# R&S®SMCVB-K163
# DVB-T
# User Manual

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This document describes the following software options:

- R&S®SMCVB-K163 DVB-T (1434.3877.xx)

This manual describes firmware version FW 5.20.043.xx and later of the R&S®SMCV100B.

The following abbreviations are used throughout this manual: R&S®SMCV100B is abbreviated as R&S SMCVB, R&S®WinIQSIM2 is abbreviated as R&S WinIQSIM2

# Contents

# 1 Welcome to the DVB-T option

The R&S SMCVB-K163 is a firmware application that adds functionality to generate signals in accordance with the DVB-T digital standard.

The R&S SMCVB-K163 option features:

● DVB-T signal generation

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 SMCV100B user manual. The latest version is available at:

www.rohde-schwarz.com/manual/SMCV100B

**Installation**

You can find detailed installation instructions in the delivery of the option or in the R&S SMCV100B service manual.

## 1.1 Accessing the DVB-T dialog

**To open the dialog with DVB-T settings**

► In the block diagram of the R&S SMCV100B, select "Baseband > DVB-T".

A dialog box opens that displays the provided general settings.

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

## 1.2 What's new

This manual describes firmware version FW 5.20.043.xx and later of the R&S®SMCV100B.

Compared to the previous version, it provides information on how to load and play stream library files. See "To load and play a stream library file" on page 48.

## 1.3 Documentation overview

This section provides an overview of the R&S SMCV100B user documentation. Unless specified otherwise, you find the documents at:

www.rohde-schwarz.com/manual/smcv100b

### 1.3.1　Getting started manual

Introduces the R&S SMCV100B 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 SMCV100B is not included.

The contents of the user manuals are available as help in the R&S SMCV100B. 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　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

### 1.3.4　Instrument security procedures

Deals with security issues when working with the R&S SMCV100B in secure areas. It is available for download on the internet.

### 1.3.5 Printed safety instructions

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

### 1.3.6 Data sheets and brochures

The data sheet contains the technical specifications of the R&S SMCV100B. 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/smcv100b

### 1.3.7 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/smcv100b

### 1.3.8 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/smcv100b

### 1.3.9 Videos

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

## 1.4 Scope

(i) 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 SMCV100B user manual.

## 1.5 Notes on screenshots

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

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

# 2 About the DVB-T option

The transmission standard complies with the specification ETSI EN 300 744 (DVB-T and DVB-H).

ⓘ **Hierarchical coding**

If you can define separate entries for the high-priority path (HP) and low-priority path (LP), a parameter is displayed twice, distinguished by HP or LP.

See also "Hierarchy" on page 12.

## 2.1 Required options

The equipment layout for generating DVB-T signals includes:

- Base unit
- Option Enable Broadcast Standard (R&S SMCVB-K519)
- Option DVB-T (R&S SMCVB-K163)

## 2.2 About DVB-H/T

The DVB-HDVB-H standard is based on the earlier standard DVB-T, that is used for terrestrial digital broadcasting.

Figure 2-1 shows the components of the DVB-H transmission system.
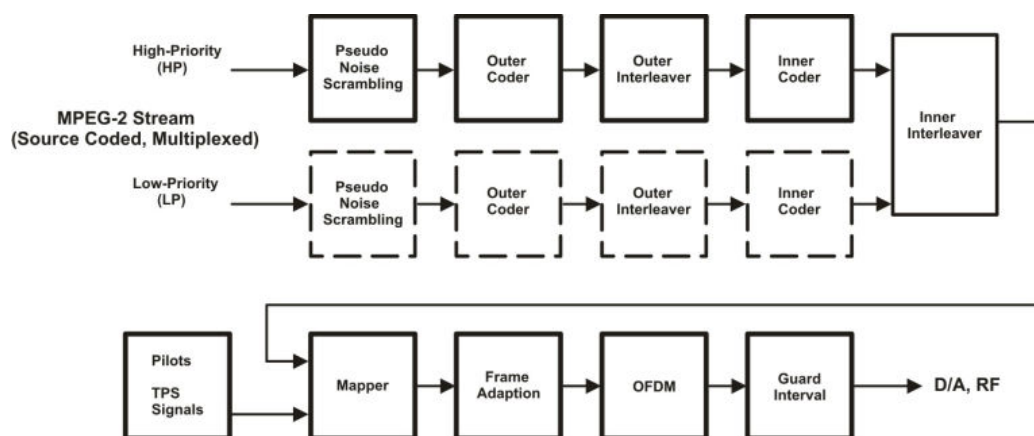


*Figure 2-1: Components of the transmission system DVB-H*

DVB-H provides features to meet the specific requirements for handheld, mobile terminals such as:

- Power off some part of the reception chain to increase the battery duration
- Ease access to the services when receivers switching to the next cell

- Mitigate the effects of man-maid noise and severe mobile multipath channels on the receiving capabilities
- Offer sufficient flexibility and scalability to allow reception of services at various speeds
- Offer the flexibility to be used in various transmission bands and channel bandwidths

The basic technical extensions that make it possible to receive digital video broadcasting services on handheld terminals are:

- 4K mode and in-depth interleavers
- Time-slicing
- Forward error correction for multiprotocol encapsulated data (MPE-FEC)

# 3 DVB-T configuration and settings

Access:

► Select "Baseband > DVB-T".

The remote commands required to define these settings are described in Chapter 5, "Remote-control commands", on page 53.

**Settings:**

## 3.1 General settings

Access:

► Select "Baseband > DVB-T".



