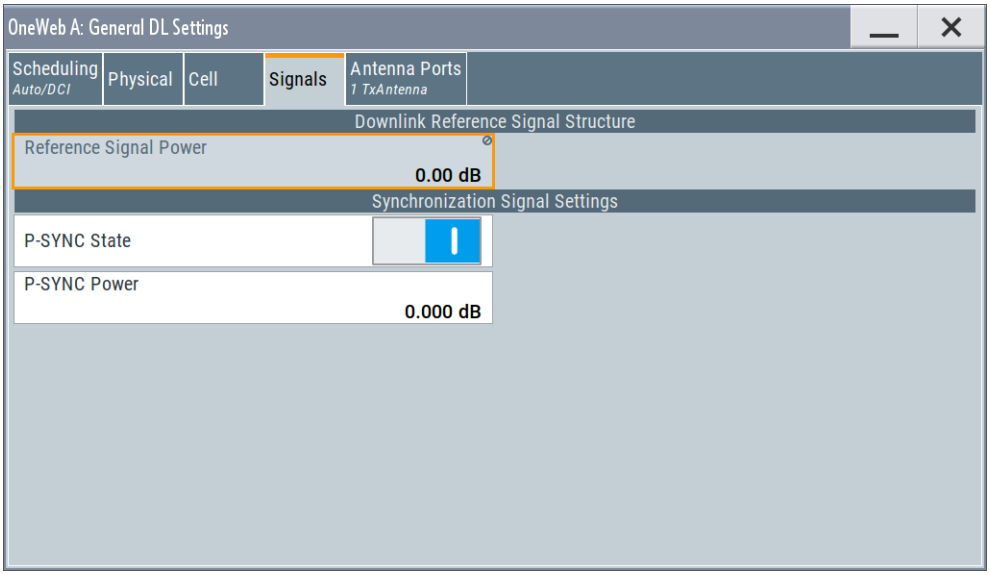
The value selected here determined the value of the parameter UE_ID/n_RNTI in case a RA_RNTI "User" is selected.

Remote command:
[:SOURce<hw>]:BB:ONEWeb:DL:CSETtings:RARNti on page 158

3.4.4 Downlink signals settings

Access:

1. Select "General > Link Direction > Downlink / Forward (SC-TDM)".
2. Select "General DL Settings > Signals".



The "Signals" dialog comprises the settings of all DL signals.

Settings:

Downlink Reference Signal Structure
Comprises the downlink reference signal settings, like the power of the reference signals.

Reference Signal Power ← Downlink Reference Signal Structure
Displays the power of the reference signal.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:DL:REFSig:POWer?` on page 159

Synchronization Signal Settings
In the "Synchronization Signal Settings" section, the power of the P-SYNC is set.

P-SYNC State ← Synchronization Signal Settings
Enables/disables the generation of the P-SYNC signal.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:DL:SYNC:PSTate` on page 159

P-SYNC Power ← Synchronization Signal Settings
Sets the power of the P-SYNC allocations.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:DL:SYNC:PPOWer` on page 159

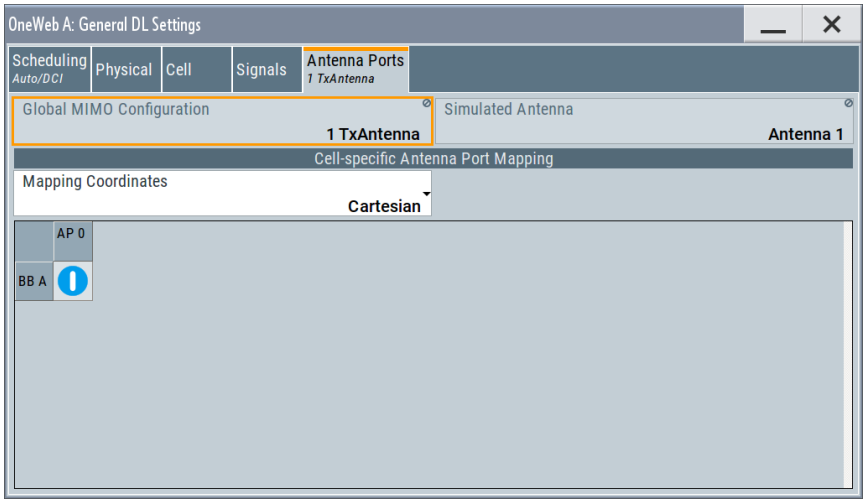
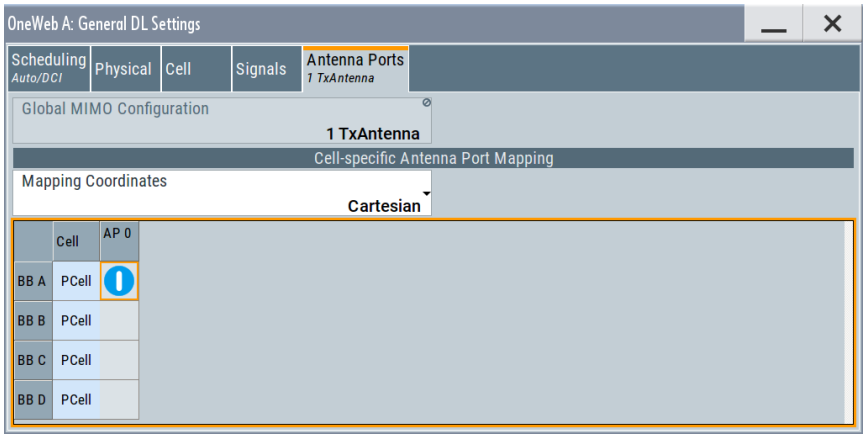
3.4.5 Antenna ports settings

Access:

1. Select "General > Link Direction > Downlink / Forward (SC-TDM)".
2. Select "General DL Settings > Antenna Ports".

   In the "Antenna Ports" section, TxAntenna is fixed at 1 for both MIMO configuration and simulated antenna.
   The provided settings depend on the selected "System Configuration > Fading and Baseband Configuration > Mode" and the enabled LxMxN MIMO scenario, i.e. the number of enabled "Entities", "Basebands" and "Streams". Refer to the user manual of the base unit.
   See Table 3-2 and compare the displayed settings for the same 4x4 MIMO configuration.

Table 3-2: Antenna ports settings depending on the enabled MxN MIMO configuration and "System Configuration" mode

"System Configuration > Fading/Baseband Configuration > BB Source Config"	"System Configuration > Fading/Baseband Configuration > 1x4x4"
"Separated"	
"Coupled"	

Settings:

Global MIMO Configuration

Displays the number of transmit antennas of the simulated OneWeb system.

The "Global MIMO Configuration" is fixed to one TxAntenna.

The Downlink Reference Signal Structure is set accordingly.

Note: One baseband simulates one antenna.

"1 TxAntenna" Enables single antenna port transmission.

Remote command:
[:SOURce<hw>]:BB:ONEWeb:DL:MIMO:CONFiguration? on page 160

Simulated Antenna
In "System Configuration > Fading/Baseband Configuration > Mode > Standard", determines the antenna to be simulated in the current baseband.

The "Simulated Antenna" is fixed to one antenna.

The Downlink Reference Signal Structure is set accordingly.

Remote command:
[:SOURce<hw>]:BB:ONEWeb:DL:MIMO:ANTenna? on page 160

Cell-Specific Antenna Port Mapping
Comprises the settings for defining the mapping of the logical antenna ports to the available physical Tx antennas (Basebands).

Mapping Coordinates ← Cell-Specific Antenna Port Mapping
Switches representation between the "Cartesian (Real/Imag)" and "Cylindrical (Magn./Phase)" coordinates.

Remote command:
[:SOURce<hw>]:BB:ONEWeb:DL:MIMO:APM:MAPCoordinates on page 160

Mapping table ← Cell-Specific Antenna Port Mapping
The mapping table is a matrix with number of rows equal to the number of physical Tx antennas and number of columns equal of the number of antenna ports (AP).

The default mapping is selected to fit the current configuration.

Remote command:
[:SOURce<hw>]:BB:ONEWeb:DL:MIMO:APM:CS:CELL:BB<st0> on page 160
[:SOURce<hw>]:BB:ONEWeb:DL:MIMO:APM:CS:AP<dir0>:ROW<st0>:REAL on page 161
[:SOURce<hw>]:BB:ONEWeb:DL:MIMO:APM:CS:AP<dir0>:ROW<st0>:IMAGinary on page 162

3.5 Downlink frame configuration

Option: R&S SMW-K130

Access:

1. Select "General > Link Direction > Downlink / Forward (SC-TDM)".
2. Select "Frame Configuration".

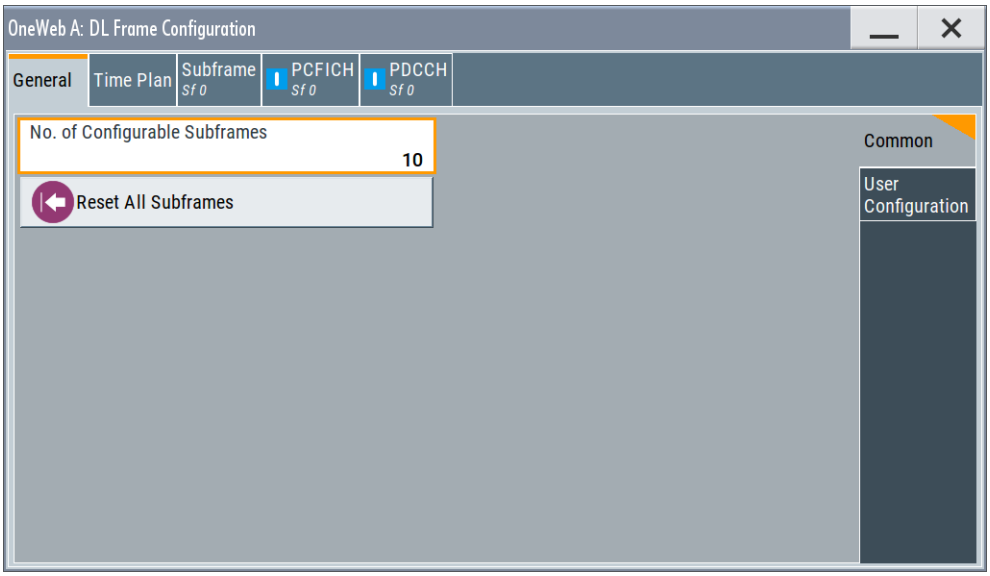
   The "DL Frame Configuration" dialog allows you to configure the subframes and the OFDMA resource allocations. The dialog consists of several tabs.

Settings:

3.5.1 General frame configuration settings

Access:

1. Select "General > Link Direction > Downlink / Forward (SC-TDM)".
2. Select "Frame Configuration > General".



This dialog comprises the general settings that can be configured in the downlink subframe.

Settings:

No Of Configurable (DL) Subframes
Sets the number of configurable subframes. Only the downlink and the special subframes are enabled for configuration.

All downlink/special subframes are filled periodically with the configured subframes except for the P-SYNC. The last are set globally in the "General DL Settings" dialog. The PBCH can only be configured in subframe 0.

For more detailed information about the maximum number of configurable subframes and for description of the dependencies between the parameters, see Chapter B.3, "Four configurable frames in uplink and downlink direction", on page 240.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:DL:CONSubframes` on page 163

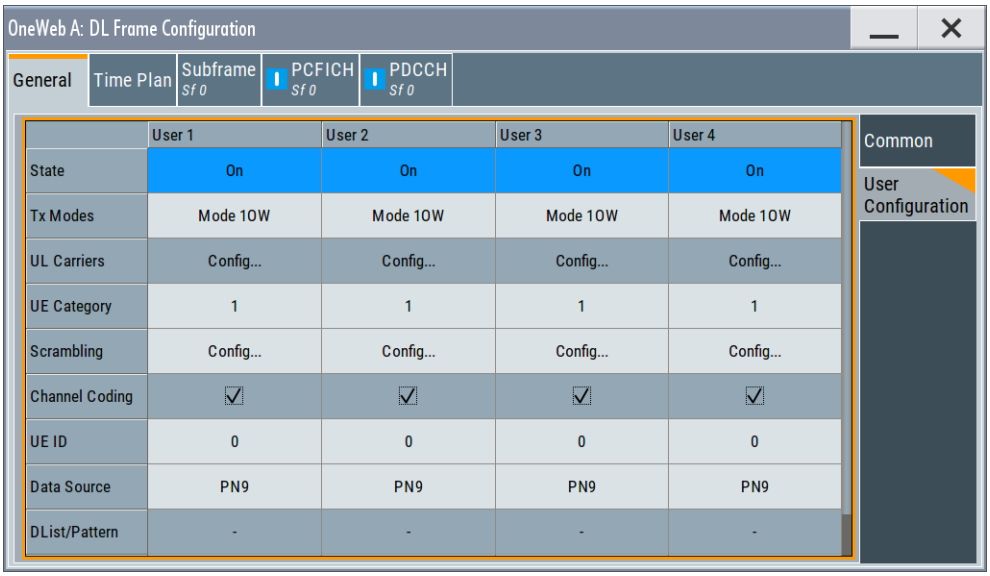
Reset All Subframes
Resets settings of all subframes and number of used allocations to the default values.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:DL:RSTFrame` on page 163

3.5.2 User configuration settings

Access:

1. Select "General > Link Direction > Downlink / Forward (SC-TDM)"
2. Select "Frame Configuration > General > User Configuration"

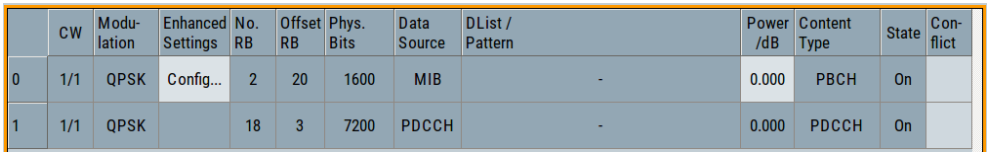


Use the provided settings to configure up to four scheduled UEs. To distribute them over the whole frame, set the data source of a certain allocation to "User x". This approach ensures that a common data source is used for allocations of one user equipment also in case that these allocations are non-adjacent.

In one subframe, all allocations belonging to the same "User" use identical settings. Changing, for example, the modulation of one of the allocations of "User 1", changes the modulation in all other allocations of this user in the current subframe.

The aforementioned applies for the following settings:

- Modulation



	CW	Modu-lation	Enhanced Settings	No. RB	Offset RB	Phys. Bits	Data Source	DList / Pattern	Power /dB	Content Type	State	Con-flict
0	1/1	QPSK	Config...	2	20	1600	MIB	-	0.000	PBCH	On	
1	1/1	QPSK		18	3	7200	PDCCH	-	0.000	PDCCH	On	

- Scrambling settings (Scrambling, UE ID/n_RNTI) and Channel Coding State. See also the "Enhanced Settings" dialog of each allocation (Chapter 3.5.8, "Enhanced PBCH and PDSCH settings", on page 52).

Settings:

User
Displays the consecutive number of the users.

Remote command:
n.a.

State
Enables/disables a user.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:DL:USER<ch>:STATe` on page 163

Tx Modes
Sets the transmission mode of the user.

Consider the following prerequisites and interdependencies:

- The selected "Tx Mode" determines the range of allowed DCI formats (Chapter 3.5.7, "DCI format configuration", on page 47), that is you can only assign valid DCI formats to this user.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:DL:USER<ch>:TXM` on page 163
`[:SOURce<hw>]:BB:ONEWeb:DL:USER<ch>:CELL<st0>:TXM` on page 164

UL Carriers Configuration
Sets the state of the associated UL carriers.

Remote command:
n.a.

UE Category
Sets the UE category.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:DL:USER<ch>:UEC` on page 164

Scrambling
Queries the scrambling state for all allocations belonging to the selected user.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:DL:USER<ch>:SCRambling:STATe?` on page 164

Channel Coding State
Sets channel coding for all allocations belonging to the selected user.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:DL:USER<ch>:CCODing:STATe` on page 165

UE ID
Sets the user equipment ID.

This UE ID is used for the generation of the scrambling sequence for the allocations, for which you select the Downlink frame configuration > "Allocation Table" > Data Source, DList/Pattern = "User x"

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:DL:USER<ch>:UEID` on page 165

Data Source, DList/Pattern
Selects the data source for the selected user.

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

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

Remote command:
[:SOURce<hw>]:BB:ONEWeb:DL:USER<ch>:DATA on page 165
[:SOURce<hw>]:BB:ONEWeb:DL:USER<ch>:DSELect on page 165
[:SOURce<hw>]:BB:ONEWeb:DL:USER<ch>:PATTern on page 166

Power
Sets PDSCH power factor.

This power value is applied to all allocations that belong to the corresponding user. The power of an allocation is also determined by the parameter "PDSCH Scheduling Mode".

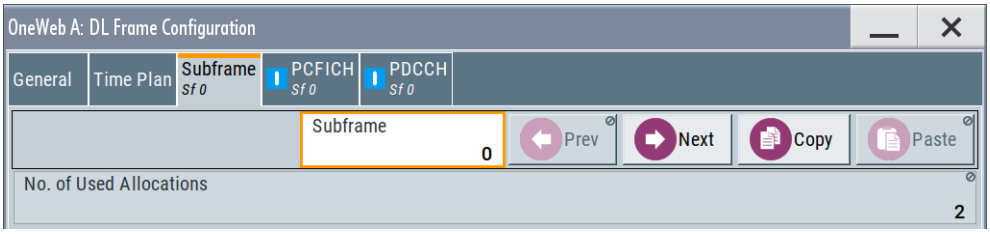
In the "Auto/DCI" mode, the power value is fixed and cannot be adjusted.

Remote command:
[:SOURce<hw>]:BB:ONEWeb:DL:USER<ch>:PA on page 166

3.5.3 Subframe configuration settings

Access:

1. Select "General > Link Direction > Downlink / Forward (SC-TDM)".
2. Select "General > Frame Configuration".
3. To access the common subframe configuration settings, select one of the following:
   - "Frame Configuration > Subframe"
   - "Frame Configuration > PCFICH"
   - "Frame Configuration > PDCCH"



Provided are the following common settings:

Settings:

Subframes
Selects the number of subframes to be displayed or configured.

Remote command:
n.a.

Next/Prev
Navigates through the subframes.

Remote command:
n.a.

Copy/Paste
Copies/pastes the settings of the selected subframe. P-SYNC/PBCH settings are not considered.

For more detailed information, see Chapter A, "Conflict handling", on page 235.

Remote command:
n.a.

No. Of Used Allocations
Sets the number of scheduled allocations in the selected subframe.

The number of available allocations depends on the allocation's content type for a subframe and the general channel bandwidth setting.

The default value depends on the existence of a PBCH channel in a subframe. In this case, the default value is set to 2, otherwise to 1.

The second or the first allocation is reserved for the PDCCH, regardless whether this allocation is enabled or not.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ALCount` on page 166

3.5.4 DL resource allocation table

Access:

1. Select "General > Link Direction > Downlink / Forward (SC-TDM)".
2. In the "General" tab, select "Frame Configuration > Subframe".

	CW	Modulation	Enhanced Settings	No. RB	Offset RB	Phys. Bits	Data Source	DList / Pattern	Power /dB	Content Type	State	Conflict
0	1/1	QPSK	Config...	2	20	1600	MIB	-	0.000	PBCH	On	
1	1/1	QPSK		18	3	7200	PDCCH	-	0.000	PDCCH	On	

The resource allocation table comprises the settings necessary to configure the individual allocation parameters for a subframe.

Settings:

Allocation number
Displays the consecutive number of the allocation.

Remote command:
n.a.

Codeword
Determines whether one or two codewords use the same physical resource, and whether codeword 1/2 or 2/2 is configured with this allocation table entry.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ALLoc<ch0>:CODWords?` on page 167

Modulation
Displays the modulation scheme for the allocation.

The modulation is fixed at QPSK for PDCCH and PBCH.

For PDSCH, the modulation (QPSK, 8PSK, 16QAM) depends on the MCS in DCI content.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ALLoc<ch0>[:CW<user>]:MODulation?` on page 167

Enhanced Settings
Opens the "Enhanced Settings" dialog for configuration of scrambling and channel coding (see Chapter 3.5.8, "Enhanced PBCH and PDSCH settings", on page 52).

Remote command:
n.a.

No. RB (Resource Blocks)
Defines bandwidth of selected allocation in terms of resource blocks in a subframe.

See also Chapter A, "Conflict handling", on page 235.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ALLoc<ch0>[:CW<user>]:RBCount?` on page 167

Offset RB
Displays the start resource block of the selected allocation in a subframe.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ALLoc<ch0>[:CW<user>]:RBOFfset?` on page 168

Phys. Bits/Number of Physical Bits (DL)
Displays the size of the selected allocation in bits and considering the subcarriers that are used for other signals or channels with higher priority.

The size of the PBCH allocation is fixed to 6400/4 Frames, 1600/1 Frame.

See Chapter A, "Conflict handling", on page 235.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ALLoc<ch0>[:CW<user>]:PHYSbits?` on page 168
`[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:USER<ch>:PHYSbits?` on page 172

Data Source
Selects the data source for the selected allocation.

For PBCH allocation with enabled parameter MIB (including SFN), the "Data Source = MIB" is used.

Use the User configuration settings dialog to configure the data sources for "User 1 .. 4".

The following standard data sources are available:

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

See also:

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

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ALLoc<ch0>[:CW<user>]:DATA?` on page 168
`[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ALLoc<ch0>[:CW<user>]:DSELect?` on page 169
`[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ALLoc<ch0>[:CW<user>]:PATTern` on page 169

Power
Displays the power P_{PDSCH} and P_{PBCH} respectively for the selected allocation.

The power of the PDCCH allocation P_{PDCCH} is set in the power of PDCCH of the corresponding subframe.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ALLoc<ch0>[:CW<user>]:POWer` on page 169

Content Type
Indicates the type of the selected allocation.

Note: There can be only one PBCH in subframe 0.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ALLoc<ch0>[:CW<user>]:CONType?` on page 170

State
Queries the allocation state.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ALLoc<ch0>[:CW<user>]:STATe?` on page 170

Conflict
Indicates a conflict between allocations.

For more information, see Chapter A, "Conflict handling", on page 235.

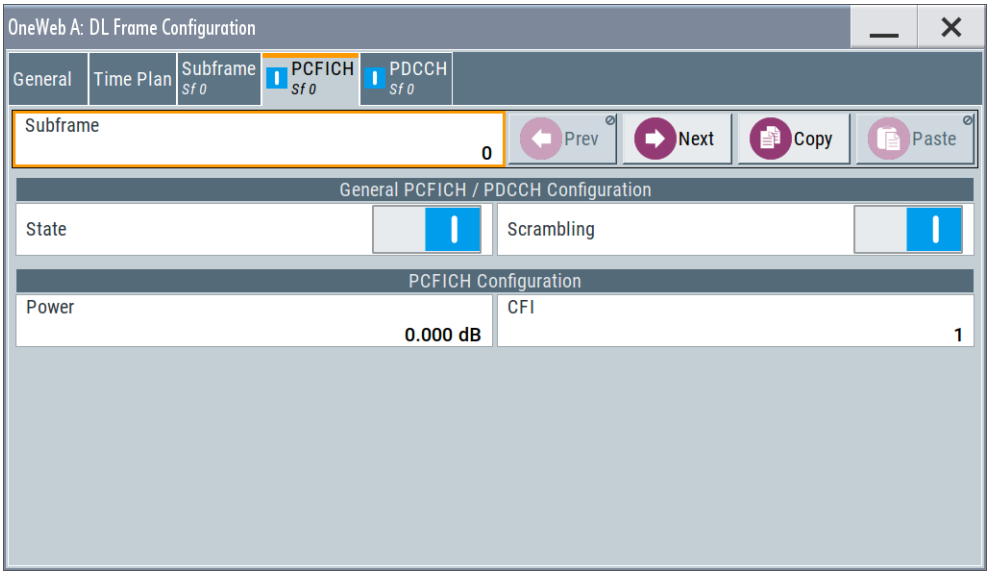
Remote command:
`[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ALLoc<ch0>[:CW<user>]:CONFlict?` on page 171

3.5.5 PCFICH settings

Access:

1. Select "General > Link Direction > Downlink / Forward (SC-TDM)".

2. Select "Frame Configuration > PCFICH".



Use these parameters and the DCI table to configure the multiple scheduling messages (DCIs) with the corresponding PDCCHs.

Settings:

General PCFICH/PDCCH Configuration
Comprises the settings common to all DL enhanced channels.

State ← General PCFICH/PDCCH Configuration
Enables/disables the PDCCH and PCFICH allocation.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:STATe` on page 174

Scrambling State ← General PCFICH/PDCCH Configuration
Enables/disables the scrambling of all DL enhanced channels.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PCFich:SCRambling:STATe` on page 174

PCFICH Configuration
Comprises the PCFICH settings:

PCFICH Power ← PCFICH Configuration
Sets the power of the PCFICH (P_{PCFICH}).

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PCFich:POWer` on page 174

CFI for PDCCH ← PCFICH Configuration
Sets the control format indicator for PDCCH. It carries information about the number of RBs used for transmission of PDCCHs in a subframe.

See Table 3-3 for the number of RBs possible to use for PDCCH.

See also Table A-1.

Table 3-3: Number of RBs used for PDCCH

Control format indicator (CFI)	Number of RBs for PDCCH ($N_{RBPDCCH}$)
1	9
2	18
3	27
4	36
5	45
6	54
7	63
8	72
9	81
10	90
11	99
12	108

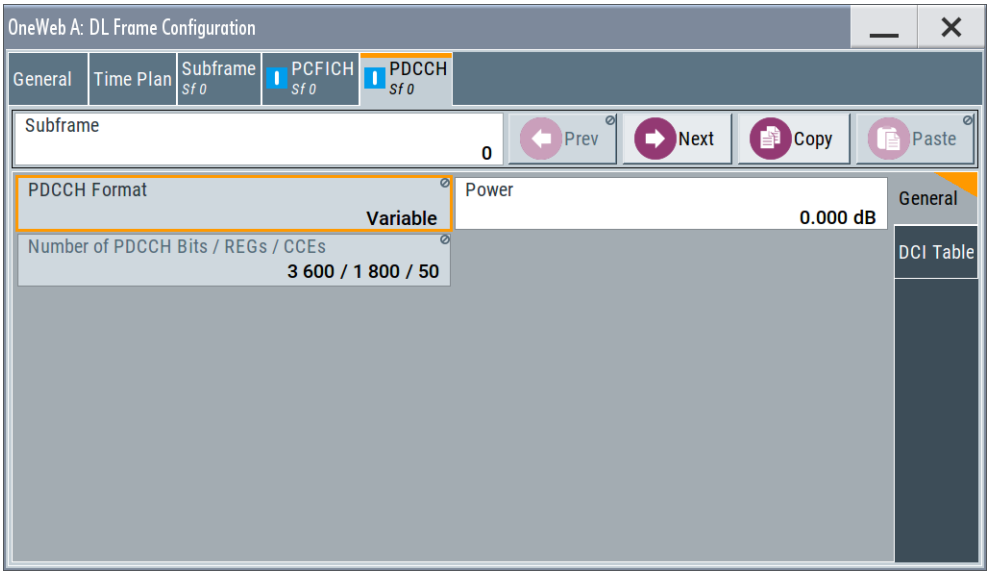
Remote command:
`[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PCFich:CFI` on page 174

3.5.6 PDCCH settings

Access:

1. Select "General > Link Direction > Downlink / Forward (SC-TDM)".

2. Select "Frame Configuration > PDCCH".



Use these parameters and the DCI table to configure the multiple scheduling messages (DCIs) with the corresponding PDCCHs.

Settings:

PDCCH Format
Displays the PDCCH format.

The PDCCH format determines how many CCEs (control channel elements) are used for the transmission of the PDCCH.

The PDCCH format is fixed to "Variable". In this mode, a full flexibility by the configuration of the downlink control information (DCI) format and content is enabled.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:FORMat?`
on page 175

Power
Sets the power of the PDCCH (P_{PDCCH}).

The value sets with this parameter is also displayed in the allocation table for the corresponding allocation.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:POWer`
on page 175

Number of PDCCH Bits / REGs / CCEs
Displays the number of bits, REGs and CCEs allocated for PDCCH.

"Number of PDCCH Bits"
Indicates the number of bits available for PDCCH.

The number of bits available for PDCCH allocation depends on the selected:
- CFI for PDCCH

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:BITS?`
on page 175

"Number of PDCCH REGs"
Indicates the number of the REGs that are available for the PDCCH allocation.
The number of REGs available for PDCCH allocation depends on the "Number of PDCCH Bits" ($\#Bits_{PDCCH}$) and is calculated as follows:
Number of RB of PDCCH * Number of REGs of single RB

Example:

CFI = 1, Number of RB of PDCCH = 9, Number of REGs of single RB = 200, thus the number of of REs available for PDCCH allocation is 1800

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:AVRegs?`
on page 176

"Number of PDCCH CCEs"

Indicates the number of the control channel elements (CCEs) that are available for the PDCCH allocation.
The PDCCH is mapped to the REs not used for PCFICH and transmitted on one or several CCEs, where a CCE corresponds to 36 REs, i.e. the number of the available CCEs is calculated as follows:
#CCEs available$_{PDCCH}$ = "Number of PDCCH REs"/ 36

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:AVCCes?` on page 176

Append
Adds a row at the end of the table.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:APPend` on page 176

Insert
Insert a new row before the current one.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:SITem` on page 177
`[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:INSert` on page 177

Delete
Deletes the selected row.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:DELete` on page 177

Down
Moves the selected row down.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:DOWN` on page 178

Up
Moves the selected row up.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:UP` on page 178

Reset
Resets the table.

Remote command:
[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:RESet
on page 177

Resolve Conflicts
The "Resolve Conf." is a built-in algorithm that reassigns automatically the CCE values depending on the configured "Search Space"; previously configured CCE values are not maintained. If the conflict cannot be resolved automatically, the values are left unchanged.

For more information on how to solve DCI conflicts, see Chapter A, "Conflict handling", on page 235.

Remote command:
[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:SOLVe?
on page 178
To query the number of current conflicts:
[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:
CONFlicts? on page 170

DCI Table
Comprises the settings concerning the PDCCH content.

Number of Used PDCCH Items ← DCI Table
Displays the number of the PDCCH items, i.e. the number of rows in the DCI table.

Remote command:
[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:UITems?
on page 178

User ← DCI Table
Selects the user the DCI is dedicated to. The available DCI Format depend on the value of this parameter.

Note: To enable one particular user in more than one component carrier, append several table rows and enable the same "User" in the different component carriers.

"User x" Selects one of the four users configured in the User configuration settings dialog.

"P-RNTI/SI-RNTI/RA-RNTI"
A group of users is selected.

"None" Allows free definition of all settings

Remote command:
[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:
ITEM<ch0>:USER on page 179

UE_ID/n_RNTI ← DCI Table
Displays the UE_ID or the n_RNTI for the selected PDCCH.

Remote command:
[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:
ITEM<ch0>:UEID on page 179

Cell Index ← DCI Table
Displays the component carrier on that the corresponding DCI is transmitted.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:CELL?` on page 179

PDCCH ← DCI Table
Indicates if the DCI is carried by a PDCCH.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:PDCChtype?` on page 180

DCI Format ← DCI Table
Sets the DCI format for the selected PDCCH.

The downlink control information (DCI) is a message used to control the physical layer resource allocation in both the UL and DL direction. It carries scheduling information as well as uplink power control commands.

The DCI is mapped on the PDCCH and depending on the DCI message size and usage are categorized into four different formats that are further subdivided (see Table 3-4).

Table 3-4: Overview DCI formats

DCI format	Purpose
DCI Format 0	PUSCH and PUACH allocation information
DCI Format 1OW DCI Format 1A	PDSCH information with one codeword
DCI Format 2OW	PDSCH information (two codewords for 2OW)
DCI Format 3/3A	Uplink power control information

The fields of each DCI format are configurable parameters that can be adjusted in the corresponding dialog box. Select Content Config to access this dialog box for the selected "DCI Format".

Not all DCI formats are always enabled for selection.

The following table gives an overview of the cross-reference between the available DCI formats and the value of the parameter User.

User	DCI format
P-RNTI/SI-RNTI/RA-RNTI	1A
User x	0, 1OW, 1A, 2OW, 3, 3A
None	3, 3A

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIFmt` on page 180

Search Space ← DCI Table
Defines the search space for the selected DCI, i.e. determines the valid CCE indexes.

The search space determines the set of CCEs a UE monitors. The UE can decode only the control information on a PDCCH that is transmitted over CCEs within the search space this UE monitors.

Note: Avoid the use of the "Auto" values; this value is provided for backwards compatibility reasons only.

"Auto" Provided for backward compatibility only.

An internal mapping to the common and UE-specific search space is applied depending on the value of the parameter "User":
- For "User x", "Auto" corresponds to "UE-spec"
- In all other cases, "Auto" corresponds to "Common"

"Common" The DCI is mapped to the common search space.
A common search space is used when all or a group of UEs is addressed. The combination "User 1" and common search space is enabled in PCell only.

"UE-spec" Non-common DCIs are mapped to the UE-specific search space.
Each UE has multiple UE-specific search space, determined as a function of the UE_ID and the subframe. A UE-specific search space applies for the User sets to "User x".

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:SESPace` on page 180

Content Config ← DCI Table
Opens the DCI format configuration dialog to configure the DCI fields of the selected DCI Format.

Remote command:
n.a.

PDCCH Format (Variable) ← DCI Table
Sets the PDCCH format.

The PDCCH format determines how many CCEs are used for the transmission of the PDCCH.

Table 3-5: Supported PDCCH formats

PDCCH format	Number of CCEs
0	2
1	4
2	8
3	16
4	40

Remote command:
[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:PFMT on page 181

Number CCEs ← DCI Table
Defines the number of control channel elements used for the transmission of the PDCCH.

The value depends on the selected PDCCH format.

Remote command:
[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:NCCes? on page 182

CCE Index ← DCI Table
Sets the CCE start index.

The available CCEs depend on the selected PDCCH format.

Remote command:
[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:CINDex on page 181

No. Dummy CCEs ← DCI Table
Defines the number of dummy CCEs that are appended to the corresponding PDCCH.

Remote command:
[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:NDCCes? on page 182

Conflict (DCI) ← DCI Table
Indicates a conflict between two DCI formats.

For more information on how to solve DCI conflicts, see Chapter A.3, "DCI conflict handling", on page 236.

Remote command:
[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:CONFlict? on page 181
To query the number of current conflicts:
[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:CONFlicts? on page 170

3.5.7 DCI format configuration

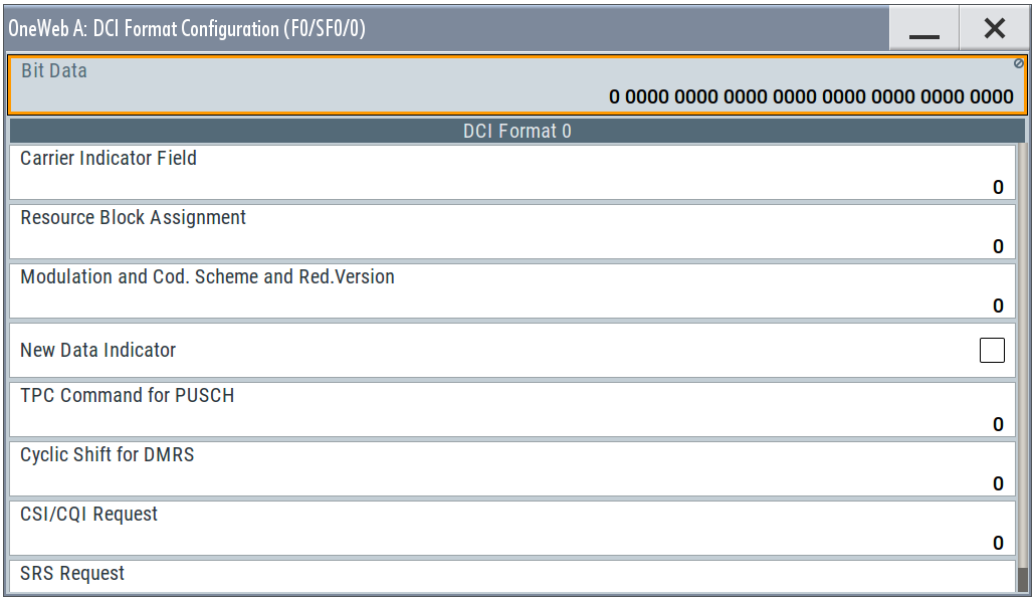
The following provides the configuration settings for the different DCI format supported in OneWeb system.

Settings:

Bit Data
Displays the resulting bit data as selected with the DCI format parameters.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:BITData?` on page 182

DCI Format 0
The DCI Format 0 is used for the scheduling of uplink transmission on PUSCH and PUACH and transmits the information listed in the following table.



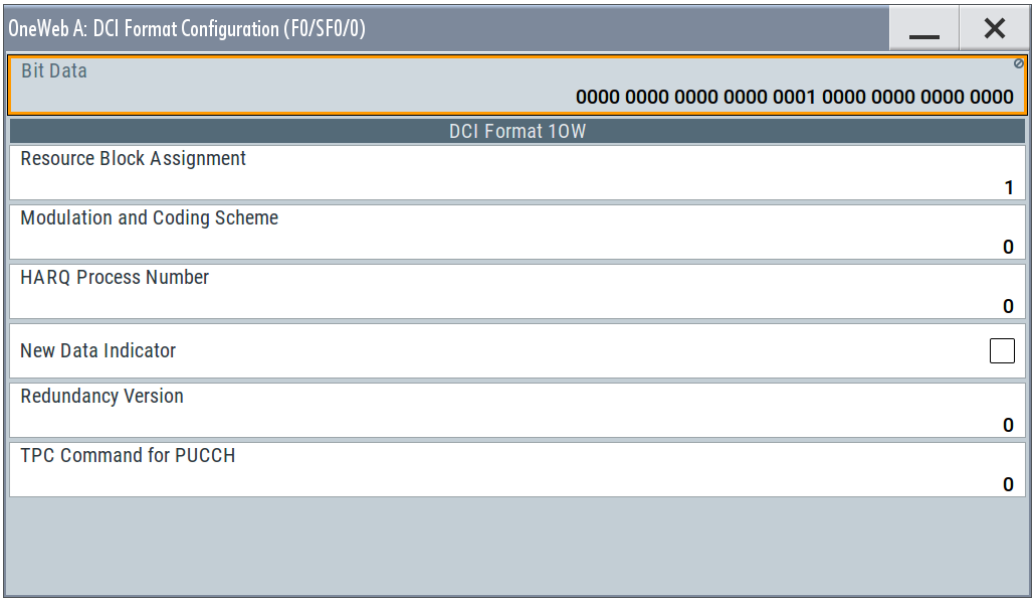
The resulting Bit Data is displayed according to the fields listed in the table.

Control Information Field	SCPI command	Dependencies
"Carrier Indicator Field (CIF)"	`[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:CIField` on page 183	
"Resource Block Assignment"	`[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:RBA` on page 184	
"Modulation and Cod. Scheme and Red. Version"	`[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:MCSR` on page 184	
"New Data Indicator"	`[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:NDI` on page 184	

Control Information Field	SCPI command	Dependencies
"TPC Command for PUSCH"	`[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:TPCC` on page 185	
"Cyclic Shift for DMRS"	`[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:CSDMrs` on page 183	
"CSI/CQI Request"	`[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:CSIRequest` on page 183	
"SRS Request"	`[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:SRSRequest` on page 185	"Search Space" other than "Common"

DCI Format 1OW

The DCI format 1 carries information for scheduling transmission of one PDSCH codeword. The different fields of this format are summarized in the following table.



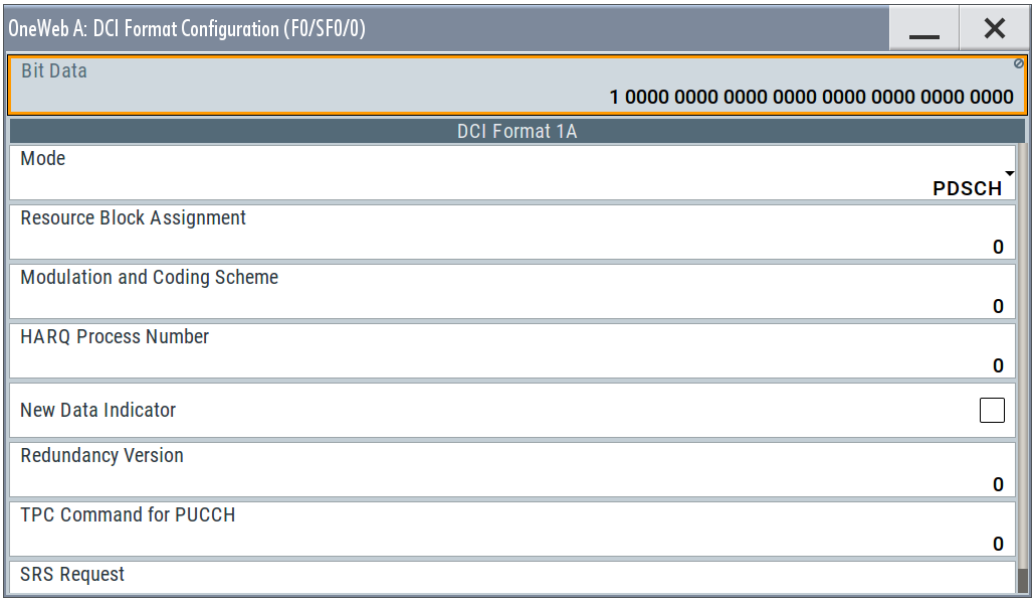
The resulting Bit Data is displayed according to the fields listed in the table.

Control Information Field	SCPI command	Dependencies
"Resource Block Assignment"	`[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:RBA` on page 184	
"Modulation and Coding Scheme"	`[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:MCSR` on page 184	
"HARQ Process Number"	`[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:HPN` on page 185	
"New Data Indicator"	`[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:NDI` on page 184	

Control Information Field	SCPI command	Dependencies
"Redundancy Version"	[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:RV on page 186	
"TPC Command for PUCCH"	[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:TPCC on page 185	

DCI Format 1A

DCI format 1A is used for the compact scheduling of one PDSCH codeword and random access procedure initiated by a PDCCH order.



The resulting Bit Data is displayed according to the fields listed in the table.

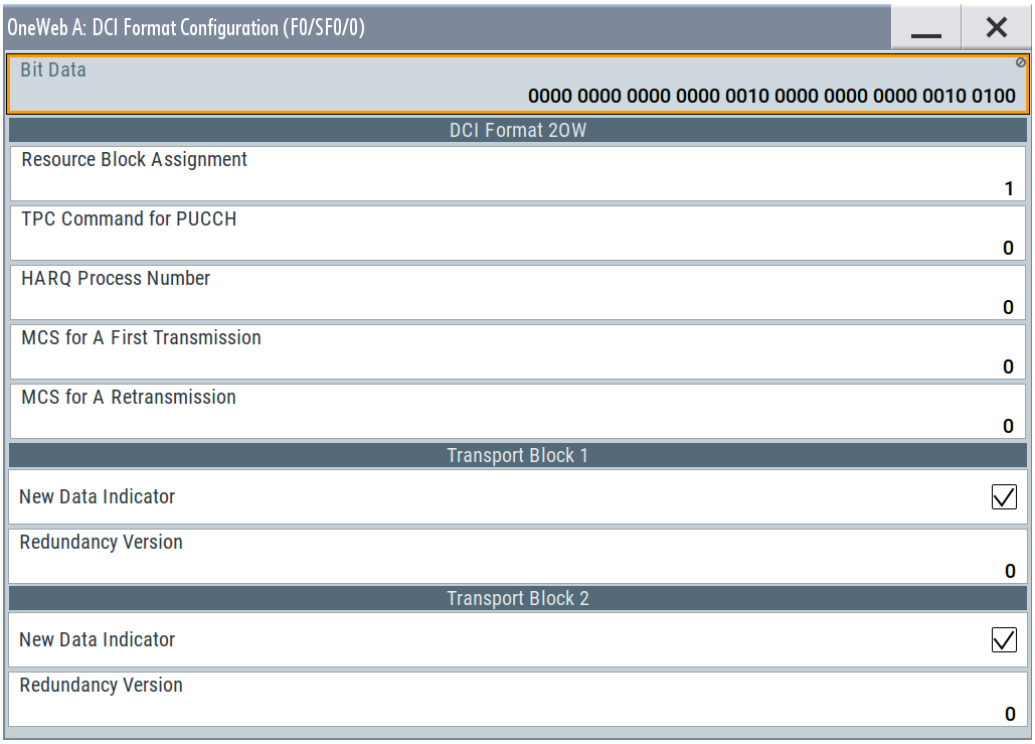
The contents of DCI Format 1A are listed in the following table; the available fields depend whether a PDSCH or PRACH is transmitted.

Control Information Field	SCPI command	Dependencies
"Mode"	[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:F1AMode on page 186	
"Resource Block Assignment"	[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:RBA on page 184	
"Modulation and Coding Scheme"	[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:MCSR on page 184	PDSCH Mode
"HARQ Process Number"	[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:HPN on page 185	PDSCH Mode
"New Data Indicator"	[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:NDI on page 184	PDSCH Mode
"Redundancy Version"	[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:RV on page 186	PDSCH Mode

Control Information Field	SCPI command	Dependencies
"TPC Command for PUCCH"	[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:TPCC on page 185	PDSCH Mode
"SRS Request"	[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:SRSRequest on page 185	PDSCH Mode
"Preamble Index"	[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:PRACh:PRINdex on page 187	PRACH Mode
"PRACH Mask Index"	[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:PRACh:MINDex on page 186	PRACH Mode

DCI Format 2OW

The DCI Format 2OW is used for the scheduling of downlink transmission on PDSCH with the transmission mode for up to two transport blocks in the following table.

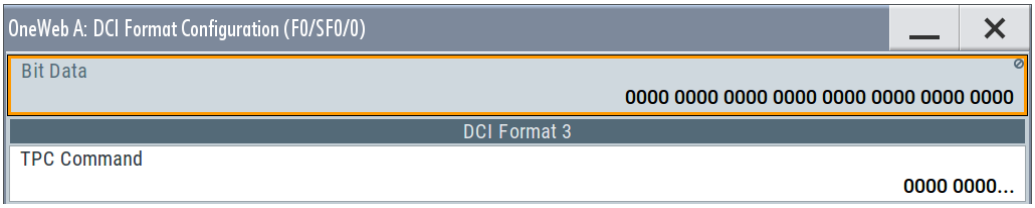


The resulting Bit Data is displayed according to the fields listed in the table.

Control Information Field	SCPI command	Dependencies
Resource Block Assignment	[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:RBA on page 184	
TPC Command for PUCCH	[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:TPCC on page 185	

Control Information Field	SCPI command	Dependencies
HARQ Process Number	[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:HPN on page 185	
MCS for A First Transmission	[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:FIRStrans:MCS on page 187	
MCS for A Retransmission	[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:RETRans:MCS on page 188	
	"Transport Block 1"	
New Data Indicator	[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:TB1:NDI on page 188	
Redundancy Version	[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:TB1:RV on page 188	
	"Transport Block 2"	
New Data Indicator	[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:TB2:NDI on page 188	
Redundancy Version	[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:TB2:RV on page 188	

DCI Format 3/3A
The DCI Format 3/3A is used for the transmission of TPC Commands for PUCCH and PUSCH with 2-bit and a single bit power adjustment respectively.



The "TPC Command" is set as a bit pattern.

The resulting Bit Data is displayed according to the fields listed in the table.

Remote command:
[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:TPCinstr on page 189

3.5.8 Enhanced PBCH and PDSCH settings

Access:

1. Select "General > Link Direction > Downlink / Forward (SC-TDM)".
2. Select "Frame Configuration > PDCCH > DCI Format = 1A".

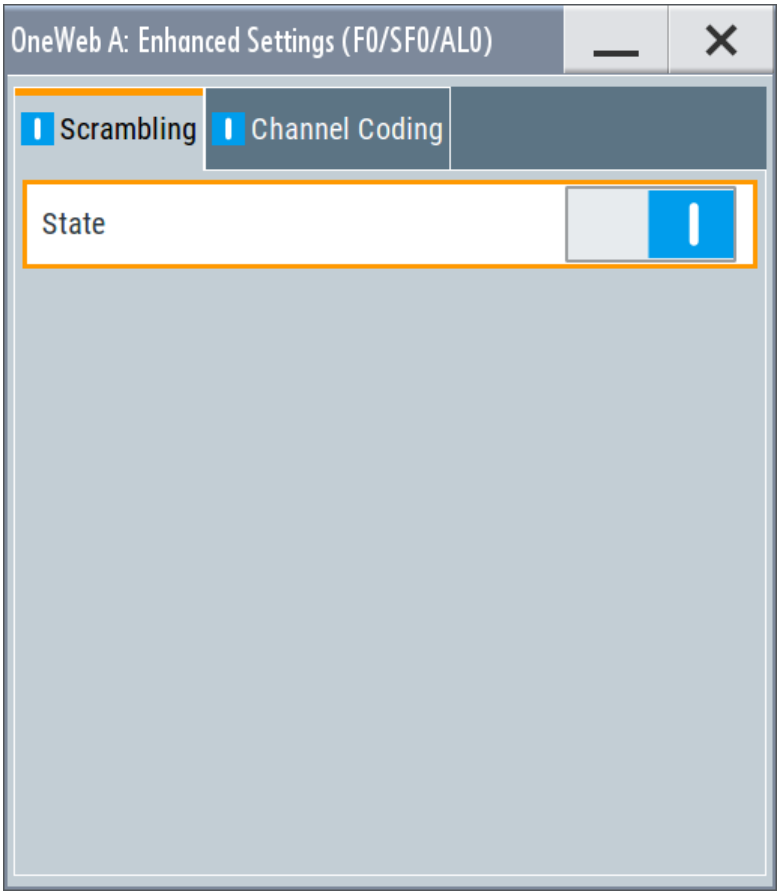
3. Select "Allocation Table > Enhanced Settings > Config...".

   In the "Enhanced Settings" dialog, you can define the channel coding settings for the DL channels PBCH and PDSCH. The settings are configurable on a subframe basis.

3.5.8.1 Scrambling settings

Access:

► Select "Enhanced Settings > Scrambling".



This dialog comprises the settings needed for configuring the scrambling:

Settings:

State Scrambling (DL)
Enables/disables the bit-level scrambling.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ALLoc<ch0>[:CW<user>]:SCRambling:STATe` on page 191

UE ID/n_RNTI (PDSCH)
Sets the user equipment identifier (n_RNTI) of the user to which the PDSCH transmission is intended. The UE ID is used to calculate the scrambling sequence.

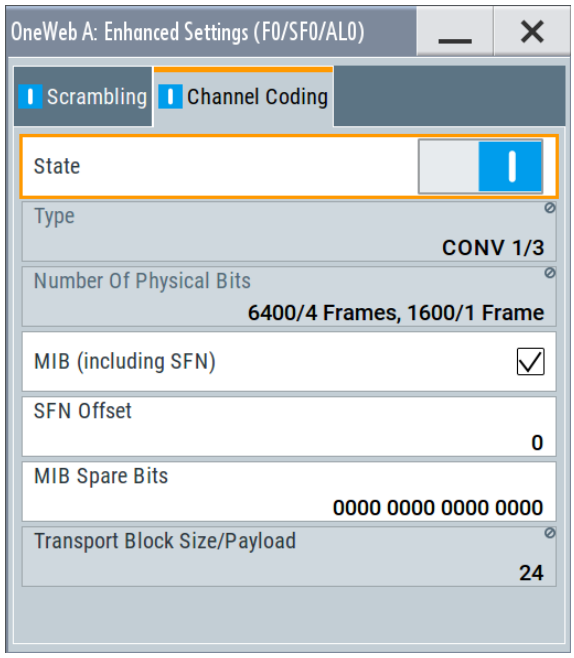
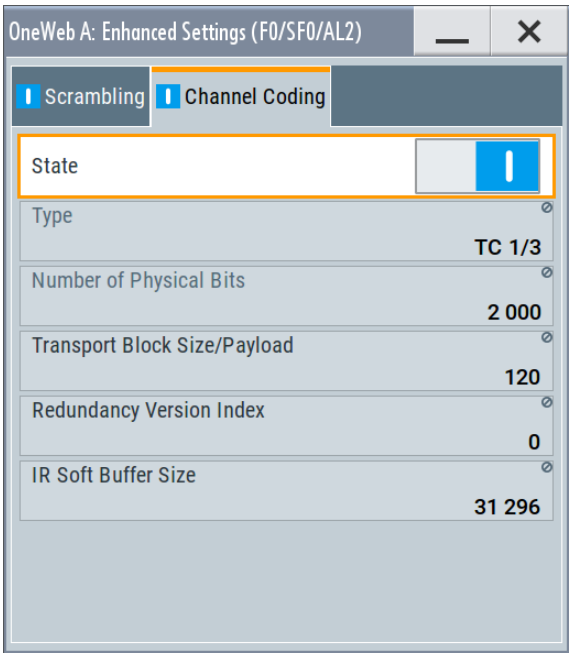
If a "User x" is selected as Data Source in the allocation table for the corresponding allocation, the "UE ID" is read only. Its value is displayed as set in the User configuration settings dialog for the corresponding user.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ALLoc<ch0>[:CW<user>]:SCRambling:UEID` on page 192

3.5.8.2 Channel coding settings

Access:

► Select "Enhanced Settings > Channel Coding".

PBCH channel coding settings	PDSCH channel coding settings
	

This dialog comprises the settings needed for configuring the channel coding. The settings vary according to the selected "Content Type"

Settings:

State Channel Coding (DL)
Enables/disables channel coding for the selected allocation and codeword.

A PBCH can be generated in one of the following modes:

- Without channel coding, i.e. this parameter is disabled.
  Dummy data or user-defined data lists are used.
- Channel coding with arbitrary transport block content
  Channel coding is activated and parameter MIB (including SFN) is disabled.
- Channel coding with real data (MIB) including SFN
  Channel coding and MIB are activated.

For the PBCH allocation with activated channel coding, one block of data (transport block size TBS of 24) is coded jointly and then spread over four frames. Set the ARB sequence length to a value that is a multiple of four.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ALLoc<ch0>[:CW<user>]:CCODing:STATe` on page 191

Type Channel Coding (DL)
Displays the used channel coding scheme and channel coding rate.

PBCH uses always tail biting convolution coding with code rate 1/3; PDSCH uses always turbo code with code rate 1/3.

Remote command:
n.a.

Phys. Bits/Number of Physical Bits (DL)
Displays the size of the selected allocation in bits and considering the subcarriers that are used for other signals or channels with higher priority.

The size of the PBCH allocation is fixed to 6400/4 Frames, 1600/1 Frame.

See Chapter A, "Conflict handling", on page 235.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ALLoc<ch0>[:CW<user>]:PHYSbits?` on page 168
`[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:USER<ch>:PHYSbits?` on page 172

MIB (including SFN)
(for PBCH only)

Enables transmission of real MIB (master information block) data, calculated according to the values of the following "General DL Settings" parameters:

- Channel Bandwidth

The SFN (system frame number) is included as well.

If this parameter is enabled, the "Transport Block Size" is fixed to 32 and the Data Source for the PBCH allocation is set to "MIB".

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:DL:PBCH:MIB` on page 190

SFN Offset
(for PBCH only)

By default, the counting of the SFN (system frame number) starts with 0. Use this parameter to set a different start SFN value.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:DL:PBCH:SOFFset` on page 190

MIB Spare Bits
(for PBCH only)

Sets the 10 spare bits in the PBCH transmission.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:DL:PBCH:MSPare` on page 190

Transport Block Size/Payload (DL)
Queries the size of the transport block/payload in bits.

- One transport block is generated and spread over all allocations.
- In case a spatial multiplexing with two codewords is configured, individual transport blocks for the two code blocks are generated.
- For PBCH allocations with enabled parameter MIB (including SFN), the transport block size is fixed to 32.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ALLoc<ch0>[:CW<user>]:CCODing:TBSize?` on page 193

Redundancy Version Index (PDSCH)
Sets the redundancy version index.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ALLoc<ch0>[:CW<user>]:CCODing:RVINdex` on page 192

IR Soft Buffer Size (PDSCH)
Sets the size of the IR soft buffer for the selected transport block.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ALLoc<ch0>[:CW<user>]:CCODing:ISBSize` on page 192

3.6 General uplink settings

Option: R&S SMW-K130

Access:

1. Select "General > Link Direction > Uplink / Reverse (SC-FDMA)".
2. Select "General Settings "

   This dialog allows configuring the OneWeb system for transmission direction uplink.

Settings:

3.6.1 UL carrier aggregation configuration

Access:

1. Select "Baseband > OneWeb > General > Link Direction > Uplink / Reverse (SC-FDMA)".
2. Select "General Settings > CA".

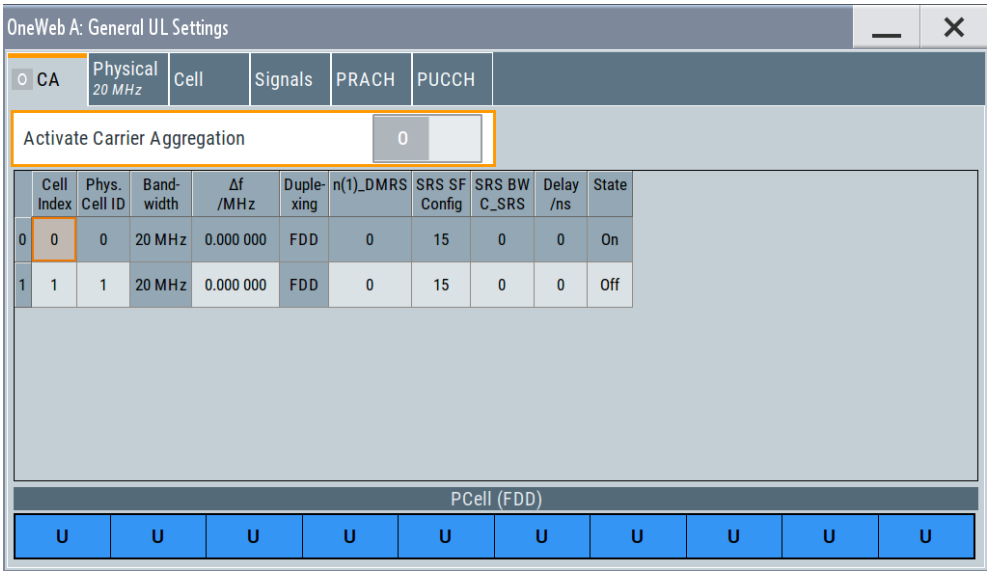


Figure 3-1: "General Settings > Carrier Aggregation" dialog in "System Config > Fading/Baseband Configuration > BB Source Config > Separated Sources"

The available settings depend on the current "System Configuration" settings, in particular on the selected "BB Source Config".
The dialog provides the settings for the configuration of one primary (PCell) and one secondary cell (SCell). The most important SCell settings are grouped in the "Carrier Aggregation" dialog.

The cell-specific parameters, like the PUSCH and PUACH configuration, the DRS and SRS transmission are configurable in the Chapter 3.8, "User equipment configuration", on page 94 dialog of the corresponding UE.

3.6.1.1 Carrier aggregation settings

The cell-specific parameters, like the PUSCH and PUACH configuration, the DRS and SRS transmission are configurable in the User equipment configuration dialog.

Settings

Activate Carrier Aggregation
Enables/disables the generation of several component carriers.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:CA:STATe` on page 195

Component Carrier Table
The table provides the settings of the component carriers.

The first row displays the settings of the PCell as configured in the General uplink settings dialog.

The second row provides the configurable settings for the SCells.

Cell Index ← Component Carrier Table
Sets the cell index of the SCell.

The cell index of the PCell is always 0.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:CA:CELL<ch0>:INDex` on page 195

Physical Cell ID ← Component Carrier Table
Sets the physical Cell ID of the corresponding component carrier.

The value of the parameter "General UL Settings" > Cell ID is set automatically to the physical cell ID of the PCell.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:CA:CELL<ch0>:ID` on page 195

Bandwidth ← Component Carrier Table
The bandwidth is fixed at 20 MHz for the corresponding component carrier.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:CA:CELL<ch0>:BW?` on page 194

delta f / MHz ← Component Carrier Table
(enabled in "System Configuration > BB Source Config > Separate Sources" configuration)

Sets the frequency offset between the central frequency of corresponding SCell and the frequency of the PCell.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:CA:CELL<ch0>:DFReq` on page 194

Duplexing ← Component Carrier Table
The duplexing mode is fixed at FDD for both PCell and SCell.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:CA:CELL<ch0>:DUPLexing?` on page 195

n(1)_DMRS ← Component Carrier Table
Sets the part of the demodulation reference signal (DMRS) index used by the calculation of the DMRS sequence, transmitted by the PCell/SCell.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:CA:CELL<ch0>:DMRS` on page 196

SRS Subframe Configuration ← Component Carrier Table
Sets the cell-specific parameter SRS subframe configuration of the PCell/SCell.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:CA:CELL<ch0>:SUConfiguration`
on page 196

SRS Bandwidth Configuration C_SRS ← Component Carrier Table
Sets the cell-specific parameter SRS Bandwidth Configuration (C_{SRS}) of the PCell/SCell.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:CA:CELL<ch0>:CSRS` on page 196

Delay / ns ← Component Carrier Table
Sets the time delay of the SCell relative to the PCell.

Remote command:
[:SOURce<hw>]:BB:ONEWeb:UL:CA:CELL<ch0>:TDELay on page 196

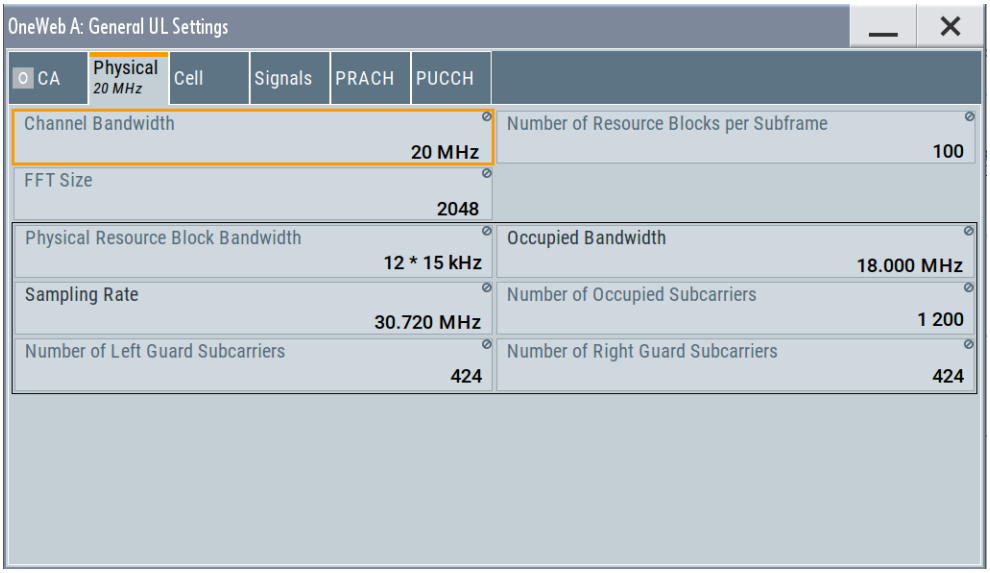
State ← Component Carrier Table
Activates/deactivates the component carrier.

Remote command:
[:SOURce<hw>]:BB:ONEWeb:UL:CA:CELL<ch0>:STATe on page 197

3.6.2 UL physical settings

Access:

1. Select "General > Link Direction > Uplink / Reverse (SC-FDMA)".
2. Select "General UL Settings > Physical"



This dialog comprises the physical settings for uplink.

Settings:

Channel Bandwidth
The channel bandwidth is fixed at 20 MHz.

Remote command:
[:SOURce<hw>]:BB:ONEWeb:UL:BW? on page 197

Number of Resource Blocks Per Subframe
Indicates the number of used resource blocks for the selected "Channel Bandwidth".

This is a read-only value, set automatically as function of the "Channel Bandwidth" and "Physical Resource Block Bandwidth".

The sampling rate and the occupied bandwidth are determined by the parameter "Number of Resource Blocks Per Subframe".

Remote command:
[:SOURce<hw>]:BB:ONEWeb:UL:NORB? on page 198

FFT Size
Sets the FFT (Fast Fourier Transformation) size. The available values depend on the selected "Number of Resource Blocks Per Subframe".

Remote command:
[:SOURce<hw>]:BB:ONEWeb:UL:FFT? on page 197

Physical Resource Block Bandwidth
Displays the bandwidth of one physical resource block.

Note: The physical resource block is fixed to 12 x 15 kHz.

Remote command:
n.a.

Occupied Bandwidth
Displays the occupied bandwidth, calculated from the parameter "Number of Resource Blocks Per Subframe".

Remote command:
[:SOURce<hw>]:BB:ONEWeb:UL:OCCBandwidth? on page 198

Sampling Rate
Displays the sampling rate, calculated from the parameter "Number of Resource Blocks Per Subframe".

Remote command:
[:SOURce<hw>]:BB:ONEWeb:UL:SRATe? on page 199

Number Of Occupied Subcarriers
Displays the number of occupied subcarriers, calculated from the parameter "Number of Resource Blocks Per Subframe".

Remote command:
[:SOURce<hw>]:BB:ONEWeb:UL:OCCSubcarriers? on page 199

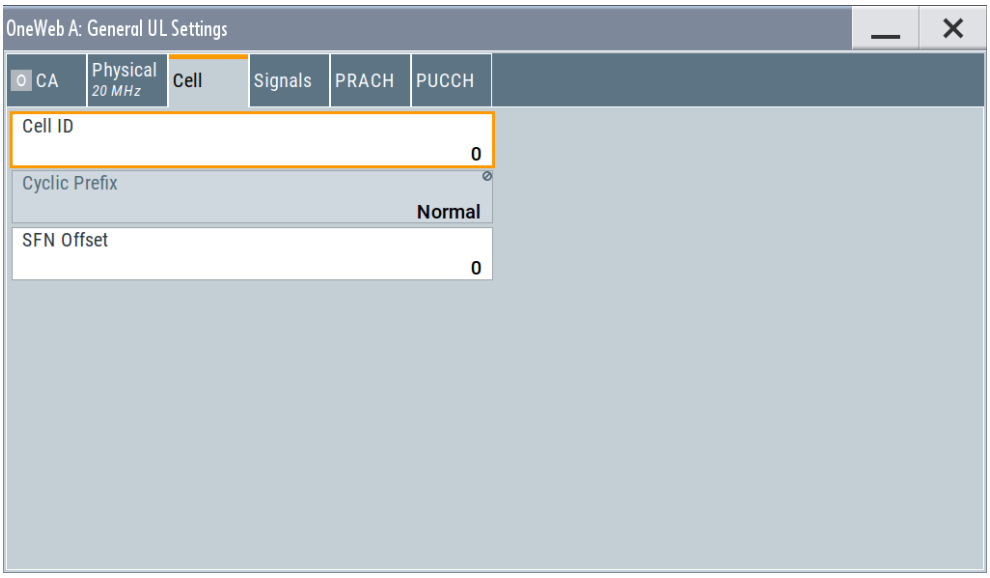
Number of Left/Right Guard Subcarriers
Displays the number of left/right guard subcarriers, calculated from the parameter "Number of Resource Blocks Per Subframe".

Remote command:
[:SOURce<hw>]:BB:ONEWeb:UL:LGS? on page 198
[:SOURce<hw>]:BB:ONEWeb:UL:RGS? on page 198

3.6.3 UL cell specific settings

Access:

1. Select "General > Link Direction > Uplink / Reverse (SC-FDMA)".
2. Select "General Settings > Cell"



This dialog comprises the settings needed for configuring the physical layer cell ID settings, the UL Reference Signal settings, the PUCCH and PRACH structures are selected, as well as cell-specific SRS parameters.

Settings:

Cell ID
Sets the cell identity.

There are 504 unique physical layer cell identities (cell ID), grouped into 168 unique physical cell identity groups that contain three unique identities each.

There is a cross-reference between the values of these three parameters and changing of one of them results in adjustment in the values of the others.

The cell ID determinates:
- The reference signal grouping hopping pattern
- The reference signal sequence hopping

- The PUSCH demodulation reference signal pseudo-random sequence
- The cyclic shifts and scrambling sequences for all PUCCH formats
- The pseudo-random sequence used for scrambling

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL[:PLCI]:CID` on page 200

Cyclic Prefix
Displays the cyclic prefix length for all subframes.

The cyclic prefix length is fixed to normal, i.e. the UL slot contains 7 SC-FDMA symbols.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:CPC?` on page 199

SFN Offset
By default, the counting of the SFN (System Frame Number) starts with 0. Use this parameter to set a different start SFN value, e.g. to skip a defined number of frames.

Example: Visualizing the SFN offset in the SC-FDMA time plan

Perform the following:

- Select "OneWeb > General > Standard > OneWeb"
- Select "OneWeb > General > ARB Configuration ...".
- Select"ARB > Sequence Length = 100 Frames".
- Select "General > Link Direction > Uplink / Reverse (SC-FDMA)".
- Select "General > General Settings > Cell > SFN Offset = 1".
- Select "General > Frame Configuration > No. of PUCCH Config = No. PUSCH Config. = 40".
- Select"Frame Configuration > Subframe#0 > PUSCH > No. of RB = 50".
- Select "Frame Configuration > Time Plan" and set "Subframes = 20".

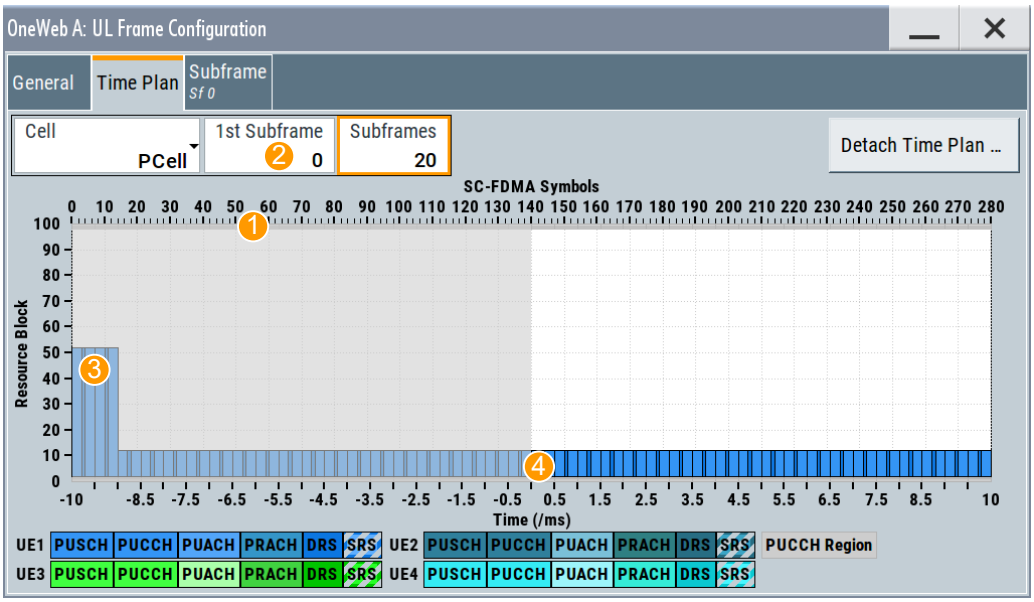


Figure 3-2: Visualization of an enabled SFN offset in the time plan

1 = SFN offset = 1 Frame = 10 Subframes
2 = First (most left) displayed subframe is Subframe#0; 20 subframes = 2 frames are displayed
3 = PUCCH with "No. of RB = 50" as configured in the Subframe#0
4 = First 1 frame is skipped; generation starts with the second frame

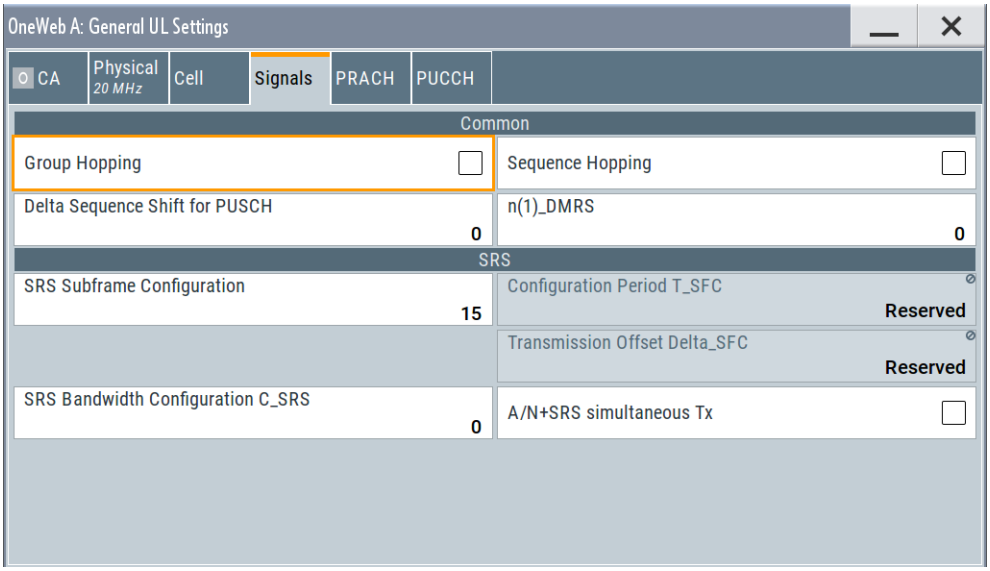
Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:SOFFset` on page 199

3.6.4 Signals settings

Access:

1. Select "General > Link Direction > Uplink / Reverse (SC-FDMA)".

2. Select "General UL > Signals"



This dialog comprises the settings needed for configuring the uplink reference signals and the SRS structure.

3.6.4.1 UL reference signals

The following provides common settings for uplink reference signals demodulation reference signal (DRS) and sounding reference signal (SRS).

Group Hopping
Enables/disables group hopping for the uplink reference signals demodulation reference signal (DRS) and sounding reference signal (SRS).

17 different hopping patterns and 30 different sequence shift patterns are used for group hopping.

PUSCH and PUCCH use **the same group hopping pattern** that is calculated if the "Group Hopping" is enabled. The group hopping pattern is generated by a pseudo-random sequence generator. The sequence shift patterns are derived as follows:

- PUCCH
  From the physical layer cell ID, Cell ID.
- PUSCH
  By the parameter Delta Sequence Shift for PUSCH.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:REFSig:GRPHopping` on page 201

Sequence Hopping
Enables/disables sequence hopping for the uplink reference signals demodulation reference signal (DRS) and sounding reference signal (SRS).

If sequence hopping and Group Hopping are to be activated simultaneously, only group hopping is applied.

The sequence hopping is generated by a pseudo-random sequence generator.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:REFSig:SEQHopping` on page 201

Delta Sequence Shift for PUSCH
Sets the delta sequence shift for PUSCH needed for the calculation of the group hopping pattern.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:REFSig:DSSHift` on page 201

n(1)_DMRS
Sets the part of the demodulation reference signal (DMRS) index which is broadcasted and therefore valid for the whole cell. This index applies when multiple shifts within a cell are used. It is used for the calculation of the DMRS sequence.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:REFSig:DMRS` on page 200

3.6.4.2 Cell-specific SRS settings

The cell-specific parameters in this section determine the structure of the sounding reference signal (SRS).

To configure the UE-specific parameters, necessary for the complete definition of the SRS structure and SRS mapping, use the settings in the "UEx > User Equipment > SRS" dialog.

Settings:

SRS Subframe Configuration
Sets the cell-specific parameter SRS subframe configuration.

This parameter can also influence the shortening of PUCCH/PUSCH transmissions, regardless whether the UEs are configured to send an SRS in the subframe or not.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:REFSig:SRS:SUConfiguration` on page 202

Configuration Period T_SFC
Displays the value for the cell-specific parameter configuration period T_{SFC} in subframes, depending on the selected "SRS Subframe Configuration".

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:REFSig:SRS:TSFC?` on page 203

Transmission Offset Delta_SFC
Displays the value for the cell-specific parameter transmission offset $Delta_{SFC}$ in subframes, depending on the selected "SRS Subframe Configuration".

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:REFSig:SRS:DSFC?` on page 202

SRS Bandwidth Configuration C_SRS
Sets the cell-specific parameter SRS bandwidth configuration (C_{SRS}).

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:REFSig:SRS:CSRS` on page 202

A/N + SRS simultaneous Tx
Enables/disables simultaneous transmission of SRS (sounding reference signal) and ACK/NACK messages, i.e. transmission of SRS and PUCCH in the same subframe.

Simultaneous transmission of SRS and PUCCH is allowed only for PUCCH formats 1, 1a, 1b and 3, since CQI reports are never simultaneously transmitted with SRS.

If this parameter is disabled, the SRS is not transmitted in the corresponding subframe.

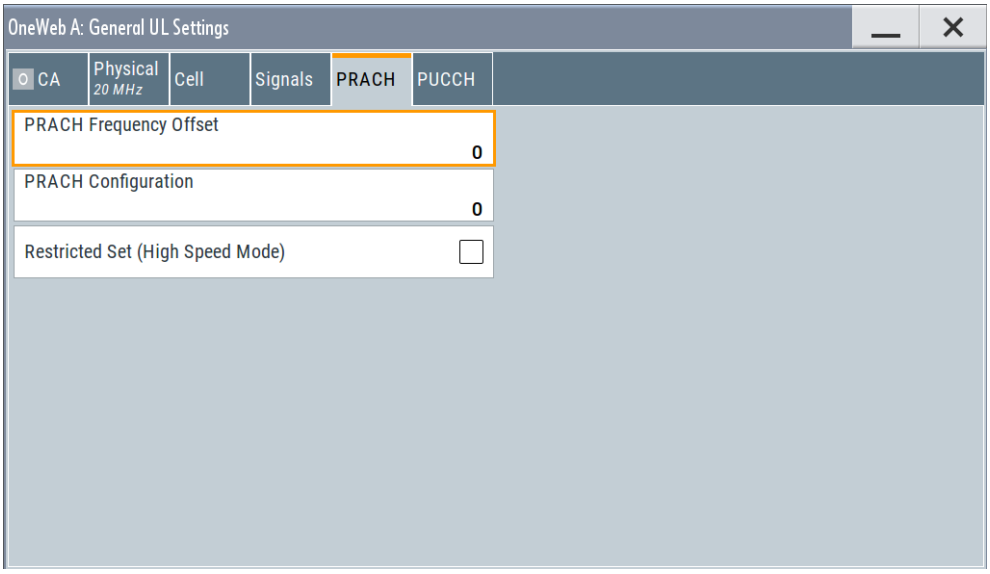
Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:REFSig:SRS:ANSTx` on page 201

3.6.5 PRACH settings

Access:

1. Select "General > Link Direction > Uplink / Reverse (SC-FDMA)".

2. Select "General UL Settings > PRACH"



This dialog comprises the cell-specific parameters that determine the PRACH configuration.

The UE-specific parameters, necessary for the complete definition of the PRACH, are configurable in the User Equipment Configuration dialog of the corresponding UE.

Settings:

PRACH Frequency Offset
For preamble formats 0-3, sets the prach-FrequencyOffset $n^{RA}_{PRBoffset}$, i.e. determines the first physical resource block available for PRACH expressed as a physical resource block number that fulfills the equation:

$0 <= n^{RA}_{PRBoffset} <=$ Number of Resource Blocks Per Subframe - 6

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:PRACh:FOFFset` on page 203

PRACH Configuration
Sets the PRACH configuration index. PRACH configuration defines the time and frequency resources in which random access preamble transmission is allowed.

The PRACH allocation occupies a bandwidth of 6 RBs.

The PRACH distribution (subframe, length, offset) depends on several other parameters:

- "Cyclic Prefix" which is fixed at "Normal".
- Selected PRACH Frequency Offset.
- Selected frame format, i.e. on the selected "Duplexing Mode" mode

Not all combinations of channel bandwidth, PRACH configuration and PRACH frequency offset are allowed.

The table below gives an overview on the dependency of the value range of the parameter "PRACH Configuration" and other parameters.

Duplexing Mode	(Global) Cyclic Prefix	PRACH Configuration
FDD	Normal	0 .. 63

The Preamble Format is automatically derived from the "PRACH Configuration".

Use the SC-FDMA Time plan to display the PRACH distribution.

Example:

PRACH example configuration:

- "Duplexing Mode = FDD"
- "Cyclic Prefix = Normal"
- "General UL Settings > Physical > Channel Bandwidth which is fixed at 20 MHz"
- "General UL Settings > PRACH > PRACH Frequency Offset = 10"
- "PRACH Configuration = 38"
  (Preamble Format = 2)
- Adjusted the PRACH frequency offset

Observe the timeplan on "Preamble Format (Burst Format)" on page 112.

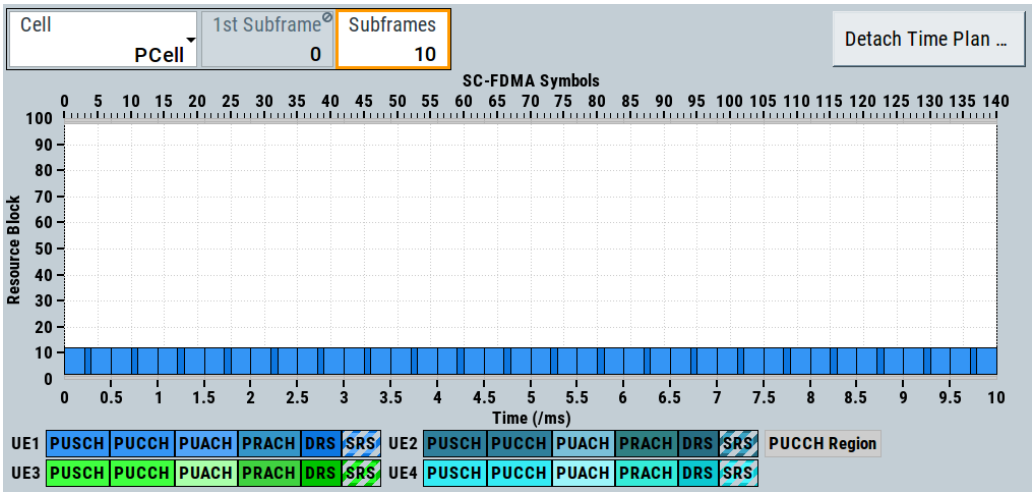


Figure 3-3: PRACH distribution (example)

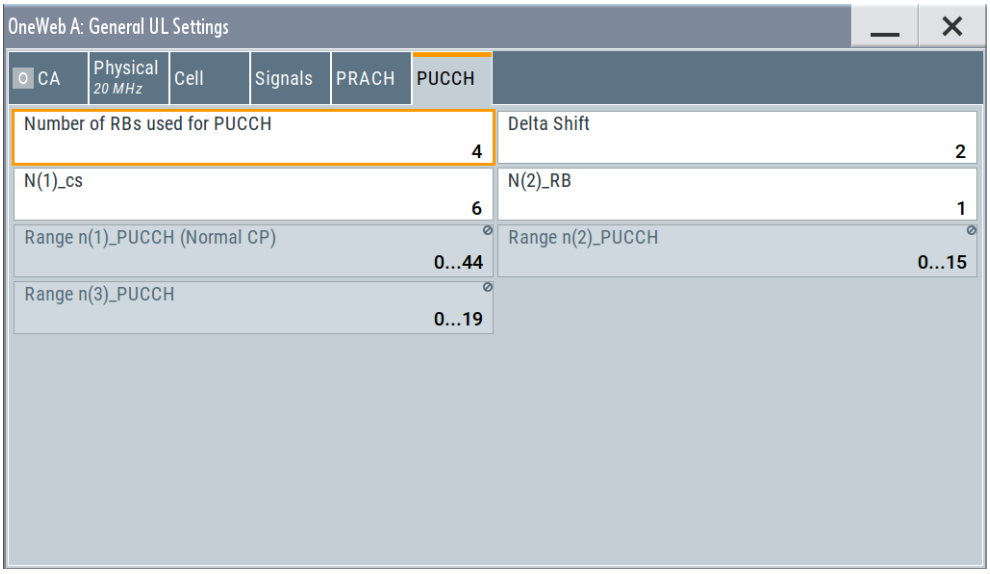
Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:PRACh:CONFiguration` on page 203

Restricted Set (High Speed Mode)
Selects whether a restricted preamble set (high speed mode) or the unrestricted preamble set (normal mode) will be used.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:PRACh:RSET` on page 203

3.6.6 PUCCH structure

1. To access this dialog, select "General > Link Direction > Uplink / Reverse (SC-FDMA)".
2. Select "General UL Settings > PUCCH".



This dialog comprises the cell-specific parameters that determine the PUCCH configuration.

Settings:

Settings:

Number of RBs used for PUCCH
Sets the PUCCH region in terms of reserved resource blocks, at the edges of the channel bandwidth. See Figure 3-4.

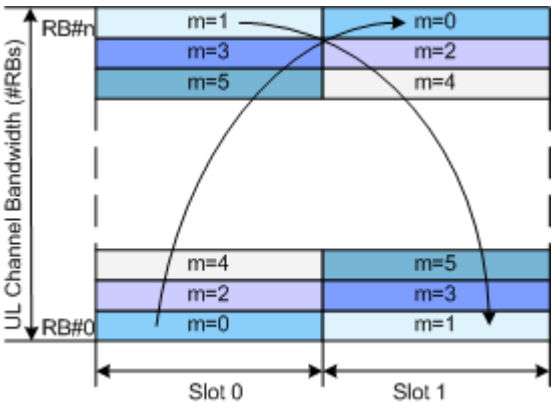


Figure 3-4: PUCCH mapping

The PUCCH region is displayed on the time plan.

Example:

- "Channel Bandwidth fixed at 20 MHz"
- "General Settings > PUCCH> Number of RBs used for PUCCH = 3"
- "Frame Configuration > Subframe > Content > PUCCH"
- "Frame Configuration > Subframe > Enhanced Settings > Common > PUCCH Format = F2a" and "PUCCH State > On"

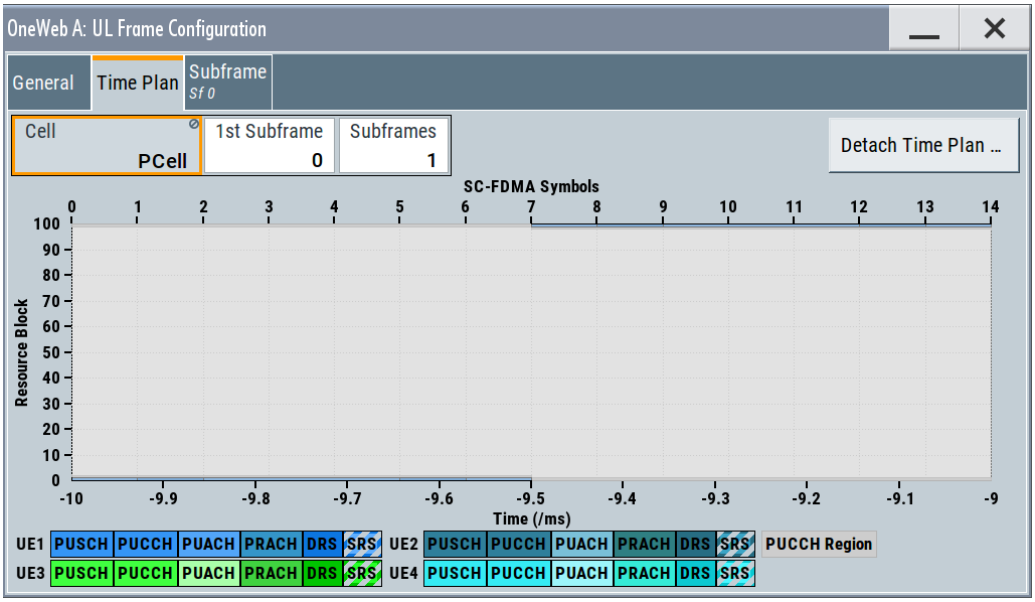


Figure 3-5: Example: Representation of subframe with PUCCH region with three reserved resource blocks on the time plan

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:PUCCh:NORB` on page 206

Delta Shift
Sets the delta shift parameter, i.e. the cyclic shift difference between two adjacent PUCCH resource indices with the same orthogonal cover sequence (OC).

The delta shift determinates the number of available sequences in a resource block that can be used for PUCCH formats 1/1a/1b (see also Table 3-6).

Table 3-6: PUCCH resource indices per PUCCH format

PUCCH format	PUCCH resource indices	Number available within a resource block
1/1a/1b	N(1)_PUCCH	44 for normal CP
2/2a/2b	N(2)_PUCCH	15
3	N(3)_PUCCH	19

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:PUCCh:DESHift` on page 204

N(1)_cs
Sets the number of cyclic shifts used for PUCCH format 1/1a/1b in a resource block used for a combination of the formats 1/1a/1b and 2/2a/2b.