This tab provides functionality for calling default settings, save and recall settings and hierarchy coding settings.

ⓘ If hierarchical coding is active, some parameters require setting for high priority and low priority input data streams. The settings are displayed separately for both paths, but summarized in this description.

**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:DVBT:STATe on page 54

**Set To Default**

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

| Parameter | Value |
|-----------|-------|
| State | Not affected by the "Set to Default" |

Remote command:

[:SOURce<hw>]:BB:DVBT:PRESet on page 54

**Save/Recall**

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

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

See also, chapter "File and Data Management" in the R&S SMCV100B user manual.

Remote command:

[:SOURce<hw>]:BB:DVBT:SETTing:CATalog? on page 55

[:SOURce<hw>]:BB:DVBT:SETTing:DELete on page 55

[:SOURce<hw>]:BB:DVBT:SETTing:LOAD on page 55

[:SOURce<hw>]:BB:DVBT:SETTing:STORe on page 55

**Hierarchy**

Selects the coding hierarchy.

**Note:** If hierarchical coding is active, some parameters require setting for high priority (HP) and low priority (LP) input data streams. The settings are displayed separately for both paths, but summarized in this description.

"Non Hierarchical"

Non-hierarchical coding used for one input data stream.

"Alpha 1/2/4"     Hierarchical coding used for two input data streams HP and LP. For some settings, there are two parameters: one for HP and one for LP.

Remote command:

[:SOURce<hw>]:BB:DVBT:HIERarchy on page 55

## 3.2  Input signal settings

Access:

► Select "Baseband > DVB-T > Input Signal".

The dialog provides settings to configure the input signal.

Most broadcast standards share the following parameters, i.e. they have the same setting independent from the standard:

- "Source"
- "Input"
- "IP TS Channel"

**Settings:**

### 3.2.1  General settings

Access:

► Select "Input Signal > General".



The dialog provides settings to configure the input signal. Also, it provides physical layer information for external signals and transport stream (TS) signals. For internal test signals, you can configure payload and structure of test packets.

**Settings:**

**Source**
Sets the modulation source for the input signal.
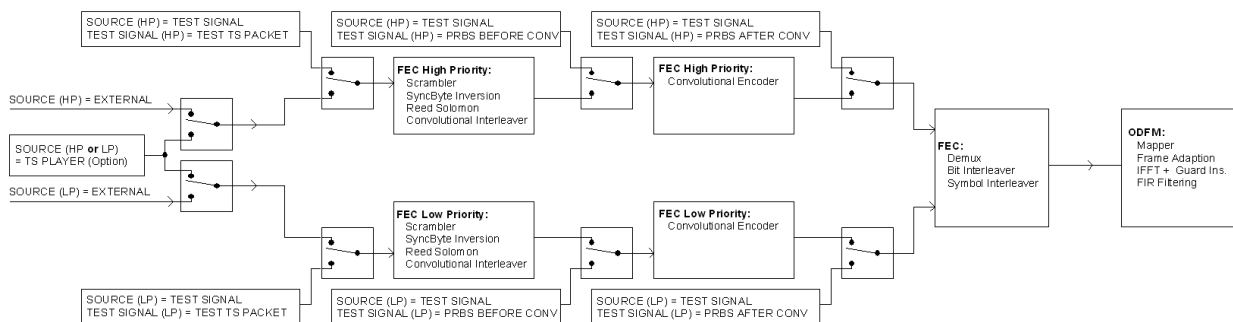


*Figure 3-1: Block diagram with test signal insertion*

"External"       Uses a transport stream, that is input at the "TS IN"/"IP Data" inter-
                face.

                For more information about connecting to the interfaces, see also:
                ● "TS IN" interface: Section "Configuring the Global Connectors" in
                  the R&S SMCV100B user manual.
                ● "IP Data" interface: Chapter 3.8, "Local IP data network settings",
                  on page 41.

"TS Player"     Uses an internal transport stream with TS packet data played from a
                file. The player requires no option.
                Playing encrypted files with extension _c requires a stream library
                option R&S SMCVB-KSx.

                See also:
                ● Chapter 3.7, "TS player", on page 31
                ● Supported TS player file types

"Test Signal"   Uses an internal test signal as specified in Chapter 3.2.3, "Test signal
                settings", on page 19.

Remote command:
Non-hierarchical coding
[:SOURce<hw>]:BB:DVBT:SOURce[:HIGH] on page 57
Hierarchical coding
[:SOURce<hw>]:BB:DVBT:SOURce[:HIGH] on page 57
[:SOURce<hw>]:BB:DVBT:SOURce:LOW on page 57

**Input**

Requires "Source > External".

Sets the external input interface.

"TS IN"          Input for serial transport stream data. The signal is input at the "User 1" connector.

"IP"           Requires "Hierarchy > Non Hierarchical", i.e. IP input requires non-hierarchical coding.

                   Input for IP-based transport stream data (TSoverIP). The signal is input at the "IP Data" connector.

Remote command:
Non-hierarchical coding
`[:SOURce<hw>]:BB:DVBT:INPut[:HIGH]` on page 57
Hierarchical coding
`[:SOURce<hw>]:BB:DVBT:INPut[:HIGH]` on page 57
`[:SOURce<hw>]:BB:DVBT:INPut:LOW` on page 57

**Input Format**

Requires "Input > TS IN".

Sets the format of the input signal.

"ASI"           ASI format

"SMPTE 310"    SMPTE 310 format

Remote command:
Non-hierarchical coding
`[:SOURce<hw>]:BB:DVBT:INPut:FORMat` on page 57
Hierarchical coding
`[:SOURce<hw>]:BB:DVBT:INPut:FORMat` on page 57
`[:SOURce<hw>]:BB:DVBT:INPut:FORMat:LOW` on page 57

**IP TS Channel**

Requires "Input > IP".

Selects the IP-based transport stream (TS) channel. You can select 1 out of 4 IP TS channels as input at the "IP Data" interface.

To configure a particular channel, see Chapter 3.2.4, "IP channel x settings", on page 20.

Remote command:
Non-hierarchical coding only
`[:SOURce<hw>]:BB:DVBT:INPut:TSCHannel[:HIGH]` on page 58

**Stuffing**

Requires "Source > External/TS Player".

Displays that stuffing is active.

Stuffing is active for HP path and LP path.

"On"          The installed input interface provides the transport stream data rate required for the current modulation parameters (regardless of the input data rate of the external transport stream).

Remote command:
Non-hierarchical coding
`[:SOURce<hw>]:BB:DVBT:STUFfing[:HIGH]?` on page 58
Hierarchical coding
`[:SOURce<hw>]:BB:DVBT:STUFfing[:HIGH]?` on page 58
`[:SOURce<hw>]:BB:DVBT:STUFfing:LOW?` on page 58

**Test Signal**

Defines the test signal data.

Use the parameter to measure the bit error rate before the Viterbi decoder with the BER application, the R&S ETL measurement receivers, and its serial outputs (clock and data).

"Test TS Packet"

Standardized packet data used as modulation data in the transport stream.
To configure the packet structure, select the side tab "Test Signal > Test TS Packet". See also Chapter 3.2.3, "Test signal settings", on page 19.

"PRBS before Conv. Enc."

Pure pseudo-random bit sequence (PRBS) data used as modulation data with no packet structure. The sequence is inserted before the convolutional encoder. PRBS data conforms with ITU-T O.151 specification.
To configure the PRBS type, select the side tab "Test Signal > PRBS". See also "PRBS" on page 20.

"PRBS after Conv. Enc."

Pure pseudo-random bit sequence (PRBS) data used as modulation data with no packet structure. The sequence is inserted after the convolutional encoder.

Remote command:
Non-hierarchical coding
`[:SOURce<hw>]:BB:DVBT:TESTsignal[:HIGH]` on page 63
Hierarchical coding
`[:SOURce<hw>]:BB:DVBT:TESTsignal[:HIGH]` on page 63
`[:SOURce<hw>]:BB:DVBT:TESTsignal:LOW` on page 63

### 3.2.2 Info

Access:

► Select "Input Signal > PLP Info".
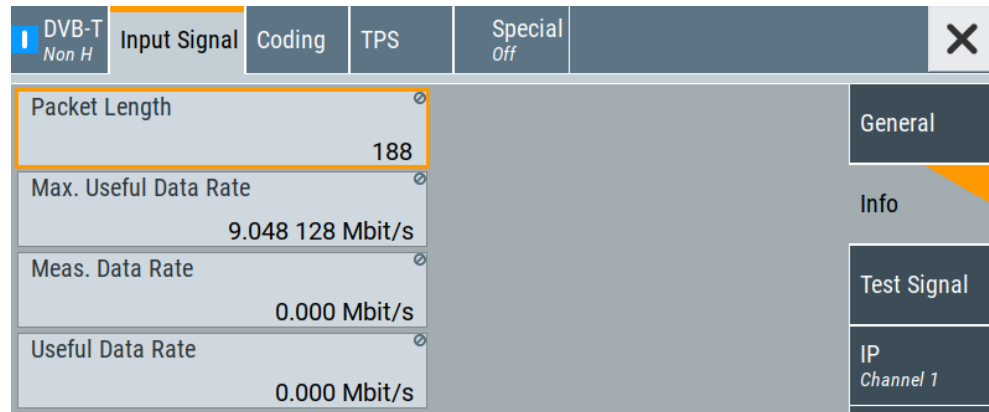


The tab displays the information on the input signal.

How to: Chapter 4.3, "Calculating the input data rate", on page 51

**Settings:**

**Packet Length**

Requires "Source > External".

Displays the packet length of the external transport stream in bytes.

If the packet length does not match the specified length, the output signal is erroneous. "Packet Length > Invalid" is displayed.

| "188" | 188 byte packets specified for serial input ("Input > TS IN") and parallel input ("Input > IP"). |
|---|---|
| "204" | 204 byte packets specified for serial input ("Input > TS IN") and parallel input ("Input > IP"). |
| "Invalid" | Packet length ≠ 188 bytes or 204 bytes, i.e. the length is not as specified. |

Remote command:
Non-hierarchical coding
[:SOURce<hw>]:BB:DVBT:PACKetlength[:HIGH]? on page 60
Hierarchical coding
[:SOURce<hw>]:BB:DVBT:PACKetlength[:HIGH]? on page 60
[:SOURce<hw>]:BB:DVBT:PACKetlength:LOW? on page 60

**Max. Useful Data Rate**

Requires "Source > External/TS Player".

Displays the maximum data rate, that is derived from the current modulation parameter settings.

The value is the optimal value at the TS input interface, that is necessary for the modulator.

How to: Chapter 4.3, "Calculating the input data rate", on page 51.

Remote command:
Non-hierarchical coding
[:SOURce<hw>]:BB:DVBT:USEFul[:RATE]:MAX[:HIGH]? on page 60
Hierarchical coding
[:SOURce<hw>]:BB:DVBT:USEFul[:RATE]:MAX[:HIGH]? on page 60
[:SOURce<hw>]:BB:DVBT:USEFul[:RATE]:MAX:LOW? on page 60

**Measured Data Rate**

Requires "Source > External".