Only one resource block per subframe can support a combination of the PUCCH formats 1/1a/1b and 2/2a/2b.

The number of cyclic shifts available for PUCCH format 2/2a/2b N(2)_cs in a block with combination of PUCCH formats is calculated as follows:

N(2)_cs = 12 - N(1)_cs -2

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:PUCCh:N1CS` on page 204

N(2)_RB
Sets bandwidth in terms of resource blocks that are reserved for PUCCH formats 2/2a/2b transmission in each subframe.

There can be only one resource block per subframe that supports a combination of the PUCCH formats 1/1a/1b and 2/2a/2b. Hence, the number of RBs per subframe available for PUCCH format 1/1a/1b is determinate by "N(2)_RB".

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:PUCCh:N2RB` on page 205

Range n(1)_PUCCH (Normal CP)
Displays the range of the possible PUCCH format 1/1a/1b transmissions from different UEs in one subframe and per cyclic prefix.

Insufficient ranges are displayed as '-'.

The parameter "Range n(1)_PUCCH (Normal CP)" determines the value range of the index "n_PUCCH" for PUCCH format 1/1a/1b.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:PUCCh:N1NMax?` on page 204

Range n(2)_PUCCH
Displays the range of possible number of PUCCH format 2/2a/2b transmissions from different UEs in one subframe.

Insufficient ranges are displayed as '-'.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:PUCCh:N2Max?` on page 205

Range n(3)_PUCCH
Displays the range of possible number of PUCCH format 3 transmissions from different UEs in one subframe.

Insufficient ranges are displayed as '-'.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:PUCCh:N3Max?` on page 205

3.7 Uplink frame configuration

Option: R&S SMW-K130

Access:

1. Select "OneWeb General > Link Direction > Uplink / Reverse (SC-FDMA)".
2. Select "Frame Configuration"

   This dialog allows you to configure the subframes and the SC-FDMA resource allocations.
   The dialog consists of the following sections:

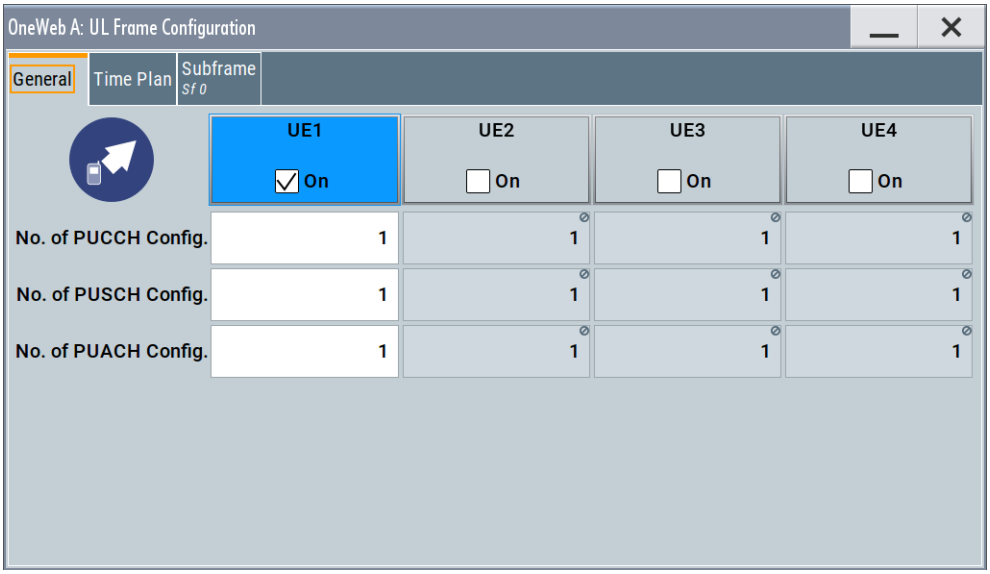
Settings:

3.7.1 General scheduling configuration settings

Access:

1. Select "General > Link Direction > Uplink / Reverse (SC-FDMA)".

2. Select "Frame Configuration > General"



This dialog provides access to the user equipment settings and settings concerning the UL scheduling, like configuring the subframes and adjusting the PUCCH, PUSCH and PUACH scheduling.

Settings:

UEx
Accesses the User equipment configuration dialog for configuring the UE settings.

The check box activates or deactivates the selected UE.

Note: Disabling the UE deactivates its allocations: the reference signal, PUSCH/ PUCCH/PUACH allocations, and PRACH are not transmitted.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>:STATe` on page 222

Number Of PUCCH/PUSCH/PUACH Configurations/ Number Of Configurable Subframes
Sets the number of configurable subframes in the UEx, i.e. determines the scheduling cycle per UE.

All uplink subframes are filled periodically with the configured subframes except for the Sounding Reference Signal. You can set the SRS individually for each UE in the User equipment configuration dialog.

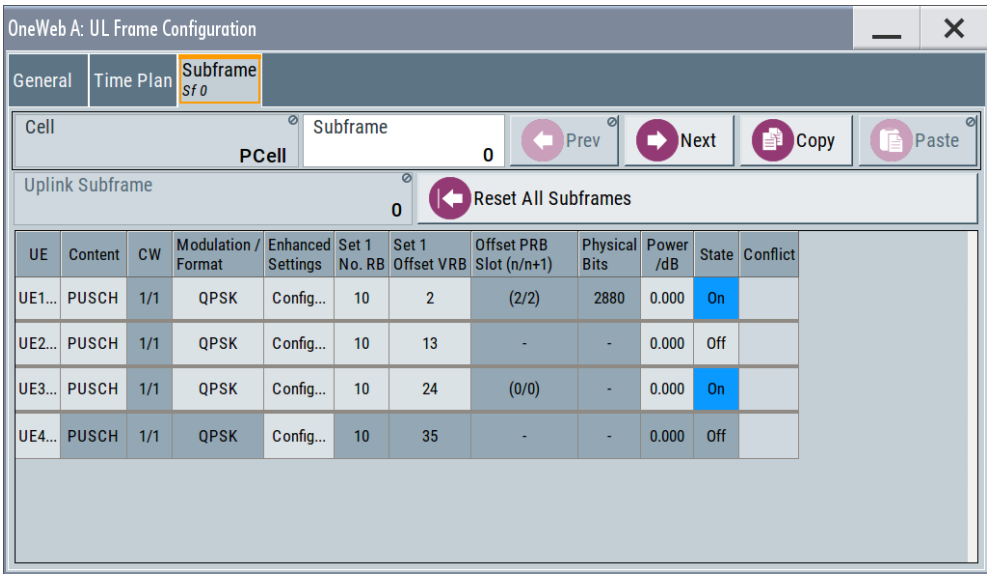
Note: The maximum number of configurable subframes is 40 subframes, where the maximum number of 40 subframes is available for sequence lengths of at least four frames.

Remote command:
[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>:CONSubframes:PUACh on page 208
[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>:CONSubframes:PUCCh on page 208
[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>:CONSubframes:PUSCh on page 208

3.7.2 Subframe configuration

Access:

1. Select "General > Link Direction > Uplink / Reverse (SC-FDMA)".
2. Select "Frame Configuration > Subframe"



Provided are the settings for selecting and configuring the subframes. In the allocation table section, the individual allocation parameters for a subframe are set.

Settings:

Cell
In enabled "General UL Settings" > "CA" > "Activate Carrier Aggregation" > "On" state, displays the settings of primary cell or secondary cell.

Remote command:
n.a.

Subframe
Sets the subframe to be configured/displayed in the frame configuration table.

All uplink subframes are filled periodically with the configured subframes except for the Sounding Reference Signal. SRS is set individually for each UE in the User equipment configuration dialog.

Subframes behind the configurable range of the corresponding UE or channel (Number Of PUCCH/PUSCH/PUACH Configurations/ Number Of Configurable Subframes) are displayed as read-only.

Remote command:
n.a.

Next/Prev
Navigates through the subframes.

Remote command:
n.a.

Copy/Paste Subframe Settings
Copies/pastes the settings of the selected subframe. Sounding Reference Signals are not considered.

For more detailed information, see Chapter B.1, "Copy/paste subframe", on page 239.

Remote command:
n.a.

Subframe Information
Displays the kind of the selected subframe, i.e. "Uplink Subframe", "Downlink Subframe".

For "Uplink Subframe", it is also shown the uplink subframe number.

Remote command:
n.a.

Reset All Subframes
Resets settings of all subframes including cyclic prefix to the default values.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:RSTFrame` on page 208

3.7.3 UL allocation table

The resource allocation table is where the individual allocation parameters for a subframe are set.

UE	Content	CW	Modulation / Format	Enhanced Settings	Set 1 No. RB	Set 1 Offset VRB	Offset PRB Slot (n/n+1)	Physical Bits	Power /dB	State	Conflict
UE1...	PUSCH	1/1	QPSK	Config...	10	2	(2/2)	2880	0.000	On	
UE2...	PUSCH	1/1	QPSK	Config...	10	13	-	-	0.000	Off	
UE3...	PUSCH	1/1	QPSK	Config...	10	24	(0/0)	-	0.000	On	
UE4...	PUSCH	1/1	QPSK	Config...	10	35	-	-	0.000	Off	

Settings:

User Equipment
Accesses the settings of the UE the selected allocation belongs to, see Chapter 3.8, "User equipment configuration", on page 94.

Remote command:
n.a.

Content (UL)
Selects the content type (PUSCH, PUCCH and PUACH) of the selected allocation.

PUACH is only on the primary cell.

Use the setting in dialog User equipment configuration to configure the PUSCH and PUACH data source.

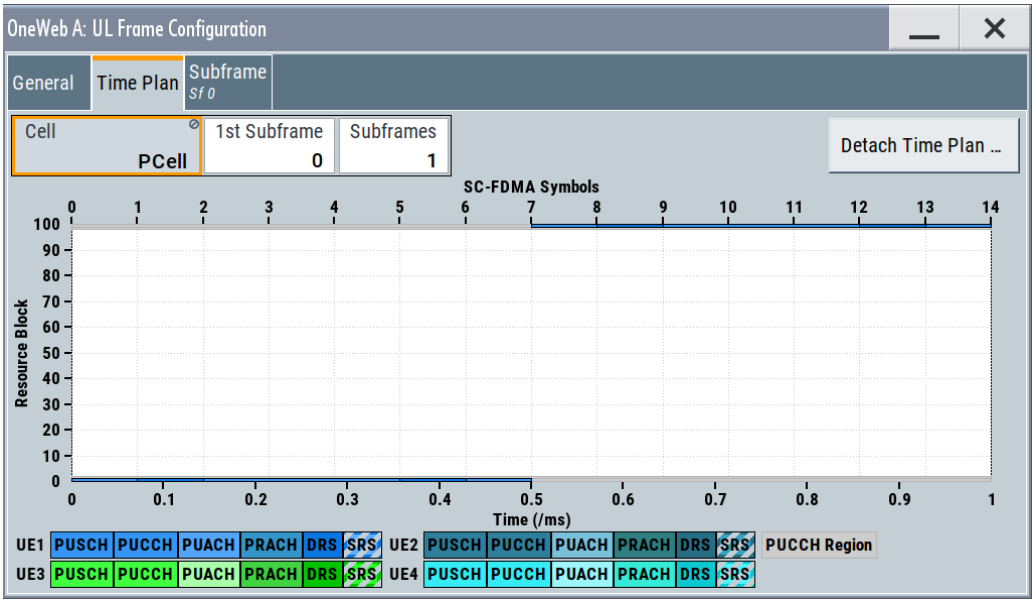
Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL[:SUBF<st0>]:ALLoc<ch0>:CONType`
on page 209

Codeword (UL)
The codeword 1/1 is fixed with the selected PUSCH and PUACH allocation.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>:PUACh:CODWords` on page 214
`[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>:PUSCh:CODWords` on page 214

Modulation/Format
For PUSCH and PUACH allocation, this parameter sets the modulation scheme (QPSK, 8PSK or 16QAM) for the allocation.

Use the "Time Plan" to visualize the position and structure of the configured PUCCH allocation.



Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>[:CW<cwid>]:PUACh:MODulation` on page 214
`[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>[:CW<cwid>]:PUSCh:MODulation` on page 214
`[:SOURce<hw>]:BB:ONEWeb:UL[:SUBF<st0>]:ALLoc<ch0>[:PUCCh]:FORMat` on page 209

Enhanced Settings UL
Accesses a dialog with further channel configuration settings, see:
- Chapter 3.7.4, "Enhanced PUSCH/PUACH settings", on page 81
- Chapter 3.7.5, "Enhanced PUCCH settings", on page 88

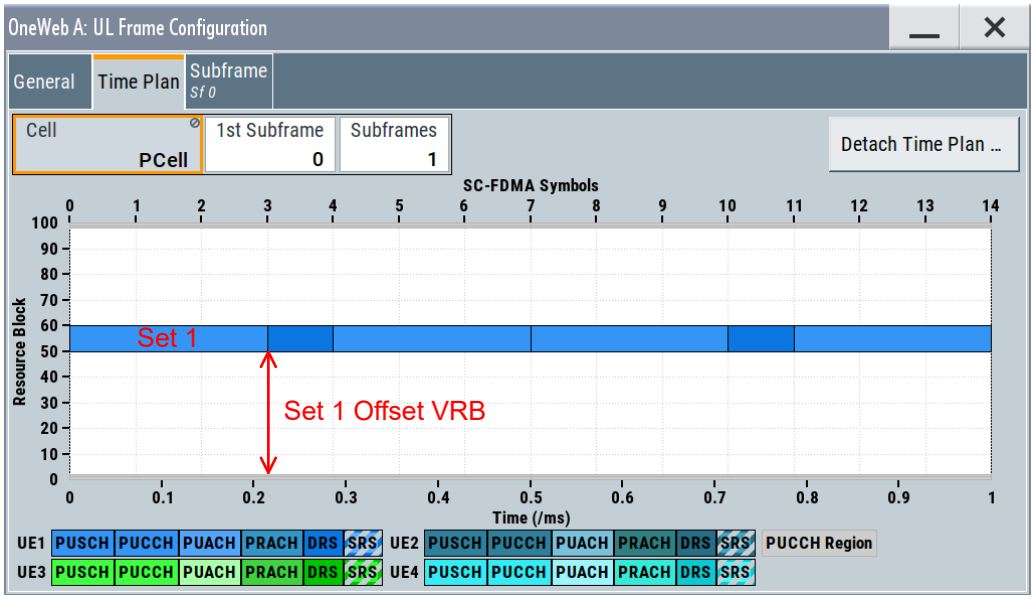
Remote command:
n.a.

Set 1 No. RB
The PUSCH and PUACH transmission in a "sets" or "clusters" of resource blocks.

The parameter defines the size of the selected allocation in resource blocks of the corresponding set.

Example: Clustered PUSCH/PUACH Transmission

- Enable "User Equipment Configuration (UE1)" to "On".
- In the "UL Frame Configuration > Allocation Table", configure the PUSCH allocation of UE1 as follows:
  – "Set 1 No. RB" = 10, "Set 1 Offs. VRB" = 50
  – "State" = ON
- Select "Time Plan" to visualize the configured allocations



Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL[:SUBF<st0>]:ALLoc<ch0>:PUCCh:RBCount?`
on page 209
`[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>:PUACh:SET<user>:RBCount` on page 209
`[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>:PUSCh:SET<user>:RBCount` on page 209

Set 1 Offset VRB
For the corresponding set, sets the virtual resource block offset of the selected subframe (see also Example"Clustered PUSCH/PUACH Transmission" on page 79).

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL[:SUBF<st0>]:ALLoc<ch0>:VRBoffset`
on page 210
`[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>:PUACh:SET<user>:VRBoffset` on page 210
`[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>:PUSCh:SET<user>:VRBoffset` on page 210

Offset PRB Slot (n/n+1)
Displays the start resource block of the selected allocation in the first and the second slot of the subframe.

Consider the following interdependencies, if frequency hopping is used:

- The start physical resource blocks in slot n and slot n+1 are set automatically These values can deviate from the Set 1 Offset VRB

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL[:SUBF<st0>]:SLOT<user0>:ALLoc<ch0>:RBOFfset?` on page 210
`[:SOURce<hw>]:BB:ONEWeb:UL[:SUBF<st0>]:SLOT<user0>:ALLoc<ch0>:PUCCh:RBOFfset?` on page 210
`[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:SLOT<user0>:ALLoc<ch0>:PUACh:SET<gr>:RBOFfset?` on page 210
`[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:SLOT<user0>:ALLoc<ch0>:PUSCh:SET<gr>:RBOFfset?` on page 210

Phys. Bits / Total Number of Physical Bits
Displays the size of the selected allocation in bits. The value is set automatically according to the current allocation's settings.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>[:CW<cwid>]:PUACh:PHYSbits?` on page 211
`[:SOURce<hw>]:BB:ONEWeb:UL[:SUBF<st0>]:ALLoc<ch0>:PUCCh:PHYSbits?` on page 211
`[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>[:CW<cwid>]:PUSCh:PHYSbits?` on page 211

Power (UL)
Sets the power for the selected allocation, i.e. PUSCH, PUACH or PUCCH power level.

The PUSCH power level (P_{PUSCH}), PPUACH power level (P_{PUACH}) and the PUCCH power level (P_{PUCCH}) can vary per subframe.

Further power-related parameters:

- UE Power (P_{UE}): for global adjustment of the transmit power of the UE
- DRS Power Offset (P_{DRS_offset}) and SRS Power Offset (P_{SRS_offset}): for boosting the reference signals, DRS and SRS, per UE.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL[:SUBF<st0>]:ALLoc<ch0>:POWer` on page 211
`[:SOURce<hw>]:BB:ONEWeb:UL[:SUBF<st0>]:ALLoc<ch0>:PUCCh:POWer` on page 211
`[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>:PUACh:POWer` on page 211
`[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>:PUSCh:POWer` on page 211

State (UL)
Sets the allocation to active or inactive state.

"On" Enables the allocation of the select UE.

"Off" Disables the allocation.
The PUSCH/PUCCH and the DRS are deactivated.
Other allocations of the same UE and the SRS are not affected.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL[:SUBF<st0>]:ALLoc<ch0>:PUCCh:STATe` on page 212
`[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>:PUACh:STATe` on page 212
`[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>:PUSCh:STATe` on page 212

Conflict (UL)
Indicates a conflict between UEs and in case an allocation exceeds the available number of resource blocks.

For more information, see Chapter B.3, "Four configurable frames in uplink and downlink direction", on page 240.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>:PUACh:CONFlict?` on page 212
`[:SOURce<hw>]:BB:ONEWeb:UL[:SUBF<st0>]:ALLoc<ch0>:PUCCh:CONFlict?` on page 212
`[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>:PUSCh:CONFlict?` on page 212

3.7.4 Enhanced PUSCH/PUACH settings

This dialog allows you to define and configure the DRS parameters for PUSCH/PUACH.

Access:

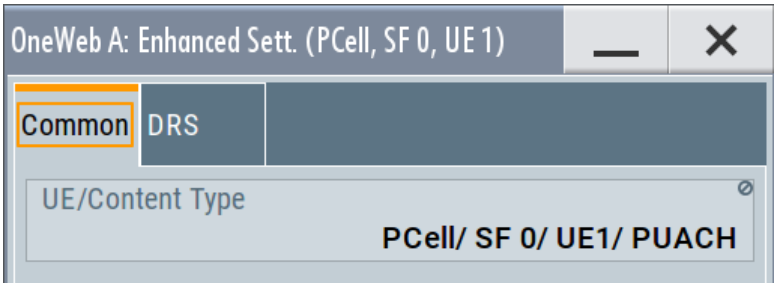
1. Select "General > Link Direction > Uplink / Reverse (SC-FDMA)".
2. Select "Frame Configuration > Subframe > Content > PUSCH".
3. Select "Enhanced Settings > Configure".

3.7.4.1 Common PUSCH/PUACH settings

Access:

1. Select "General > Link Direction > Uplink / Reverse (SC-FDMA)".
2. Select "Frame Configuration > Subframe > Content > PUSCH or PUACH".
3. Select "Enhanced Settings > Configure".

4. Select "Common"



Provides common settings for PUSCH/PUACH signals

Settings:

UE/Content Type 82

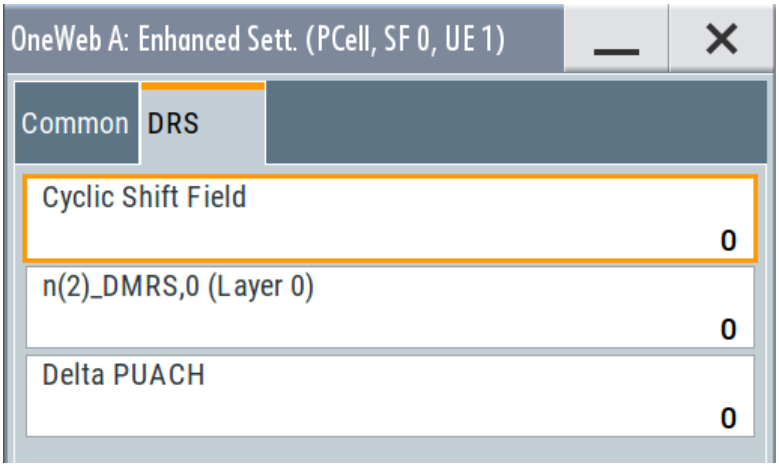
UE/Content Type
Displays the UE number and the content type of the selected allocation.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL[:SUBF<st0>]:ALLoc<ch0>:CONType`
on page 209

3.7.4.2 Demodulation reference signal (DRS)

Access:

1. Select "General > Link Direction > Uplink / Reverse (SC-FDMA)".
2. Select "Frame Configuration > Subframe > Content > PUSCH or PUACH".
3. Select "Enhanced Settings > Configure".
4. Select "DRS".



Provides setting for DRS parameters in PUSCH/PUACH signals

Settings:

Cyclic Shift Field
Cyclic shifts are used to separate the DRS signals of different users in the time domain. This parameter sets the cyclic shift field in the uplink-related DCI formats, see Table 3-7.

See also "DCI Format 3/3A" on page 52.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>:PUACh:DRS:CYCShift` on page 214
`[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>:PUSCh:DRS:CYCShift` on page 214

n(2)_DMRS, 0 (Layer 0)
Displays the part of the demodulation reference signal (DMRS) index $n^{(2)}_{DMRS,\lambda}$ per layer, where the number of layers λ in this case is defined as 0.

Table 3-7: DRS index n(2)_DMRS,λ as function of the cyclic shifts and number of layers λ

Cyclic Shift Field in DCI Formats	λ = 0 (1 layer)
000	0
001	6
010	3
011	4
100	2
101	8
110	10
111	9

The DMRS index is part of the uplink scheduling assignment and valid for one UE in the subframe. This index applies when multiple shifts within a cell are used and is used by the calculation of the DRS sequence.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>:PUACh:NDMRs` on page 215
`[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>:PUSCh:NDMRs` on page 215

Delta PUACH
Delta PUACH is used to differentiate the DMRS (PUSCH DMRS or PUACH DMRS) used in the uplink scheduling assignment.

Remote command:
[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>:PUACh:DRS:DELTa on page 209

3.7.4.3 Channel coding / multiplexing

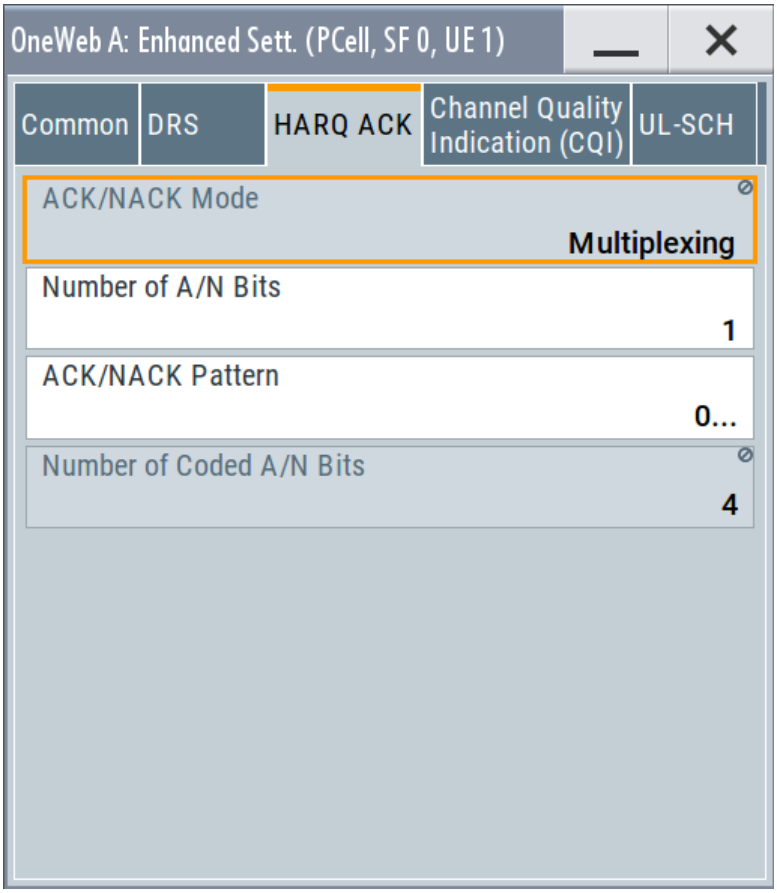
Access:

1. Select "General > Link Direction > Uplink / Reverse (SC-FDMA)".
2. Select "Frame Configuration > General > Select User Equipment > UE1... UE4"
3. Select "PUSCH > Channel Coding and Multiplexing > State > On" (refer to Mode Channel Coding)
4. Select " Mode > UCI+UL-SCH " or " Mode > UCI only" (refer to Mode Channel Coding)
5. Select "Frame Configuration > Subframe > Content > PUSCH"
6. Select "Enhanced Settings > Configure > Channel Coding/Multiplexing"

   In this dialog, you can adjust the parameters for channel coding of the control information (HARQ and CQI) and configure the multiplexing of this control information with the data transmission over the UL-SCH.

Settings:

HARQ ACK Settings



The following HARQ ACK settings are available:

ACK/NACK Mode ← HARQ ACK Settings
This field is fixed to "Multiplexing" in the ACK/NACK mode.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>:PUSCh:HARQ:MODE?` on page 215

Number of A/N Bits ← HARQ ACK Settings
Sets the number of ACK/NACK bits.

Sets this parameter to 0 to deactivate the ACK/NACK transmission for the corresponding subframe.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>:PUSCh:HARQ:BITS` on page 215

ACK/NACK Pattern ← HARQ ACK Settings
Sets the ACK/NACK bits in form of a 64 bits long pattern.

A "1" indicates an ACK, a "0" - a NACK.

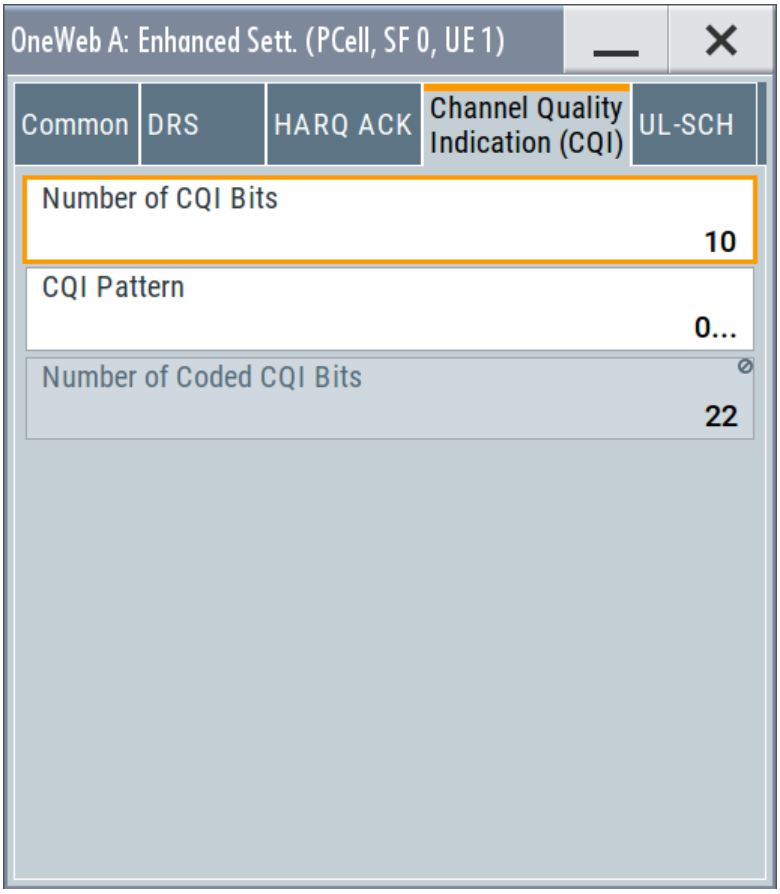
The pattern is read out cyclically and if the pattern is longer than the selected "Number of ACK/NACK Bits", different bits are transmitted in different subframes using this configuration.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>:PUSCh:HARQ:PATTern` on page 216

Number of Coded A/N Bits (CW) ← HARQ ACK Settings
Displays the number of coded ACK/NACK bits per codeword.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>[:CW<cwid>]:PUSCh:HARQ:CBITs?` on page 216

Channel Quality Indication (CQI) Settings



Following CQI settings are available:

Number of CQI Bits ← Channel Quality Indication (CQI) Settings
Sets the number of CQI bits before channel coding.

If a "Channel Coding Mode UCI + UL-SCH" is selected, the Number of Physical Bits for UL-SCH is determinate by the number of coded bits used for CQI and RI transmission.

Remote command:
[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>:PUSCh:CQI:BITS on page 212

CQI Pattern ← Channel Quality Indication (CQI) Settings
Sets the CQI pattern for the PUSCH.

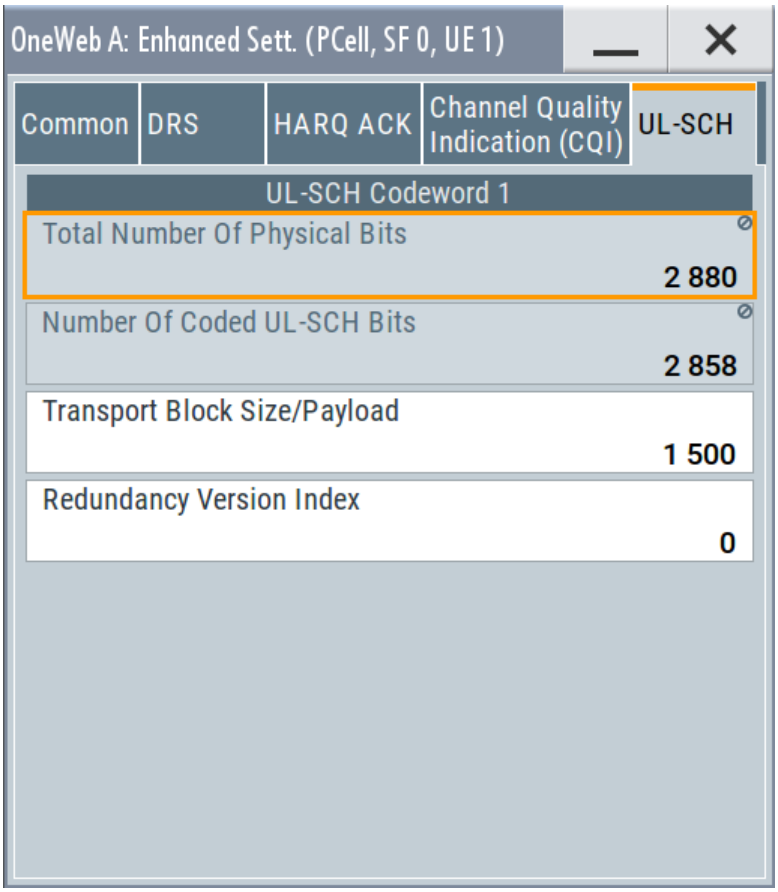
The pattern is read out cyclically and if the pattern is longer than the selected Number of CQI Bits, different bits are transmitted in different subframes using this configuration.

Remote command:
[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>:PUSCh:CQI:PATTern on page 213

Number of Coded CQI Bits ← Channel Quality Indication (CQI) Settings
Displays the number of coded CQI bits.

Remote command:
[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>:PUSCh:CQI:CBITs? on page 213

UL-SCH Settings
Displays the UL-SCH parameters per codeword.



Phys. Bits / Total Number of Physical Bits ← UL-SCH Settings
Displays the size of the selected allocation in bits. The value is set automatically according to the current allocation's settings.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>[:CW<cwid>]:PUACh:PHYSbits?` on page 211
`[:SOURce<hw>]:BB:ONEWeb:UL[:SUBF<st0>]:ALLoc<ch0>:PUCCh:PHYSbits?` on page 211
`[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>[:CW<cwid>]:PUSCh:PHYSbits?` on page 211

Number of Coded UL-SCH Bits ← UL-SCH Settings
Displays the number of physical bits used for UL-SCH transmission.

If a "Channel Coding Mode UCI + UL-SCH" is selected, the value is calculated as follows:

"Number of Coded UL-SCH Bits" = Total Number of Physical Bits - Number of Coded CQI Bits

Note: Number of Coded RI Bits for codeword 1 is fixed at 4.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>[:CW<cwid>]:PUACh:ULSCh:BITS?` on page 217
`[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>[:CW<cwid>]:PUSCh:ULSCh:BITS?` on page 217

Transport Block Size/Payload (PUSCH/PUACH) ← UL-SCH Settings
Sets the size of the transport block.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>[:CW<cwid>]:PUACh:CCODing:TBSize` on page 217
`[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>[:CW<cwid>]:PUSCh:CCODing:TBSize` on page 217

Redundancy Version Index (PUSCH/PUACH) ← UL-SCH Settings
Sets the redundancy version index.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>[:CW<cwid>]:PUACh:CCODing:RVINdex` on page 217
`[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>[:CW<cwid>]:PUSCh:CCODing:RVINdex` on page 217

3.7.5 Enhanced PUCCH settings

Access:

1. Select "General > Link Direction > Uplink / Reverse (SC-FDMA)".

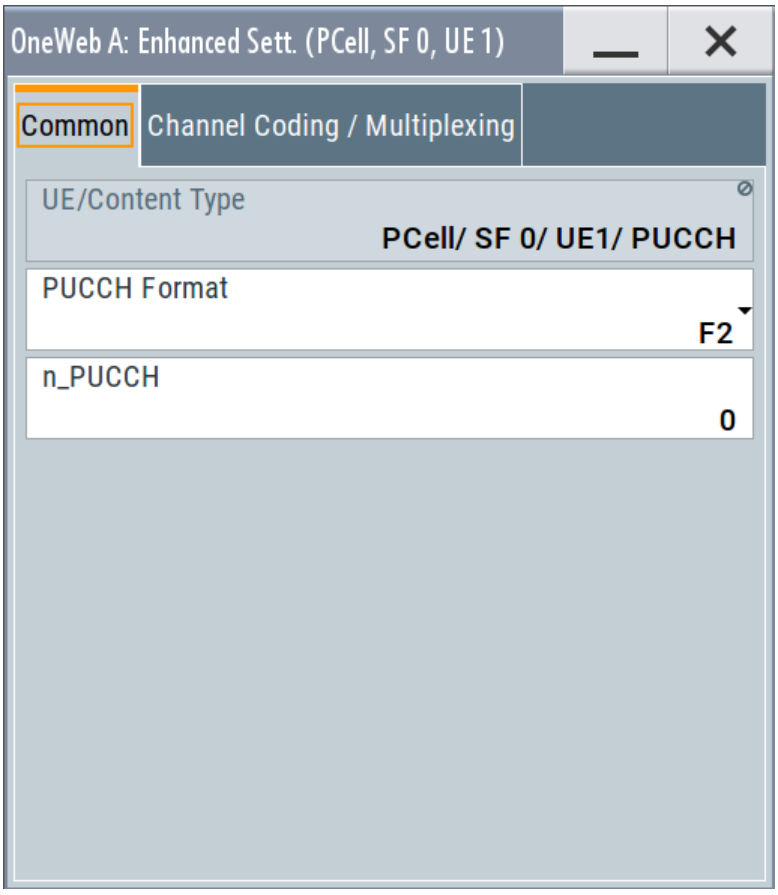
2. Select "Frame Configuration > Subframe > Content > PUCCH".
3. Select "Enhanced Settings > Configure".

   This dialog displays the PUCCH relevant settings and allows you to define and configure the PUCCH resource index:
   - Chapter 3.7.5.1, "Common settings", on page 89
   - Chapter 3.7.5.2, "Channel coding / multiplexing", on page 90

3.7.5.1 Common settings

Access:

1. Select "General > Link Direction > Uplink / Reverse (SC-FDMA)".
2. Select "Frame Configuration > Subframe > Content > PUCCH"
3. Select "Enhanced Settings > Configure > Common"



This dialog displays the PUCCH relevant settings and allows you to define and configure the PUCCH resource index.

Settings:

UE/Content Type
Displays the UE number and the content type of the selected allocation.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL[:SUBF<st0>]:ALLoc<ch0>:CONType`
on page 209

PUCCH Format
Displays the selected PUCCH Format.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL[:SUBF<st0>]:ALLoc<ch0>[:PUCCh]:FORMat`
on page 209

n_PUCCH
Sets the PUCCH resource index.

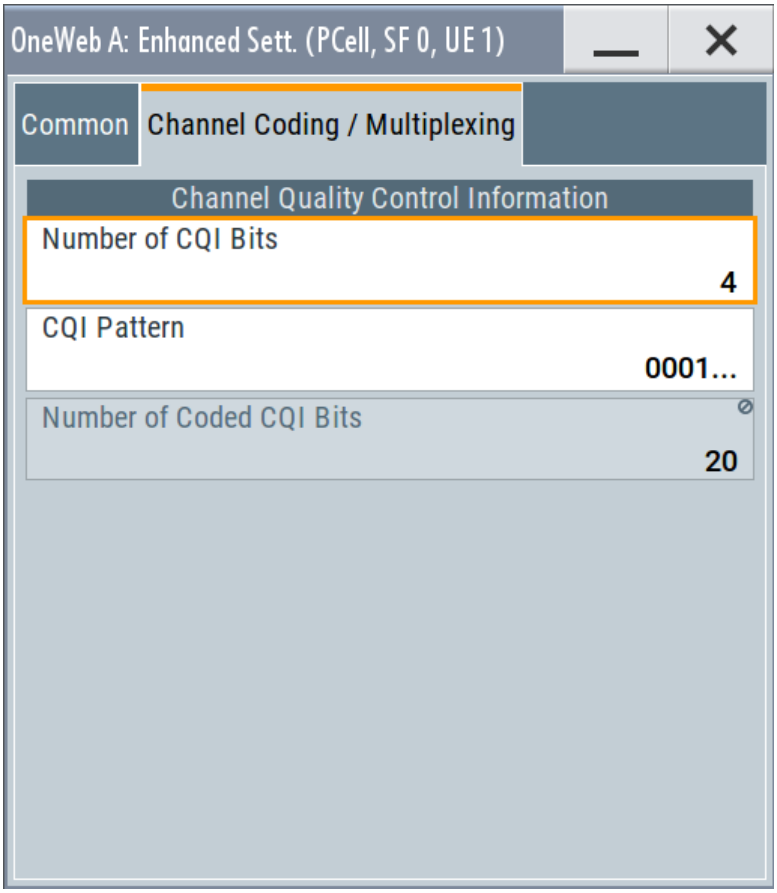
Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL[:SUBF<st0>]:ALLoc<ch0>:PUCCh:NPAR<ap>`
on page 220

3.7.5.2 Channel coding / multiplexing

Access:

1. Select "General > Link Direction > Uplink / Reverse (SC-FDMA)".
2. Select "Frame Configuration > Subframe > Content > PUCCH"

3. Select "Enhanced Settings > Configure > Channel Coding/Multiplexing"



This dialog and the parameters available for configuration depend on the selected PUCCH Format for the corresponding allocation.
PUCCH Format F1 carries no control information, i.e. the entire "Channel Coding/ Multiplexing" section is not displayed.
CQI control information is carried only by PUCCH formats F2/F2a/F2b and the CQI parameters are enabled only if one of these formats is selected.

Settings:

A/N Pattern / A/N+SR+CSI Pattern
("A/N Pattern" is enabled for PUCCH formats F1a/F1b, F2a/F2b; "A/N+SR+CSI Pattern" is enabled for PUCCH format F3)

Use this parameter to sets the ACK/NACK pattern for the PUCCH for the selected subframe. A "1" indicates an ACK, a "0" indicates a NACK.

In PUCCH format 3, the bits given by the "ACK/NACK+SR Pattern" represent the $o^{\sim ACK}$ bits, i.e. the up to 22 bits that contain ACK/NACK information for up to two codewords and optionally SR and CSI. The number of bits used per subframe is determinate by the value of the parameter "Number of A/N+SR+CSI Bits" on page 93.

To enable the generation of signals with ACK/NACK respectively ACK/NACK+SR information that varies not only per subframe but also differs over the frames, set a pattern with:

- More than 1 bit for the PUCCH formats F1a/F2a
- More than 2 bits for the PUCCH formats F1b/F2b
- More than "Number of A/N+SR+CSI Bits" on page 93 for PUCCH format F3

The ACK/NACK pattern has a maximal length of 32 bits and is read out cyclically.

Example:

"Duplexing Mode > FDD"

"Sequence Length = 4 Frames"

"Number of Configurable Subframes = 8"

"PUCCH Format = F1a or F2a"

"A/N Pattern = 01001"

The generated signal carries ACK/NACK information as shown on the figure bellow.

Example: PUCCH Format F1a/F2a, ACK/NACK Pattern '01001'

Subframe	#0	#1	#2	#3	#4	#5	#6	#7	#8	#9
Frame#1	ACK/ NACK=0								ACK/ NACK=1	
Frame#2							ACK/ NACK=0			
Frame#3					ACK/ NACK=0					
Frame#4			ACK/ NACK=1							

By changing only the PUCCH Format to F1b or F2b, the ACK/NACK information per subframe changes as shown on the figure bellow.

Example: PUCCH Format F1b/F2b, ACK/NACK Pattern '01001'

Subframe	#0	#1	#2	#3	#4	#5	#6	#7	#8	#9
Frame#1	ACK/ NACK=01								ACK/ NACK=00	
Frame#2							ACK/ NACK=10			
Frame#3					ACK/ NACK=10					
Frame#4			ACK/ NACK=01							

Remote command:
[:SOURce<hw>]:BB:ONEWeb:UL[:SUBF<st0>]:ALLoc<ch0>:PUCCh:HARQ:ANPattern on page 219
[:SOURce<hw>]:BB:ONEWeb:UL[:SUBF<st0>]:ALLoc<ch0>:PUCCh:HARQ:PATTern on page 219

Number of CQI Bits
(enabled for PUCCH formats F2/F2a/F2b only)

Sets the number of CQI bits before channel coding.

Remote command:
[:SOURce<hw>]:BB:ONEWeb:UL[:SUBF<st0>]:ALLoc<ch0>:PUCCh:CQI:BITS on page 218

PUCCH Format 3 Settings
The PUCCH format F3 is required for sending of the ACK/NACK messages.

Number of A/N+SR+CSI Bits ← PUCCH Format 3 Settings
Sets the number of ACK/NACK+SR+CSI bits before channel coding.

Remote command:
[:SOURce<hw>]:BB:ONEWeb:UL[:SUBF<st0>]:ALLoc<ch0>:PUCCh:HARQ:BITS on page 219

A/N+SR+CSI Pattern ← PUCCH Format 3 Settings
See "A/N Pattern / A/N+SR+CSI Pattern" on page 91.

Number of Coded A/N+SR+CSI Bits ← PUCCH Format 3 Settings
Displays the number of coded ACK/NACK+SR bits.

Remote command:
[:SOURce<hw>]:BB:ONEWeb:UL[:SUBF<st0>]:ALLoc<ch0>:PUCCh:HARQ:CBITs? on page 220

CQI Pattern
Sets the CQI pattern for the PUCCH.

The length of the pattern is determinate by the value of the parameter Number of CQI Bits.

Remote command:
[:SOURce<hw>]:BB:ONEWeb:UL[:SUBF<st0>]:ALLoc<ch0>:PUCCh:CQI:PATTern on page 219

Number of Coded CQI Bits
Displays the number of coded CQI bits.

The number of coded CQI bits for PUCCH is always 20.