Displays the measured value of the data rate $r_{meas}$ of one of the following:
- External transport stream including null packets input at "User 1" connector
- External transport stream including null packets input at "IP Data/LAN" connector (TSoverIP)

The value $r_{meas}$ equals the sum of useful data rate $r_{useful}$ and the rate of null packets $r_0$:

$r_{meas} = r_{useful} + r_0$

Remote command:
Non-hierarchical coding
[:SOURce<hw>]:BB:DVBT[:INPut]:DATarate[:HIGH]? on page 61
Hierarchical coding
[:SOURce<hw>]:BB:DVBT[:INPut]:DATarate[:HIGH]? on page 61
[:SOURce<hw>]:BB:DVBT[:INPut]:DATarate:LOW? on page 61

**Useful Data Rate**

Requires "Source > External/TS Player".

Displays the data rate of useful data $r_{useful}$ of the external transport stream. The data rate is measured at the input of the installed input interface.

Remote command:
Non-hierarchical coding
[:SOURce<hw>]:BB:DVBT:USEFul[:RATE][:HIGH]? on page 60
Hierarchical coding
[:SOURce<hw>]:BB:DVBT:USEFul[:RATE][:HIGH]? on page 60
[:SOURce<hw>]:BB:DVBT:USEFul[:RATE]:LOW? on page 60

### 3.2.3 Test signal settings

Access:

► Select "Input Signal > Test Signal".
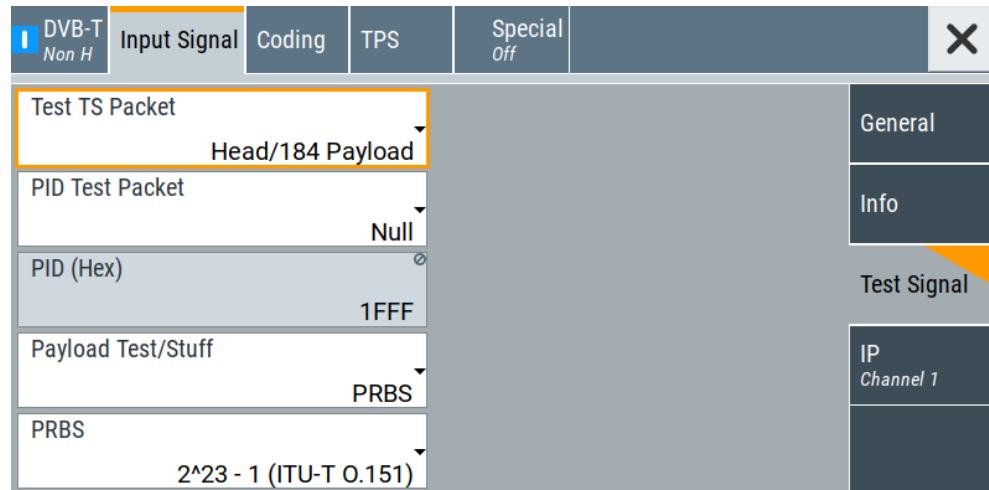


The tab provides settings to configure the input test signal.

**Settings:**

**Test TS Packet**

Specifies the structure of the test transport stream packet that is fed to the modulator.

"Head/184 Payload"
A sync byte (0x47) followed by three header bytes and 184 payload bytes.

"Sync/187 Payload"
A sync byte (0x47) followed by 187 payload bytes.

Remote command:
[:SOURce<hw>]:BB:DVBT:TSPacket on page 63

**PID Test Packet**

If a header is present in the test packet ("Test TS Packet > Head/184 Payload"), you can specify a fixed or variable packet identifier (PID).

"Null"
The header of the test transport stream packets has a fixed setting of null packet header 1FFF (hex).

"Variable"
Uses the header value defined with PID (Hex).

Remote command:

[:SOURce<hw>]:BB:DVBT:PIDTestpack on page 62

**PID (Hex)**

Sets the PID.

Remote command:

[:SOURce<hw>]:BB:DVBT:PID on page 62

**Payload Test/Stuff**

Defines the payload area content of the TS packet.

For "Source > Test Signal", the packet is a test packet.

For "Stuffing > On", the packet is a null packet. Null packets are inserted into the external transport stream to adapt the stream data rate.

"PRBS"　　　　　　PRBS data in accordance with ITU-T O.151

"0x00"　　　　　　Exclusively 00 (hex) data

"0xFF"　　　　　　Exclusively FF (hex) data

Remote command:

[:SOURce<hw>]:BB:DVBT:PAYLoad on page 62

**PRBS**

Sets the length of the PRBS sequence.

You can select a PRBS 15 or a PRBS 23 sequence as specified by ITU-T O.151.

Remote command:

[:SOURce<hw>]:BB:DVBT:PRBS[:SEQuence] on page 63

## 3.2.4　IP channel x settings

Access:

1. Select "Input Signal > General".

2. Select "Source > External"

3. Select "Input > IP"

4.  Select "Input Signal > IP Channel x"

| Input IP | ☐ | Alias Alias 1 | General |
|---|---|---|---|
| Type Unicast | | Multicast Address 226.0.0.0 | Info |
| Port 6 002 | | IGMPv3 Source Address 0.0.0.0 | Test Signal |
| → Ping Source Address | | 🌐 Local IP Data Network ... | IP Channel 1 |
| Ping Result | | | |

The tab provides settings to configure IP channel `x`.