Remote command:
[:SOURce<hw>]:BB:ONEWeb:UL[:SUBF<st0>]:ALLoc<ch0>:PUCCh:CQI:CBITs? on page 218

3.8 User equipment configuration

Option: R&S SMW-K130

Access:

1. Select "OneWeb General > Link Direction > Uplink / Reverse (SC-FDMA)".
2. Select "General Settings > CA > Activate carrier Aggregation > On"
3. Select "Frame Configuration > General > Select User Equipment > UEx".

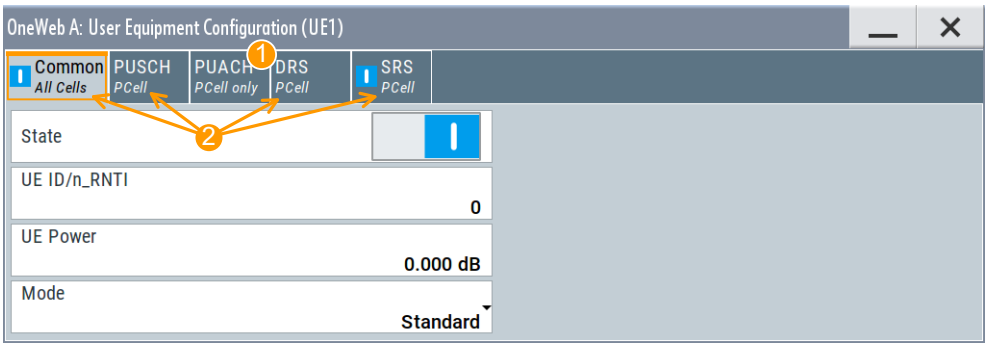
   You can configure up to four scheduled user equipment (UE) and freely distribute them over the time. You can also configure the structure of the demodulation reference signal (DRS) and the sounding reference signal (SRS) per UE.
   In advanced mode ("System Configuration > Fading/Baseband Configuration > Mode > Advanced"), the tab names indicate whether the provided settings are cell-specific or common to all cells.

Settings:

3.8.1 Common settings

Access:

1. Select "General > Link Direction > Uplink / Reverse (SC-FDMA)"
2. Select "Frame Configuration > General > Select User Equipment > UEx".
3. Select "Common".



1 = PUACH is available in the primary cell (PCell)
2 = Indicate whether the provided settings are cell-specific PCell or SCell) or common to all cells

The available settings allow you to configure the state of the user equipment, UE ID, and the operational mode.

Settings:

State
Activates or deactivates the user equipment.

Disabling the UE deactivates its allocations: the reference signal, PUSCH, PUACH (or PUCCH) allocations, and PRACH are not transmitted.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>:STATe` on page 222

UE ID/n_RNTI
Sets the radio network temporary identifier (RNTI) of the UE.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>:ID` on page 222

UE Power
Sets the power level of the selected UE (P_{UE}).

The P_{UE} determines the power levels of the reference signals (DRS and SRS) and of the allocations, PUSCH (P_{PUSCH}), PUACH (P_{PUACH}) and PUCCH (P_{PUCCH}). Use the P_{UE} for global adjustment of the transmit power of the UEs.

Further power-related parameters:
- Power: varies the PUSCH and PUCCH power per subframe.
- DRS Power Offset (P_{DSR_offset}): boosts the reference signals DRS per UE.
- "SRS Power Offset" on page 102 (P_{SRS_offset}): boosts the reference signals SRS per UE.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>:POWer` on page 222

Mode
Selects whether the user equipment is in standard or in PRACH mode.

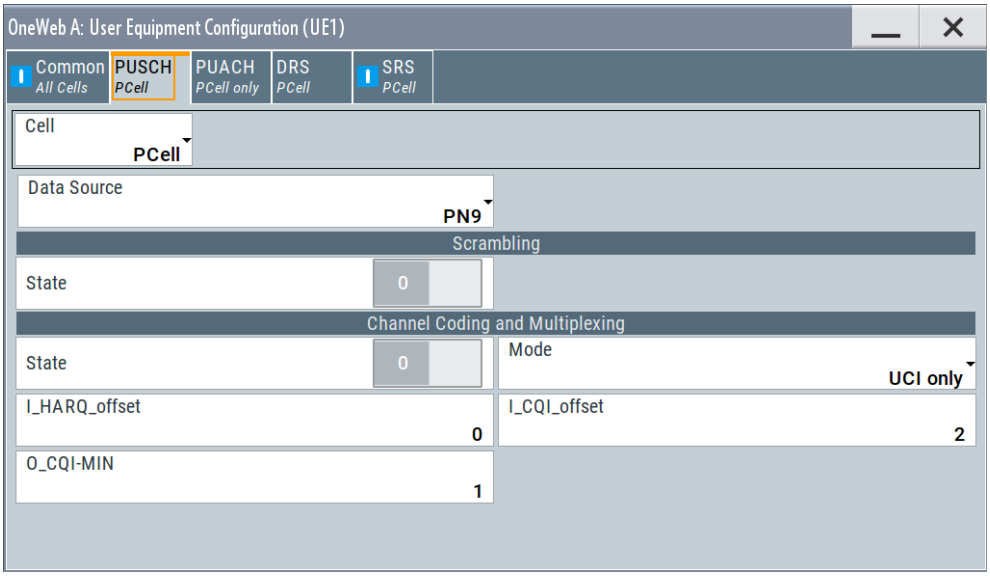
See Chapter 3.8.6, "PRACH configuration", on page 111.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>:POWer` on page 222

3.8.2 Physical uplink shared channel/physical uplink aloha channel (PUSCH/PUACH)

Access:

1. Select "General > Link Direction > Uplink / Reverse (SC-FDMA)".
2. Select "Frame Configuration > General > Select User Equipment > UEx"
3. Select "PUSCH/PUACH"



In this dialog, the data source for the PUSCH/PUACH can be selected and the channel coding can be configured. Use the Enhanced PUSCH/PUACH settings dialog to adjust the additional settings for channel coding of the control information and the multiplexing of the data and control information.

Settings:

Cell
In enabled "General UL Settings" > "CA" > "Activate Carrier Aggregation" > "On" state, displays the settings of primary cell or secondary cell.

Remote command:
n.a.

Data Source
Selects the data source for the PUSCH/PUACH allocation.

The following standard data sources are available:

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

See also:

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

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:PUSCh:DATA` on page 225
`[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:PUSCh:PATTern` on page 225
`[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:PUSCh:DSELect` on page 225
`[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:PUACh:DATA` on page 225
`[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:PUACh:PATTern` on page 225
`[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:PUACh:DSELect` on page 225

State Scrambling (PUSCH/PUACH)
Enables/disables scrambling for all PUSCH/PUACH allocations of the corresponding UE.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:PUSCh:SCRambling:STATe` on page 226
`[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:PUACh:SCRambling:STATe` on page 226

State Channel Coding and Multiplexing (PUSCH)
Enables/disables channel coding and multiplexing of data and control information for all PUSCH/PUACH allocations of the corresponding UE.

If this parameter is disabled, the content retrieved from the Data Source is forwarded to the scrambler without any coding processing.

Additional parameters for the encoding of control information can be set in Enhanced PUSCH/PUACH settings dialog.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:PUSCh:CCODing:STATe` on page 224
`[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:PUACh:CCODing:STATe` on page 224

Mode Channel Coding
Defines the information transmitted on the PUSCH/PUACH.

For PUACH, this value is read-only.

"UCI+UL-SCH" Control information and data are multiplexed into the PUSCH.

"UL-SCH" Only data is transmitted on PUSCH/PUACH.

"UCI only" Only uplink control information is transmitted on PUSCH.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:PUSCh:CCODing:MODE` on page 224
`[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:PUACh:CCODing:MODE?` on page 223

I_HARQ_offset
Sets the HARQ-ACK offset index for control information MCS offset determination.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:PUSCh:CCODing:IHARqoffset` on page 223
`[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:PUACh:CCODing:IHARqoffset` on page 223

I_CQI_offset
Sets the CQI offset index for control information MCS offset.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:PUSCh:CCODing:ICQioffset` on page 223
`[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:PUACh:CCODing:ICQioffset` on page 223

O_CQI-Min
(Enabled in "UCI only" transmission)

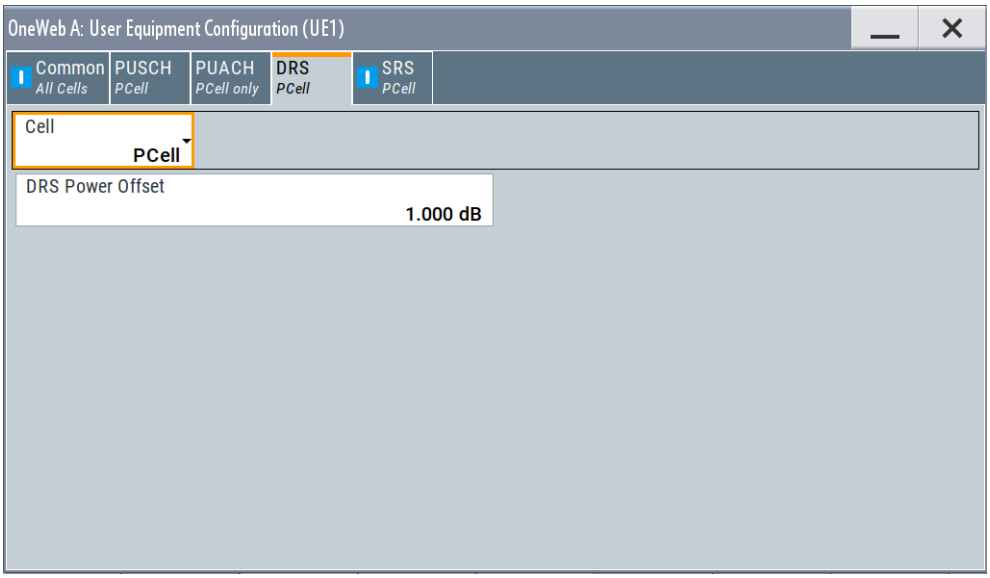
Sets the parameter O-CQI-Min, where O_CQI-Min is the number of CQI bits including CRC bits assuming rank equals to 1.

Remote command:
[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:PUSCh:CCODing:OCQimin on page 224
[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:PUACh:CCODing:OCQimin on page 224

3.8.3 Demodulation reference signal (DRS)

Access:

1. Select "General > Link Direction > Uplink / Reverse (SC-FDMA)".
2. Select "Frame Configuration > General > Select User Equipment > UEx".
3. Select "DRS".



Comprises the parameters of the demodulation reference signal.

Settings:

Cell
In enabled "General UL Settings" > "CA" > "Activate Carrier Aggregation" > "On" state, displays the settings of primary cell or secondary cell.

Remote command:
n.a.

DRS Power Offset
Sets the power offset of the DRS relative to the power level of the PUSCH/PUACH or PUCCH allocation of the corresponding subframe.

The selected DRS power offset (P_{DRS_Offset}) applies for all subframes.

Depending on the allocation of the subframe, the effective power level of the DRS is calculated as following:

$P_{DRS}=P_{UE}+P_{PUSCH/PUACH/PUCCH}+P_{DRS\_Offset}$

The PUSCH/PUACH and PUCCH power levels (P_{PUSCH} and P_{PUACH} and P_{PUCCH}) can vary per subframe.

For global adjustment of the transmit power of the corresponding UE, use the parameter UE Power (P_{UE}).

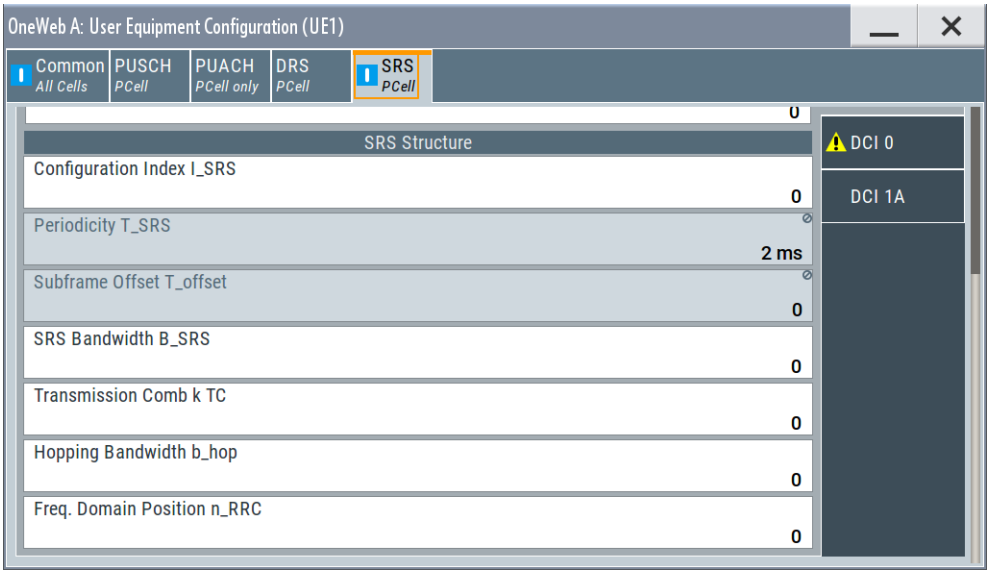
Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:REFSig:DRS:POWoffset` on page 229

3.8.4 Sounding reference signal (SRS)

Access:

1. Select "General > Link Direction > Uplink / Reverse (SC-FDMA)".
2. Select "Frame Configuration > General > Select User Equipment > UEx".
3. Select "SRS".

The UE dialog consists of 3 subtabs, one for the "trigger type 0" SRS and 2 for the SRS sets.



In the "SRS Structure" section, you can configure the **UE-specific SRS parameters**.

The **cell-specific parameters**, necessary for the complete definition of the SRS structure and SRS mapping, are configurable in the General uplink settings"General UL Settings" dialog.

Settings:

Cell
In enabled "General UL Settings" > "CA" > "Activate Carrier Aggregation" > "On" state, displays the settings of primary cell or secondary cell.

Remote command:
n.a.

SRS State
Enables/disables sending of SRS for the corresponding UE.

In the symbols reserved for SRS transmission, PUSCH is not transmitted.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:REFSig:SRS:STATe` on page 230

Transmit Trigger Type 0
There are two types of SRS transmission:

- **Periodic SRS**
  SRS occurs at regular time intervals.
  Periodic SRS is referred as "trigger type 0" SRS.
- **Aperiodic SRS**
  The aperiodic SRS transmission is a single (one-shot) transmission.
  Aperiodic SRS is referred as "trigger type 1" SRS.

"On" Trigger type 0 is used.
The SRS is configured by higher levels.
To configure the SRS structure, use the settings in the "Type 0" dialog.

"Off" Trigger type 1 is used.
The SRS is triggered by the PDCCH DCI content, in particular by the DCI format 0/1A.
To configure the SRS structure, use the dedicated settings in the "DCI 0/DCI 1A" dialogs.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:REFSig:SRS:TT0` on page 230

SRS Power Offset
Sets the power offset of the SRS relative to the power of the corresponding UE.

The selected SRS power offset applies for all subframes.

The effective power level of the SRS is calculated as follows:

$P_{SRS} = P_{UE} + P_{SRS\_Offset}$

For global adjustment of the transmit power of the corresponding UE, use the parameter UE Power (P_{UE}).

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:REFSig:SRS:POWoffset` on page 230

SRS Set Configuration
There is one SRS set of parameters and one tab, "Type 0", where the SRS structure is defined.

The aperiodic SRS is triggered by the "SRS Request" flag in one of the DCI formats 0 or DCI format 1A.

SRS Cyclic Shift n_cs (First AP) ← SRS Set Configuration
Sets the cyclic shift n_cs used for the generation of the sounding reference signal CAZAC sequence for the first port. The n_cs for the other ports are calculated automatically; they have a fixed relation to the first one.

The different shifts of the same Zadoff-Chu sequence are orthogonal to each other. Thus, you can apply different SRS cyclic shifts to schedule different users to transmit simultaneously their sounding reference signal.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:REFSig:SRS[<srsidx>]:CYCShift` on page 231

SRS Structure ← SRS Set Configuration
Use the following parameters to define the SRS structure:

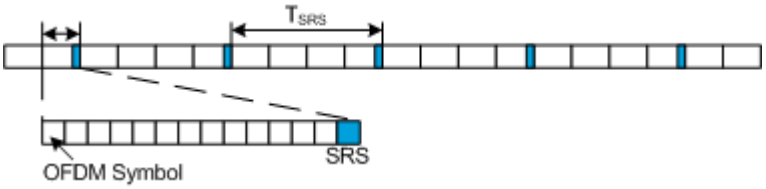
Configuration Index I_SRS ← SRS Structure ← SRS Set Configuration
Sets the UE-specific parameter SRS configuration index I_{SRS}.

Depending on the selected "Duplexing Mode", this parameter determines the parameters Periodicity T_SRS and Subframe Offset T_offset.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:REFSig:SRS[<srsidx>]:ISRS` on page 232

Periodicity T_SRS ← SRS Structure ← SRS Set Configuration
Displays the UE-specific parameter SRS periodicity T_{SRS}, i.e. displays the interval of milliseconds after which the SRS is transmitted. The displayed value depends on the selected SRS Configuration Index I_SRS.

Adjust the SRS configuration index to enable more frequent SRS transmission like each 2 ms or an infrequently SRS transmission like each 320 ms for instance.



Example:

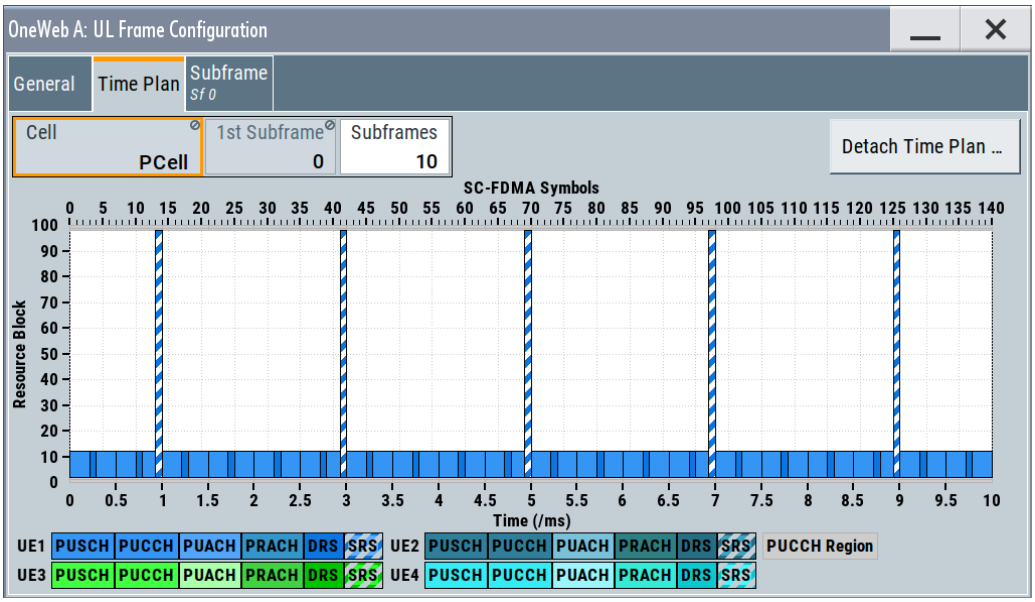
"Configuration Index = 0", i.e. "Periodicity T_SRS = 2 ms" and "Subframe Offset T_offset = 0"

"SRS State > On"

"Duplexing > FDD"

The default values of all other SRS parameters are left unchanged.

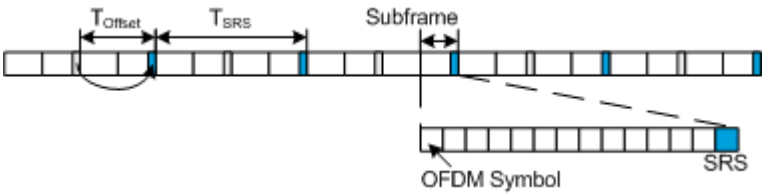
The SRS is transmitted every 2 ms and occupies the entire channel bandwidth.



Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:REFSig:SRS[<srsidx>]:TSRS?` on page 234

Subframe Offset T_offset ← SRS Structure ← SRS Set Configuration
Displays the UE-specific parameter SRS subframe offset T_{offset}, depending on the selected SRS Configuration Index I_SRS.

An SRS subframe offset shifts the SRS pattern. While SRS periodicity T_SRS remains constant, the SRS transmission is delayed with period of time equal to the SRS subframe offset T_offset.



Example:

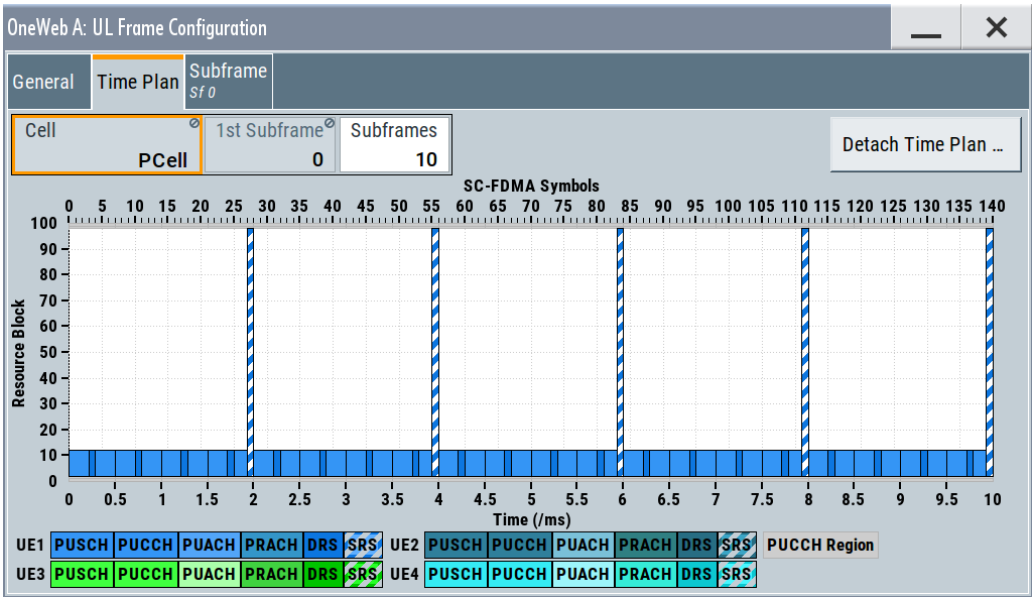
"Configuration Index = 1", i.e. "Periodicity T_SRS = 2 ms" and "Subframe Offset T_offset = 1"

"SRS State > On"

"Duplexing > FDD"

The default values of all other SRS parameters are left unchanged.

The SRS is transmitted every 2 ms and occupies the entire channel bandwidth, i.e. frequency hopping is not enabled. Compared to the SRS transmission with T_{offset} = 0, the SRS transmission is delayed with 1 ms.

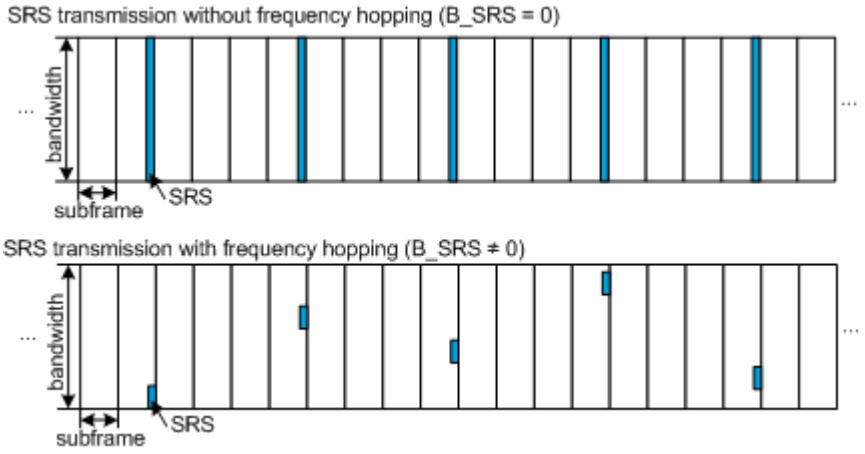


Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:REFSig:SRS[<srsidx>]:TOFFset?` on page 233

SRS Bandwidth B_SRS ← SRS Structure ← SRS Set Configuration
Sets the bandwidth covered by a single SRS transmission. The parameter SRS bandwidth B_{SRS} is UE-specific.

The SRS can span the entire frequency bandwidth or use frequency hopping where several narrowband SRSs cover the same total bandwidth.

There are 4 SRS bandwidths defined in the standard. The most narrow SRS bandwidth (B_SRS = 3) spans 4 resource blocks and is available for all channel bandwidths. The other 3 values of the parameter B_SRS define more wideband SRS bandwidths, available depending on the channel bandwidth.



The SRS transmission bandwidth is determined also by the "SRS Bandwidth Configuration C_{SRS}".

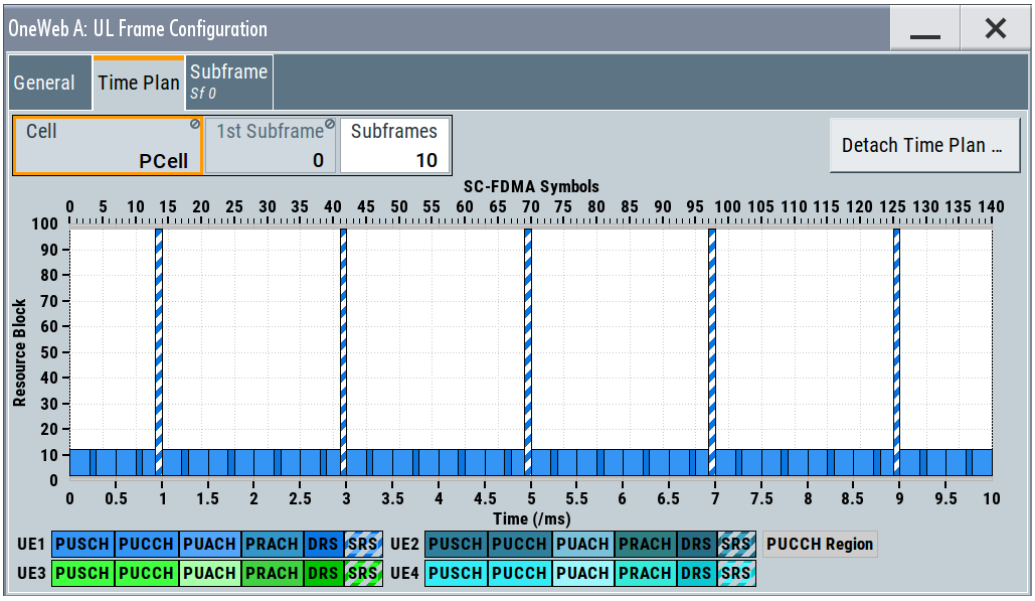
Example:

"SRS State > On"

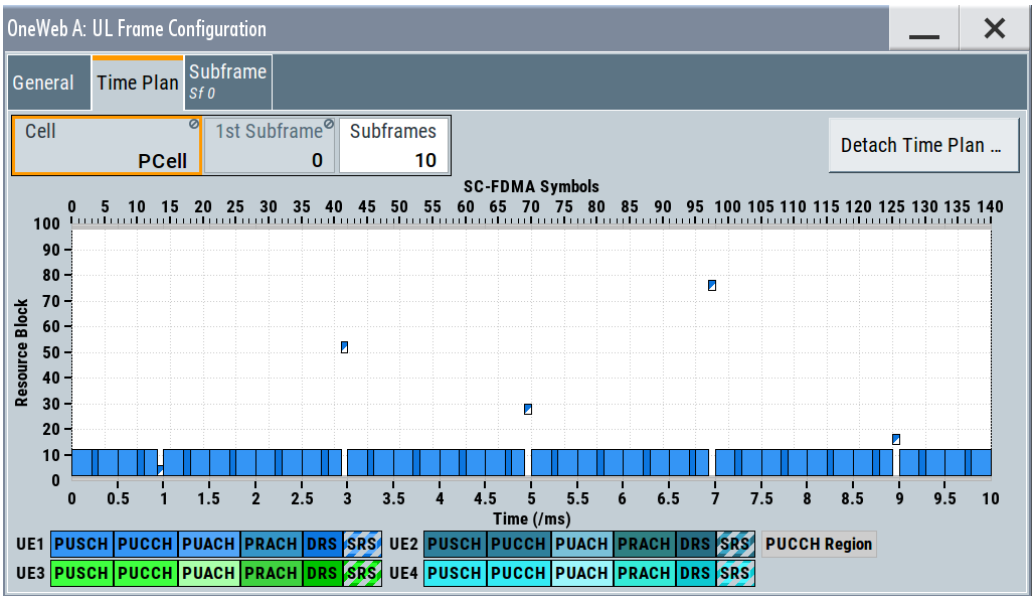
"Duplexing > FDD"

The default values of all other SRS parameters are left unchanged.

For "B_SRS = 0", the SC-FDMA time plan shows a wideband SRS without frequency hopping.



Changing the SRS bandwidth to "B_SRS = 3" results in the most narrowband SRS transmission with SRS bandwidth of 4 RBs and enabled frequency hopping.



Remote command:

`[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:REFSig:SRS[<srsidx>]:BSRS` on page 231

Transmission Comb k TC ← SRS Structure ← SRS Set Configuration
Sets the UE-specific parameter transmission comb parameter k_{TC}.

The SRS is transmitted on alternating subcarriers, where with k_{TC} = 1 every odd and with k_{TC} = 0 every even subcarrier is used.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:REFSig:SRS[<srsidx>]:TRComb` on page 233

Hopping Bandwidth b_hop ← SRS Structure ← SRS Set Configuration
Requires trigger type 0 SRS ("Type 0").

Sets the UE-specific parameter frequency hopping bandwidth b_{hop}.

SRS frequency hopping is enabled, if b_{HOP}<B_{SRS}. Hopping bandwidth is the frequency band in that the SRS hops.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:REFSig:SRS:BHOP` on page 229

Freq. Domain Position n_RRC ← SRS Structure ← SRS Set Configuration
Sets the UE-specific parameter `frqDomainPosition` n_{RRC}.

This parameter determines the starting physical resource block of the SRS transmission.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:REFSig:SRS[<srsidx>]:NRRC` on page 232

Number of Transmissions ← SRS Structure ← SRS Set Configuration
Sets the number of SRS transmissions.

That is, the number of cells in the table Subframes for Transmission.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:REFSig:SRS[<srsidx>]:NTRans` on page 232

Subframes for Transmission ← SRS Structure ← SRS Set Configuration
Sets the subframes in that the SRS is transmitted. The values correspond to the values of the SRS parameter Configuration Index I_SRS.

A conflict is indicated in the following situations:
- The subframe number is already used in the SRS set
- The subframe number is used in another SRS set of the same UE

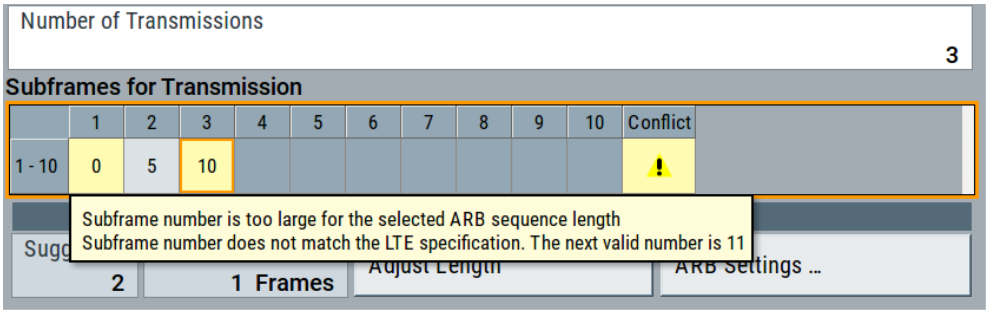


Figure 3-6: Example of conflict indication

- The subframe number is outside the current ARB sequence length.

Note: If there is conflict, observe the tooltip.
Change the subframe index or select "Adjust Length" to set the "ARB Sequence Length" to the proposed value.

See "Adjust length" on page 109.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:REFSig:SRS[<srsidx>]:SUBF<subfidx>` on page 232

ARB Sequence Length ← SRS Structure ← SRS Set Configuration
Indicates the current and suggest ARB sequence length as number of frames.

Suggested ← ARB Sequence Length ← SRS Structure ← SRS Set Configuration
Displays the suggested ARB sequence length.

This length is calculated depending on the settings of the number of subframes, resource block allocated and DCI format used.

Remote command:
n.a.

Current ARB Sequence Length ← ARB Sequence Length ← SRS Structure ← SRS Set Configuration
Sets the sequence length of the signal in number of frames. One frame corresponds to 10 ms. The signal is calculated in advance and output in the arbitrary waveform generator. The maximum number of frames is calculated as follows:

Max. no. of frames = ARB waveform memory size/("Sampling Rate" x 10 ms).

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:SLENgth` on page 144

Adjust length ← ARB Sequence Length ← SRS Structure ← SRS Set Configuration
This function is active, if an SRS transmission is configured in subframe number that is outside of the frames in the current "ARB Sequence Length".See "Subframes for Transmission" on page 108.

Select "Adjust Length" to set the ARB sequence length to the proposed value.

Remote command:
n.a.

ARB Settings ← ARB Sequence Length ← SRS Structure ← SRS Set Configuration
Access the "ARB" dialog and displays the "ARB Sequence Length" value.

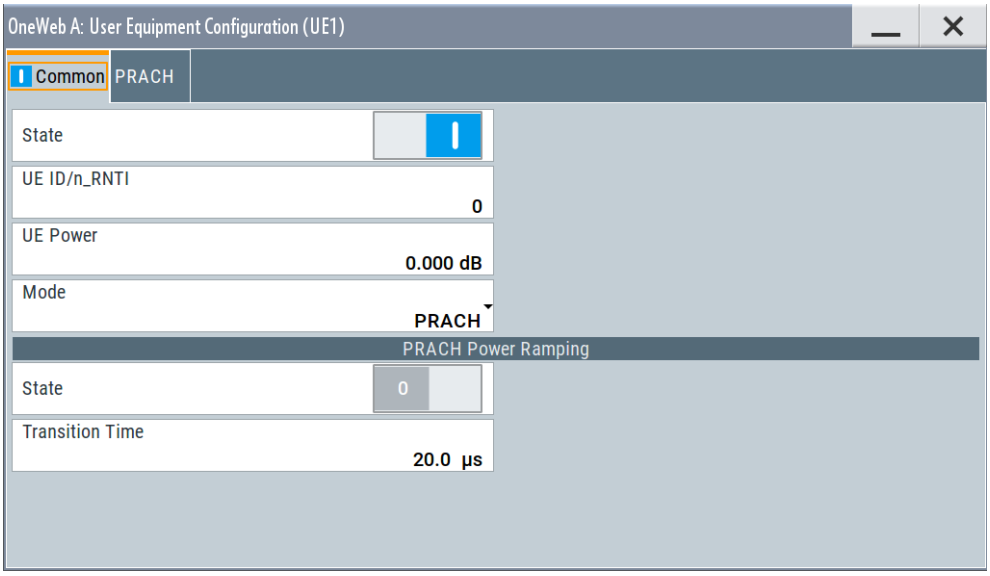
See Chapter 3.12.3, "ARB settings", on page 130.

Remote command:
n.a.

3.8.5 PRACH power ramping

Access:

1. Select "General > Link Direction > Uplink / Reverse (SC-FDMA)".
2. Select "Frame Configuration > General > Select User Equipment > UEx"
3. Select "Common > Mode > PRACH"



This dialog comprises the settings needed for configuring the PRACH power ramping.

Settings:

State PRACH Power Ramping
Activates power ramping for the PRACH preamble. The start and the end of the preamble is cyclically extended and multiplied with a ramping function (sin ^ 2).

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>:PRACh:PRSTate` on page 226

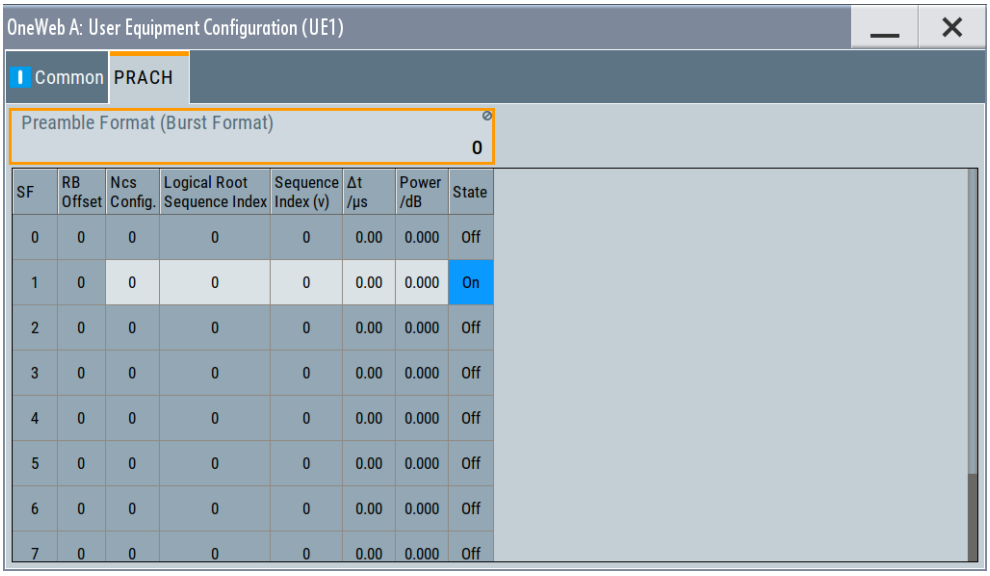
Transition Time
Defines the transition time from beginning of the extended preamble to the start of the preamble itself.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>:PRACh:PRTT` on page 227

3.8.6 PRACH configuration

Access:

1. Select "General > Link Direction > Uplink / Reverse (SC-FDMA)".
2. Select "Frame Configuration > General > Select User Equipment > UEx"
3. Select "Common > Mode > PRACH"
4. Select "PRACH"



In this dialog, the UE-specific parameters are displayed for configuration.
The cell-specific parameters, necessary for the complete definition of the PRACH, are configurable in the dialog "General UL Settings" > "PRACH".

Settings:

Preamble Format (Burst Format)
Displays the preamble format.

The "Preamble Format" is automatically derived from the PRACH Configuration.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>:PRACh:PRFormat?` on page 226

SF
Displays the consecutive number of the subframe.

The subframes available for configuration depend on the "PRACH Configuration".

Remote command:
n.a.

RB Offset
Displays the starting RB, as sets with the parameter PRACH Frequency Offset.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>:PRACh:SUBF<ch0>:RBOFfset?`
on page 228

Ncs Configuration
Selects the Ncs configuration of the selected subframe, i.e. determines the Ncs value for the selected preamble set.

The value range of this parameter depends on the selected duplexing mode, PRACH configuration and whether a restricted preamble set is enabled or not.

Parameter	Value range Ncs configuration
Disabled Restricted Set (High Speed Mode)	0 to 15
Enabled "Restricted Preamble Set"	0 to 14

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>:PRACh:SUBF<ch0>:NCSConf`
on page 227

Logical Root Sequence Index
Selects the logical root sequence index for the selected subframe.

The value range of this parameter depends on the PRACH configuration.

The value range between 0 to 837.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>:PRACh:SUBF<ch0>:RSEQuence`
on page 228

Sequence Index (v)
Selects the sequence index **v** for the selected subframe, i.e. selects which one of the 64 preambles available in a cell is used.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>:PRACh:SUBF<ch0>:SINDex`
on page 228

Delta t/us
Sets the parameter Delta_t in us.

A value of delta t different than 0 causes a time shift of the configured preamble.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>:PRACh:SUBF<ch0>:DT` on page 227

Power (PRACH)
Sets the PRACH power relative to the UE power. The PRACH power can be adjusted independently for every configured preamble.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>:PRACh:SUBF<ch0>:POWer`
on page 228

State (PRACH)
Enables/disables the PRACH for the selected subframe.

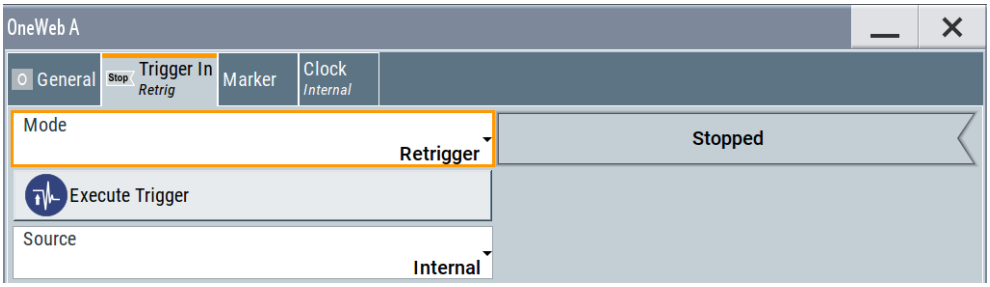
The subframes available for configuration depend on the selected PRACH configuration.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>:PRACh:SUBF<ch0>:STATe`
on page 229

3.9 Trigger settings

Access:

► Select "OneWeb" > "Trigger In".



This tab provides settings to select and configure the trigger, like trigger source, trigger mode and trigger delays, and to arm or trigger an internal trigger manually.

The header of the tab displays the status of the trigger signal and trigger mode. As in the tabs "Marker" and "Clock", this tab provides also access to the settings of the related connectors.

Routing and activating a trigger signal

1. Define the effect of a trigger event and the trigger signal source.
   a) Select "Trigger In" > "Mode".
   b) Select "Trigger In" > "Source".
2. For external trigger signals, define the connector for signal input. See Chapter 3.13, "Local and global connectors settings", on page 132.
   You can map trigger signals to one or more USER x or T/M connectors.

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

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

About baseband trigger signals

This section focuses on the available settings.

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

Settings:

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

The icon  indicates that common trigger settings are applied.

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

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

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

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

Remote command:
`[:SOURce<hw>]:BB:ONEWeb[:TRIGger]:SEQuence` on page 147

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

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:TRIGger:SLUNit` on page 149

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

Enters the length of the trigger signal sequence.

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

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:TRIGger:SLENgth` on page 149

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

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

Remote command:
[:SOURce<hw>]:BB:ONEWeb:TRIGger:RMODe? on page 147

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

Activates time-based triggering with a fixed time reference.

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

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

Remote command:
[:SOURce<hw>]:BB:ONEWeb:TRIGger:TIME[:STATe] on page 149

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

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

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

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

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

Remote command:
[:SOURce<hw>]:BB:ONEWeb:TRIGger:TIME:DATE on page 148

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

Remote command:
[:SOURce<hw>]:BB:ONEWeb:TRIGger:TIME:TIME on page 148

Arm
Stops the signal generation until subsequent trigger event occurs.

Remote command:
[:SOURce<hw>]:BB:ONEWeb:TRIGger:ARM:EXECute on page 150

Execute Trigger
For internal trigger source, executes trigger manually.

Remote command:
[:SOURce<hw>]:BB:ONEWeb:TRIGger:EXECute on page 150

Source
The following sources of the trigger signal are available:

- "Internal"

The trigger event is executed manually by the "Execute Trigger".

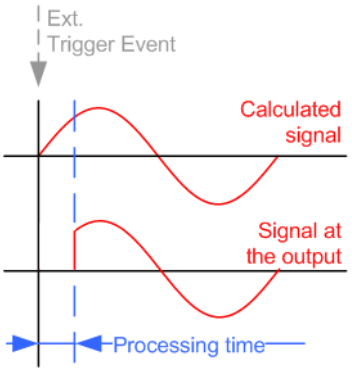
- "Internal (Baseband A/B)"
  The trigger event is provided by the trigger signal from the other basebands.
  If common trigger settings are applied, this trigger source is disabled.
- "External Global Trigger"
  The trigger event is the active edge of an external trigger signal provided and configured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

How to: "Routing and activating a trigger signal" on page 114

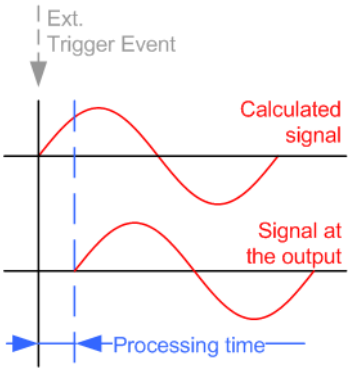
Remote command:
`[:SOURce<hw>]:BB:ONEWeb:TRIGger:SOURce` on page 147

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

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



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



Remote command:
[:SOURce<hw>]:BB:ONEWeb:TRIGger:EXTernal:SYNChronize:OUTPut on page 150

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

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

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

Remote command:
[:SOURce<hw>]:BB:ONEWeb:TRIGger[:EXTernal]:INHibit on page 153
[:SOURce<hw>]:BB:ONEWeb:TRIGger:OBASeband:INHibit on page 152

(External) Delay Unit
Determine whatever the trigger delay is expressed in samples or directly defined as a time period (seconds).

To specify the delay, use the parameter (Specified) External Delay/(Specified) Trigger Delay.

The parameter Actual Trigger Delay/Actual External Delay displays the delay converted in time.

Remote command:
[:SOURce<hw>]:BB:ONEWeb:TRIGger:DELay:UNIT on page 151

(Specified) External Delay/(Specified) Trigger Delay
The name of the parameter and the units the delay is expressed in, changes depending on the parameter (External) Delay Unit.

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

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

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

The parameter displays the delay converted in time.

Remote command:
[:SOURce<hw>]:BB:ONEWeb:TRIGger[:EXTernal]:DELay on page 152
[:SOURce<hw>]:BB:ONEWeb:TRIGger:EXTernal:TDELay on page 152
[:SOURce<hw>]:BB:ONEWeb:TRIGger:EXTernal:TDELay on page 152
[:SOURce<hw>]:BB:ONEWeb:TRIGger:OBASeband:TDELay on page 151

Actual Trigger Delay/Actual External Delay
Indicates the resulting trigger delay in "Time" unit.

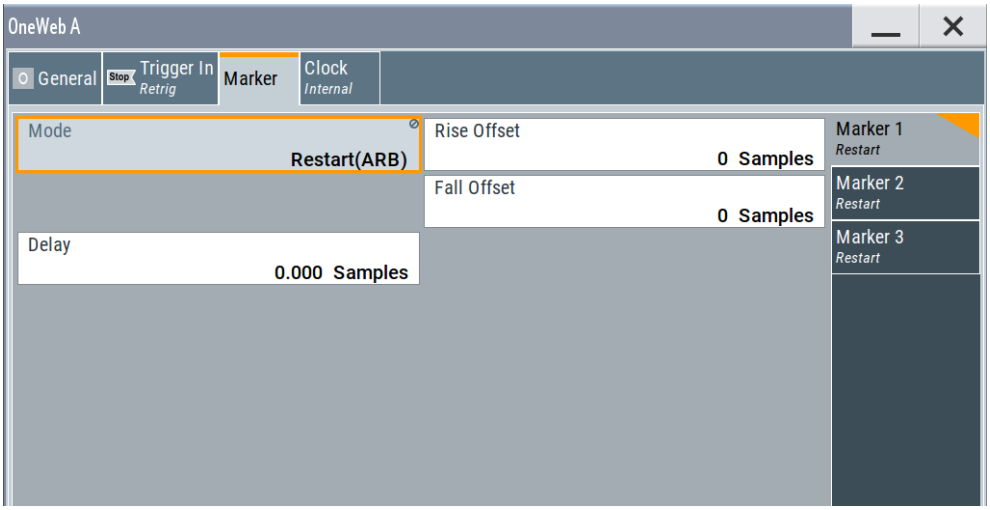
See also, chapter Basics in the R&S SMW user manual.

Remote command:
[:SOURce<hw>]:BB:ONEWeb:TRIGger:EXTernal:RDELay? on page 152
[:SOURce<hw>]:BB:ONEWeb:TRIGger:OBASeband:RDELay? on page 151

3.10 Marker settings

Access:

► Select "OneWeb" > "Marker".



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

Routing and activating a marker signal

1. To define the signal shape of an individual marker signal "x", select "Marker" > "Marker x" > "Mode".
2. Optionally, define the connector for signal output. See Chapter 3.13, "Local and global connectors settings", on page 132.

You can map marker signals to one or more USER x or T/M connectors.

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

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

About marker output signals

This section focuses on the available settings.

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

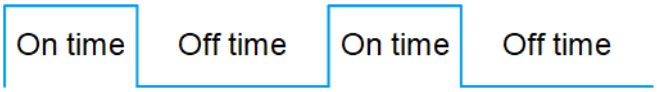
Settings:

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

How to: "Routing and activating a marker signal" on page 119

"Restart (ARB)"
A marker signal is generated at the start of each ARB sequence.

"On/Off Ratio"
Generated is a regular marker signal that is defined by an on/off ratio is generated; a period lasts one on and off cycle.



Remote command:
`[:SOURce<hw>]:BB:ONEWeb:TRIGger:OUTPut<ch>:ONTime` on page 155
`[:SOURce<hw>]:BB:ONEWeb:TRIGger:OUTPut<ch>:OFFTime` on page 155

"User Period" Generated is marker signal that marks the beginning of every user-defined period.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:TRIGger:OUTPut<ch>:PERiod` on page 154

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:TRIGger:OUTPut<ch>:MODE?` on page 153

Rise Offset/Fall Offset
Shifts the rising or falling ramp of the marker by the selected number of samples. Positive values shift the rising ramp to later positions; negative values shift it to earlier positions.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:TRIGger:OUTPut<ch>:FOFFset` on page 154
`[:SOURce<hw>]:BB:ONEWeb:TRIGger:OUTPut<ch>:ROFFset` on page 154

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

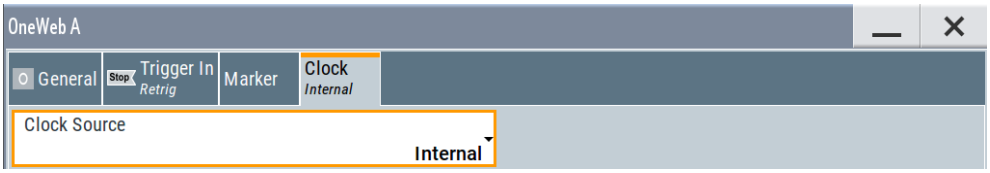
Variation of the parameter "Marker x" > "Delay" causes signal recalculation.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:TRIGger:OUTPut<ch>:DELay` on page 154

3.11 Clock settings

Access:

► Select "OneWeb" > "Clock".



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

Defining the clock

1. Select "Clock" > "Source" to define the source of clock signal.
2. For external clock signals, define the connector for signal input. See Chapter 3.13, "Local and global connectors settings", on page 132.
   You can map clock signals to one or more USER x or T/M connectors.

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

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

About clock signals

This section focuses on the available settings.

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

Settings:

Clock Source
Selects the clock source.

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

How to: "Defining the clock" on page 121

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:CLOCk:SOURce` on page 155

Clock Mode
Sets the type of externally supplied clock.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:CLOCk:MODE` on page 156

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

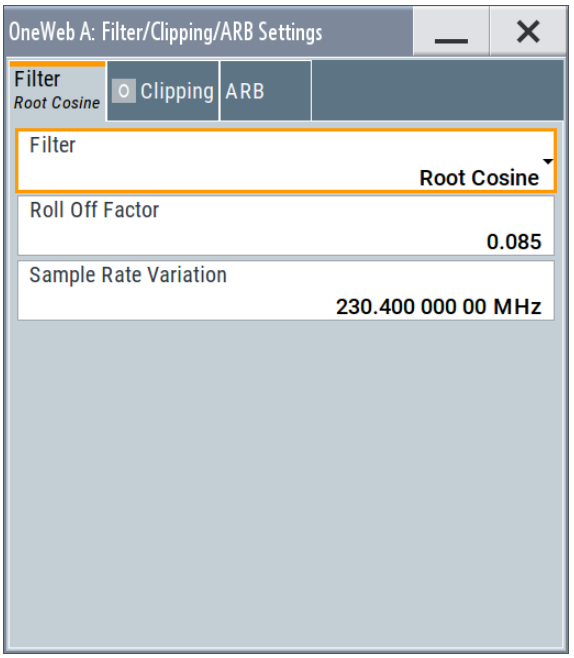
Remote command:
`CLOCk:INPut:FREQuency?`

3.12 Filter/clipping/ARB settings

Access:

► • For uplink:
  Select "OneWeb" > "General" > "ARB Configuration...".
  • For downlink:

Select "OneWeb" > "General" > "Filter/Clipping/ARB...".

Uplink	Downlink
	

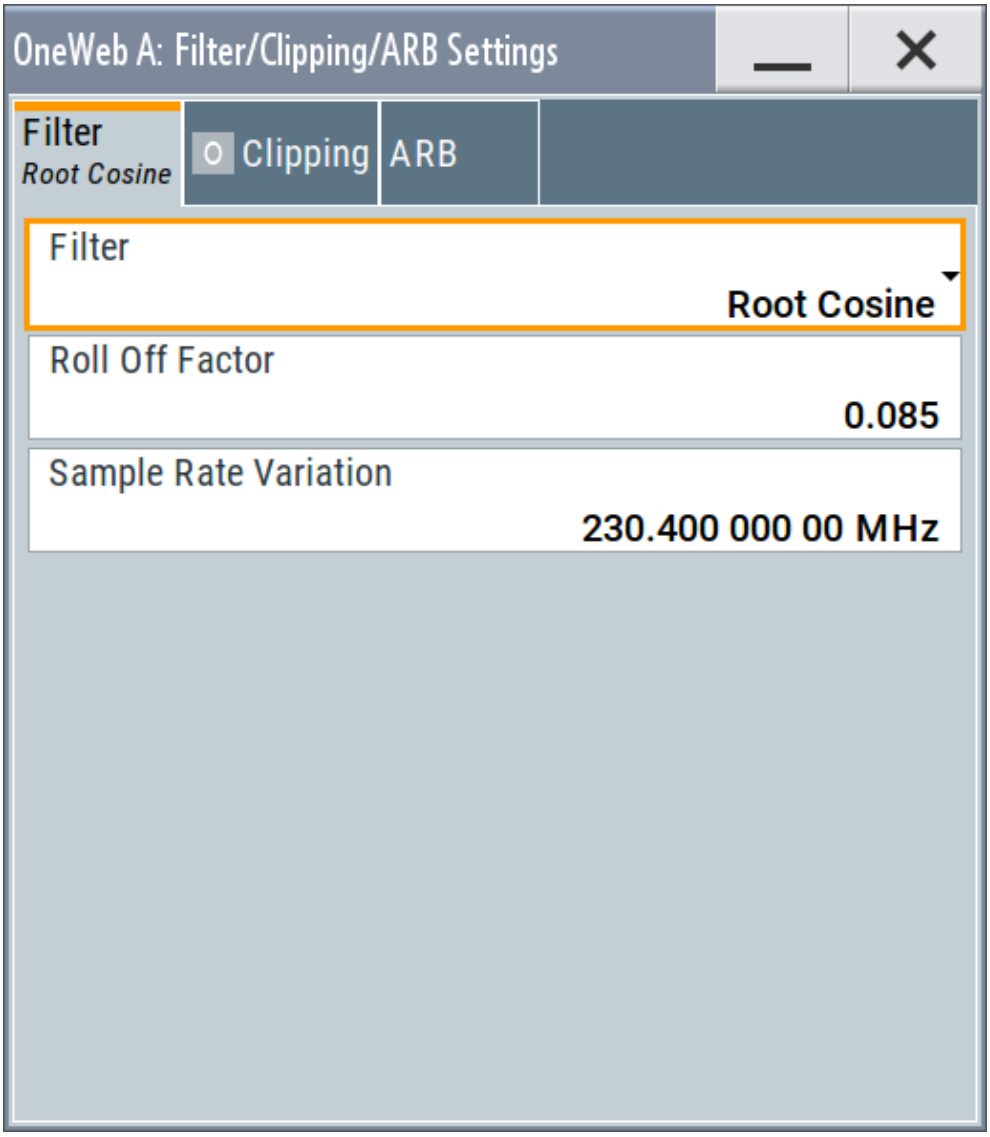
This dialog comprises the settings required for configuring the arbitrary waveform. The settings vary according to the selected "Link Direction".

Settings:

3.12.1 Filter settings

Access:

1. Select "OneWeb" > "General" > "Link Direction" > "Downlink SC (TDM)".
2. Select "Filter/Clipping/ARB ..." > "Filter".



This dialog comprises the settings required for configuring the baseband filter.

Settings:

Filter
Sets the baseband filter.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:FILTer:TYPE` on page 142

Optimization

Selects one of the provided EUTRA/LTE filters.

Each filter is designed for different application field and optimized for a particular performance. Depending on the filter implementation, these filters require different calculation time. The applied upsampling factor also influences the size of the calculated output waveform file.

Waveforms can be calculated in the following ways:

- With the "Generate Waveform File" function
- With the signal generation software R&S WinIQSIM2

The following table outlines the difference between the provided EUTRA/LTE filters by comparing their major specifications.

Table 3-8: Overview of the EUTRA/LTE filters

Characteristic	"Best EVM"	"Best ACP" "Best ACP (Narrow)"	"Best EVM (no upsampling)"
Design goal	An excellent EVM performance while ignoring the effects on ACP	A combination of an excellent ACP performance and a good EVM performance "Best ACP (Narrow)" features also a smoother shape in frequency domain	A combination of an excellent ACP performance and a good EVM performance Small output waveform file size
Calculation time (in real-time processing)	By real-time processing, short calculation time	Long calculation time: the filtered signal is precalculated because of the filter complexity	Long calculation time: the filtered signal is precalculated because of the filter complexity
Upsampling	Upsampling with factor 2 The sample rate of the output waveform is twice the LTE sample rate	Upsampling with factor 2 The sample rate of the output waveform is twice the LTE sample rate The signal processing requires twice as much internal memory. The available memory on the instrument is sufficient for the simulation of half as many frames compared to filter "Best EVM"	Upsampling is not applied The sample rate of the output waveform is not changed
Output waveform file size	Increased file size	Increased file size	File size is maintained The resulting file size is smaller than in the other cases
Recommended application field	Receiver and performance tests with internal real-time generation, where BLER is analyzed	Transmitter and components tests where excellent ACP is required	Receiver and performance tests with pre-generated waveform files, where BLER is analyzed

Remote command:

`[:SOURce<hw>]:BB:ONEWeb:FILTer:PARameter:LTE:OPTimization`

on page 144

Load User Filter

If "Filter" on page 124 > "User" is selected, it opens the standard dialog "Select List File User Filter" for loading a user-defined filter file.

User filters are used as offline filters. The following types are supported:

- Files with predefined file format and extensions `*.vaf`

For information, refer to the description "Introduction to "filtwiz" Filter Editor" on the Rohde & Schwarz web page.

- ASCII files with simple format and file extension `*.dat`
  These files describe filters as a sequence of normalized filter coefficients. Each coefficient is defined as a pair of I and Q samples. The I and Q components alternate at each file line. The I and Q values vary between - 1 and + 1.
  A user filter can contain up to 2560 coefficients.
  The user filter must be real-valued. For both I and Q components of the coefficients, only real coefficients different than 0 are allowed.
  You can create user filter files for example with MATLAB, see Example"Script that generates user filter file" on page 126.

Example: Script that generates user filter file

This MATLAB script creates a user filter file that fits the LTE default settings: "Channel Bandwidth" = "10 MHz", "Number of Resource Blocks" = "50", "FFT Size" = "1024".

```
n_fft = 1048; %10MHz
n_scs = 50*12; %50RBs*12 subcarriers per RB

trans_region = 0.02 * n_fft/2; %in %, controls steepness of filter slopes,
relative to nyquist frequency

%cutoff frequencies
f = [n_scs/2 n_scs/2+trans_region];

%ripples in dB
rp = 0.01; %passband
rs = 80; %stopband
dev = [(10^(rp/20)-1)/(10^(rp/20)+1) 10^(-rs/20)];

%estimate filter order
[n,fo,ao,w] = firpmord(f,[1 0],dev,n_fft);

%generate filter coefficients
b = firpm(n,fo,ao,w);

fvtool(b); %displays filter response

%write filter out into .dat filter coefficient file
coeffs_out = zeros(2*length(b),1);
coeffs_out(1:2:end) = real(b);
coeffs_out(2:2:end) = imag(b);

dlmwrite(['smw_user_filter_' num2str(n) 'coeffs_' num2str(n_scs)
'scs_' num2str(n_fft) 'fft.dat'],coeffs_out);
```

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:FILTer:PARameter:USER` on page 144

Rolloff factor or BxT
Sets the filter parameter.

The rolloff factor affects the steepness of the filter slopes. A "Rolloff Factor = 0" results in the steepest slopes; values near to 1 make the slopes more flat.

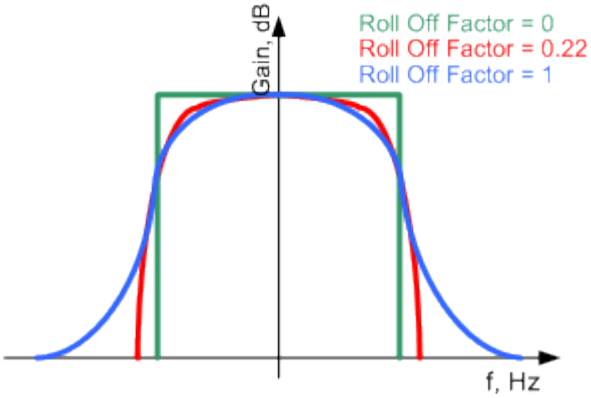


Figure 3-7: Example of the frequency response of a filter with different rolloff factors

For the default cosine filter, a rolloff factor of 0.10 is used.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:FILTer:PARameter:COSine` on page 142
`[:SOURce<hw>]:BB:ONEWeb:FILTer:PARameter:RCOSine` on page 142
`[:SOURce<hw>]:BB:ONEWeb:FILTer:PARameter:PGAuss` on page 142
`[:SOURce<hw>]:BB:ONEWeb:FILTer:PARameter:GAUSs` on page 142
`[:SOURce<hw>]:BB:ONEWeb:FILTer:PARameter:SPHase` on page 142
`[:SOURce<hw>]:BB:ONEWeb:FILTer:PARameter:APCO25` on page 142
`[:SOURce<hw>]:BB:ONEWeb:FILTer:PARameter:LTE:ROFactor` on page 144

Cutoff frequency shift
Available for filter parameter cosine and EUTRA/LTE with EVM optimization only.

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

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

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

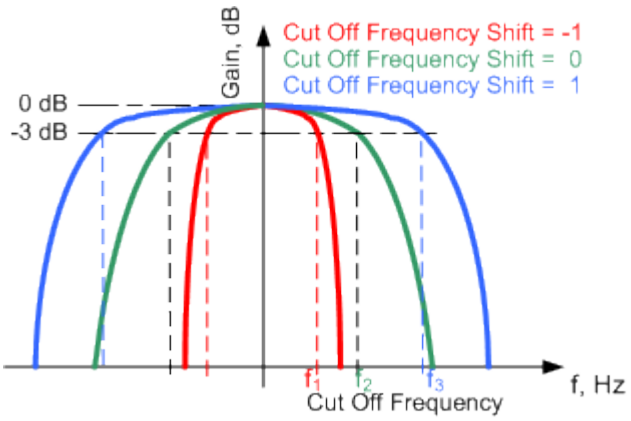


Figure 3-8: Example of the frequency response of a filter with different cutoff frequency shift

Example:

"Channel Bandwidth" = 10 MHz

"Sample Rate" = 15.36 MHz

"Cutoff Frequency Shift" = 0

Frequency at 3 dB down point = +/- 7.68 MHz

Remote command:

`[:SOURce<hw>]:BB:ONEWeb:FILTer:PARameter:COSine:COFS` on page 143

`[:SOURce<hw>]:BB:ONEWeb:FILTer:PARameter:LTE:COFS` on page 143

Cutoff Frequency Factor

Available for filter parameter lowpass and EUTRA/LTE with ACP optimization only.

Sets the value for the cutoff frequency factor.

The cutoff frequency of the filter can be adjusted to reach spectrum mask requirements.

Remote command:

`[:SOURce<hw>]:BB:ONEWeb:FILTer:PARameter:LPASs` on page 142

`[:SOURce<hw>]:BB:ONEWeb:FILTer:PARameter:LTE:COFFactor` on page 143

`[:SOURce<hw>]:BB:ONEWeb:FILTer:PARameter:LPASSEVM` on page 142

Sample Rate Variation

Sets the sample rate of the signal. A variation of this parameter affects the ARB clock rate; all other signal parameters remain unchanged.

The value of this parameter is set according to the current physical settings, like the channel bandwidth.

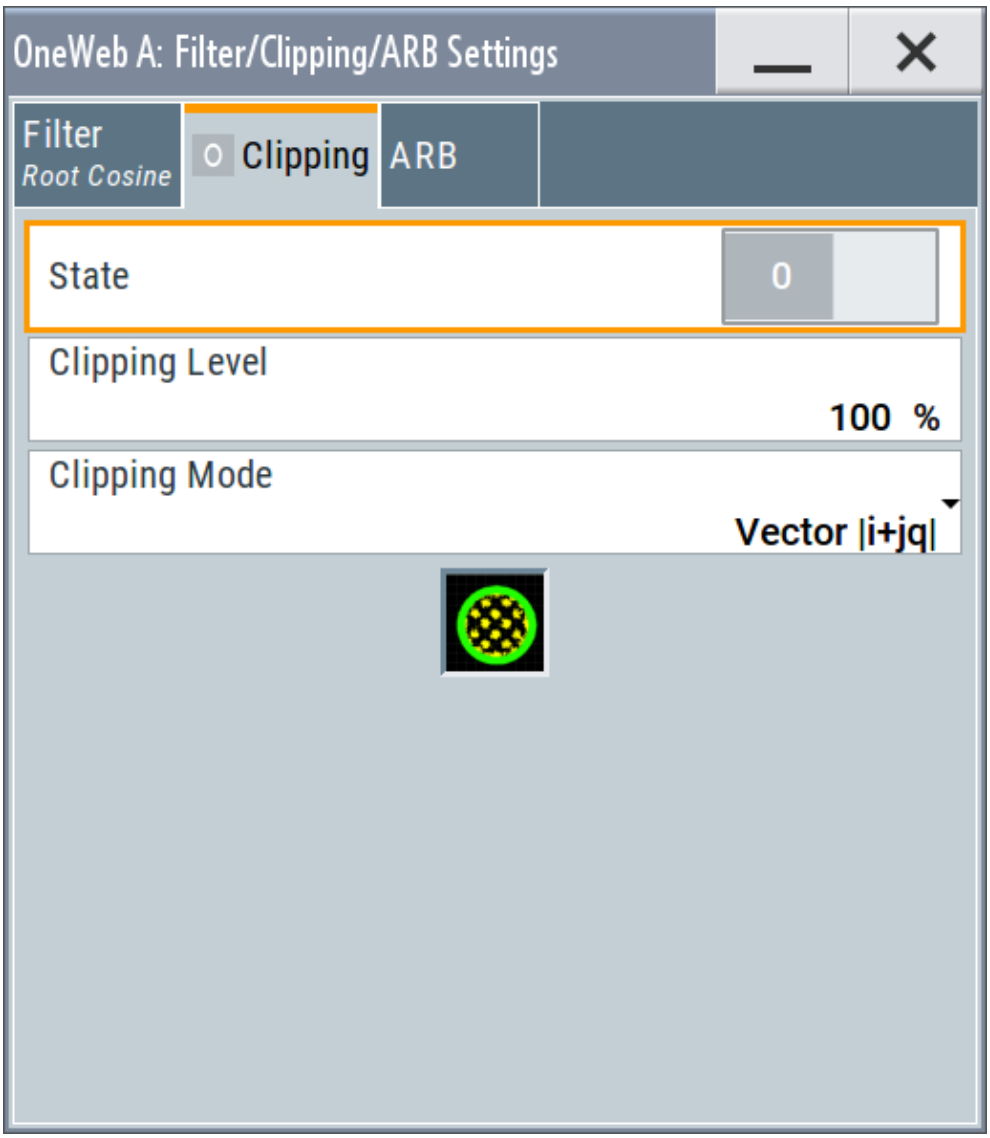
Remote command:

`[:SOURce<hw>]:BB:ONEWeb:SRATe:VARiation` on page 145

3.12.2 Clipping settings

Access:

► Select "Filter/Clipping/ARB..." > "Clipping".



This dialog comprises the settings required for configuring the clipping.

Settings:

State
Switches baseband clipping on and off.

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

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:CLIPping:STATe` on page 142

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:ONEWeb:CLIPping:LEVel` on page 141

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

- "Vector | i + jq |"
  The limit is related to the amplitude | i + q |. The I and Q components are mapped together, the angle is retained.
- "Scalar | i | , | q |"
  The limit is related to the absolute maximum of all the I and Q values | i | + | q |. The I and Q components are mapped separately, the angle changes.

Selects the clipping method. A graphic illustrates how the two methods work.

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:CLIPping:MODE` on page 141

3.12.3 ARB settings

Access:

► - For uplink:
  Select "ARB Configuration" > "ARB...".
- For downlink:
  Select "Filter/Clipping/ARB ..." > "ARB".

This dialog comprises the settings required for configuring the arbitrary waveform.

Settings:

Current ARB Sequence Length.....131

Current ARB Sequence Length
Sets the sequence length of the signal in number of frames. One frame corresponds to 10 ms. The signal is calculated in advance and output in the arbitrary waveform generator. The maximum number of frames is calculated as follows:

Max. no. of frames = ARB waveform memory size/("Sampling Rate" x 10 ms).

Remote command:
`[:SOURce<hw>]:BB:ONEWeb:SLENgth` on page 144

3.13 Local and global connectors settings

Accesses a dialog to configure local connectors or global connectors.

The button is available in the following dialogs or tabs:

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

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

4 Observing current allocations on the time plan

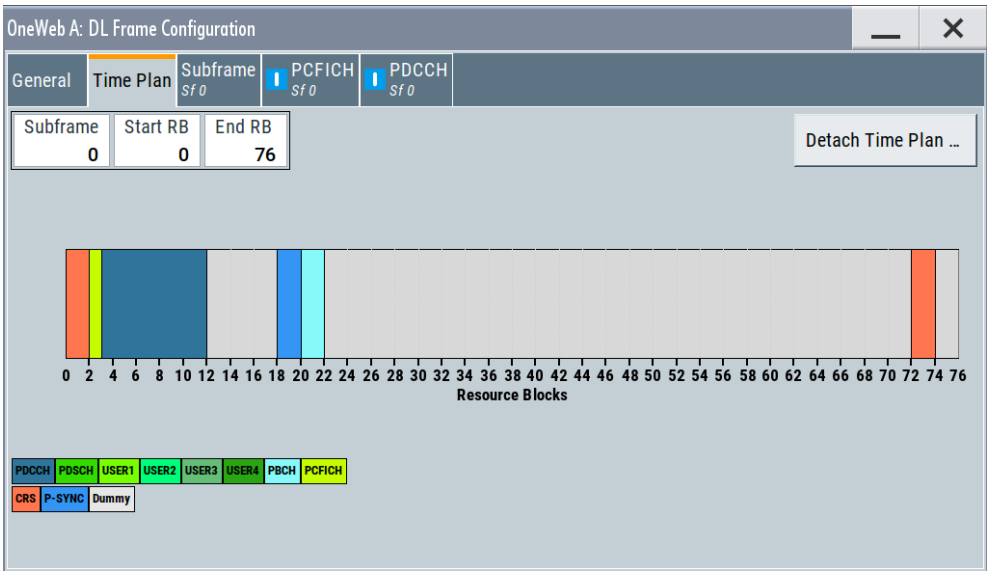
You can observe the current allocations on the time plan. There are dedicated uplink and downlink time plans.

The time plan shows active channels and signals, the allocations of the active UEs and indicates the cell it applies for if a carrier aggregation is used. Per default, the time plan shows the allocation per used channel bandwidth and one subframe but you can extend the displayed time region to up to 40 subframes. You can also scroll over all available subframes and open the time plan in a separate window.

4.1 SC-TDM time plan

Access:

1. Select "General > Link Direction > Downlink / Foward (SC-FDMA)".
2. Select "Frame Configuration > Time Plan".



This dialog shows the downlink time plan.
The x-axis shows allocation in the time domain. The y-axis shows the resource blocks as smallest allocation granularity in the frequency domain. One allocation to a UE can span 1 to up to "No. of Resource Blocks" in the frequency domain.

P-SYNC is automatically calculated according to the settings in Chapter 3.4, "General downlink settings", on page 21.

Subframes
Selects the number of subframes to be displayed or configured.

Remote command:
n.a.

Start RB
Selects the starting number of resource block to be displayed.

Remote command:
n.a.

End RB
Selects the ending number of resource block to be displayed.

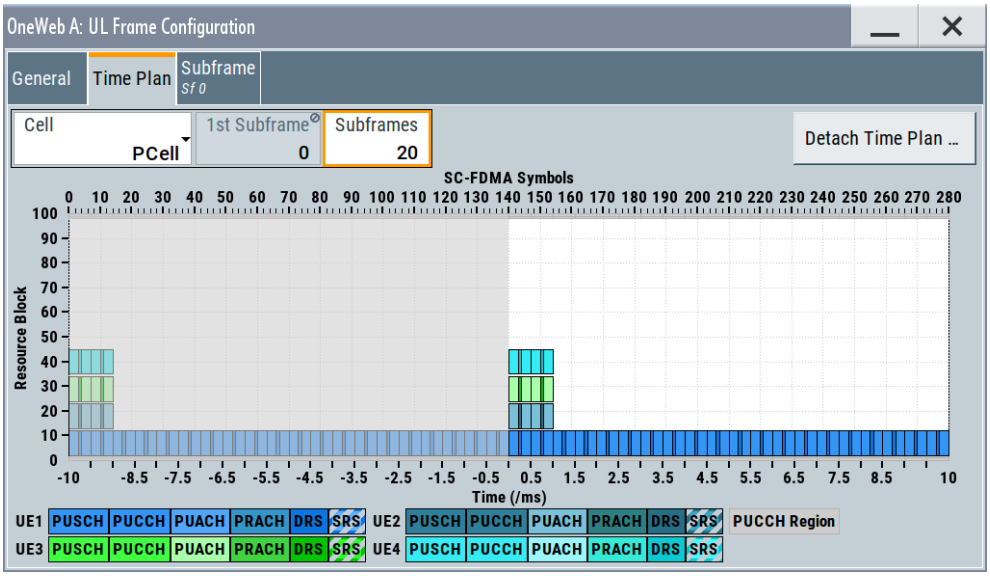
Remote command:
n.a.

Detach Time Plan
Enlarges the time plan display.

4.2 SC-FDMA time plan

Access:

1. Select "General > Link Direction > Uplink / reverse (SC-FDMA)".
2. Select "Frame Configuration > Time Plan".



This dialog shows the uplink time plan.

The x-axis shows allocation in the time domain. The y-axis shows the resource blocks as smallest allocation granularity in the frequency domain. One allocation of a UE can span 1 to up to "No. of Resource Blocks" in the frequency domain.

Sounding Reference Signals are automatically calculated according to the settings for signal structure in "User Equipment" dialog.

An enabled SFN offset is also displayed, see Chapter 3.6, "General uplink settings", on page 57.

Cell
In enabled "General UL Settings" > "CA" > "Activate Carrier Aggregation" > "On" state, displays the settings of primary cell or secondary cell.

Remote command:
n.a.

First Subframe
Selects the first subframe to be displayed.

Remote command:
n.a.

Subframes
Selects the number of subframes to be displayed.

Remote command:
n.a.

Detach Time Plan
Enlarges the time plan display.

5 Remote-control commands

The following commands are required to perform signal generation with the option R&S SMW-K130/-K355 in a remote environment. We assume that the R&S SMW has already been set up for remote operation in a network as described in the R&S SMW documentation. A knowledge about the remote control operation and the SCPI command syntax are assumed.

Conventions used in SCPI command descriptions

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

Common Suffixes

The following common suffixes are used in the remote commands:

Suffix	Value range	Description
`ENTity<ch>`	1 to 4	Entity in a multiple entity configuration with separate baseband sources `ENTity3|4` require option R&S SMW-K76
`SOURce<hw>`	[1] to 4	Available baseband signals Only `SOURce1` possible, if the keyword `ENTity` is used
`OUTPut<ch>`	1 to 3	Available markers

Using SCPI command aliases for advanced mode with multiple entities

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

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

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

Programming examples

This description provides simple programming examples. The purpose of the examples is to present **all** commands for a given task. In real applications, one would rather reduce the examples to an appropriate subset of commands.

The programming examples have been tested with a software tool which provides an environment for the development and execution of remote tests. To keep the example as simple as possible, only the "clean" SCPI syntax elements are reported. Non-executable command lines (e.g. comments) start with two // characters.

At the beginning of the most remote control program, an instrument reset or preset is recommended to set the instrument to a definite state. The commands `*RST` and `SYSTem:PRESet` are equivalent for this purpose. `*CLS` also resets the status registers and clears the output buffer.

The following commands specific to the R&S SMW-K130/-K355 option are described here:

5.1 General commands

Example: Saving current configuration

```
SOURce1:BB:ONEWeb:CMOD PREDefined
SOURce1:BB:ONEWeb:REFSignal:CATalog?
// HY11-H9878-2_2.0_FL_16qam_736399.8052,HY11-H9878-2_2.0_FL_8psk_736399.8358,...
SOURce1:BB:ONEWeb:REFSignal "HY11-HA674-2_1.0_RL_16QAM_2CC_TDD_736523.441"
SOURce1:BB:ONEWeb:SETTing:STATe 1
SOURce1:BB:ONEWeb:WAVeform:CREate "/var/user/wv_oneweb_conf_1"

SOURce1:BB:ONEWeb:SETTing:STORe "/var/user/oneweb_conf_1"
*RST
SOURce1:BB:ONEWeb:SETTing:CATalog?
// oneweb_conf_1, oneweb_conf_2, 1web
SOURce1:BB:ONEWeb:SETTing:LOAD "/var/user/oneweb_conf_1"
SOURce1:BB:ONEWeb:SETTing:DEL "1web"
```

Commands:

[:SOURce<hw>]:BB:ONEWeb:STATe <OneWebState>

Activates the standard.

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

Example: See Chapter 5.1, "General commands", on page 137.

Manual operation: See "State" on page 18

[:SOURce<hw>]:BB:ONEWeb:DUPLexing?

Queries the duplexing mode.

Return values:
<Duplexing> FDD
*RST: FDD

Example: `SOURce1:BB:ONEWeb:DUPLexing?`

Usage: Query only

Manual operation: See "Duplexing" on page 20

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

Sets the transmission direction.

Parameters:
<Link> UP | DOWN
*RST: UP

Example: `SOURce1:BB:ONEWeb:LINK UP`

Manual operation: See "Link Direction" on page 21

[:SOURce<hw>]:BB:ONEWeb: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:ONEWeb:STATe`.

Example: `SOURce1:BB:ONEWeb:PRESet`

Usage: Event

Manual operation: See "Set to Default" on page 18

[:SOURce<hw>]:BB:ONEWeb:SETTing:CATalog?

Queries the files with settings in the default directory. Listed are files with the file extension `*.ow`.

Return values:
<Catalog> string

Example: See Chapter 5.1, "General commands", on page 137.

Usage: Query only

Manual operation: See "Save/Recall" on page 18

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

Loads the selected file from the default or the specified directory. Loaded are files with extension `*.ow`.

Parameters:
<Filename> "<filename>"
Filename or complete file path; file extension can be omitted

Example: See Chapter 5.1, "General commands", on page 137.

Manual operation: See "Save/Recall" on page 18

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

Saves the current settings into the selected file; the file extension (`*.ow`) is assigned automatically.

Parameters:
<Filename> string
Filename or complete file path

Example: See Chapter 5.1, "General commands", on page 137.

Manual operation: See "Save/Recall" on page 18

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

Stores the current settings as an ARB signal in a waveform file (`*.wv`).

Setting parameters:
<Filename> string
Filename or complete file path; file extension is assigned automatically

Example: See Chapter 5.1, "General commands", on page 137.

Usage: Setting only

Manual operation: See "Generate Waveform File" on page 18

[:SOURce<hw>]:BB:ONEWeb:CMOD <ConfigMode>

Sets the configuration mode.

Parameters:
<ConfigMode> PREDefined | USER
*RST: PREDefined

Example: See Example"Saving current configuration" on page 137.

Manual operation: See "Mode" on page 18

[:SOURce<hw>]:BB:ONEWeb:REFSignal:CATalog?

Queries the available reference signals files in the default directory. Only predefined files are listed.

Return values:
<RefSigCataLog> string

Example: See Example"Saving current configuration" on page 137.

Usage: Query only

[:SOURce<hw>]:BB:ONEWeb:REFSignal <RefSignal>

Selects and loads a predefined reference signal.

Parameters:
<RefSignal> string
Filename as returned by the query `[:SOURce<hw>]:BB:ONEWeb:REFSignal:CATalog?`.
File extension is omitted.

Example: See Example"Saving current configuration" on page 137.

Manual operation: See "Reference Signal" on page 20

5.2 Filter/clipping/ARB commands

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

Sets the limit for level clipping.

Parameters:

<Level> integer

Range: 1 to 100
*RST: 100

Example: `BB:ONEWeb:CLIP:LEV 80PCT`
Sets the limit for level clipping to 80% of the maximum level.
`BB:ONEWeb:CLIP:STAT ON`
Activates level clipping.

Manual operation: See "Clipping Level" on page 130

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

Sets the method for level 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:ONEWeb:CLIP:MODE SCAL`
Selects the absolute maximum of all the I and Q values as the reference level.
`BB:ONEWeb:CLIP:LEV 80PCT`
Sets the limit for level clipping to 80% of this maximum level.
`BB:ONEWeb:CLIP:STAT ON`
Activates level clipping.

Manual operation: See "Clipping Mode" on page 130

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

Activates level clipping (Clipping). The value is defined with the command `[SOURce:]BB:ONEWeb:CLIPping:LEVel`, the mode of calculation with the command `[SOURce:]BB:ONEWeb:CLIPping:MODE`.

Parameters:

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

Manual operation: See "State" on page 129

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

Selects the baseband filter type.

Parameters:

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

Example: `SOURce1:BB:ONEWeb:FILTer:TYPE COS`
Sets the filter type.

Manual operation: See "Filter" on page 124

[:SOURce<hw>]:BB:ONEWeb:FILTer:PARameter:APCO25 <Apco25>
[:SOURce<hw>]:BB:ONEWeb:FILTer:PARameter:COSine <Cosine>
[:SOURce<hw>]:BB:ONEWeb:FILTer:PARameter:GAUSs <Gauss>
[:SOURce<hw>]:BB:ONEWeb:FILTer:PARameter:LPASs <LPass>
[:SOURce<hw>]:BB:ONEWeb:FILTer:PARameter:LPASSEVM <CutoffFrequency>
[:SOURce<hw>]:BB:ONEWeb:FILTer:PARameter:PGAuss <PGauss>
[:SOURce<hw>]:BB:ONEWeb:FILTer:PARameter:RCOSine <RCosine>
[:SOURce<hw>]:BB:ONEWeb:FILTer:PARameter:SPHase <SPhase>

Sets the filter parameter.

Filter type	Parameter	Parameter name	Min	Max	Increment	Default
APCO25	Rolloff factor	<Apco25>	0.05	0.99	0.01	0.2
COSine	Rolloff factor	<Cosine>	0	1	0.01	0.1
GAUSs	BxT	<Gauss>	0.15	2.5	0.01	0.5
LPASs	Cutoff frequency	<LPass>	0.02	2	0.01	0.34
LPASSEVM	Cutoff frequency	<CutoffFrequency>	0.05	2	0.01	0.29
PGAuss	BxT	<PGauss>	0.15	2.5	0.01	0.5

Filter type	Parameter	Parameter name	Min	Max	Incre-ment	Default
RCOSine	Rolloff factor	<RCosine>	0	1	0.01	0.22
SPHase	BxT	<SPhase>	0.15	2.5	0.01	2

Parameters:

<SPhase> float

Range: 0.15 to 2.5
Increment: 0.01
*RST: 2

Example:

```
SOURce:BB:ONEWeb:FILTer:TYPE COS
SOURce:BB:ONEWeb:FILTer:PARameter:COSine 0.1
SOURce:BB:ONEWeb:FILTer:PARameter:COSine:COFS -0.2
```

Manual operation: See "Rolloff factor or BxT" on page 127

[:SOURce<hw>]:BB:ONEWeb:FILTer:PARameter:COSine:COFS <Cofs>
[:SOURce<hw>]:BB:ONEWeb:FILTer:PARameter:LTE:COFS <CutOffFreqShift>

Sets the filter parameter.

Parameters:

<CutOffFreqShift> float

Range: -1 to 1
Increment: 0.01
*RST: -0.2

Example:

```
SOURce:BB:ONEWeb:FILTer:TYPE LTEF
SOURce:BB:ONEWeb:FILTer:PARameter:LTE:OPTimization ACP
SOURce:BB:ONEWeb:FILTer:PARameter:LTE:COFS 0.34
```

Manual operation: See "Cutoff frequency shift" on page 127

[:SOURce<hw>]:BB:ONEWeb:FILTer:PARameter:LTE:COFFactor <CutoffFactor>

Sets the cutoff frequency factor for the LTE filter type.

Parameters:

<CutoffFactor> float

Range: 0.02 to 2
Increment: 0.001
*RST: 0.34

Example:

```
SOURce:BB:ONEWeb:FILTer:TYPE LTEF
SOURce:BB:ONEWeb:FILTer:PARameter:LTE:OPTimization EVM
SOURce:BB:ONEWeb:FILTer:PARameter:LTE:COFFactor 0.1
SOURce:BB:ONEWeb:FILTer:PARameter:LTE:ROFactor -0.2
```

Manual operation: See "Cutoff Frequency Factor" on page 128

[:SOURce<hw>]:BB:ONEWeb:FILTer:PARameter:LTE:OPTimization
<Optimization>

Defines the applied LTE filter.

Parameters:

<Optimization> EVM | ACP | ACPN | BENU

Available are `EVM`, `ACP`, `ACPN` (ACP narrow) and `BENU` (Best EVM, no upsampling).

*RST: EVM

Example: See `[:SOURce<hw>]:BB:ONEWeb:FILTer:PARameter:LTE:COFS` on page 143

Manual operation: See "Optimization" on page 125

[:SOURce<hw>]:BB:ONEWeb:FILTer:PARameter:LTE:ROFactor <RollOffFactor>

Sets the rolloff factor for the LTE filter type.

Parameters:

<RollOffFactor> float

Range: 0 to 1
Increment: 0.01
*RST: 0.1

Manual operation: See "Rolloff factor or BxT" on page 127

[:SOURce<hw>]:BB:ONEWeb:FILTer:PARameter:USER <Filename>

Loads the file from the default or the specified directory.

Loaded are files with extension `*.vaf` or `*.dat`.

Parameters:

<Filename> string

Complete file path incl. filename and extension

Example:
```
SOURce:BB:ONEWeb:FILTer:TYPE USER
SOURce:BB:ONEWeb:FILTer:PARameter:USER "/var/user/my_filter.dat"
```

Manual operation: See "Load User Filter" on page 125

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

Sets the sequence length of the signal in number of frames. The signal is calculated in advance and output in the arbitrary waveform generator. The maximum number of frames is calculated as follows:

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

Parameters:

<SLength> integer

Range: 1 to dynamic
*RST: 1

Example: `SOURce1:BB:OneWeb:SLEN 4`
Selects the generation of 4 frames.

Manual operation: See "Current ARB Sequence Length" on page 109

[:SOURce<hw>]:BB:ONEWeb:SRATe:VARiation <SampleRateVar>

Sets the output sample rate.

A variation of this parameter affects the ARB clock rate; all other signal parameters remain unchanged.

The current value of this parameter depends on the current physical settings, like the channel bandwidth.