You can configure settings for 4 IP channels `x = 1 to 4` individually, see also "Input Signal > General > IP TS Channel".

ⓘ IP channel settings affect input IP data of the local IP data network. The settings are independent from the used broadcast standard configuration.

Saving/recalling a certain IP channel or local IP data network configuration is not possible via the broadcast standard-specific functionality.

Use the global save/recall functionality instead, see section "Saving and Recalling Instrument Settings" in the R&S SMCV100B user manual.

The table below shows the availability of the tab in the broadcast standard configuration.

*Table 3-1: IP channel configuration support in broadcast standards*

| Baseband standard | "IP Channel x" | Baseband standard | "IP Channel x" |
|---|---|---|---|
| "ATSC/ATSC-M/H" | Yes | "DVB-S" | Yes |
| "ATSC 3.0" | No | "DVB-S2" | Yes |
| "DTMB" | Yes | "DVB-C" | Yes |
| "DVB-T" | Yes | "J.83/B" | Yes |
| "DVB-T2" | Yes | "DRM" | No |
| "ISDB-T" | Yes | "Audio AM" | No |
| "T-DMB/DAB" | Yes | "Audio FM" | No |

See also:

- Chapter 4.1.1, "How to apply an external IP input signal", on page 44
- Chapter 3.8, "Local IP data network settings", on page 41

**Requirements**

At your IP source, set the "transport stream packets per internet protocol packet" (TP per IP) parameter as follows:

- If TP packet length = 188 bytes: Set TP per IP to *7* or *6*.
- If TP packet length = 204/208 bytes: Set TP per IP to *6*.

We recommend that you use a separate LAN infrastructure to stream the transport streams via IP to the IP connector of the baseband board. Also, avoid TS packet losses during IP transmission.

**Settings:**

**Input IP**
Activates/deactivates the IP input.

Remote command:
[:SOURce<hw>]:BB:INPut:IP<ch>[:STATe] on page 65

**Alias**
Sets a unique name for the IP connection.

The definition of a name is optional but facilitates identification in the measurement views. The name input fits maximum 16 characters in ASCII format.

Remote command:
[:SOURce<hw>]:BB:INPut:IP<ch>:ALIas on page 65

**Type**
Sets the input signal type.

"Unicast"　　　　Analyzes all unicast IP packets that arrive at the specified "Port".

"Multicast"　　　When an IP address is in the multicast address range, an attempt is made to join a multicast group using IGMP.
　　　　　　　　　Set "Multicast Address" and "Port".

Remote command:
[:SOURce<hw>]:BB:INPut:IP<ch>:TYPE on page 66

**Multicast Address**
Editing requires "Type > Multicast".

Sets the destination IP address (IPv4) of the IP connection.

You can set addresses from "224.0.0.0" to "239.255.255.255".

Remote command:

`[:SOURce<hw>]:BB:INPut:IP<ch>:MULticast:ADDRess` on page 66

**Port**

Sets the destination UDP port.

Due to UDP/RTP autosensing, we recommend that you set a port offset of at least 6 between neighboring IP TS channels.

Remote command:

`[:SOURce<hw>]:BB:INPut:IP<ch>:PORT` on page 65

**IGMPv3 Source Address**

Requires "Type > Multicast".

Sets the IGMPv3 source address.

If you need to filter the data sent to the multicast address, specify the source address. A source address different from "0.0.0.0" accepts only data originating from the specified IP address.

Remote command:

`[:SOURce<hw>]:BB:INPut:IP<ch>:IGMP[:SOURce]:ADDRess` on page 66

**Ping Source Address**

Clicking "Ping Source Address" triggers pinging of the IGMPv3 source address.

If you set a different value from "IGMPv3 Source Address = 0.0.0.0" and click the button, the software checks if the address is reachable.

Remote command:

`[:SOURce<hw>]:BB:INPut:IP<ch>:IGMP[:SOURce]:PING` on page 66

**Ping Result**

Displays the result after pinging the source address.

If "Ping Result > Ping: Successful", the source address is available in the network.

If "Ping Result > Ping: Transmit Failed. xxx", the source address is not available in the network. "xxx" can be, e.g. "General Failure". Try another "IGMPv3 Source Address".

Remote command:

`[:SOURce<hw>]:BB:INPut:IP<ch>:IGMP[:SOURce]:RESult?` on page 67

**Local IP Data Network**

Accesses local IP data network settings, see Chapter 3.8, "Local IP data network settings", on page 41.

## 3.3  Coding settings

Access:

► Select "Baseband > DVB-T > Coding".

| DVB-T *Non H* | Input Signal | **Coding** | TPS | Special *Off* | ✕ |
|---|---|---|---|---|---|

| Hierarchy | | Constellation | |
|---|---|---|---|
| | Non Hierarchical | | 64QAM |
| **Channel Bandwidth** | | **Used Bandwidth** | |
| | 8 MHz | | 7.607 142 9 MHz |
| **FFT-Mode** | | **Guard Interval** | |
| | 8 K | | 1/32 |
| **DVB-H State** | ☐ | | |
| **Code Rate** | | | |
| | 3/4 | | |

The tab provides settings for coding of one or two input paths.

**Settings:**

**Hierarchy**

Selects the coding hierarchy.

**Note:** If hierarchical coding is active, some parameters require setting for high priority (HP) and low priority (LP) input data streams. The settings are displayed separately for both paths, but summarized in this description.

"Non Hierarchical"

Non-hierarchical coding used for one input data stream.