Parameters:

<SampleRateVar> float

Range: 400 to 4E7
Increment: 1E-3
*RST: 15.360000E6
Default unit: Hz

Example:
```
SOURce:BB:ONEWeb:LINK DOWN
SOURce:BB:ONEWeb:SRATe:VARiation?
Response: 15360000
```

Manual operation: See "Sample Rate Variation" on page 128

5.3 Trigger commands

Example: Configure and enable triggering

```
SOURce:BB:ONEWeb:TRIGger:SEQuence SINGle
SOURce:BB:ONEWeb:TRIGger:SLENgth 200

// the first 200 samples of the current waveform will be output after
// the next trigger event
// SOURce:BB:ONEWeb:TRIGger:SEQuence ARETrigger
// SOURce:BB:ONEWeb:TRIGger:SOURce EGT1
// external trigger signal must be provided at the USER connector
// SOURce:BB:ONEWeb:TRIGger:EXTernal:SYNChronize:OUTPut ON
// SOURce:BB:ONEWeb:TRIGger:EXTernal:DELay 200
// SOURce:BB:ONEWeb:TRIGger:EXTernal:INHibit 100

// SOURce:BB:ONEWeb:TRIGger:SOURce INTB
```

```
// the internal trigger signal from the other path must be used
// SOURce:BB:ONEWeb:TRIGger:OBASeband:DELay 25
// SOURce:BB:ONEWeb:TRIGger:OBASeband:INHibit 10

SOURce:BB:ONEWeb:TRIGger:SEQuence AAUTo
SOURce:BB:ONEWeb:TRIGger:SOURce INTernal
SOURce:BB:ONEWeb:STAT ON
SOURce:BB:ONEWeb:TRIGger:EXEC
```

Example: Specifying trigger delay and trigger inhibit

```
SOURce1:BB:ONEWeb:CLOCk 1000000
SOURce1:BB:ONEWeb:TRIGger:SEQuence AAUT
SOURce1:BB:ONEWeb:TRIGger:SOURce EGT1
SOURce1:BB:ONEWeb:TRIGger:DELay:UNIT SAMP
SOURce1:BB:ONEWeb:TRIGger:EXTernal:DELay 100
SOURce1:BB:ONEWeb:TRIGger:EXTernal:RDELay?
// Response: 100

SOURce1:BB:ONEWeb:TRIGger:DELay:UNIT TIME
SOURce1:BB:ONEWeb:TRIGger:EXTernal:TDELay 0.00001
SOURce1:BB:ONEWeb:TRIGger:EXTernal:RDELay?
// Response: 0.00001

SOURce1:BB:ONEWeb:TRIGger:DELay:UNIT SAMP
SOURce1:BB:ONEWeb:TRIGger:EXTernal:DELay 10
```

[:SOURce<hw>]:BB:ONEWeb[:TRIGger]:SEQuence <TrigMode>

Selects the trigger mode:

- `AUTO` = auto
- `RETRigger` = retrigger
- `AAUTo` = armed auto
- `ARETrigger` = armed retrigger
- `SINGle` = single

Parameters:

<TrigMode> AUTO | RETRigger | AAUTo | ARETrigger | SINGle
*RST: AUTO

Example: See Chapter 5.3, "Trigger commands", on page 145.

Manual operation: See "Mode" on page 115

[:SOURce<hw>]:BB:ONEWeb:TRIGger:SOURce <TrigSour>

Selects the trigger signal source and determines the way the triggering is executed. Provided are:

- Internal triggering by a command (`INTernal`)
- External trigger signal via one of the local or global connectors
  - `EGT1|EGT2`: External global trigger
  - `EGC1|EGC2`: External global clock
  - `ELTRigger`: External local trigger
  - `ELCLock`: External local clock
- Internal triggering by a signal from the other basebands (`INTA|INTB`)
- `OBASeband|BEXTernal|EXTernal`: Setting only
  Provided only for backward compatibility with other Rohde & Schwarz signal generators.
  The R&S SMW accepts these values and maps them automatically as follows:
  `EXTernal = EGT1, BEXTernal = EGT2, OBASeband = INTA or INTB`
  (depending on the current baseband)

Parameters:

<TrigSour> INTB|INTernal|OBASeband|EGT1|EGT2|EGC1|EGC2|ELTRigger|INTA|ELCLock|BEXTernal|EXTernal
*RST: INTernal

Example: See Chapter 5.3, "Trigger commands", on page 145.

Manual operation: See "Source" on page 116

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

Queries the signal generation status.

Return values:
<TrigRunMode> STOP | RUN
*RST: 0

Example: See Chapter 5.3, "Trigger commands", on page 145.

Usage: Query only

Manual operation: See "Running/Stopped" on page 115

[:SOURce<hw>]:BB:ONEWeb:TRIGger:TIME:DATE <Year>, <Month>, <Day>

Sets the date for a time-based trigger signal. For trigger modes single or armed auto, you can activate triggering at this date via the following command:

`SOURce<hw>:BB:<DigStd>:TRIGger:TIME:STATe`

`<DigStd>` is the mnemonic for the digital standard, for example, `ARB`. Time-based triggering behaves analogously for all digital standards that support this feature.

Parameters:
<Year> integer
Range: 1980 to 9999

<Month> integer
Range: 1 to 12

<Day> integer
Range: 1 to 31

Example: See example "Configure a time-based trigger signal" in the subchapter "Trigger Commands" of the chapter "SOURce:BB:ARB subsystem" in the R&S SMW user manual.

Manual operation: See "Trigger Time" on page 116

[:SOURce<hw>]:BB:ONEWeb:TRIGger:TIME:TIME <Hour>, <Minute>, <Second>

Sets the time for a time-based trigger signal. For trigger modes single or armed auto, you can activate triggering at this time via the following command:

`SOURce<hw>:BB:<DigStd>:TRIGger:TIME:STATe`

`<DigStd>` is the mnemonic for the digital standard, for example, `ARB`. Time-based triggering behaves analogously for all digital standards that support this feature.

Parameters:
<Hour> integer
Range: 0 to 23

<Minute> integer
Range: 0 to 59

<Second> integer
Range: 0 to 59

Example: See example "Configure a time-based trigger signal" in the subchapter "Trigger Commands" of the chapter "SOURce:BB:ARB subsystem" in the R&S SMW user manual.

Manual operation: See "Trigger Time" on page 116

[:SOURce<hw>]:BB:ONEWeb:TRIGger:TIME[:STATe] <State>

Activates time-based triggering with a fixed time reference. If activated, the R&S SMW triggers signal generation when its operating system time matches a specified time.

Specify the trigger date and trigger time with the following commands:

`SOURce<hw>:BB:<DigStd>:TRIGger:TIME:DATE`

`SOURce<hw>:BB:<DigStd>:TRIGger:TIME:TIME`

`<DigStd>` is the mnemonic for the digital standard, for example, `ARB`. Time-based triggering behaves analogously for all digital standards that support this feature.

Parameters:

<State> 1 | ON | 0 | OFF

*RST: 0

Example: See example "Configure a time-based trigger signal" in the subchapter "Trigger Commands" of the chapter "SOURce:BB:ARB subsystem" in the R&S SMW user manual.

Manual operation: See "Time Based Trigger" on page 116

[:SOURce<hw>]:BB:ONEWeb:TRIGger:SLENgth <TrigSeqLen>

Defines the length of the signal sequence that is output in the `SINGle` trigger mode.

Parameters:

<TrigSeqLen> integer

Range: 1 to 4294967295

*RST: 1

Example: See Chapter 5.3, "Trigger commands", on page 145.

Manual operation: See "Signal Duration" on page 115

[:SOURce<hw>]:BB:ONEWeb:TRIGger:SLUNit <SeqLenUnit>

Defines the unit for the entry of the signal sequence length, generated after the trigger event.

Parameters:

<SeqLenUnit> SEQuence | FRAMe | SUBFrame | SLOT | SAMPle

FRAMe

Single frame

SEQuence
Single sequence.

SUBFrame
Single subframe.

SLOT
Single slot

SAMPle
Selected number of samples.

*RST: SEQuence

Example: See Chapter 5.3, "Trigger commands", on page 145.

Manual operation: See "Signal Duration Unit" on page 115

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

Executes a trigger.

Example: See Chapter 5.3, "Trigger commands", on page 145.

Usage: Event

Manual operation: See "Execute Trigger" on page 116

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

Stops signal generation; a subsequent trigger event restarts signal generation.

Example:
```
SOURce1:BB:ONEWeb:TRIGger:SOURce INT
SOURce1:BB:ONEWeb:TRIGger:SEQuence ARETrigger
SOURce1:BB:ONEWeb:TRIGger:EXEcute
// executes a trigger, signal generation starts
SOURce1:BB:ONEWeb:TRIGger:ARM:EXECute
// signal generation stops
SOURce1:BB:ONEWeb:TRIGger:EXEcute
// executes a trigger, signal generation starts
again
```

Usage: Event

Manual operation: See "Arm" on page 116

[:SOURce<hw>]:BB:ONEWeb:TRIGger:EXTernal:SYNChronize:OUTPut
<TrigSyncOut>

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

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

Example: See Chapter 5.3, "Trigger commands", on page 145.

Manual operation: See "Sync. Output to External Trigger/Sync. Output to Trigger" on page 117

[:SOURce<hw>]:BB:ONEWeb:TRIGger:DELay:UNIT <TrigDelUnit>

Sets the units the trigger delay is expressed in.

Parameters:

<TrigDelUnit> SAMPle | TIME

*RST: SAMPle

Example: See Chapter 5.3, "Trigger commands", on page 145.

Manual operation: See "(External) Delay Unit" on page 118

[:SOURce<hw>]:BB:ONEWeb:TRIGger:OBASeband:DELay <OthDelay>

Sets the trigger delay for triggering by the trigger signal from the other path.

Parameters:

<OthDelay> float

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

Example: See Chapter 5.3, "Trigger commands", on page 145.

[:SOURce<hw>]:BB:ONEWeb:TRIGger:OBASeband:RDELay?

Queries the time a trigger event form the other path is delayed.

Return values:

<OthTimeResDel> float

Range: 0 to 688
Increment: 250E-12
*RST: 0

Example: See Chapter 5.3, "Trigger commands", on page 145.

Usage: Query only

Manual operation: See "Actual Trigger Delay/Actual External Delay" on page 119

[:SOURce<hw>]:BB:ONEWeb:TRIGger:OBASeband:TDELay <OthTimeDelay>

Specifies the trigger delay for triggering by the signal from the other path.

Parameters:

<OthTimeDelay> float

Range: 0 to 688
Increment: 250E-12
*RST: 0

Example: See Chapter 5.3, "Trigger commands", on page 145.

Manual operation: See "(Specified) External Delay/(Specified) Trigger Delay" on page 118

[:SOURce<hw>]:BB:ONEWeb:TRIGger:OBASeband:INHibit <OthInhibit>

For triggering via the other path, specifies the duration by which a restart is inhibited.

Parameters:

<OthInhibit> integer

Range: 0 to 67108863
*RST: 0

Example: See Chapter 5.3, "Trigger commands", on page 145.

Manual operation: See "External Inhibit/Trigger Inhibit" on page 118

[:SOURce<hw>]:BB:ONEWeb:TRIGger[:EXTernal]:DELay <TrigExtDelay>

Sets the trigger delay.

Parameters:

<TrigExtDelay> float

Range: 0 to 68719476735
Increment: 0.01
*RST: 0

Example: See Chapter 5.3, "Trigger commands", on page 145.

Manual operation: See "(Specified) External Delay/(Specified) Trigger Delay" on page 118

[:SOURce<hw>]:BB:ONEWeb:TRIGger:EXTernal:TDELay <TrigExtTimeDel>

Specifies the trigger delay for external triggering. The value affects all external trigger signals.

Parameters:

<TrigExtTimeDel> float

Range: 0 to 688
Increment: 250E-12
*RST: 0

Example: See Chapter 5.3, "Trigger commands", on page 145.

Manual operation: See "(Specified) External Delay/(Specified) Trigger Delay" on page 118

[:SOURce<hw>]:BB:ONEWeb:TRIGger:EXTernal:RDELay?

Queries the time (in seconds) an external trigger event is delayed for.

Return values:
<TrigExtTimeResD> float
Range: 0 to 688
Increment: 250E-12
*RST: 0

Example: See Chapter 5.3, "Trigger commands", on page 145.

Usage: Query only

Manual operation: See "Actual Trigger Delay/Actual External Delay" on page 119

[:SOURce<hw>]:BB:ONEWeb:TRIGger[:EXTernal]:INHibit <TrigExtInhibit>

Specifies the duration by which a restart is inhibited.

Parameters:
<TrigExtInhibit> integer
Range: 0 to 67108863
*RST: 0

Example: See Chapter 5.3, "Trigger commands", on page 145.

Manual operation: See "External Inhibit/Trigger Inhibit" on page 118

5.4 Marker commands

Example: Configure and enable standard marker signals

```
SOURce:BB:ONEWeb:TRIGger:OUTPut2:MODE?
// RESTart
SOURce:BB:ONEWeb:TRIGger:OUTPut2:FOFFset 10
SOURce:BB:ONEWeb:TRIGger:OUTPut2:ROFFset 20

SOURce:BB:ONEWeb:TRIGger:OUTPut3:DELay 16
```

Commands:

[:SOURce<hw>]:BB:ONEWeb:TRIGger:OUTPut<ch>:MODE?

Queries the signal for the selected marker output.

Return values:
<Mode> RESTart
*RST: RESTart

Example: See Example"Configure and enable standard marker signals" on page 153.

Usage: Query only

Manual operation: See "Mode" on page 120

[:SOURce<hw>]:BB:ONEWeb:TRIGger:OUTPut<ch>:ROFFset <MarkRiseOffs>
[:SOURce<hw>]:BB:ONEWeb:TRIGger:OUTPut<ch>:FOFFset <MarkFallOffs>
Parameters:
<MarkFallOffs> integer
Range: -640000 to 640000
*RST: 0

Example: See Example"Configure and enable standard marker signals" on page 153.

Manual operation: See "Rise Offset/Fall Offset" on page 121

[:SOURce<hw>]:BB:ONEWeb:TRIGger:OUTPut<ch>:PERiod <MarkUsrPer>

Sets the repetition rate for the signal at the marker outputs.

*) If R&S SMW-B9 is installed, the minimum marker duration depends on the sample/ symbol rate.

See chapter "Basics on ..." in the R&S SMW user manual.

Parameters:
<MarkUsrPer> integer
Range: 1 (R&S SMW-B10) / 1* (R&S SMW-B9) to 4294967295
*RST: 2

Example: See Example"Configure and enable standard marker signals" on page 153.

Manual operation: See "Mode" on page 120

[:SOURce<hw>]:BB:ONEWeb:TRIGger:OUTPut<ch>:DELay <MarkDelay>

Defines the delay between the signal on the marker outputs and the start of the signals.

Parameters:

<MarkDelay> float

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

Example: See Example"Configure and enable standard marker signals" on page 153.

Manual operation: See "Delay" on page 121

[:SOURce<hw>]:BB:ONEWeb:TRIGger:OUTPut<ch>:ONTime <MarkTimeOn>
[:SOURce<hw>]:BB:ONEWeb:TRIGger:OUTPut<ch>:OFFTime <MarkTimeOffs>

Sets the duration during which the marker output is on or off.

*) If R&S SMW-B9 is installed, the minimum marker duration depends on the sample/ symbol rate.

See chapter "Basics on ..." in the R&S SMW user manual.

Parameters:

<MarkTimeOffs> integer

Range: 1 (R&S SMW-B10) / 1* (R&S SMW-B9) to 16777215
*RST: 1

Example: See Example"Configure and enable standard marker signals" on page 153.

Manual operation: See "Mode" on page 120

5.5 Clock commands

Example: Clock settings

```
SOURce:BB:ONEWeb:CLOCk:SOURce ELCL
SOURce:BB:ONEWeb:CLOCk:MODE SAMP
CLOCk:INPUt:FREQuency?
```

Commands:

[:SOURce<hw>]:BB:ONEWeb:CLOCk:SOURce <ClocSource>

Selects the clock source:

- `INTernal`: Internal clock reference
- `ELCLock`: External local clock

- `EXTernal = ELCLock`: Setting only
  Provided for backward compatibility with other Rohde & Schwarz signal generators

Parameters:
<ClocSource> INTernal|ELCLock|EXTernal
*RST: INTernal

Example: See Example"Clock settings" on page 155.

Manual operation: See "Clock Source" on page 122

[:SOURce<hw>]:BB:ONEWeb:CLOCk:MODE <ClocMode>

Sets the type of externally supplied clock.

Parameters:
<ClocMode> SAMPle
*RST: SAMPle

Example: See Example"Clock settings" on page 155.

Manual operation: See "Clock Mode" on page 122

5.6 General downlink commands

Option: R&S SMW-K130

[:SOURce<hw>]:BB:ONEWeb:DL:CONF:MODE?

Queries the PDSCH scheduling mode.

Return values:
<Scheduling> AUTO
Enables the generation of ONEWeb signal and the PDSCH allocations are configured automatically accodring to the configuration of the PDCCH DCIs.
*RST: AUTO

Example: `BB:ONEWeb:DL:CONF:MODE?`

Usage: Query only

[:SOURce<hw>]:BB:ONEWeb:DL:BW?

Queries the DL channel bandwidth.

Return values:
<Bw> BW250_00
*RST: BW250_00

Example: `SOURce:BB:ONEWeb:DL:BW?`

Usage: Query only

Manual operation: See "Channel Bandwidth" on page 24

[:SOURce<hw>]:BB:ONEWeb:DL:NORB?

Queries the number of physical resource blocks per subframe.

Return values:
<Norb> integer
Range: 100 to 1152
*RST: 1152

Example: `SOURce1:BB:ONEWeb:DL:NORB?`

Usage: Query only

Manual operation: See "Number of Resource Blocks Per Subframe" on page 24

[:SOURce<hw>]:BB:ONEWeb:DL:OCCBandwidth?

Queries the occupied bandwidth.

Return values:
<OccupBandwidth> integer
*RST: dynamic

Example: `BB:ONEWeb:DL:OCCB?`
Queries the automatically set occupied bandwidth in downlink.

Usage: Query only

Manual operation: See "Occupied Bandwidth" on page 24

[:SOURce<hw>]:BB:ONEWeb:DL:OCCSubcarriers?

Queries the occupied subcarriers.

Return values:
<OccupSubcarr> integer
Range: 72 to 1321
*RST: 601

Example: `BB:ONEWeb:DL:OCCS?`
Queries the number of occupied subcarriers.

Usage: Query only

[:SOURce<hw>]:BB:ONEWeb:DL:SRATe?

Queries the sampling rate.

Return values:
<SampleRate> float
Range: 192E4 to 3072E4
Increment: 1000
*RST: 1536E4

Example: `BB:ONEWeb:DL:SRAT?`
Queries the automatically set sampling rate.

Usage: Query only

Manual operation: See "Sampling Rate" on page 25

[:SOURce<hw>]:BB:ONEWeb:DL[:PLCI]:CID <CellId>

Sets the cell identity.

Parameters:
<CellId> integer
Range: 0 to 255
*RST: 0

Example: `BB:ONEWeb:DL:PLC:CID 100`
Sets the Cell ID.

Manual operation: See "Cell ID" on page 25

[:SOURce<hw>]:BB:ONEWeb:DL:CSETtings:RARNti <RaRnti>

Sets the random-access response identity RA-RNTI.

The value selected here determines the value of the parameter "UE_ID/n_RNTI" in case a RA_RNTI "User" is selected.

Parameters:

<RaRnti> integer

Range: 1 to 60
*RST: 1

Example: `SOURce1:BB:ONEWeb:DL:CSETtings:RARNti 5`

Manual operation: See "RA_RNTI" on page 26

[:SOURce<hw>]:BB:ONEWeb:DL:REFSig:POWer?

Queries the reference signal power.

Return values:

<Power> float

Range: -80 to 10
Increment: 0.01
*RST: 0

Example: `SOURce1:BB:ONEWeb:DL:REFSig:POWer?`

Usage: Query only

Manual operation: See "Reference Signal Power" on page 27

[:SOURce<hw>]:BB:ONEWeb:DL:SYNC:PSTate <PSyncState>

Sets the P-SYNC signal transmission state.

Parameters:

<PSyncState> 1 | ON | 0 | OFF

*RST: ON

Example: `BB:ONEWeb:DL:SYNC:PST 1`

Manual operation: See "P-SYNC State" on page 27

[:SOURce<hw>]:BB:ONEWeb:DL:SYNC:PPOWer <PPower>

Sets the power of the primary synchronization signal (P-SYNC).

Parameters:

<PPower> float

Range: -80 to 10
Increment: 0.001
*RST: 0

Example: `BB:ONEWeb:DL:SYNC:PPOWer 0.00`
Sets the P-SYNC power to 0.00dB.

Manual operation: See "P-SYNC Power" on page 27

[:SOURce<hw>]:BB:ONEWeb:DL:MIMO:CONFiguration?

Queries the global MIMO configuration.

Return values:
<Configuration> TX1
*RST: TX1

Example:
```
SOURce1:BB:ONEWeb:DL:MIMO:CONFiguration?
SOURce1:BB:ONEWeb:DL:MIMO:ANTenna?
SOURce1:BB:ONEWeb:DL:MIMO:APM:MAPCoordinates
CARTesian
SOURce1:BB:ONEWeb:DL:MIMO:APM:CS:AP0:ROW0:REAL
1
```

Usage: Query only

Manual operation: See "Global MIMO Configuration" on page 28

[:SOURce<hw>]:BB:ONEWeb:DL:MIMO:ANTenna?

Queries the simulated antenna.

Return values:
<Antenna> ANT1
*RST: ANT1

Example: See `[:SOURce<hw>]:BB:ONEWeb:DL:MIMO:CONFiguration?` on page 160

Usage: Query only

Manual operation: See "Simulated Antenna" on page 29

[:SOURce<hw>]:BB:ONEWeb:DL:MIMO:APM:MAPCoordinates <Type>

Switches between the cartesian and cylindrical coordinates representation.

Parameters:
<Type> CARTesian | CYLindrical
*RST: CARTesian

Example: See `[:SOURce<hw>]:BB:ONEWeb:DL:MIMO:CONFiguration?` on page 160

Manual operation: See "Mapping Coordinates" on page 29

[:SOURce<hw>]:BB:ONEWeb:DL:MIMO:APM:CS:CELL:BB<st0>
<AntPortCCIndex>

Maps a component carrier to a baseband.

Suffix:
<st0> 0 to 7
baseband identifier, where <st0>=0 indicates BB A

Parameters:
<AntPortCCIndex> PC | SC1
*RST: PC

Example: `BB:ONEWeb:DL:MIMO:APM:CS:CELL:BB0 PC`

Manual operation: See "Mapping table" on page 29

[:SOURce<hw>]:BB:ONEWeb:DL:MIMO:APM:CS:AP<dir0>:ROW<st0>:REAL
<AntPortMapDat>

Define the mapping of the antenna ports to the physical antennas.

Suffix:
<dir0> 0 | 1 | 2 | 3 | 4 | 6 | 15 to 46
Antenna port
`AP0|1|2|3` can only be mapped to the `BB0|1|2|3`

<st0> 0 to 7
Available basebands

Parameters:
<AntPortMapDat> 0 | 1 (for AP = 0 to 3); float (for AP = 4 | 6 | 15 to 46)
The mapping of the first four APs `AP0|1|2|3` depends on the system configuration as follows:
If `SCONfiguration:BASeband:SOURce SEParate`, then exactly one single AP can be mapped to a BB.
If `SCONfiguration:BASeband:SOURce COUPled|CPENtity`, then none or exactly one single AP can be mapped to a BB.
To map an AP, use the command `SOURce1:BB:ONEWeb:DL:MIMO:APM:CS:AP0|1|2|3:ROW0|1|2|3:REAL 1`. The corresponding `...:CS:AP0|1|2|3:ROW0|1|2|3:IMAG` command has no effect.
The `REAL` (Magnitude) and `IMAGinary` (Phase) values are interdependent. Their value ranges change depending on each other and so that the resulting complex value is as follows:
|`REAL`+j*`IMAGinary`| ≤ 1
Otherwise, the values are normalized to Magnitude = 1.

Range: -1 to 360
Increment: 0.001
*RST: dynamic

Example: See `[:SOURce<hw>]:BB:ONEWeb:DL:MIMO:CONFiguration?` on page 160

Manual operation: See "Mapping table" on page 29

[:SOURce<hw>]:BB:ONEWeb:DL:MIMO:APM:CS:AP<dir0>:ROW<st0>:IMAGinary <AntPortMapDat>

Define the mapping of the antenna ports to the physical antennas.

Suffix:

<dir0> 4 | 6 | 15 to 46
Antenna port

<st0> 0 to 7
Available basebands

Parameters:

<AntPortMapDat> float

The `REAL` (Magnitude) and `IMAGinary` (Phase) values are interdependent. Their value ranges change depending on each other and so that the resulting complex value is as follows:
|`REAL`+j*`IMAGinary`| ≤ 1
Otherwise, the values are normalized to Magnitude = 1.

Range: -1 to 360
Increment: 0.001
*RST: dynamic

Example: See `[:SOURce<hw>]:BB:ONEWeb:DL:MIMO:CONFiguration?` on page 160

Manual operation: See "Mapping table" on page 29

5.7 DL frame configuration

Option: R&S SMW-K130

[:SOURce<hw>]:BB:ONEWeb:DL:CONSubframes <ConSubFrames>

Sets the number of configurable subframes.

Parameters:

<ConSubFrames> integer

Range: 1 to 40
*RST: 10

Example: `BB:ONEWeb:DL:CONS 10`
Ten subframes are configurable in downlink.

Manual operation: See "No Of Configurable (DL) Subframes" on page 30

[:SOURce<hw>]:BB:ONEWeb:DL:RSTFrame

Resets all subframe settings of the selected link direction to the default values.

Example: `BB:ONEWeb:DL:RSTF`
Resets the downlink subframe parameters of path A to the default settings.

Manual operation: See "Reset All Subframes" on page 31

[:SOURce<hw>]:BB:ONEWeb:DL:USER<ch>:STATe <UserState>

Enables/disables a user.

Parameters:

<UserState> 1 | ON | 0 | OFF

*RST: 1

Example: `SOURce1:BB:ONEWeb:DL:USER1:STATe OFF`

Manual operation: See "State" on page 32

[:SOURce<hw>]:BB:ONEWeb:DL:USER<ch>:TXM <TxMode>

Sets the transmission mode.

Parameters:
<TxMode> M1OW | M2OW
*RST: M1OW

Example: `SOURce1:BB:ONEWeb:DL:USER1:TXM M1OW`

Manual operation: See "Tx Modes" on page 32

[:SOURce<hw>]:BB:ONEWeb:DL:USER<ch>:CELL<st0>:TXM <TxMode>

Sets the transmission mode of the user.

Suffix:
<st0> 0 to 4
0 = PCell, 1 to 4 = SCell1 to SCell4

Parameters:
<TxMode> M1OW | M2OW | M3OW
*RST: M1OW

Example:
```
SOURce1:BB:ONEWeb:DL:USER1:CELL0:TXM M1OW
SOURce1:BB:ONEWeb:DL:USER1:CELL1:TXM M1OW
```

Manual operation: See "Tx Modes" on page 32

[:SOURce<hw>]:BB:ONEWeb:DL:USER<ch>:UEC <UECategory>

Sets the UE Category.

Parameters:
<UECategory> C1 | C2 | C3 | C5 | C4
*RST: C1

Example: `BB:ONEWeb:DL:USER1:UEC C1`

Manual operation: See "UE Category" on page 33

[:SOURce<hw>]:BB:ONEWeb:DL:USER<ch>:SCRambling:STATe?

Queries the scrambling state for all allocations belonging to the selected user.

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

Example:
```
SOUR:BB:ONEWeb:DL:USER3:SCR:STAT?
// Returns the scrambling state for allocations belonging to user 3
```

Usage: Query only

Manual operation: See "Scrambling" on page 33

[:SOURce<hw>]:BB:ONEWeb:DL:USER<ch>:CCODing:STATe <State>

Sets the channel coding for all allocations belonging to the selected user.

Parameters:

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

Example:
```
BB:ONEWeb:DL:USER2:CCOD:STAT ON
```
Enables channel coding for the allocations belonging to user 2.

Manual operation: See "Channel Coding State" on page 33

[:SOURce<hw>]:BB:ONEWeb:DL:USER<ch>:UEID <Ueid>

Sets the user equipment ID.

Parameters:

<Ueid> integer
Range: 0 to 65535
*RST: 0

Example:
```
BB:ONEWeb:DL:USER2:UEID 3308
```
Sets the UE ID.

Manual operation: See "UE ID" on page 33

[:SOURce<hw>]:BB:ONEWeb:DL:USER<ch>:DATA <Data>

Selects the data source for the selected user configuration.

Parameters:

<Data> PN9 | PN11 | PN15 | PN16 | PN20 | PN21 | PN23 | PATTern | DLISt | ZERO | ONE
*RST: PN9

Example:
```
SOURce1:BB:ONEWeb:USER0:DATA PN23
// file oneweb_datalist.dm_iqd must exist in
the default directory
SOURce1:BB:ONEWeb:USER2:DATA DLISt
SOURce1:BB:ONEWeb:USER2:LIST
"/var/user/oneweb_datalist.dm_iqd"
SOURce1:BB:ONEWeb:USER4:DATA PATTern
SOURce1:BB:ONEWeb:USER4:PATTern #H1C4A9,17
```

Manual operation: See "Data Source, DList/Pattern" on page 33

[:SOURce<hw>]:BB:ONEWeb:DL:USER<ch>:DSELect <DSelect>

Selects an existing data list file from the default directory or from the specific directory.

Parameters:

<DSelect> string

File name incl. file extension or complete file path

Example: See `[:SOURce<hw>]:BB:ONEWeb:DL:USER<ch>:DATA` on page 165.

Manual operation: See "Data Source, DList/Pattern" on page 33

[:SOURce<hw>]:BB:ONEWeb:DL:USER<ch>:PATTern <Pattern>, <BitCount>

Sets a bit pattern as data source.

Parameters:

<Pattern> numeric

*RST: #H0

<BitCount> integer

Range: 1 to 64
*RST: 1

Example: See `[:SOURce<hw>]:BB:ONEWeb:DL:USER<ch>:DATA` on page 165.

Manual operation: See "Data Source, DList/Pattern" on page 33

[:SOURce<hw>]:BB:ONEWeb:DL:USER<ch>:PA <Power>

Sets PDSCH power factor.

Parameters:

<Power> -6.02 | -4.77 | -3.01 | -1.77 | 0.97 | 2.04 | 3.01 | 0

*RST: 0

Example:
```
BB:ONEWeb:DL:USER2:PA 0.00
```

Example: Selects the P_A

Manual operation: See "Power" on page 34

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ALCount <AllocCount>

Sets the number of scheduled allocations in the selected subframe. The maximum number of allocations that can be scheduled depends on the number of the selected resource blocks.

Parameters:

<AllocCount> integer

Range: 0 to dynamic
*RST: 2 (SUBF0, SUBF10,SUBF20,SUBF30); 1(all other subframes)

Example: `BB:ONEWeb:DL:SUBF4:ALC 5`
Five scheduled allocations are assigned to subframe four.

Manual operation: See "No. Of Used Allocations" on page 35

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ALLoc<ch0>:CODWords?

Queries the number of codewords for an allocation.

Return values:
<CodeWords> integer
Range: 1 to 3
*RST: 1

Example: `BB:ONEWeb:DL:SUBF1:ALL5:CODW?`
`Response: 1`

Usage: Query only

Manual operation: See "Codeword" on page 36

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ALLoc<ch0>[:CW<user>]:MODulation?

Queries the modulation scheme for the allocation.

Return values:
<Modulation> QPSK | PSK8 | QAM16
*RST: QPSK

Example: `BB:ONEWeb:DL:SUBF4:ALL5:CW1:MOD?`
`Response: QPSK`
Retrun QPSK as the modulation scheme for the allocation.

Usage: Query only

Manual operation: See "Modulation" on page 36

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ALLoc<ch0>[:CW<user>]:RBCount?

Queries the number of resource block for the selected allocation. The value is set automatically according to the current allocation settings.

Return values:
<ResBlockCount> integer
Range: 1 to 1152
*RST: 1

Example: `BB:ONEWeb:DL:SUBF0:ALL0:CW1:RBC?`
`Response: 2`

Usage: Query only

Manual operation: See "No. RB (Resource Blocks)" on page 36

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ALLoc<ch0>[:CW<user>]:RBOFfset?

Queries the start resource block of the selected allocation.

Return values:

<ResBlockOffset> integer

Range: 0 to 1151
*RST: 0

Example:
```
BB:ONEWeb:DL:SUBF0:ALL0:CW1:RBOF?
Response: 20
```

Usage: Query only

Manual operation: See "Offset RB" on page 36

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ALLoc<ch0>[:CW<user>]:PHYSbits?

Queries the number of physical bits for the selected allocation. The value is set automatically according to the current allocation settings.

Return values:

<PhysicalBits> integer

Range: 0 to 105600
*RST: 0

Example:
```
BB:ONEWeb:DL:SUBF4:ALL5:CW:PHYS?
```
Queries the number of physical bits for allocation five in subframe four.

Usage: Query only

Manual operation: See "Phys. Bits/Number of Physical Bits (DL)" on page 37

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ALLoc<ch0>[:CW<user>]:DATA?

Queries the data source for the selected allocation.

Return values:

<Data> USER1 | USER2 | USER3 | USER4 | PN9 | PN11 | PN15 | PN16 | PN20 | PN21 | PN23 | PATTern | DLISt | ZERO | ONE | MIB

MIB
Returns value indicates that the PBCH transmits real MIB data.
See also `[:SOURce<hw>]:BB:ONEWeb:DL:PBCH:MIB` on page 190

*RST: dynamic

Example: BB:ONEWeb:DL:SUBF4:ALL5:CW1:DATA?
Response: PN9
Returns the data source for the selected allocation as PN9.

Usage: Query only

Manual operation: See "Data Source" on page 37

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ALLoc<ch0>[:CW<user>]:DSELect?

Queries an existing data list file from the default directory or from the specific directory.

Return values:
<DSelect> string

Example: BB:ONEWeb:DL:SUBF2:ALL5:CW:DATA DLISt
BB:ONEWeb:DL:SUBF2:ALL5:CW:DSELect?
Response: /var/user/Oneweb_list1

Usage: Query only

Manual operation: See "Data Source" on page 37

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ALLoc<ch0>[:CW<user>]:PATTern <Pattern>, <BitCount>

Sets a bit pattern as data source.

Parameters:
<Pattern> numeric
*RST: #H0

<BitCount> integer
Range: 1 to 64
*RST: 1

Example: BB:ONEWeb:DL:SUBF4:ALL5:CW:DATA PATT
BB:ONEWeb:DL:SUBF4:ALL5:CW:PATT #H3F,8

Manual operation: See "Data Source" on page 37

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ALLoc<ch0>[:CW<user>]:POWer <Power>

Sets the power P_{PDSCH} respectively P_{PBCH} for the selected allocation. The power of the PDCCH allocation P_{PDCCH} is read-only. The value is set with the command [:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:POWer.

For allocations with two codewords, the power for the second codeword is automatically set to the power set for first one.

Parameters:

<Power> float

Range: -80 to 10
Increment: 0.001
*RST: 0

Example: P_{PDSCH}, P_{PBCH}

```
SOUR:BB:ONEWeb:DL:SUBF1:ALL2:POW 0.00
```

Example: P_{PDCCH}

```
SOUR:BB:ONEWeb:DL:SUBF1:ENCC:PDCC:POW 0.00
SOUR:BB:ONEWeb:DL:SUBF1:ALL1:POW?
Response: 0
```

Manual operation: See "Power" on page 38

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ALLoc<ch0>[:CW<user>]:CONType?

Queries the type for the selected allocation.

PBCH can be configured in subframe 0 only.

Return values:

<ConType> PDSCh | PBCH | PDCCh | EPD1 | EPD2

*RST: PDSCh

Example:

```
BB:ONEWeb:DL:SUBF4:ALL5:CW:CONT?
Response: PDSC
```

Usage: Query only

Manual operation: See "Content Type" on page 38

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ALLoc<ch0>[:CW<user>]:STATe?

Queries the allocation state?

Return values:

<State> 1 | ON | 0 | OFF

*RST: ON

Example:

```
BB:ONEWeb:DL:SUBF4:ALL5:CW1:STAT?
Response: ON
```

Returns value indicates that the selected allocation is activated.

Usage: Query only

Manual operation: See "State" on page 38

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:CONFlicts?

Queries the number of conflicts between the DCI formats.

To query whether there is a conflict in one particular PDCCH item, use the command `[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:CONFlict?` on page 181.

Return values:

<NoOfConf> integer

Range: 0 to 20
*RST: 0

Example:

```
SOURce1:BB:ONEWeb:DL:SUBF1:ENCC:PDCCh:FORMat VARiable
SOURce1:BB:ONEWeb:DL:SUBF1:ENCC:PDCCh:EXTC:CONFlicts?
```
Response: `1`
```
SOURce1:BB:ONEWeb:DL:SUBF1:ENCC:PDCCh:EXTC:UITems?
```
Response: `2`
```
SOURce1:BB:ONEWeb:DL:SUBF1:ENCC:PDCCh:EXTC:ITEM0:CONFlict?
```
Response: `0`
```
SOURce1:BB:ONEWeb:DL:SUBF1:ENCC:PDCCh:EXTC:ITEM1:CONFlict?
```
Response: `1`
The DCI conflict is in the second PDCCH item
```
SOURce1:BB:ONEWeb:DL:SUBF1:ENCC:PDCCh:EXTC:SOLVe
```

Usage: Query only

Manual operation: See "Resolve Conflicts" on page 44
See "Conflict (DCI)" on page 47

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ALLoc<ch0>[:CW<user>]:CONFlict?

Indicates a conflict between two allocations.

Return values:

<Conflict> 1 | ON | 0 | OFF

*RST: OFF

Example:

```
BB:ONEWeb:DL:SUBF4:ALL5:CW1:CONF?
```
Queries for the selected allocation whether there is a conflict with another allocation.

Usage: Query only

Manual operation: See "Conflict" on page 38

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:USER<ch>:PHYSbits?

Queries the size of the selected allocation in bits and considering the subcarriers that are used for other signals or channels with higher priority.

If a User 1...4 is selected for the "Data Source" in the allocation table for the corresponding allocation, the value of the parameter "Number of Physical Bits" is the sum of the "Physical Bits" of all single allocations that belong to the same user in the selected subframe.

Return values:

<PhysicalBits> integer

Range: 0 to 100000
*RST: 0

Example: `BB:ONEWeb:DL:SUBF1:USER3:PHYS?`
Queries the number of physical bits

Usage: Query only

Manual operation: See "Phys. Bits/Number of Physical Bits (DL)" on page 37

5.8 Enhanced PCFICH and PDCCH configuration commands

Option: R&S SMW-K130

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:STATe <State>

Enables/disables the PDCCH and PCFICH allocation.

Parameters:

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

Example: `BB:ONEWeb:DL:SUBF1:ENCC:STAT ON`
Enables PDCCH and PCFICH.

Manual operation: See "State" on page 39

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PCFich:SCRambling:STATe <State>

Enables/disables the scrambling of the enhanced channels.

Parameters:

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

Example: `SOURce1:BB:ONEWeb:DL:SUBF1:ENCC:PCFich:SCRambling:STATe ON`

Manual operation: See "Scrambling State " on page 39

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PCFich:POWer <Power>

Sets the power of the PCFICH (P_{PCFICH}).

Parameters:

<Power> float
Range: -80 to 10
Increment: 0.001
*RST: 0

Example: `BB:ONEWeb:DL:SUBF1:ENCC:PCF:POW 0`
Sets the power of the PCFICH to 0 dBm

Manual operation: See "PCFICH Power" on page 40

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PCFich:CFI <CFI>

Sets the control format indicator for PDCCH.

Parameters:

<CFI> integer

Range: 1 to 12
*RST: 2

Manual operation: See "CFI for PDCCH" on page 40

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:POWer <Power>

Sets the power of the PDCCH (P_{PDCCH}).

The value set with this parameter is also displayed in the allocation table for the corresponding allocation.

Parameters:

<Power> float

Range: -80 to 10
Increment: 0.001
*RST: 0

Example: `BB:ONEWeb:DL:SUBF1:ENCC:PDCC:POW 0.00`
Sets the power of the PDCCH to 0.00 dB

Manual operation: See "Power" on page 42

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:FORMat?

Queries the PDCCH format.

Return values:

<Format> VAR

VAR
Enables full flexibility by the configuration of the downlink control information (DCI) format and content.

*RST: VAR

Example: `BB:ONEWeb:DL:SUBF2:ENCC:PDCC:FORM?`
`Response: VAR`
Returns that the PDCCH format to variable.

Usage: Query only

Manual operation: See "PDCCH Format" on page 42

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:BITS?

Queries the number of bits allocated for PDCCH.

Return values:

<PhysBits> integer

Range: 0 to 1E5
*RST: 0

Example: `BB:ONEWeb:DL:SUBF1:ENCC:STAT ON`
Enables PDCCH.
`BB:ONEWeb:DL:SUBF1:ENCC:PDCC:BITS?`
Queries the number of bits
`Response: 3144`

Usage: Query only

Manual operation: See "Number of PDCCH Bits / REGs / CCEs" on page 42

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:AVCCes?

Queries the number of the control channel elements (CCEs) that are available for the PDCCH allocation.

Return values:
<AvailCceCount> integer
Range: 0 to 1E5
*RST: 0

Example: `BB:ONEWeb:DL:SUBF1:ENCC:STAT ON`
Enables PDCCH.
`BB:ONEWeb:DL:SUBF1:ENCC:PDCC:AVCC?`
Queries the number of CCEs
`Response 43`

Usage: Query only

Manual operation: See "Number of PDCCH Bits / REGs / CCEs" on page 42

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:AVRegs?

Queries the number of the REGs that are available for the PDCCH allocation.

Return values:
<AvailRegionCoun> integer
Range: 0 to 1E5
*RST: 0

Example: `BB:ONEWeb:DL:SUBF1:ENCC:STAT ON`
`BB:ONEWeb:DL:SUBF1:ENCC:PDCC:AVR?`
`Response: 393`

Usage: Query only

Manual operation: See "Number of PDCCH Bits / REGs / CCEs" on page 42

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:APPend

Adds a new row at the end of the DCI table.

Example: `BB:ONEWeb:DL:SUBF1:ENCC:PDCC:FORM VAR`
Sets the PDCCH format.
`BB:ONEWeb:DL:SUBF1:ENCC:PDCC:EXTC:APP`
Adds a new row

Manual operation: See "Append" on page 43

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:DELete

Deletes the selected row.

Example: `BB:ONEWeb:DL:SUBF1:ENCC:PDCC:FORM VAR`
Sets the PDCCH format.
`BB:ONEWeb:DL:SUBF1:ENCC:PDCC:EXTC:SIT 2`
Selects the third row in the DCI table
`BB:ONEWeb:DL:SUBF1:ENCC:PDCC:EXTC:DEL`
Deletes the third row

Usage: Event

Manual operation: See "Delete" on page 43

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:INSert

Insert a new row before the currently selected item.

Example: `BB:ONEWeb:DL:SUBF1:ENCC:PDCC:FORM VAR`
Sets the PDCCH format.
`BB:ONEWeb:DL:SUBF1:ENCC:PDCC:EXTC:SIT 2`
Selects the third row in the DCI table
`BB:ONEWeb:DL:SUBF1:ENCC:PDCC:EXTC:INS`
Inserts a new row before the third one

Manual operation: See "Insert" on page 43

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:RESet

Resets the table.

Example: `BB:ONEWeb:DL:SUBF1:ENCC:PDCC:FORM VAR`
Sets the PDCCH format.
`BB:ONEWeb:DL:SUBF1:ENCC:PDCC:EXTC:RES`
Resets the table

Manual operation: See "Reset" on page 43

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:SITem <SelectedItem>

Selects an PDCCH item, i.e. a row in the DCI table.

Parameters:

<SelectedItem> integer

Range: 0 to 39
*RST: 0

Example: `BB:ONEWeb:DL:SUBF1:ENCC:PDCC:FORM VAR`
Sets the PDCCH format.
`BB:ONEWeb:DL:SUBF1:ENCC:PDCC:EXTC:SIT 2`
Selects the third row in the DCI table

Manual operation: See "Insert" on page 43

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:DOWN
[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:UP

Moves the selected row down or up.

Example: `BB:ONEWeb:DL:SUBF1:ENCC:PDCC:FORM VAR`
Sets the PDCCH format.
`BB:ONEWeb:DL:SUBF1:ENCC:PDCC:EXTC:SIT 2`
Selects the third row in the DCI table
`BB:ONEWeb:DL:SUBF1:ENCC:PDCC:EXTC:UP`
Moves the third row one row up

Manual operation: See "Up" on page 43

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:SOLVe?

Triggers a built-in algorithm that re-assigns automatically the CCE values depending on the configured "Search Space"; previously configured CCE values will not be maintained.

If the conflict cannot be resolved automatically, the values are left unchanged.

Example: `:SOURce:BB:ONEWeb:DL:SUBF1:ENCC:PDCCh:EXTC:SOLVe`

Usage: Query only

Manual operation: See "Resolve Conflicts" on page 44

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:UITems?

Queries the number of used PDCCH items.

Return values:

<UsedItems> integer

Range: 0 to 10
*RST: 0

Example: `SOURce1:BB:ONEWeb:DL:SUBF1:ENCC:PDCCh:EXTC:UITems?`
Response: `2`

Usage: Query only

Manual operation: See "Number of Used PDCCH Items" on page 44

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:USER <User>

Sets the user which the DCI is dedicated to.