"Alpha 1/2/4"    Hierarchical coding used for two input data streams HP and LP.
For some settings, there are two parameters: one for HP and one for LP.

Remote command:

[:SOURce<hw>]:BB:DVBT:HIERarchy on page 55

**Constellation**

Defines the constellation.

The higher the coding hierarchy, that is the alpha factor, the greater is the distance between the constellation points of two different quadrants. With identical power output, the high priority path is transmitted more reliably at a higher alpha factor (at the expense of the low priority path).

"QPSK"          Requires "Hierachy > Non-hierarchical".

"16 QAM/64 QAM"

Requires "Hierachy > Alpha 1/2/4".
The high priority path is mapped to the 4 quadrants and therefore represents a QPSK.

Remote command:
[:SOURce<hw>]:BB:DVBT:CONStel on page 68

**Channel Bandwidth**

Selects the channel bandwidth.

The channel bandwidth correlates with the "Used Bandwidth", that is smaller. For the correlation between the two bandwidths, see Table 3-2.

Remote command:
[:SOURce<hw>]:BB:DVBT:CHANnel[:BANDwidth] on page 68

**Used Bandwidth**

Defines the used bandwidth.

The used bandwidth correlates with the "Channel Bandwidth", see Table 3-2. triggers the used bandwidth value the automatic setting "Channel Bandwidth > Variable".

*Table 3-2: Correlation between channel bandwidth and used bandwidth*

| "Channel bandwidth" | "Used bandwidth" | Elementary frequency |
|---|---|---|
| 5 MHz | 4.7544643 MHz | 40/7 MHz |
| 6 MHz | 5.70535717 MHz | 48/7 MHz |
| 7 MHz | 6.6562500 MHz | 56/7 MHz |
| 8 MHz | 7.6071429 MHz | 64/7 MHz |
| Variable | 1 MHz to 10 MHz | |

Remote command:
[:SOURce<hw>]:BB:DVBT:USED[:BANDwidth] on page 69

**FFT-Mode**

Sets the fast fourier transform (FFT) window to determine the number of carriers per OFDM symbol.

To find out the number of carriers for a given FFT window, see Table 3-3.

*Table 3-3: Number of carriers*

| Parameter | 2K | 4K | 8K |
|---|---|---|---|
| Number of K carriers | 1705 | 3409 | 6817 |
| Number of data carriers | 1512 | 3024 | 6048 |

The frequency spacing between adjacent OFDM carriers $1/T_u$ and the useful part of the OFDM symbol period $T_u$ also depend on the channel bandwidth $\Delta f$. Table 3-4 provides an overview.

*Table 3-4: OFDM carrier spacing and OFDM symbol period relation with channel bandwidth*

| Parameter | $\Delta f$ | 2K | 4K | 8K |
|---|---|---|---|---|
| $1/T_u$ | 5 MHz | 2.790 kHz | 1.395 kHz | 0.698 kHz |
| | 6 MHz | 3.348 kHz | 1.674 kHz | 0.837 kHz |
| | 7 MHz | 3.906 kHz | 1.953 kHz | 0.977 kHz |
| | 8 MHz | 4.464 kHz | 2.232 kHz | 1.116 kHz |
| $T_u$ | 5 MHz | 358.4 us | 716.8 us | 1433.6 us |
| | 6 MHz | 298.7 us | 597.3 us | 1194.7 us |
| | 7 MHz | 256 us | 512 us | 1024 us |
| | 8 MHz | 224 us | 448 us | 896 us |

Remote command:
[:SOURce<hw>]:BB:DVBT:FFT:MODE on page 69

**Guard Interval**

Sets the guard interval. The interval is expressed in fractions of the useful part of the OFDM symbol period $T_u$.

Remote command:
[:SOURce<hw>]:BB:DVBT:GUARd:INTerval on page 69

**DVB-H State**

Enables or disables DVB-H.

If enabled, extended functionality becomes available for handheld operation (DVB-H) as specified in annex F of ETSI EN 300 744. The functionality comprises for example:
- Set between "In-Depth" or "Native" symbol interleaver, see "Symbol Interleaver" on page 26.
- Specify TPS bits for "Time Slicing" and "MPE FEC", see Chapter 3.4, "TPS settings", on page 27.

If disabled, DVB-T only functionality of specification ETSI EN 300 744 is available.

Remote command:
[:SOURce<hw>]:BB:DVBT:DVHState on page 68

**Symbol Interleaver**

Requires "DVB-H State > On".

Sets the symbol interleaver.

For "DVB-H State > Off", the "Symbol Interleaver > Native" is set automatically. The setting is hidden.

Remote command:
[:SOURce<hw>]:BB:DVBT:DVBH:SYMBol[:INTerleaver] on page 68

**Code Rate**
Sets the code rate.

With hierarchical coding enabled, you can set individual code rates for high priority path and low priority path.

Remote command:
Non-hierarchical coding
[:SOURce<hw>]:BB:DVBT:RATE[:HIGH] on page 69
Hierarchical coding
[:SOURce<hw>]:BB:DVBT:RATE[:HIGH] on page 69
[:SOURce<hw>]:BB:DVBT:RATE:LOW on page 69

## 3.4 TPS settings

Access:

► Select "Baseband > DVB-T > TPS".



The tab provides settings of the TPS carriers that are not related to transmission parameters.

**Settings:**

**TPS Cell ID (Hex)**
Sets the cell ID in four-digit hexadecimal format.

8 bit are used for this purpose. The most significant byte is transferred in the OFDM frames 1 and 3. The least significant byte is transferred in the OFDM frames 2 and 4, see Table 3-5.

*Table 3-5: TPS cell ID in binary form*

| TPS bit number | TPS cell ID | |
|---|---|---|
| | **OFDM frame 1 and 3** | **OFDM frame 2 and 4** |
| s40 | (15) - MSB | (7) |
| s41 | (14) | (6) |
| s42 | (13) | (5) |
| s43 | (12) | (4) |
| s44 | (11) | (3) |
| s45 | (10) | (2) |
| s46 | (9) | (1) |
| s47 | (8) | (0) - LSB |
| MSB = most significant bit, LSB = least significant bit | | |

Remote command:

[:SOURce<hw>]:BB:DVBT:CELL:ID on page 70

**TPS Reserved State**

Enables or disables the reserved TPS bits.

See "TPS Reserved Bits (Hex)" on page 28.

Remote command:

[:SOURce<hw>]:BB:DVBT:TPSReserved:STATE on page 71

**TPS Reserved Bits (Hex)**

Sets the reserved bits in one-digit hexadecimal format.

4 bit are used for this purpose, see Table 3-5.

*Table 3-6: TPS reserved bits in binary form*

| TPS bit number | TPS reserved bits |
|---|---|
| s50 | (3) |
| s51 | (2) |
| s52 | (1) |
| s53 | (0) |

Remote command:

[:SOURce<hw>]:BB:DVBT:TPSReserved:VALue on page 71

**Time Slicing**

Requires "Coding > DVB-H State > On".

Enables/disables time slicing.

If enabled, 1 TPS bit (s48) is used to signal that at least one data stream with time slicing exists in the multiplex.

For hierarchical coding, the information for the HP path is transmitted in OFDM frames 1 and 3. The information for the LP path is transmitted in OFDM frames 2 and 4. See Table 3-7.

For non-hierarchical coding, no distinction is made between the OFDM frames.

*Table 3-7: Time slicing for hierarchical coding*

| TPS bit number | Time slicing | |
| --- | --- | --- |
| | **OFDM frame 1 and 3** | **OFDM frame 2 and 4** |
| s48 | HP | LP |

Remote command:
Non-hierarchical coding
`[:SOURce<hw>]:BB:DVBT:TIMeslice[:HIGH]` on page 71
Hierarchical coding
`[:SOURce<hw>]:BB:DVBT:TIMeslice[:HIGH]` on page 71
`[:SOURce<hw>]:BB:DVBT:TIMeslice:LOW` on page 71

**MPE FEC**
Requires "Coding > DVB-H State > On".

Enables/disables MPE FEC.

If enabled, 1 TPS bit (s49) is used to signal that MPE FEC is used in at least one data stream.

For hierarchical coding, the information for the HP path is transmitted in OFDM frames 1 and 3. The information for the LP path is transmitted in OFDM frames 2 and 4. See Table 3-8.

For non-hierarchical coding, no distinction is made between the OFDM frames.

*Table 3-8: MPE FEC for hierarchical coding*

| TPS bit number | MPE FEC | |
| --- | --- | --- |
| | **OFDM frame 1 and 3** | **OFDM frame 2 and 4** |
| s49 | HP | LP |

Remote command:
Non-hierarchical coding
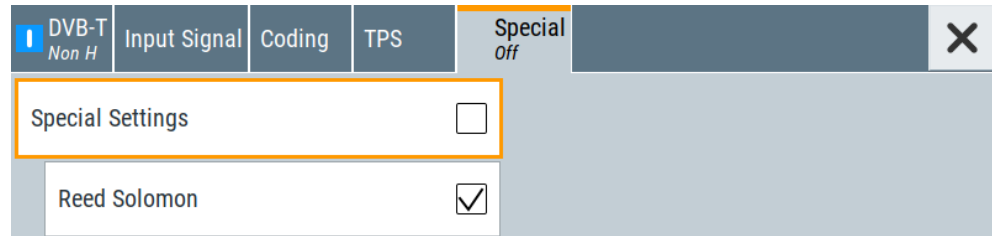`[:SOURce<hw>]:BB:DVBT:MPEFec[:HIGH]` on page 71
Hierarchical coding
`[:SOURce<hw>]:BB:DVBT:MPEFec[:HIGH]` on page 71
`[:SOURce<hw>]:BB:DVBT:TIMeslice:LOW` on page 71

## 3.5 Special settings

Access:

► Select "Baseband > DVB-T > Special".



The tab provides settings, that differ from the specification of the broadcast standard.

ⓘ Settings different from the broadcast standard can be useful for research and development. Applying these settings requires "Special Settings > On".

If you set a parameter different from the specification, the warning icon ⚠ is displayed to the left of the parameter.

**Settings:**

**Special Settings**

Enables/disables special settings.

The setting allows you to switch between standard-compliant and user-defined channel coding.

Remote command:

[:SOURce<hw>]:BB:DVBT[:SPECial]:SETTing[:STATe] on page 73

**Reed Solomon**

Enables/disables the Reed-Solomon encoder.

The standard stipulates a Reed-Solomon RS (204, 188), i.e. "Reed Solomon > On". Incoming packets of the TS frame have a length of 188 bytes or, in special cases, a length of 204 bytes. The packet length determines

"On"
- "Packet Length = 188": The Reed-Solomon encoder adds 16 Reed-Solomon bytes to the incoming 188 bytes of an MPEG transport stream frame. The Reed-Solomon decoder can correct up to 8 erroneous bytes in a Reed-Solomon packet (= 204 bytes). The number of incorrect bits in an errored byte is irrelevant.
- "Packet Length = 204": Of the incoming 204 bytes of an MPEG transport stream frame, the Reed-Solomon encoder overwrites the last 16 bytes with its own Reed-Solomon bytes.