The available DCI Formats depend on the value of this parameter.

Parameters:

<User> USER1 | USER2 | USER3 | USER4 | PRNTi | SIRNti | RARNti | NONE

*RST: USER1

Example: `SOURce1:BB:ONEWeb:DL:SUBF1:ENCC:PDCCh:EXTC:ITEM1:USER USER2`
DCI is dedicated to User 2

Manual operation: See "User" on page 44

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:UEID <Ueid>

Sets the n_RNTI for the selected PDCCH.

Parameters:

<Ueid> integer

Range: 0 to 100000
*RST: 0

Example: `BB:ONEWeb:DL:SUBF1:ENCC:PDCC:FORM VAR`
Sets the PDCCH format.
`BB:ONEWeb:DL:SUBF1:ENCC:PDCC:EXTC:ITEM1:UEID 100`
Sets the n_RNTI

Manual operation: See "UE_ID/n_RNTI" on page 44

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:CELL?

Queries the component carrier the corresponding DCI is transmitted on.

Return values:

<CellIdx> integer

Range: 0 to 7
*RST: 0

Example: `BB:ONEWeb:DL:SUBF4:ENCC:PDCC:EXTC:ITEM0:CELL?`
`Response: 0`

Usage: Query only

Manual operation: See "Cell Index" on page 45

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:PDCChtype?

Queries if the DCI is carried by a PDCCH.

Return values:

<PdcchType> PDCCh

*RST: n.a. (no preset. default: PDCCh)

Example:
```
SOURce1:BB:ONEWeb:DL:SUBF0:ENCC:PDCCh:EXTC:
ITEM1:PDCChtype?
Response: PDCC
```

Usage: Query only

Manual operation: See "PDCCH" on page 45

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIFmt <DciFormat>

Sets the DCI format for the selected PDCCH.

Parameters:

<DciFormat> F1A | F3 | F3A | F0 | F1OW | F2OW | F3OW

*RST: F0

Example:
```
SOURce1:BB:ONEWeb:DL:SUBF1:ENCC:PDCCh:FORMat
VARiable
SOURce1:BB:ONEWeb:DL:SUBF1:ENCC:PDCCh:EXTC:
ITEM1:DCIFmt F1
```

Manual operation: See "DCI Format" on page 45

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:SESPace <SearchSpace>

If enabled, this parameter configures the PDCCH DCI to be transmitted within the common or UE-specific search space.

Parameters:

<SearchSpace> AUTO | COMMon | UE | ON | 1

COMMon|UE
Common and UE-specific search spaces, as defined in the 3GPP specification

OFF|AUTO
For backwards compatibility only.

*RST: AUTO

Example: `BB:ONEWeb:DL:SUBF1:ENCC:PDCC:EXTC:ITEM1:SESP UE`
The DCI is transmitted within the UE-specific search space.

Manual operation: See "Search Space" on page 46

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:PFMT <Format>

Sets the PDCCH format for the selected PDCCH.

Parameters:

<Format> integer

Range: 0 to 4
*RST: 0

Example: `BB:ONEWeb:DL:SUBF1:ENCC:PDCC:FORM VAR`
Sets PDCCH format variable.
`BB:ONEWeb:DL:SUBF1:ENCC:PDCC:EXTC:ITEM1:PFMT 0`
Sets the PDCCH format.

Manual operation: See "PDCCH Format (Variable)" on page 46

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:CINDex <CceIndex>

Sets the CCE start index.

Parameters:

<CceIndex> integer

Range: 0 to 1E5
*RST: 0

Example: `SOURce1:BB:ONEWeb:DL:SUBF1:ENCC:PDCCh:FORMat VAR`
Sets the PDCCH format.
`SOURce1:BB:ONEWeb:DL:SUBF1:ENCC:PDCCh:EXTC:ITEM1:CINDex 10`
Sets the CCE start index

Manual operation: See "CCE Index" on page 47

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:CONFlict?

Queries the conflicts status for the transmission of the PDCCH.

Return values:

<Conflict> 1 | ON | 0 | OFF

*RST: OFF

Example: `SOURce1:BB:ONEWeb:DL:SUBF0:ENCC:PDCCh:EXTC:ITEM0:CONFlict?`

Usage: Query only

Manual operation: See "Conflict (DCI)" on page 47

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:NCCes?

Queries the number of control channel elements used for the transmission of the PDCCH.

Return values:

<CceCount> integer

Range: 0 to 1E5
*RST: 1

Usage: Query only

Manual operation: See "Number CCEs" on page 47

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:NDCCes?

Queries the number of dummy CCEs that are appended to the PDCCH.

Return values:

<DummyCceCount> integer

Range: 0 to 1E5
*RST: 25

Example: `BB:ONEWeb:DL:SUBF1:ENCC:PDCC:FORM VAR`
Sets the PDCCH format.
`BB:ONEWeb:DL:SUBF1:ENCC:PDCC:EXTC:ITEM1:NDCC?`
Queries the number of dummy CCEs

Usage: Query only

Manual operation: See "No. Dummy CCEs" on page 47

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:BITData?

Queries the resulting bit data as selected with the DCI format parameters.

Return values:

<BitData> string

Example: `BB:ONEWeb:DL:SUBF1:ENCC:PDCC:FORM VAR`
Sets the PDCCH format.
`BB:ONEWeb:DL:SUBF1:ENCC:PDCC:EXTC:ITEM1:DCIC:BITD?`
Queries the bit data

Usage: Query only

Manual operation: See "Bit Data" on page 48

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:CIField <CaIndField>

The CIF is present in **each** DCI Format and identifies the component carrier that carries the PDSCH or PUSCH for the particular PDCCH in the cross-carrier approach.

Parameters:

<CaIndField> integer

Range: 0 to 7
*RST: 0

Example:

```
BB:ONEWeb:DL:CA:STAT ON
BB:ONEWeb:DL:USER2:CA:STAT ON
BB:ONEWeb:DL:CA:CELL0:CIF ON
BB:ONEWeb:DL:ENCC:PDCC:EXTC:ITEM1:DCIC:CIF 1
```

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:CSDMrs <CyclicShftDmRs>

Sets the DCI Format 0 field cyclic shift for DMRS.

Parameters:

<CyclicShftDmRs> integer

Range: 0 to 7
*RST: 0

Example:

```
BB:ONEWeb:DL:SUBF1:ENCC:PDCC:FORM VAR
```

Sets the PDCCH format.

```
BB:ONEWeb:DL:SUBF1:ENCC:PDCC:EXTC:ITEM1:DCIF F0
```

Sets the DCI format

```
BB:ONEWeb:DL:SUBF1:ENCC:PDCC:EXTC:ITEM1:DCIC:
CSDM 1
```

Sets the cyclic shift

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:CSIRequest <CsiRequest>

Sets the DCI Format 0 field CSI/CQI Request.

Parameters:

<CsiRequest> integer

Range: 0 to 3
*RST: 0

Example:

```
BB:ONEWeb:DL:SUBF1:ENCC:PDCC:FORM VAR
BB:ONEWeb:DL:SUBF1:ENCC:PDCC:EXTC:ITEM1:DCIF F0
BB:ONEWeb:DL:SUBF1:ENCC:PDCC:EXTC:ITEM1:DCIC:
CSIR 1
```

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:MCSR <Mcsr>

Sets the DCI Format 0/1OW/1A field Modulation and Coding Scheme.

Parameters:

<Mcsr> integer

Range: 0 to 31
*RST: 0

Example:

```
BB:ONEWeb:DL:SUBF1:ENCC:PDCC:FORM VAR
BB:ONEWeb:DL:SUBF1:ENCC:PDCC:EXTC:ITEM1:DCIF F0
BB:ONEWeb:DL:SUBF1:ENCC:PDCC:EXTC:ITEM1:DCIC:
MCSR 5
```

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:NDI <NewDataIndicat>

Sets the DCI Format 0/1OW/1A field New Data Indicator.

Parameters:

<NewDataIndicat> 1 | ON | 0 | OFF

*RST: OFF

Example:

```
BB:ONEWeb:DL:SUBF1:ENCC:PDCC:FORM VAR
```

Sets the PDCCH format.

```
BB:ONEWeb:DL:SUBF1:ENCC:PDCC:EXTC:ITEM1:DCIF F0
```

Sets the DCI format

```
BB:ONEWeb:DL:SUBF1:ENCC:PDCC:EXTC:ITEM1:DCIC:
NDI ON
```

Sets the New Data Indicator

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:RBA <ResBlockAssign>

Sets the DCI Format 0/1OW/1A/2OW/3OW field Resource Block Assignment.

Parameters:

<ResBlockAssign> integer

Range: 0 to 268435455
*RST: 0

Example:

```
BB:ONEWeb:DL:SUBF1:ENCC:PDCC:FORM VAR
```

Sets the PDCCH format.

```
BB:ONEWeb:DL:SUBF1:ENCC:PDCC:EXTC:ITEM1:DCIF F0
```

Sets the DCI format

```
BB:ONEWeb:DL:SUBF1:ENCC:PDCC:EXTC:ITEM1:DCIC:
RBA 100
```

Sets Resource Block Assignment

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:SRSRequest <SrsRequest>

Sets the SRS Request filed.

Parameters:

<SrsRequest> integer

Range: 0 to 1
*RST: 0

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:TPCC <TpcCommand>

Sets the DCI Format 0/1OW/1A/2OW/3OW field TPC Command for PUSCH.

Parameters:

<TpcCommand> integer

Range: 0 to 3
*RST: 0

Example:

```
BB:ONEWeb:DL:SUBF1:ENCC:PDCC:FORM VAR
```

Sets the PDCCH format.

```
BB:ONEWeb:DL:SUBF1:ENCC:PDCC:EXTC:ITEM1:DCIF F0
```

Sets the DCI format

```
BB:ONEWeb:DL:SUBF1:ENCC:PDCC:EXTC:ITEM1:DCIC:TPCC 1
```

Sets the TPC Command for PUSCH

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:HPN <HarqProcessNumb>

Sets the DCI Format 1OW/1A/2OW/3OW field HARQ process number.

Parameters:

<HarqProcessNumb> integer

Range: 0 to 15
*RST: 0

Example:

```
BB:ONEWeb:DL:SUBF1:ENCC:PDCC:FORM VAR
```

Sets the PDCCH format.

```
BB:ONEWeb:DL:SUBF1:ENCC:PDCC:EXTC:ITEM1:DCIF F1A
```

Sets the DCI format

```
BB:ONEWeb:DL:SUBF1:ENCC:PDCC:EXTC:ITEM1:DCIC:HPN 5
```

Sets the HARQ process number

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:RV <RedundVersion>

Sets the DCI Format 1OW/1A field Redundancy Version.

Parameters:

<RedundVersion> integer

Range: 0 to 3
*RST: 0

Example:
```
BB:ONEWeb:DL:SUBF1:ENCC:PDCC:FORM VAR
```
Sets the PDCCH format.
```
BB:ONEWeb:DL:SUBF1:ENCC:PDCC:EXTC:ITEM1:DCIF F1
```
Sets the DCI format
```
BB:ONEWeb:DL:SUBF1:ENCC:PDCC:EXTC:ITEM1:DCIC:RV 1
```
Sets the Redundancy Version

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:F1AMode <Format1aMode>

Selects the mode of the DCI format.

Parameters:

<Format1aMode> PDSCh | PRACh

*RST: PDSCh

Example:
```
BB:ONEWeb:DL:SUBF1:ENCC:PDCC:FORM VAR
```
Sets the PDCCH format.
```
BB:ONEWeb:DL:SUBF1:ENCC:PDCC:EXTC:ITEM1:DCIF F1A
```
Sets the DCI format
```
BB:ONEWeb:DL:SUBF1:ENCC:PDCC:EXTC:ITEM1:DCIC:F1AM PRAC
```
Sets the mode

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:PRACh:MINDex <MaskIndex>

(PRACH mode only)

Sets the DCI Format 1A field PRACH Mask Index.

Parameters:

<MaskIndex> integer

Range: 0 to 15
*RST: 0

Example: `BB:ONEWeb:DL:SUBF1:ENCC:PDCC:FORM VAR`
Sets the PDCCH format.
`BB:ONEWeb:DL:SUBF1:ENCC:PDCC:EXTC:ITEM1:DCIFF1A`
Sets the DCI format
`BB:ONEWeb:DL:SUBF1:ENCC:PDCC:EXTC:ITEM1:F1AMPRAC`
Sets the mode
`BB:ONEWeb:DL:SUBF1:ENCC:PDCC:EXTC:ITEM1:DCIC:PRAC:MIND 10`
Sets the preamble index

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:PRACh:PRINdex <PreambleIndex>

(PRACH mode only)

Sets the DCI Format 1A field Preamble index.

Parameters:
<PreambleIndex> integer
Range: 0 to 63
*RST: 0

Example: `BB:ONEWeb:DL:SUBF1:ENCC:PDCC:FORM VAR`
Sets the PDCCH format.
`BB:ONEWeb:DL:SUBF1:ENCC:PDCC:EXTC:ITEM1:DCIFF1A`
Sets the DCI format
`BB:ONEWeb:DL:SUBF1:ENCC:PDCC:EXTC:ITEM1:F1AMPRAC`
Sets the mode
`BB:ONEWeb:DL:SUBF1:ENCC:PDCC:EXTC:ITEM1:DCIC:PRAC:PRIN 10`
Sets the preamble index

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:FIRStrans:MCS <Mcs>

PDCCH DCI <Modulation and Coding Scheme> - First Transmission

Parameters:
<Mcs> integer
Range: 0 to 31
*RST: 0

Example: `BB:ONEWeb:DL:SUBF1:ENCC:PDCCh:EXTC:ITEM1:DCIConf:FIRStrans:MCS 2`

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:RETRans:MCS <Mcs>

Enhanced Channel Configuration: DCI Format Configuration: Re-Transmission: <Modulation and Coding Scheme>

Parameters:

<Mcs> integer

Range: 0 to 31
*RST: 0

Example:
```
BB:ONEWeb:DL:SUBF1:ENCC:PDCCh:EXTC:ITEM1:
DCIConf:RETRans:MCS 2
```

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:TB1:NDI <NewDataIndicat>
[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:TB2:NDI <NewDataIndicat>

Sets the DCI Format 2OW/3OW field New Data Indicator.

Parameters:

<NewDataIndicat> 1 | ON | 0 | OFF

*RST: OFF

Example:
```
BB:ONEWeb:DL:SUBF1:ENCC:PDCC:FORM VAR
```
Sets the PDCCH format.
```
BB:ONEWeb:DL:SUBF1:ENCC:PDCC:EXTC:ITEM1:DCIF
F2OW
```
Sets the DCI format
```
BB:ONEWeb:DL:SUBF1:ENCC:PDCC:EXTC:ITEM1:DCIC:
TB2:NDI ON
```
Sets the New Data Indicator for TB2

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:TB1:RV <RedundVersion>
[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:TB2:RV <RedundVersion>

Sets the DCI Format 2OW field Redundancy Version.

Parameters:

<RedundVersion> integer

Range: 0 to 3
*RST: 0

Example: `BB:ONEWeb:DL:SUBF1:ENCC:PDCC:FORM VAR`
Sets the PDCCH format.
`BB:ONEWeb:DL:SUBF1:ENCC:PDCC:EXTC:ITEM1:DCIF F2OW`
Sets the DCI format
`BB:ONEWeb:DL:SUBF1:ENCC:PDCC:EXTC:ITEM1:DCIC:TB2:RV 1`
Sets the Redundancy Version for TB2

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:TPCinstr <TpcCommand>

Sets the DCI Format 3/3A field TPC Command.

Parameters:
<TpcCommand> bit pattern

Example: `BB:ONEWeb:DL:SUBF1:ENCC:PDCC:FORM VAR`
Sets the PDCCH format.
`BB:ONEWeb:DL:SUBF1:ENCC:PDCC:EXTC:ITEM1:DCIF F3`
Sets the DCI format
`BB:ONEWeb:DL:SUBF1:ENCC:PDCC:EXTC:ITEM1:DCIC:TPC #B101,3`
Sets the TPC Command

Manual operation: See "DCI Format 3/3A" on page 52

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ENCC:PDCCh:EXTC:ITEM<ch0>:DCIConf:F3RI <Format3ResInd>

Sets the DCI Format 3OW PUCCH Format 3 resource indicator.

Parameters:
<Format3ResInd> integer
Range: 0 to 3
*RST: 0

Example: `BB:ONEWeb:DL:SUBF0:ENCC:PDCCh:EXTC:ITEM1:DCIConf:F3RI 1`

5.9 Enhanced PBCH and PDSCH commands

Option: R&S SMW-K130

[:SOURce<hw>]:BB:ONEWeb:DL:PBCH:MIB <State>

Enables transmission of real MIB data.

Parameters:

<State> 1 | ON | 0 | OFF

*RST: ON

Example:

```
SOURce1:BB:ONEWeb:DL:SUBF0:ALLoc0:CW1:CONType?
// PBCH
SOURce1:BB:ONEWeb:DL:SUBF0:ALLoc0:CW1:
SCRambling:STATe 1
SOURce1:BB:ONEWeb:DL:SUBF0:ALLoc0:CW1:CCODing:
STATe 1
SOURce1:BB:ONEWeb:DL:PBCH:MIB 1
SOURce1:BB:ONEWeb:DL:PBCH:SOFFset 0
SOURce1:BB:ONEWeb:DL:SUBF0:ALLoc0:CW1:CCODing:
TBSize?
//24
SOURce1:BB:ONEWeb:DL:SUBF0:ALLoc0:CW1:PHYSbits?
//480
SOURce1:BB:ONEWeb:DL:PBCH:MSPare #H001,10
SOURce1:BB:ONEWeb:DL:SUBF0:ALLoc0:CW1:STATe 1
```

Manual operation: See "MIB (including SFN)" on page 55

[:SOURce<hw>]:BB:ONEWeb:DL:PBCH:MSPare <MibSpareBits>

Sets the 10 spare bits in the PBCH transmission.

Parameters:

<MibSpareBits> 64 bit

*RST: #H0,1

Example: See `[:SOURce<hw>]:BB:ONEWeb:DL:PBCH:MIB` on page 190

Manual operation: See "MIB Spare Bits" on page 56

[:SOURce<hw>]:BB:ONEWeb:DL:PBCH:SOFFset <SfnOffset>

Sets an offset for the start value of the SFN (System Frame Number).

Parameters:

<SfnOffset> integer

Range: 0 to 1020
Increment: 4
*RST: 0

Example: See `[:SOURce<hw>]:BB:ONEWeb:DL:PBCH:MIB` on page 190

Manual operation: See "SFN Offset" on page 56

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ALLoc<ch0>[:CW<user>]:CCODing:STATe <State>

Enables/disables channel coding for the selected allocation and codeword.

Parameters:

<State> 1 | ON | 0 | OFF

*RST: ON

Example:
```
BB:ONEWeb:DL:SUBF4:ALL5:CW2:CCOD:STAT ON
```

Manual operation: See "State Channel Coding (DL)" on page 55

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ALLoc<ch0>[:CW<user>]:SCRambling:STATe <State>

Enables/disables the bit-level scrambling.

Parameters:

<State> 1 | ON | 0 | OFF

*RST: ON

Example:
```
SOUR:BB:ONEWeb:DL:SUBF0:ALL5:CW:DATA PN9
SOUR:BB:ONEWeb:DL:SUBF0:ALL5:CW:SCR:STAT ON
```
Enables scrambling

Example: If a "User 1..4" is selected for the Data Source for the corresponding allocation, this command is query only and the return value corresponds the state determined with the command `[:SOURce<hw>]:BB:ONEWeb:DL:USER<ch>:SCRambling:STATe?`.
```
SOUR:BB:ONEWeb:DL:SUBF0:ALL4:CW:DATA USER3
SOUR:BB:ONEWeb:DL:USER3:SCR:STAT ON
SOUR:BB:ONEWeb:DL:SUBF0:ALL4:CW:SCR:STAT?
Response: On
```

Manual operation: See "State Scrambling (DL)" on page 53

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ALLoc<ch0>[:CW<user>]:SCRambling:UEID <Ueid>

Sets the user equipment identifier (n_RNTI) of the user to which the PDSCH transmission is intended. The UE ID is used to calculate the scrambling sequence.

Parameters:

<Ueid> integer

Range: 0 to 65535
*RST: 0

Example: `BB:ONEWeb:DL:SUBF0:ALL5:CW:UEID 120`
Sets the user equipment identifier.

Manual operation: See "UE ID/n_RNTI (PDSCH)" on page 54

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ALLoc<ch0>[:CW<user>]:CCODing:ISBSize <SoftBufSize>

Sets the size of the IR soft buffer.

Parameters:

<SoftBufSize> integer

Range: 800 to 3667200
*RST: 3667200

Example:
```
SOUR:BB:ONEWeb:DL:SUBF9:ALL5:CW:DATA USER3
SOUR:BB:ONEWeb:DL:SUBF9:ALL5:PHYS?
Response: 2400
SOUR:BB:ONEWeb:DL:SUBF9:ALL5:CW2:CCOD:TBS?
Response: 1500
SOUR:BB:ONEWeb:DL:SUBF9:ALL5:CW2:CCOD:ISBS 1600
SOUR:BB:ONEWeb:DL:SUBF9:ALL4:CW:DATA USER3
SOUR:BB:ONEWeb:DL:SUBF9:ALL4:CW2:CCOD:ISBS?
Response: 1600
```

Manual operation: See "IR Soft Buffer Size (PDSCH)" on page 56

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ALLoc<ch0>[:CW<user>]:CCODing:RVINdex <RedundVersIndex>

Sets the redundancy version index.

Parameters:

<RedundVersIndex> integer

Range: 0 to 3
*RST: 0

Example: `BB:ONEWeb:DL:SUBF4:ALL5:CW2:CCOD:RVIN 2`
Sets the redundancy version index to 2

Manual operation: See "Redundancy Version Index (PDSCH)" on page 56

[:SOURce<hw>]:BB:ONEWeb:DL[:SUBF<st0>]:ALLoc<ch0>[:CW<user>]:CCODing:TBSize?

Queries the size of the transport block.

Note: The parameter depends on the content type and the global MIMO configuration.

Return values:

<TranspBlockSize> integer

Range: 0 to 850656
*RST: dynamic

Example:
```
BB:ONEWeb:DL:SUBF0:ALL0:CW1:PHYS?
```
Queries the number of physical bits of allocation 0
```
Response: 6400
BB:ONEWeb:DL:SUBF0:ALL0:CW1:CCOD:TBS?
Response: 24
```
Returns the transport block size to of allocation 0.

Usage: Query only

Manual operation: See "Transport Block Size/Payload (DL)" on page 56

5.10 General uplink commands

Option: R&S SMW-K130

[:SOURce<hw>]:BB:ONEWeb:UL:CA:CELL<ch0>:BW?

Queries the bandwidth of the corresponding component carrier.

Return values:

<ULCaBw> BW20_00

*RST: BW20_00

Example: See `[:SOURce<hw>]:BB:ONEWeb:UL:CA:STATe` on page 195

Usage: Query only

Manual operation: See "Bandwidth" on page 59

[:SOURce<hw>]:BB:ONEWeb:UL:CA:CELL<ch0>:DFReq <ULCaDeltaF>

Sets the frequency offset between the central frequency of corresponding SCell and the frequency of the PCell.

Parameters:

<ULCaDeltaF> float

Value range depends on the installed options, the number of cells and the cell bandwidth.

Range: -60 to 60
Increment: 0.1
*RST: 0
Default unit: MHz

Manual operation: See "delta f / MHz" on page 59

[:SOURce<hw>]:BB:ONEWeb:UL:CA:CELL<ch0>:DUPLexing?

Queries the duplexing mode of the component carriers.

Return values:
<ULCaDuplexMode> FDD
*RST: FDD

Example: See `[:SOURce<hw>]:BB:ONEWeb:UL:CA:STATe` on page 195

Usage: Query only

Manual operation: See "Duplexing" on page 59

[:SOURce<hw>]:BB:ONEWeb:UL:CA:CELL<ch0>:ID <ULCaPhyCellId>

Sets the physical Cell ID of the PCell and the SCells.

Parameters:
<ULCaPhyCellId> integer
Range: 0 to 503
*RST: 0

Example: See `[:SOURce<hw>]:BB:ONEWeb:UL:CA:STATe` on page 195

Manual operation: See "Physical Cell ID" on page 59

[:SOURce<hw>]:BB:ONEWeb:UL:CA:CELL<ch0>:INDex <ULCaCellIndex>

Sets the cell index of the corresponding SCell.

Parameters:
<ULCaCellIndex> integer
Range: 1 to 7
*RST: 1

Example: See `[:SOURce<hw>]:BB:ONEWeb:UL:CA:STATe` on page 195

Manual operation: See "Cell Index" on page 58

[:SOURce<hw>]:BB:ONEWeb:UL:CA:STATe <ULCaGlobState>

Enables UL carrier aggregation.

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

Manual operation: See "Activate Carrier Aggregation" on page 58

[:SOURce<hw>]:BB:ONEWeb:UL:CA:CELL<ch0>:DMRS <ULCaN1Dmrs>

Sets the parameter n(1)_DMRS per component carrier.

Parameters:

<ULCaN1Dmrs> integer

Range: 0 to 11
*RST: 0

Example: See `[:SOURce<hw>]:BB:ONEWeb:UL:CA:STATe` on page 195

Manual operation: See "n(1)_DMRS" on page 59

[:SOURce<hw>]:BB:ONEWeb:UL:CA:CELL<ch0>:SUConfiguration <ULCaSrsSubfConf>

Sets the SRS subframe configuration per component carrier.

Parameters:

<ULCaSrsSubfConf> integer

Range: 0 to 15
*RST: 15

Example: See `[:SOURce<hw>]:BB:ONEWeb:UL:CA:STATe` on page 195

Manual operation: See "SRS Subframe Configuration" on page 59

[:SOURce<hw>]:BB:ONEWeb:UL:CA:CELL<ch0>:CSRS <ULCaSrsCSRS>

Sets the parameter SRS Bandwidth Configuration per component carrier.

Parameters:

<ULCaSrsCSRS> integer

Range: 0 to 7
*RST: 0

Example: See `[:SOURce<hw>]:BB:ONEWeb:UL:CA:STATe` on page 195

Manual operation: See "SRS Bandwidth Configuration C_SRS" on page 59

[:SOURce<hw>]:BB:ONEWeb:UL:CA:CELL<ch0>:TDELay <TimeDelay>

Sets the time delay of the SCell relative to the PCell.

Parameters:

<TimeDelay> integer

Range: 0 to 7E5
*RST: 0

Example: See `[:SOURce<hw>]:BB:ONEWeb:UL:CA:STATe` on page 195

Manual operation: See "Delay / ns" on page 59

[:SOURce<hw>]:BB:ONEWeb:UL:CA:CELL<ch0>:STATe <ULCaCellState>

Activates the corresponding component carrier.

Parameters:

<ULCaCellState> 1 | ON | 0 | OFF

*RST: 0

Example: See `[:SOURce<hw>]:BB:ONEWeb:UL:CA:STATe` on page 195

Manual operation: See "State" on page 60

[:SOURce<hw>]:BB:ONEWeb:UL:BW?

Queries the UL channel bandwidth.

Return values:

<BandWidth> BW20_00

*RST: BW20_00

Example: `SOURce:BB:ONEWeb:UL:BW?`

Usage: Query only

Manual operation: See "Channel Bandwidth" on page 60

[:SOURce<hw>]:BB:ONEWeb:UL:FFT?

Queries the FFT (Fast Fourier Transformation) size. The available values depend on the selected number of resource blocks per subframe.

Return values:

<FftSize> integer

Range: 128 to 2048

*RST: 2048

Example: `BB:ONEWeb:UL:FFT?`
Queries the automatically set FFT size.

Usage: Query only

Manual operation: See "FFT Size" on page 61

[:SOURce<hw>]:BB:ONEWeb:UL:LGS?
[:SOURce<hw>]:BB:ONEWeb:UL:RGS?

Queries the number of right guard subcarriers. The value is set automatically according to the selected number of resource blocks per subframe.

Return values:
<RgSubCarr> integer
Range: 35 to 601
*RST: 211

Example: `BB:ONEWeb:UL:RGS?`
Queries the number of right guard subcarriers.

Usage: Query only

Manual operation: See "Number of Left/Right Guard Subcarriers" on page 61

[:SOURce<hw>]:BB:ONEWeb:UL:NORB?

Queries the number of physical resource blocks per subframe.

Return values:
<NumResBlocks> integer
Range: 6 to 110
*RST: 100

Example: `BB:ONEWeb:UL:BW USER`
Sets the bandwidth mode to USER in uplink.
`BB:ONEWeb:UL:NORB?`
Queries the number of resource blocks.

Usage: Query only

Manual operation: See "Number of Resource Blocks Per Subframe" on page 61

[:SOURce<hw>]:BB:ONEWeb:UL:OCCBandwidth?

Queries the occupied bandwidth. This value is set automatically according to the selected number of resource blocks per subframe.

Return values:
<OccBandwidth> float

Example: `BB:ONEWeb:UL:OCCB?`
Queries the automatically set occupied bandwidth in uplink.

Usage: Query only

Manual operation: See "Occupied Bandwidth" on page 61

[:SOURce<hw>]:BB:ONEWeb:UL:OCCSubcarriers?

Queries the occupied subcarriers. The value is set automatically according to the selected number of resource blocks per subframe.

Return values:
<OccSubcarriers> integer
Range: 72 to 1321
*RST: 600

Example: `BB:ONEWeb:UL:OCCS?`
Queries the number of occupied subcarriers.

Usage: Query only

Manual operation: See "Number Of Occupied Subcarriers" on page 61

[:SOURce<hw>]:BB:ONEWeb:UL:SRATe?

Queries the sampling rate.

Return values:
<SampRate> float
Range: 192E4 to 3072E4
Increment: 1000
*RST: 1536E4

Example: `BB:ONEWeb:UL:SRAT?`
Queries the automatically set sampling rate.

Usage: Query only

Manual operation: See "Sampling Rate" on page 61

[:SOURce<hw>]:BB:ONEWeb:UL:CPC?

Queries the cyclic prefix length for all subframes.

Return values:
<CyclicPrefix> NORMal
*RST: NORMal

Example: `SOURce1:BB:ONEWeb:UL:CPC?`

Usage: Query only

Manual operation: See "Cyclic Prefix" on page 63

[:SOURce<hw>]:BB:ONEWeb:UL:SOFFset <SfnOffset>

Sets the start SFN value.

Parameters:
<SfnOffset> integer
Range: 0 to 4095
*RST: 0

Example: `:SOURce1:BB:ONEWeb:UL:SOFFset 10`
Sets the SFN start value

Manual operation: See "SFN Offset" on page 63

[:SOURce<hw>]:BB:ONEWeb:UL[:PLCI]:CID <CellId>

Sets the cell identity.

Parameters:
<CellId> integer
Range: 0 to 503
*RST: 0

Example: `BB:ONEWeb:UL:PLC:CID 100`
Sets the cell ID.

Manual operation: See "Cell ID" on page 62

[:SOURce<hw>]:BB:ONEWeb:UL[:PLCI]:CIDGroup <PhysCellIdGroup>

Sets the ID of the physical cell identity group.

Parameters:
<PhysCellIdGroup> integer
Range: 0 to 167
*RST: 0

Example: `BB:ONEWeb:UL:PLC:CIDG 100`
Sets the UL physical cell ID group

[:SOURce<hw>]:BB:ONEWeb:UL:REFSig:DMRS <DrsDmrs>

Sets the part of the demodulation reference signal (DMRS) index which is broadcasted and therefore valid for the whole cell. This index applies when multiple shifts within a cell are used and is used by the calculation of the DMRS sequence.

Parameters:
<DrsDmrs> integer
Range: 0 to 11
*RST: 0

Example: `BB:ONEWeb:UL:REFS:DMRS 4`
Sets the demodulation reference signal index to 4

Manual operation: See "n(1)_DMRS" on page 66

[:SOURce<hw>]:BB:ONEWeb:UL:REFSig:DSSHift <DeltaSeqShift>

Sets the delta sequence shift for PUSCH needed for the calculation of the group hopping pattern.

Parameters:

<DeltaSeqShift> integer

Range: 0 to 29
*RST: 0

Example: `BB:ONEWeb:UL:REFS:DSSH 3`
Sets the delta sequence shift for PUSCH

Manual operation: See "Delta Sequence Shift for PUSCH" on page 66

[:SOURce<hw>]:BB:ONEWeb:UL:REFSig:GRPHopping <GroupHopping>

Enables/disables group hopping for the uplink reference signals demodulation reference signal (DRS) and sounding reference signal (SRS).

Parameters:

<GroupHopping> 1 | ON | 0 | OFF

*RST: OFF

Example: `BB:ONEWeb:UL:REFS:GRPH ON`
Enables group hopping

Manual operation: See "Group Hopping" on page 65

[:SOURce<hw>]:BB:ONEWeb:UL:REFSig:SEQHopping <SequenceHopping>

Enables/disables sequence hopping for the uplink reference signals demodulation reference signal (DRS) and sounding reference signal (SRS).

Parameters:

<SequenceHopping> 1 | ON | 0 | OFF

*RST: OFF

Example: `BB:ONEWeb:UL:REFS:SEQH ON`
Enables sequence hopping

Manual operation: See "Sequence Hopping" on page 66

[:SOURce<hw>]:BB:ONEWeb:UL:REFSig:SRS:ANSTx <AnSrsSimTxState>

Enables/disables simultaneous transmission of SRS (sounding reference signal) and ACK/NACK messages, i.e. transmission of SRS and PUCCH in the same subframe.

Parameters:

<AnSrsSimTxState> 1 | ON | 0 | OFF

*RST: OFF

Example: `BB:ONEWeb:UL:REFS:SRS:ANST ON`

Manual operation: See "A/N + SRS simultaneous Tx" on page 67

[:SOURce<hw>]:BB:ONEWeb:UL:REFSig:SRS:CSRS <Csrs>

Sets the cell-specific parameter SRS bandwidth configuration (C_{SRS}).

Parameters:

<Csrs> integer

Range: 0 to 7
*RST: 0

Example: `BB:ONEWeb:UL:REFS:SRS:CSRS 4`
Sets the SRS bandwidth configuration

Manual operation: See "SRS Bandwidth Configuration C_SRS" on page 67

[:SOURce<hw>]:BB:ONEWeb:UL:REFSig:SRS:DSFC?

Queries the value for the cell-specific parameter transmission offset $Delta_{SFC}$ in subframes, depending on the selected SRS subframe configuration (`[:SOURce<hw>]:BB:ONEWeb:UL:REFSig:SRS:CSRS`) and the duplexing mode (`[:SOURce<hw>]:BB:ONEWeb:DUPLexing?`.

Return values:

<DeltSFC> string

Example: `BB:ONEWeb:UL:REFS:SRS:SUC 4`
Sets the SRS configuration
`BB:ONEWeb:UL:REFS:SRS:DSFC?`
Queries the Delta_SFC parameter

Usage: Query only

Manual operation: See "Transmission Offset Delta_SFC" on page 67

[:SOURce<hw>]:BB:ONEWeb:UL:REFSig:SRS:SUConfiguration
<SubFrameConfig>

Sets the cell-specific parameter SRS subframe configuration.

Parameters:

<SubFrameConfig> integer

Range: 0 to 15
*RST: 15

Example: `BB:ONEWeb:UL:REFS:SRS:SUC 4`
Sets the SRS configuration

Manual operation: See "SRS Subframe Configuration" on page 66

[:SOURce<hw>]:BB:ONEWeb:UL:REFSig:SRS:TSFC?

Queries the value for the cell-specific parameter configuration period T_{SFC} in subframes, depending on the selected SRS subframe configuration (`[:SOURce<hw>]:BB:ONEWeb:UL:REFSig:SRS:CSRS`) and the duplexing mode (`[:SOURce<hw>]:BB:ONEWeb:DUPLexing?`).

Return values:
<Tsfc> string

Example: `BB:ONEWeb:UL:REFS:SRS:SUC 4`
Sets the SRS configuration
`BB:ONEWeb:UL:REFS:SRS:TSFC?`
Queries the T_SFC parameter

Usage: Query only

Manual operation: See "Configuration Period T_SFC" on page 67

[:SOURce<hw>]:BB:ONEWeb:UL:PRACh:FOFFset <FrequencyOffset>

Sets the prach-FrequencyOffset $n^{RA}_{PRBoffset}$

Parameters:
<FrequencyOffset> integer
Range: 0 to dynamic
*RST: 0

Example: `BB:ONEWeb:UL:PRAC:FOFF 2`
Sets the frequency offset

Manual operation: See "PRACH Frequency Offset" on page 68

[:SOURce<hw>]:BB:ONEWeb:UL:PRACh:CONFiguration <Configuration>

Sets the PRACH configuration number.

Parameters:
<Configuration> integer
Range: 0 to 63
*RST: 0

Example: `BB:ONEWeb:UL:PRAC:CONF 10`
Sets the PRACH configuration

Manual operation: See "PRACH Configuration" on page 68

[:SOURce<hw>]:BB:ONEWeb:UL:PRACh:RSET <RestrictedSet>

Enables/disables using of a restricted preamble set.

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

Example: `BB:ONEWeb:UL:PRAC:RSET ON`
Enables using of restricted set

Manual operation: See "Restricted Set (High Speed Mode)" on page 69

[:SOURce<hw>]:BB:ONEWeb:UL:PUCCh:DESHift <DeltaShift>

Sets the delta shift parameter.

Parameters:
<DeltaShift> integer
Range: 1 to 3
*RST: 2

Example: `BB:ONEWeb:PUCC:DESH 3`
Sets the delta shift parameter

Manual operation: See "Delta Shift" on page 72

[:SOURce<hw>]:BB:ONEWeb:UL:PUCCh:N1CS <N1Cs>

Sets the number of cyclic shifts used for PUCCH format 1/1a/1b in a resource block used for a combination of the formats 1/1a/1b and 2/2a/2b.

Parameters:
<N1Cs> integer
Range: 0 to dynamic
*RST: 6

Example: `BB:ONEWeb:UL:PUCC:N1CS 5`
5 cyclic shifts are used for PUCCH format F1/F1a/F1b in an RB used for a combination of the PUCCH formats 1/1a/1b and 2/2a/2b

Manual operation: See "N(1)_cs" on page 72

[:SOURce<hw>]:BB:ONEWeb:UL:PUCCh:N1NMax?

Queries the range of the possible PUCCH format 1/1a/1b transmissions from different users in one subframe and for normal CP.

Return values:
<N1NormCP> integer
Range: 0 to 110
*RST: 44

Example: `BB:ONEWeb:UL:PUCC:N1NM?`
Queries the range of the possible PUCCH formats 1/1a/1b transmissions.
`Response: 24`

Usage: Query only

Manual operation: See "Range n(1)_PUCCH (Normal CP)" on page 72

[:SOURce<hw>]:BB:ONEWeb:UL:PUCCh:N2Max?

Queries the range of possible number of PUCCH format 2/2a/2b transmissions from different users in one subframe.

Return values:
<N2Max> integer

Range: 0 to 110
*RST: 15

Example: `BB:ONEWeb:UL:PUCC:N2M?`
Queries the range of the possible PUCCH formats 2/2a/2b transmissions.
`Response: 16`

Usage: Query only

Manual operation: See "Range n(2)_PUCCH" on page 73

[:SOURce<hw>]:BB:ONEWeb:UL:PUCCh:N2RB <N2Rb>

Sets bandwidth in terms of resource blocks that are reserved for PUCCH formats 2/2a/2b transmission in each subframe.

Parameters:
<N2Rb> integer

Range: 0 to dynamic
*RST: 1

Example: `BB:ONEWeb:UL:PUCC:N2RB 3`
Reserves 3 RB for PUCCH formats 2/2a/2b

Manual operation: See "N(2)_RB" on page 72

[:SOURce<hw>]:BB:ONEWeb:UL:PUCCh:N3Max?

Queries the range of possible number of PUCCH format x transmissions from different users in one subframe.

Return values:
<N3Max> integer

Range: 0 to 549
*RST: 19

Usage: Query only

Manual operation: See "Range n(3)_PUCCH" on page 73

[:SOURce<hw>]:BB:ONEWeb:UL:PUCCh:NORB <RbCount>

Sets the PUCCH region in terms of reserved resource blocks, at the edges of the channel bandwidth.

Parameters:

<RbCount> integer

Range: 0 to 110
*RST: 4

Example: `BB:ONEWeb:UL:PUCC:NORB 3`
Reserves 3 RBs for PUCCH

Manual operation: See "Number of RBs used for PUCCH" on page 70

5.11 UL frame configuration

Option: R&S SMW-K130

[:SOURce<hw>]:BB:ONEWeb:UL:RSTFrame

Resets all subframe settings of the selected link direction to the default values.

Example: `BB:ONEWeb:UL:RSTF`
Resets the uplink subframe parameters of path A to the default settings.

Manual operation: See "Reset All Subframes" on page 76

[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>:CONSubframes:PUACh <ConfSubframes>
[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>:CONSubframes:PUCCh <ConSubframes>
[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>:CONSubframes:PUSCh <ConfSubframes>

Sets the number of configurable subframes.

Parameters:
<ConfSubframes> integer
Range: 1 to 40
*RST: 1

Example:
```
SOURce1:BB:ONEWeb:UL:UE1:ID 100
SOURce1:BB:ONEWeb:UL:UE2:ID 100
SOURce1:BB:ONEWeb:UL:UE1:CONSubframes:PUCCh 10
SOURce1:BB:ONEWeb:UL:UE1:CONSubframes:PUSCh 10
SOURce1:BB:ONEWeb:UL:UE1:CONSubframes:PUACh 10
SOURce1:BB:ONEWeb:UL:UE2:CONSubframes:PUCCh 8
SOURce1:BB:ONEWeb:UL:UE2:CONSubframes:PUSCh 8
SOURce1:BB:ONEWeb:UL:UE2:CONSubframes:PUACh 8
```

Manual operation: See "Number Of PUCCH/PUSCH/PUACH Configurations/ Number Of Configurable Subframes" on page 74

[:SOURce<hw>]:BB:ONEWeb:UL[:SUBF<st0>]:ALLoc<ch0>:CONType <ContentType>

Selects the content type for the selected allocation.

Parameters:

<ContentType> PUSCh | PUCCh | PUACh
*RST: PUSCh

Example: `BB:ONEWeb:UL:SUBF4:ALL2:CONT PUSC`

Manual operation: See "Content (UL)" on page 77
See "UE/Content Type" on page 82

[:SOURce<hw>]:BB:ONEWeb:UL[:SUBF<st0>]:ALLoc<ch0>[:PUCCh]:FORMat <Format>

Sets the PUCCH Format.

Parameters:

<Format> F1 | F1A | F1B | F2 | F2A | F2B | F3
*RST: F1

Example:
```
SOUR:BB:ONEWeb:UL:SUBF4:ALL2:CONT PUCC
SOUR:BB:ONEWeb:UL:SUBF4:ALL2:FORM F2A
```

Manual operation: See "Modulation/Format" on page 78
See "PUCCH Format" on page 90

[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>:PUACh:DRS:DELTa <DeltaPuach>

Delta PUACH is used to differentiate the DMRS (PUSCH DMRS or PUACH DMRS) used in the uplink scheduling assignment.

Parameters:

<DeltaPuach> integer
Range: 0 to 1
*RST: 0

Manual operation: See "Delta PUACH" on page 83

[:SOURce<hw>]:BB:ONEWeb:UL[:SUBF<st0>]:ALLoc<ch0>:PUCCh:RBCount?
[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>:PUACh:SET<user>:RBCount <NumberOfRBs>
[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>:PUSCh:SET<user>:RBCount <NumberOfRBs>

Sets the size of the selected allocation in resource blocks (per subframe).

Suffix:

<user> 1..2

Parameters:

<NumberOfRBs> integer

Range: 0 to 110
*RST: 0

Example:

```
BB:ONEWeb:UL:SUBF0:ALL1:RBC 3
BB:ONEWeb:UL:SUBF0:ALL2:PUCC:RBC ?
BB:ONEWeb:UL:SUBF0:ALL2:PUSC:SET1:RBC 4
BB:ONEWeb:UL:SUBF0:ALL2:PUSC:SET1:VRB 5
```

Manual operation: See "Set 1 No. RB" on page 78

[:SOURce<hw>]:BB:ONEWeb:UL[:SUBF<st0>]:ALLoc<ch0>:VRBoffset <VrbOffset>
[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>:PUACh:SET<user>:VRBoffset <NumberOfVRBs>
[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>:PUSCh:SET<user>:VRBoffset <NumberOfVRBs>

Sets the virtual resource block offset of the selected subframe.

Suffix:

<user> 1..2

Parameters:

<NumberOfVRBs> integer

Range: 0 to 49
*RST: 0

Example:

```
BB:ONEWeb:UL:SUBF0:ALL1:VRB 6
BB:ONEWeb:UL:SUBF0:ALL2:PUSC:SET1:VRB 5
BB:ONEWeb:UL:SUBF0:ALL2:PUSC:SET1:VRB 15
```

Manual operation: See "Set 1 Offset VRB" on page 79

[:SOURce<hw>]:BB:ONEWeb:UL[:SUBF<st0>]:SLOT<user0>:ALLoc<ch0>:RBOFfset?
[:SOURce<hw>]:BB:ONEWeb:UL[:SUBF<st0>]:SLOT<user0>:ALLoc<ch0>:PUCCh:RBOFfset?
[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:SLOT<user0>:ALLoc<ch0>:PUACh:SET<gr>:RBOFfset?
[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:SLOT<user0>:ALLoc<ch0>:PUSCh:SET<gr>:RBOFfset?

Queries the start resource block of the selected allocation in slot n of the subframe.

Suffix:

<user0> 0..1

<s2us> 1..2

Return values:
<RbOffs> integer
Range: 0 to 49
*RST: 2

Usage: Query only

Manual operation: See "Offset PRB Slot (n/n+1)" on page 79

[:SOURce<hw>]:BB:ONEWeb:UL[:SUBF<st0>]:ALLoc<ch0>:PUCCh:PHYSbits?
[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>[:CW<cwid>]:PUACh:PHYSbits?
[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>[:CW<cwid>]:PUSCh:PHYSbits?

Queries the number of physical bits for the selected allocation.

Suffix:
<cwid> 1..2
Codeword

Return values:
<PuscPhysBits> integer
Range: -1 to 105600
*RST: -1

Example:
```
SOURce1:BB:ONEWeb:UL:SUBF4:ALLoc2:CW1:PUSCh:PHYSbits?
```

Usage: Query only

Manual operation: See "Phys. Bits / Total Number of Physical Bits" on page 80
See "Phys. Bits / Total Number of Physical Bits" on page 88

[:SOURce<hw>]:BB:ONEWeb:UL[:SUBF<st0>]:ALLoc<ch0>:POWer <Power>
[:SOURce<hw>]:BB:ONEWeb:UL[:SUBF<st0>]:ALLoc<ch0>:PUCCh:POWer <PuccPower>
[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>:PUACh:POWer <PuacPower>
[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>:PUSCh:POWer <PuscPower>

Sets the power for the selected allocation.

Parameters:
<PuscPower> float
Range: -80 to 10
Increment: 0.001
*RST: 0

Example:
```
BB:ONEWeb:UL:SUBF4:ALL1:POW 3.00
BB:ONEWeb:UL:SUBF4:ALL2:PUSH:POW -1.00
BB:ONEWeb:UL:SUBF4:ALL2:PUCC:POW -1.00
BB:ONEWeb:UL:SUBF4:ALL2:PUAC:POW -1.00
```

Manual operation: See "Power (UL)" on page 80

[:SOURce<hw>]:BB:ONEWeb:UL[:SUBF<st0>]:ALLoc<ch0>:PUCCh:STATe <PuccState>
[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>:PUACh:STATe <PuacState>
[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>:PUSCh:STATe <PuscState>

Sets the allocation state to active or inactive.

Note: Disabling an allocation deactivate the PUACH/PUSCH/PUCCH and the corresponding demodulation reference signal, but does not affect other allocations of the UE or the sounding reference signal.

Parameters:
<PuscState> 1 | ON | 0 | OFF
*RST: dynamic

Manual operation: See "State (UL)" on page 80

[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>:PUACh:CONFlict?
[:SOURce<hw>]:BB:ONEWeb:UL[:SUBF<st0>]:ALLoc<ch0>:PUCCh:CONFlict?
[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>:PUSCh:CONFlict?

Indicates a conflict between two allocations.

Return values:
<PuscConflict> 1 | ON | 0 | OFF
*RST: 0

Usage: Query only

Manual operation: See "Conflict (UL)" on page 81

[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>:PUSCh:CQI:BITS <Bits>

Sets the number of CQI bits before channel coding.

Parameters:
<Bits> integer
Range: dynamic to 1024
*RST: 10

Example: See [:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>:PUSCh:CQI:PATTern on page 213

Manual operation: See "Number of CQI Bits" on page 86

[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>:PUSCh:CQI:CBITs?

Queries the number of coded CQI bits.

Return values:

<CodedBits> integer

Range: 0 to max
*RST: 22

Example:
```
SOURce1:BB:ONEWeb:UL:SUBF4:ALLoc2:PUSCh:CQI:CBITs?
```
Queries the number of coded CQI bits

Usage: Query only

Manual operation: See "Number of Coded CQI Bits" on page 87

[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>:PUSCh:CQI:PATTern <Pattern>, <BitCount>

Sets the CQI pattern for the PUSCH.

The length of the pattern is determined by the number of CQI bits ([:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>:PUSCh:CQI:CBITs?).

Parameters:

<Pattern> numeric

*RST: #H0

<BitCount> integer

Range: 1 to 1024
*RST: 1

Example:
```
SOURce1:BB:ONEWeb:UL:SUBF4:ALLoc2:PUSCh:CQI:BITS 6
SOURce1:BB:ONEWeb:UL:SUBF4:ALLoc2:PUSCh:CQI:PATTern #H100100,6
```

Manual operation: See "CQI Pattern" on page 87

[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>:PUACh:CODWords <NumOfCodeWords>
[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>:PUSCh:CODWords <NumOfCodeWords>

Queries the number of the used codeword.

Parameters:
<NumOfCodeWords> integer
Range: 1 to 2
*RST: 1

Example:
```
SOURce1:BB:ONEWeb:UL:CELL0:SUBF0:ALLoc0:PUSCh:CODWords?
```

Manual operation: See "Codeword (UL)" on page 77

[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>[:CW<cwid>]:PUACh:MODulation <Modulation>
[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>[:CW<cwid>]:PUSCh:MODulation <Modulation>

Selects the modulation scheme for the allocation.

Suffix:
<cwid> 1..2
Codeword

Parameters:
<Modulation> QPSK | QAM16 | QAM64 | PSK8 | QAM256
*RST: QPSK

Example:
```
SOURce1:BB:ONEWeb:UL:SUBF0:ALLoc0:CONType PUSCh
SOURce1:BB:ONEWeb:UL:SUBF0:ALLoc0:PUSCh:CODWords 1
SOURce1:BB:ONEWeb:UL:SUBF0:ALLoc0:CW1:MODulation QPSK
SOURce1:BB:ONEWeb:UL:SUBF0:ALLoc0:PHYSbits?
```

Manual operation: See "Modulation/Format" on page 78

[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>:PUACh:DRS:CYCShift <Cyclicshift>
[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>:PUSCh:DRS:CYCShift <Cyclicshift>

Sets the cyclic shift field in the uplink-related DCI formats.

Suffix:
<st0> 0..39
Subframe

<ch0> 0..3
Allocation

Parameters:

<Cyclicshift> int

Range: 0 to 7
Increment: 1
*RST: 0

Example: See `[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>:PUSCh:NDMRs` on page 215

Manual operation: See "Cyclic Shift Field" on page 83

[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>:PUACh:NDMRs <Ndmrs>
[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>:PUSCh:NDMRs <Ndmrs>

Sets the parameter n(2)_DMRS,λ (Layer λ).

Parameters:

<Ndmrs> integer

Range: 0 to 10
*RST: 0

Example:
```
SOURce1:BB:ONEWeb:UL:SUBF0:ALLoc1:PUSCh:DRS:CYCShift 1
SOURce1:BB:ONEWeb:UL:SUBF0:ALLoc1:PUSCh:NDMRs 1
```

Manual operation: See "n(2)_DMRS, 0 (Layer 0)" on page 83

[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>:PUSCh:HARQ:BITS <Bits>

Sets the number of ACK/NACK bits.

Set this parameter to 0 to deactivate the ACK/NACK transmission for the corresponding subframe.

Parameters:

<Bits> integer

Range: 0 to dynamic
*RST: 1

Example:
```
BB:ONEWeb:UL:SUBF4:ALL2:PUSC:HARQ:BITS 2
```
Sets the number of A/N bits

Manual operation: See "Number of A/N Bits" on page 85

[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>:PUSCh:HARQ:MODE?

Queries the ACK/NACK mode.

Return values:
<Mode> MUX
*RST: MUX

Example: `BB:ONEWeb:UL:SUBF4:ALL2:PUSC:HARQ:MODE?`

Usage: Query only

Manual operation: See "ACK/NACK Mode" on page 85

[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>:PUSCh:HARQ:PATTern <Pattern>, <BitCount>

Sets the ACK/NACK pattern for the PUSCH.

Parameters:
<Pattern> numeric
*RST: #H0

<BitCount> integer
Range: 1 to 64
*RST: 1

Example:
```
// Set 2-bit HARQ-ACK control information
BB:ONEWeb:UL:SUBF4:ALL2:PUSC:HARQ:ACKT BIT2
BB:ONEWeb:UL:SUBF4:ALL2:PUSC:HARQ:PATT #B10,2
```

Manual operation: See "ACK/NACK Pattern" on page 85

[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>[:CW<cwid>]:PUSCh:HARQ:CBITs?

Queries the number of coded ACK/NACK bits per codeword.

Suffix:
<cwid> 1..2
Codeword

Return values:
<Codedbits> integer
Range: 0 to max
Increment: 0
*RST: 2

Example:
```
SOURce1:BB:ONEWeb:UL:SUBF4:ALLoc2:PUSCh:HARQ:BITS 2
```
Sets the number of A/N bits
```
SOURce1:BB:ONEWeb:UL:SUBF4:ALLoc2:CW1:PUSCh:HARQ:CBITs?
Response: 8
```

Usage: Query only

Manual operation: See "Number of Coded A/N Bits (CW)" on page 86

[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>[:CW<cwid>]:PUACh:CCODing:RVINdex <RedundVersIndex>
[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>[:CW<cwid>]:PUSCh:CCODing:RVINdex <RedundVersIndex>

Sets the redundancy version index.

Suffix:
<cwid> 1..2
Codeword

Parameters:
<RedundVersIndex> integer
Range: 0 to 3
*RST: 0

Example:
```
SOURce1:BB:ONEWeb:UL:SUBF4:ALLoc2:CW1:PUSCh:CCODing:RVINdex 2
```
Sets the redundancy version index

Manual operation: See "Redundancy Version Index (PUSCH/PUACH)" on page 88

[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>[:CW<cwid>]:PUACh:CCODing:TBSize <TranspBlockSize>
[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>[:CW<cwid>]:PUSCh:CCODing:TBSize <TranspBlockSize>

Sets the size of the transport block.

Suffix:
<cwid> 1..2
Codeword

Parameters:
<TranspBlockSize> integer
Range: 1 to 100000
*RST: 1500

Example:
```
SOURce1:BB:ONEWeb:UL:SUBF4:ALLoc2:CW0:PUSCh:CCODing:TBSize 100
SOURce1:BB:ONEWeb:UL:SUBF4:ALLoc2:CW2:PUSCh:CCODing:TBSize 1500
```

Manual operation: See "Transport Block Size/Payload (PUSCH/PUACH)" on page 88

[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>[:CW<cwid>]:PUACh:ULSCh:BITS?
[:SOURce<hw>]:BB:ONEWeb:UL[:CELL<ccidx>][:SUBF<st0>]:ALLoc<ch0>[:CW<cwid>]:PUSCh:ULSCh:BITS?

Queries the number of physical bits used for UL-SCH transmission.

Suffix:
<cwid> 1..2
Codeword

Return values:
<PhysBitCount> integer
Range: 0 to max
*RST: 1500

Example: `SOURce1:BB:ONEWeb:UL:SUBF0:ALLoc0:CW1:PUSCh:ULSCh:BITS?`
Queries the number of physical bits for UL-SCH
`Response: 5688`

Usage: Query only

Manual operation: See "Number of Coded UL-SCH Bits" on page 88

[:SOURce<hw>]:BB:ONEWeb:UL[:SUBF<st0>]:ALLoc<ch0>:PUCCh:CQI:BITS
<Bits>

Sets the number of CQI bits before channel coding.

Parameters:
<Bits> integer
Range: 1 to 13
*RST: 4

Example: See `[:SOURce<hw>]:BB:ONEWeb:UL[:SUBF<st0>]:ALLoc<ch0>:PUCCh:CQI:PATTern` on page 219

Manual operation: See "Number of CQI Bits" on page 93

[:SOURce<hw>]:BB:ONEWeb:UL[:SUBF<st0>]:ALLoc<ch0>:PUCCh:CQI:CBITs?

Queries the number of coded CQI bits.

Return values:
<CodedBits> integer
Range: 0 to max
*RST: 20

Example: `SOURce1:BB:ONEWeb:UL:SUBF4:ALLoc2:PUCCh:CQI:CBITs?`
Queries sets the number of coded CQI bits
`Response: 20`

Usage: Query only

Manual operation: See "Number of Coded CQI Bits" on page 93

[:SOURce<hw>]:BB:ONEWeb:UL[:SUBF<st0>]:ALLoc<ch0>:PUCCh:CQI:PATTern <Pattern>, <BitCount>

Sets the CQI pattern for the PUCCH.

The length of the pattern is determined by the number of CQI bits (`[:SOURce<hw>]:BB:ONEWeb:UL[:SUBF<st0>]:ALLoc<ch0>:PUCCh:CQI:CBITs?`).

Parameters:

<Pattern> numeric
*RST: #H1

<BitCount> integer
Range: 1 to 13
*RST: 4

Example:
```
SOURce1:BB:ONEWeb:UL:SUBF4:ALLoc2:PUCCh:CQI:BITS 6
SOURce1:BB:ONEWeb:UL:SUBF4:ALLoc2:PUCCh:CQI:PATTern #B100100,6
```

Manual operation: See "CQI Pattern" on page 93

[:SOURce<hw>]:BB:ONEWeb:UL[:SUBF<st0>]:ALLoc<ch0>:PUCCh:HARQ:BITS <Bits>

(PUCCH format ≥3)

Sets the number of ACK/NACK+SR+CSI bits before channel coding.

Parameters:

<Bits> Max number of bits depend on the PUCCH format
Range: 1 to dynamic
*RST: 1

Manual operation: See "Number of A/N+SR+CSI Bits" on page 93

[:SOURce<hw>]:BB:ONEWeb:UL[:SUBF<st0>]:ALLoc<ch0>:PUCCh:HARQ:PATTern <Pattern>, <BitCount>
[:SOURce<hw>]:BB:ONEWeb:UL[:SUBF<st0>]:ALLoc<ch0>:PUCCh:HARQ:ANPattern <AckNackPattern>, <BitCount>

Sets the PUCCH ACK/NACK pattern or ACK/NACK + SR pattern per subframe.

Parameters:

<AckNackPattern> numeric
*RST: #H0

<BitCount> integer
Range: 1 to 32
*RST: 1

Example:
```
SOURce1:BB:ONEWeb:SLENgth 4
SOURce1:BB:ONEWeb:UL:UE1:CONSubframes:PUCCh 8
SOURce1:BB:ONEWeb:UL:SUBF0:ALLoc1:FORMat F1A
SOURce1:BB:ONEWeb:UL:SUBF4:ALLoc2:PUCCh:HARQ:
ANPattern #B01001,5
SOURce1:BB:ONEWeb:UL:SUBF0:ALLoc1:FORMat F1B
```

Manual operation: See "A/N Pattern / A/N+SR+CSI Pattern" on page 91

[:SOURce<hw>]:BB:ONEWeb:UL[:SUBF<st0>]:ALLoc<ch0>:PUCCh:HARQ:CBITs?

(PUCCH format ≥3)

Queries the number of coded ACK/NACK+SR+CSI bits.

Return values:

<CBits> integer

Range: 0 to 48
*RST: 0

Usage: Query only

Manual operation: See "Number of Coded A/N+SR+CSI Bits" on page 93

[:SOURce<hw>]:BB:ONEWeb:UL[:SUBF<st0>]:ALLoc<ch0>:PUCCh:NPAR<ap> <NPar>

Sets the resource index for the supported PUCCH formats.

Suffix:

<ap> 0..1
Antenna port index

Parameters:

<NPar> integer

Range: 0 to n(1)_PUCCH_max / n(2)_PUCCH_max / n(3)_PUCCH_max
*RST: 0

Example:
```
SOURce1:BB:ONEWeb:UL:SUBF1:ALLoc2:PUCCh:NPAR0
10
```
Sets the n_PUCCH parameter

Manual operation: See "n_PUCCH" on page 90

5.12 User equipment

Option: R&S SMW-K130

[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>:ID <Id>

Sets the radio network temporary identifier (RNTI) of the UE.

Parameters:

<Id> integer

Range: 0 to 65535
*RST: 0

Example: `BB:ONEWeb:UL:UE3:ID 303`
Sets the UE ID

Manual operation: See "UE ID/n_RNTI" on page 95

[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>:MODE <Mode>

Selects whether the user equipment is in standard or in PRACH mode.

Parameters:

<Mode> STD | PRACh

*RST: STD

Example: `BB:ONEWeb:UL:UE:MODE STD`
Selects the standard mode for UE1.

[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>:POWer <Power>

Sets the power level of the selected UE.

Parameters:

<Power> float

Range: -80 to 10
Increment: 0.001
*RST: 0

Example: `BB:ONEWeb:UL:UE2:POW -5.0`
Sets the power of UE2

Manual operation: See "UE Power" on page 95
See "Mode" on page 95

[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>:STATe <State>

Selects the user equipment state.

Parameters:

<State> 1 | ON | 0 | OFF

*RST: 1 (UE1); 0 (UE2 to UE4)

Example: `BB:ONEWeb:UL:UE2:STAT ON`
Activates UE2.

Manual operation: See "UEx" on page 74
See "State" on page 95

[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:PUACh:CCODing:ICQioffset <IcqiOffset>
[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:PUSCh:CCODing:ICQioffset <IcqiOffset>

Sets the CQI offset index for control information MCS offset determination.

Parameters:
<IcqiOffset> integer
Range: 2 to 15
*RST: 2

Example: `BB:ONEWeb:UL:UE2:PUSC:CCOD:MODE COMB`
Enables multiplexing of the control information (UCI) and data (UL-SCH) on the PUSCH for UE2
`BB:ONEWeb:UL:UE2:PUSC:CCOD:ICQ 5`
Sets the CQI offset index

Manual operation: See "I_CQI_offset" on page 98

[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:PUACh:CCODing:IHARqoffset <IHarqOffset>
[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:PUSCh:CCODing:IHARqoffset <IHarqOffset>

Sets the HARQ-ACK offset index for control information MCS offset determination.

Parameters:
<IHarqOffset> integer
Range: 0 to 14
*RST: 0

Example: `BB:ONEWeb:UL:UE2:PUSC:CCOD:MODE COMB`
Enables multiplexing of the control information (UCI) and data (UL-SCH) on the PUSCH for UE2
`BB:ONEWeb:UL:UE2:PUSC:CCOD:IHAR 5`
Sets the HARQ-ACK offset index

Manual operation: See "I_HARQ_offset" on page 98

[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:PUACh:CCODing:MODE?

Queries the channel coding and multiplexing mode for PUACH.

Return values:
<Mode> ULSChonly
*RST: ULSChonly

Usage: Query only

Manual operation: See "Mode Channel Coding" on page 98

[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:PUSCh:CCODing:MODE <Mode>

Sets the information transmitted on the PUSCH.

Parameters:

<Mode> ULSChonly | UCIonly | COMBined

COMBined
Control information and data are multiplexed into the PUSCH.

ULSChonly
Only data is transmitted on PUSCH.

UCIonly
Only uplink control information is transmitted on PUSCH.

*RST: ULSChonly

Example: `BB:ONEWeb:UL:UE2:PUSC:CCOD:MODE COMB`
Enables multiplexing of the control information (UCI) and data (UL-SCH) on the PUSCH for UE2

Manual operation: See "Mode Channel Coding" on page 98

[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:PUACh:CCODing:OCQimin <ChanCodOCQIMin>
[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:PUSCh:CCODing:OCQimin <ChanCodOCQIMin>

For PUSCH/PUACH channel coding and multiplexing mode UCI only, sets the parameter O_CQI-Min.

Parameters:

<ChanCodOCQIMin> integer

Range: 1 to 472
*RST: 1

Example:
```
SOURce1:BB:ONEWeb:UL:UE1:PUSCh:CCODing:MODE UCI
SOURce1:BB:ONEWeb:UL:UE1:PUSCh:CCODing:OCQimin 7
```

Manual operation: See "O_CQI-Min" on page 98

[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:PUACh:CCODing:STATe <State>
[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:PUSCh:CCODing:STATe <State>

Enables/disables channel coding and multiplexing of data and control information for all PUSCH/PUACH allocations of the corresponding UE.

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

Example: `BB:ONEWeb:UL:UE2:PUSC:CCOD:STAT ON`
Enables channel coding for UE2

Manual operation: See "State Channel Coding and Multiplexing (PUSCH)" on page 98

[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:PUACh:DATA <Data>
[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:PUSCh:DATA <Data>

Selects the PUSCH/PUACH data source of the selected UE. For the selected UE, this data source is used for the PUSCH/PUACH channel in every subframe where this channel is configured.

Parameters:
<Data> PN9 | PN11 | PN15 | PN16 | PN20 | PN21 | PN23 | PATTern | DLISt | ZERO | ONE
*RST: PN9

Example: `SOURce1:BB:ONEWeb:UL:UE3:PUSCh:DATA PN11`

Manual operation: See "Data Source" on page 97

[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:PUACh:DSELect
<Filename>
[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:PUSCh:DSELect
<Filename>

Selects an existing data list file from the default directory or from the specific directory.

Parameters:
<Filename> string
Filename incl. file extension or complete file path

Example:
```
SOURce1:BB:ONEWeb:UL:UE3:PUSCh:DATA DLISt
SOURce1:BB:ONEWeb:UL:UE3:PUSCh:DSELect
"/var/user/oneweb_data_list"
```

Manual operation: See "Data Source" on page 97

[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:PUACh:PATTern
<Pattern>, <BitCount>
[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:PUSCh:PATTern
<Pattern>, <BitCount>

Sets the bit pattern.

Parameters:
<Pattern> numeric
*RST: #H0

<BitCount> integer
Range: 1 to 64
*RST: 1

Example:
```
BB:ONEWeb:UL:UE2:PUSC:DATA PATT
BB:ONEWeb:UL:UE2:PUSC:PATT #H3F,8
```

Manual operation: See "Data Source" on page 97

[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:PUACh:SCRambling:STATe <State>
[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:PUSCh:SCRambling:STATe <State>

Enables/disables scrambling for all PUSCH/PUACH allocations of the corresponding UE.

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

Example:
```
BB:ONEWeb:UL:UE2:PUSC:SCR:STAT ON
```
Enables scrambling for UE2

Manual operation: See "State Scrambling (PUSCH/PUACH)" on page 97

[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>:PRACh:PRFormat?

Queries the preamble format.

Return values:
<PreaFormat> integer
Range: 0 to 3
*RST: 0

Example:
```
BB:ONEWeb:UL:UE1:PRAC:PRF?
```
Queries the preamble format.

Usage: Query only

Manual operation: See "Preamble Format (Burst Format)" on page 112

[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>:PRACh:PRSTate <State>

Activates Power Ramping for the PRACH preamble. The start and the end of the preamble is cyclically extended and multiplied with a ramping function (sin^2).

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

Example:
```
BB:ONEWeb:UL:UE1:MODE PRAC
BB:ONEWeb:UL:UE1:PRAC:PRST ON
```

Manual operation: See "State PRACH Power Ramping" on page 110

[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>:PRACh:PRTT <TransitionTime>

Sets the transition time from beginning of the extended preamble to the start of the preamble itself.

Parameters:

<TransitionTime> float

Range: 0 to 3E-5
Increment: 1E-7
*RST: 2E-5

Example:
```
BB:ONEWeb:UL:UE1:MODE PRAC
BB:ONEWeb:UL:UE1:PRAC:PRST ON
BB:ONEWeb:UL:UE1:PRAC:PRTT 15us
```

Manual operation: See "Transition Time" on page 111

[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>:PRACh:SUBF<ch0>:DT <DeltaTime>

Sets the parameter delta_t in us.

Parameters:

<DeltaTime> float

Range: -500 to 500
Increment: 0.01
*RST: 0
Default unit: us

Example:
```
SOURce1:BB:ONEWeb:UL:UE1:PRACh:SUBF2:DT 300
```

Manual operation: See "Delta t/us" on page 113

[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>:PRACh:SUBF<ch0>:NCSConf <NcsConfig>

Selects the Ncs configuration of the selected subframe.

Parameters:

<NcsConfig> integer

Range: 0 to 15
*RST: 0

Example:
```
BB:ONEWeb:UL:UE1:PRAC:SUBF2:NCSC 2
```
Sets the Ncs Configuration

Manual operation: See "Ncs Configuration" on page 112

[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>:PRACh:SUBF<ch0>:POWer <Power>

Sets the PRACH power relative to the UE power. The PRACH power can be adjusted independently for every configured preamble.

Parameters:

<Power> float

Range: -80 to 10
Increment: 0.001
*RST: 0

Example: `BB:ONEWeb:UL:UE1:PRAC:SUBF2:POW -3`
Sets the power

Manual operation: See "Power (PRACH)" on page 113

[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>:PRACh:SUBF<ch0>:RBOFfset?

Queries the starting RB, as set with the command `[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>:PRACh:SUBF<ch0>:RBOFfset?`.

Return values:

<RbOffset> integer

Range: 0 to 109
*RST: 0

Example: `BB:ONEWeb:UL:UE1:PRAC:SUBF2:RBOF?`
Queries the RB offset.

Usage: Query only

Manual operation: See "RB Offset" on page 112

[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>:PRACh:SUBF<ch0>:RSEQuence <RootSequence>

Selects the logical root sequence index for the selected subframe.

Parameters:

<RootSequence> integer

Range: 0 to 838
*RST: 0

Example: `BB:ONEWeb:UL:UE1:PRAC:SUBF2:RSEQ 200`
Sets the root sequence.

Manual operation: See "Logical Root Sequence Index" on page 112

[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>:PRACh:SUBF<ch0>:SINDex <SequenceIndex>

Selects the sequence index v.

Parameters:

<SequenceIndex> integer

Range: 0 to 63
*RST: 0

Example: `BB:ONEWeb:UL:UE1:PRAC:SUBF2:SIND 30`
Sets the sequence index

Manual operation: See "Sequence Index (v)" on page 113

[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>:PRACh:SUBF<ch0>:STATe <State>

Enables/disables the PRACH for the selected subframe.

The subframes available for configuration depend on the selected PRACH configuration.

Parameters:

<State> 1 | ON | 0 | OFF

*RST: 0

Example: `BB:ONEWeb:UL:UE1:PRAC:SUBF2:STAT ON`
Activates PRACH in subframe 2 for UE1.

Manual operation: See "State (PRACH)" on page 113

[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:REFSig:DRS:POWoffset <PowerOffset>

Sets the power offset of the demodulation reference signal (DRS) relative to the power level of the PUSCH/PUCCH allocation of the corresponding subframe.

Parameters:

<PowerOffset> float

Range: -80 to 10
Increment: 0.001
*RST: 0

Example: `BB:ONEWeb:UL:UE2:REFS:DRS:POW -2`

Manual operation: See "DRS Power Offset" on page 99

[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:REFSig:SRS:BHOP <BandwidthHopp>

Sets the UE-specific parameter frequency hopping bandwidth b_{hop}.

Parameters:

<BandwidthHopp> integer

Range: 0 to 3
*RST: 0

Example: `BB:ONEWeb:UL:UE2:REFS:SRS:BHOP 2`
Sets the SRS hopping bandwidth

Manual operation: See "Hopping Bandwidth b_hop" on page 108

[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:REFSig:SRS:POWoffset
<PowerOffset>

Sets the power offset of the Sounding Reference Signal (SRS) relative to the power of the corresponding UE.

Parameters:
<PowerOffset> float
Range: -80 to 10
Increment: 0.001
*RST: 0

Example: `BB:ONEWeb:UL:UE2:REFS:SRS:POW -2`
Sets the sounding reference symbol power offset to -2 dB.

Manual operation: See "SRS Power Offset" on page 102

[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:REFSig:SRS:STATe
<State>

Enables sending of SRS for the corresponding UE.

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

Example: See `[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:REFSig:SRS:TT0` on page 230

Manual operation: See "SRS State" on page 102

[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:REFSig:SRS:TT0
<TType0>

Enables transmission of trigger type 0.

Parameters:
<TType0> 1 | ON | 0 | OFF
*RST: 1

Example:
```
:SOURce1:BB:ONEWeb:LINK UP
:SOURce1:BB:ONEWeb:UL:UE1:STATe 1
:SOURce1:BB:ONEWeb:UL:UE1:CELL0:REFSig:SRS1:
STATe 1
:SOURce1:BB:ONEWeb:UL:UE1:CELL0:REFSig:SRS1:TT0
1
:SOURce1:BB:ONEWeb:UL:UE1:CELL0:REFSig:SRS1:
CYCShift 3
:SOURce1:BB:ONEWeb:UL:UE1:CELL0:REFSig:SRS1:
ISRS 3
:SOURce1:BB:ONEWeb:UL:UE1:CELL0:REFSig:SRS1:
TRComb 1
:SOURce1:BB:ONEWeb:UL:UE1:CELL0:REFSig:SRS1:
BHOP 2
```

Manual operation: See "Transmit Trigger Type 0" on page 102

[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:REFSig:SRS[<srsidx>]:BSRS <Bsrs>

Sets the UE-specific parameter SRS bandwidth B_{SRS}.

Parameters:

<Bsrs> integer

Range: 0 to 3
*RST: 0

Example:
```
BB:ONEWeb:UL:UE2:REFS:SRS:BSRS 2
```
Sets the SRS bandwidth configuration

Manual operation: See "SRS Bandwidth B_SRS" on page 105

[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:REFSig:SRS[<srsidx>]:CYCShift <CyclicShift>

Sets the cyclic shift used for the generation of the sounding reference signal CAZAC sequence.

Parameters:

<CyclicShift> integer

Range: 0 to 7
*RST: 0

Example:
```
BB:ONEWeb:UL:UE2:REFS:SRS:CYCS 5
```
Sets the SRS cyclic shift for UE2

Manual operation: See "SRS Cyclic Shift n_cs (First AP)" on page 103

[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:REFSig:SRS[<srsidx>]:ISRS <Isrs>

Sets the UE-specific parameter SRS configuration index I_{SRS}.

Parameters:

<Isrs> integer

Range: 0 to 1023
*RST: 0

Example: `BB:ONEWeb:DUPL FDD`
Sets the duplexing mode
`BB:ONEWeb:UL:UE2:REFS:SRS:ISRS 22`
Sets the SRS configuration index

Manual operation: See "Configuration Index I_SRS" on page 103

[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:REFSig:SRS[<srsidx>]:NRRC <Nrrc>

Sets the UE-specific parameter `frqDomainPosition` n_{RRC}

Parameters:

<Nrrc> integer

Range: 0 to 23
*RST: 0

Example: `BB:ONEWeb:UL:UE2:REFS:SRS:NRRC 10`
Sets the SRS frequency domain position

Manual operation: See "Freq. Domain Position n_RRC" on page 108

[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:REFSig:SRS[<srsidx>]:NTRans <Transmissions>

Sets the number of SRS transmissions.

Parameters:

<Transmissions> integer

Range: 0 to (10*SeqLengthARB - 1)
*RST: 0

Example: See `[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:REFSig:SRS:TT0` on page 230

Manual operation: See "Number of Transmissions" on page 108

[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:REFSig:SRS[<srsidx>]:SUBF<subfidx> <Subframe>

Sets the subframes in that SRS is transmitted.

Suffix:
<subfidx> 1 to 50
Transmission number, as set with `[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:REFSig:SRS[<srsidx>]:NTRans`

Parameters:
<Subframe> integer
Range: 0 to (10*SeqLengthARB - 1)
*RST: 0

Example: See `[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:REFSig:SRS:TTO` on page 230

Manual operation: See "Subframes for Transmission" on page 108

[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:REFSig:SRS[<srsidx>]:TOFFset?

Queries the UE-specific parameter SRS subframe offset T_{offset}.

Return values:
<TOffset> integer
Range: 0 to 320
*RST: 0

Example:
```
BB:ONEWeb:DUPL FDD
```
Sets the duplexing mode
```
BB:ONEWeb:UL:UE2:REFS:SRS:ISRS 22
```
Sets the SRS configuration index
```
BB:ONEWeb:UL:UE2:REFS:SRS:TOFF?
```
Queries the SRS subframe offset
```
Response: 5
```

Usage: Query only

Manual operation: See "Subframe Offset T_offset" on page 104

[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:REFSig:SRS[<srsidx>]:TRComb <TransmComb>

Sets the UE-specific parameter transmission comb k_{TC}.

Parameters:
<TransmComb> integer
Range: 0 to 1
*RST: 0

Example:
```
BB:ONEWeb:UL:UE2:REFS:SRS:TRC 1
```
Sets the SRS transmission comb

Manual operation: See "Transmission Comb k TC" on page 108

[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:REFSig:SRS[<srsidx>]:TSRS?

Queries the UE-specific parameter SRS periodicity T_{SRS}.

The value depends on the selected SRS configuration index I_{SRS} (`[:SOURce<hw>]:BB:ONEWeb:UL:UE<st>[:CELL<ccidx>]:REFSig:SRS[<srsidx>]:ISRS`) and duplexing mode (`[:SOURce<hw>]:BB:ONEWeb:DUPLexing?`).

Return values:

<PeriodTsrs> integer

Range: 0 to 65535
*RST: 0

Example:

```
BB:ONEWeb:DUPL FDD
```
Sets the duplexing mode
```
BB:ONEWeb:UL:UE2:REFS:SRS:ISRS 22
```
Sets the SRS configuration index
```
BB:ONEWeb:UL:UE2:REFS:SRS:TSRS?
```
Queries the SRS periodicity
```
Response: 20 ms
```

Usage: Query only

Manual operation: See "Periodicity T_SRS" on page 103

Annex

A Conflict handling

The following chapters provide information on OneWeb conflict handling in downlink, uplink and DCI settings.

A.1 Downlink

R&S SMW supports the following types of downlink signals and channels (see Figure A-1):

- Reference signals (RS)
- Primary synchronization signal (PSS)
- Physical broadcast channel (PBCH)
- Physical Downlink Control Channel (PDCCH)
- Physical control format indicator channel (PCFICH)
- Physical Downlink Shared Channel (PDSCH)

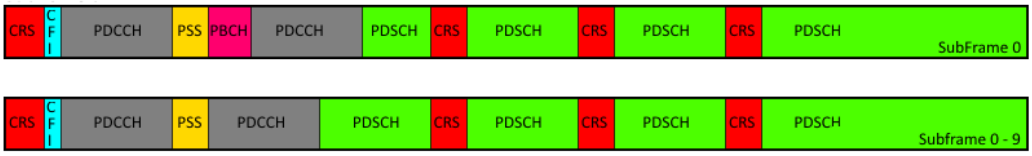


Figure A-1: OneWeb downlink for resource block (RB) mapping in subframes

Due to the concept of the R&S SMW, different situations can appear that need clarification. If several signals and/or channels (of the same or different type) partly share resources, a decision has to be made on how resource blocks are mapped to the affected subcarriers.

The maximum resource block (RB) that can be allocated in one subframe is 1152.

In OneWeb system, the CRS, PCFICH, PSS and PBCH have fix RB position in the subframe. For PDCCH and PDSCH channels, the setting of RB varies in subframes and conflict handling is needed to handle in the following conditions:

- resource block allocation on PDCCH depends on the settings of CFI in PCFICH. See also Table A-1.
- resource block allocation on PDSCH depends on the settings of "Resource Block Assignment" in the DCI format configuration.
- Overlapping of RB for multiple allocation of PDSCH in one subframe

Copying allocation from a subframe without PBCH to one subframe with PBCH and vice versa can lead to conflict situation. Auto re-calculation of the resource block offset is made when such situation occurs.

Table A-1: PDCCH resource block as a function of CFI

Control format indicator (CFI)	PDDCH Resource Blocks Allocation		
	Max nos of RBs = CFI x 2	Range of RBs for subframe 0	Range of RBs for subframe 1 to subframe 9
1	9	3 to 11	
2	18	3 to 17 and 22 to 24	3 to 17 and 20 to 22
3	27	3 to 17 and 22 to 33	3 to 17 and 20 to 31
4	36	3 to 17 and 22 to 42	3 to 17 and 20 to 40
5	45	3 to 17 and 22 to 51	3 to 17 and 20 to 49
6	54	3 to 17 and 22 to 60	3 to 17 and 20 to 58
7	63	3 to 17 and 22 to 69	3 to 17 and 20 to 67
8	72	3 to 17 and 22 to 71 and 74 to 80	3 to 17 and 20 to 71 and 74 to 78
9	81	3 to 17 and 22 to 71 and 74 to 89	3 to 17 and 20 to 71 and 74 to 87
10	90	3 to 17 and 22 to 71 and 74 to 98	3 to 17 and 20 to 71 and 74 to 96
11	99	3 to 17 and 22 to 71 and 74 to 107	3 to 17 and 20 to 71 and 74 to 105
12	108	3 to 17 and 22 to 71 and 74 to 116	3 to 17 and 20 to 71 and 74 to 114

A.2 Uplink

In the uplink implementation of the R&S SMW, you can configure different user equipment (UEs) to use the same physical resources. The signals of the different UEs are added, nevertheless a conflict is indicated in the resource allocation table.

Although a conflict is also displayed if the PUSCH and PUCCH allocations of one UE are overlapping, the signals of both allocations are added. However, a conflict can occur between the sounding reference signal of a certain UE and the PUSCH of another UE.

A.3 DCI conflict handling

In the R&S SMW, you can configure multiple scheduling messages with their corresponding PDCCHs per subframe. Using the DCI table in the Chapter 3.5, "Downlink frame configuration", on page 29 dialog, you can set appropriate CCE index and define the position of the DCI/PDCCH inside the multiplexed bitstream.

Because the number of CCEs for each PDCCH vary, Table A-2 defines some restriction on the aggregation of CCEs. An aggregation of eight CCEs for instance can only start on CCE numbers evenly dividable by eight. The same principle applies to the other aggregation levels. In this implementation, if the restriction is not fulfilled or two CCEs are overlapping, a conflict is displayed for the DCI/PDCCH with the greater number. This DCI/PDCCH is not considered by the multiplexing, i.e. it is not transmitted.

Table A-2: PDCCH candidates monitored by a UE

Search space			**Number of PDCCH candidates**
Type	**Aggregation level**	**Size [in CCEs]**	
UE specific	2	24	12
	4	48	12
	8	96	12
	16	64	4
	40	160	4
Common	8	32	4
	16	64	4
	40	80	2

The R&S SMW provides the operations "Append", "Insert", "Delete", "Up", "Down" and "Resolve Conf." for flexibly configuration of valid DCIs and for resolving of conflicts.

Example:

This example is based on a DCI table of a control channel with a total "Number of CCEs = 150".

The "DCI Table" indicates a conflict in the fourth DCI/PDCCH. The reason for this conflict is that the CCEs allocated for the fourth DCI/PDCCH are overlapping with the CCEs used by the 3rd one. The fourth DCI/PDCCH is ignored by the multiplexing.

	User	UE_ID n_RNTI	Cell Index	PDCCH	DCI Format	Search Space	Content	PDCCH Format	Number CCEs	CCE Index	No.Dummy CCEs	Conflict
0	User1	0	0	PDCCH	0	Common	Config...	3	16	0	0	
1	User1	0	0	PDCCH	1A	UE-Spec	Config...	0	2	16	6	
2	User1	0	0	PDCCH	0	Common	Config...	2	8	24	18	
3	RA-RNTI	1	0	PDCCH	1A	Common	Config...	2	8	24	-	!

One of the ways to overcome this problem and to resolve the DCI conflict is to use the Resolve Conflicts function of the software. The built-in algorithm reassigns automatically the CCE values depending on the configured "Search Space"; previously configured CCE values are not maintained. The calculated signal is suitable for receiver tests that demand conflict free CCEs but have no requirements on explicit CCE values. If the conflict cannot be resolved automatically, the values remain unchanged.

If however there is a requirement for CCE indexes with explicit values, you can perform the corrections manually. In this particular example, you can set the CCE index of the third DCI/PDCCH to 4.

	User	UE_ID n_RNTI	Cell Index	PDCCH	DCI Format	Search Space	Content	PDCCH Format	Number CCEs	CCE Index	No.Dummy CCEs	Conflict
0	User1	0	0	PDCCH	0	Auto	Config...	3	16	0	0	
1	User1	0	0	PDCCH	0	Auto	Config...	0	2	16	6	
2	User1	0	0	PDCCH	0	UE-Spec	Config...	2	8	32	10	
3	RA-RNTI	1	0	PDCCH	1A	Common	Config...	2	8	24	0	

The CCEs used by the two subsequent DCIs/PDCCHs are not overlapping and the two DCIs/PDCCHS are configured to be transmitted consecutive, i.e. there is no gap between them ("No. Dummy CCEs" = 0).

The Figure A-2 shows the resulting PDCCH after multiplexing.

Figure A-2: PDCCH multiplexing (example)

B Subframes handling

The following sections explain the subframes handling concept and implementation in the R&S SMW.

B.1 Copy/paste subframe

The required OneWeb test signal consists of several subframes, possibly with the same or similar settings.

In these cases, you can:

- Copy and paste settings from one subframe to another.
- Configure a subset of subframes manually and use them periodically
  See Chapter B.2, "Number of configurable subframes", on page 239

Consider, however, that with both methods only subset of settings are inherited.

Both methods maintain the following settings:

- Structure of PDCCH and PDSCH allocations
- Structure of PUSCH and PUCCH allocations

The following settings are not considered:

- P-SYNC
  The P-SYNC are global setting (General downlink settings dialog) and therefore cannot be overwritten by the configuration of one particular frame
- PBCH
  The PBCH is transmitted in subframe#0 only
- PRACH and sounding reference signals
  The SRS and the PRACH are settings dedicated to the individual user equipment (User equipment configuration dialog)

Copying allocations from a subframe without PBCH to one with PBCH and vice versa can lead to conflict situations. In this case, the internal algorithm applies the rules discussed in Chapter A, "Conflict handling", on page 235.

B.2 Number of configurable subframes

As described in Chapter B.1, "Copy/paste subframe", on page 239 , you can simplify the configuration of the OneWeb test signal if you define a small number of subframes manually and use them periodically.

Internally, the R&S SMW applies the Subframe functionality and the same subset of settings are inherited.

B.3 Four configurable frames in uplink and downlink direction

The R&S SMW supports the configuration of up to four frames in uplink and downlink direction. However, there is a limitation for the maximum number of the real configurable subframes in these four frames depending on the transmission direction and several other parameters. The following shows the limitations for the maximum number of the real configurable subframes in these four frames depending on the transmission direction and several other parameters.

B.3.1 Uplink direction

The maximum number of configurable subframes is 40 subframes, where the maximum number of 40 subframes is available for sequence lengths of at least four frames.

The current subframe to be configured is selected by means of the parameter Subframe.

The configurable range ("Number of configurable uplink subframes") can be selected independently for the individual user equipment (UE). Furthermore, the range can be selected independently for the PUCCH and the PUSCH channel in the UEs.

Subframes behind the configurable range of the corresponding UE or channel are indicated as read-only.

Table B-1: Value range for the parameter "Number of Configurable UL Subframes"

"Duplexing mode"	"UL/DL Configuration"	UL subframes in the first four frames	Number of UL subframes per frame	Number of HARQ processes	Value range for the parameter "Number of Configurable UL Subframes"	
					Disabled realtime feedback	Enabled realtime feedback
FDD	-	0 .. 39	10	8	1 .. 40	1, 2, 4 ,8

B.3.2 Downlink direction

The subframe to be configured is selected by means of the parameter Subframe Selection.

The subframe to be configured is selected by means of the parameter "Subframe Selection". The maximum value for this parameter is then determined by the number of the last configurable subframe (see also Chapter B.3.2, "Downlink direction", on page 240).

Table B-2: Value range for the parameter "Number of Configurable DL Subframes"

Duplexing mode	UL/DL Configuration	DL and special subframes in the first four frames	Number of DL and special subframes per frame	Value range for the parameter "Number of Configurable DL Subframes"
FDD	-	0 .. 39	10	1 .. 40

List of commands

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