"Off"
- "Packet Length = 188": 16 dummy bytes are transmitted instead of the 16 Reed-Solomon bytes. The data rate is not changed.
- "Packet Length = 204": All 204 bytes of an MPEG frame are forwarded unchanged. The data rate is not changed.

Remote command:

Non-hierarchical coding

`[:SOURce<hw>]:BB:DVBT[:SPECial]:REEDsolomon[:HIGH]` on page 72

Hierarchical coding

`[:SOURce<hw>]:BB:DVBT[:SPECial]:REEDsolomon[:HIGH]` on page 72

`[:SOURce<hw>]:BB:DVBT[:SPECial]:REEDsolomon:LOW` on page 72

## 3.6  Global connector settings

The "Input Signal" dialog, the "Trigger/Marker/Clock" dialog and "Trigger In", "Marker" and "Clock" tabs in "Baseband > ARB/Custom Digital Mod" configuration dialogs provide quick access to the related connector settings. Click the "Global Connectors" button to access the settings.
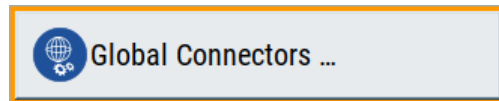


See also chapter "Global connector settings" in the user manual.

## 3.7  TS player

The "TS Player" application allows you to play stream files for simulation of dedicated transport stream (TS) scenarios. Also, the R&S SMCV100B offers stream libraries containing stream files with a wide range of ready-made signals for testing systems with different transmission parameters. For supported file types, see Table 3-9.

**Key features**

The key features for playing stream files with "TS Player" application are:
- Support of numerous broadcast transmission standards
- Streaming of high-quality video contents
- Streaming of high-quality audio contents
- Efficient use with dedicated streams

**Required options**

The equipment layout for processing files of waveform libraries includes:
- R&S SMCV100B base unit (64 MSample ARB memory, 60 MHz RF bandwidth)
- Broadcast standard option for the "TS Player" application (R&S SMCVB-Kxxx)
- Enable Broadcast Standards option (R&S SMCVB-K519)

- Stream library option (R&S SMCVB-KSxx)

For more information, see data sheet.

**To access and download a stream library file**

The steps to access a stream library and to download stream library files is analogous as for waveform libraries. See chapter "Installation" in the user manual of the stream library at:

www.rohde-schwarz.com/manual/smcv100b/ksxx-kvxx-stream-and-waveform-libraries-user-manuals-manuals-gb1_78701-972224.html

**To access the "TS Player" application**

1.  Select "Baseband > DVB-T > Input Signal".

2.  Select "Source > TS Player".

3.  Select "TS Player" button.

    Opens the TS player dialog, where you can load files.

**Support in broadcast standard configuration**

Various broadcast baseband standards of the R&S SMCV100B support the "TS Player" application. For an overview, see the table below.

| Baseband standard | "Source > TS Player" | Baseband standard | "Source > TS Player" |
|---|---|---|---|
| "ATSC/ATSC-M/H" | Yes | "DVB-S" | Yes |
| "ATSC 3.0" | Yes | "DVB-S2" | Yes |
| "DTMB" | Yes | "DVB-C" | Yes |
| "DVB-T" | Yes | "J.83/B" | Yes |
| "DVB-T2" | Yes | "DRM" | No |
| "ISDB-T" | Yes | "Audio AM" | No |
| "T-DMB/DAB" | Yes | "Audio FM" | No |

The remote commands required to define these settings are described in Chapter 5.6, "TSGen subsystem", on page 73.

**Settings:**

### 3.7.1 TS Player settings

Access:

1. Follow the steps in "To access the "TS Player" application" on page 32.

2. Select "TS Player > TS-Player".
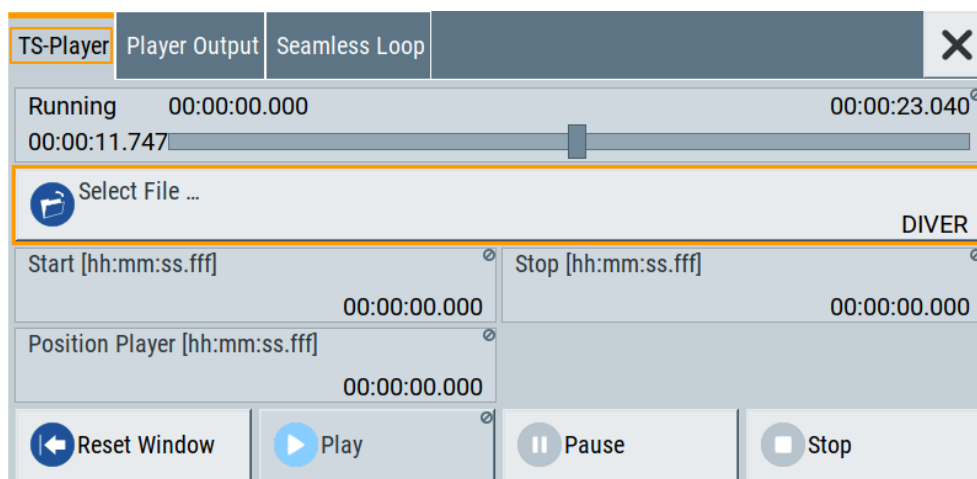


The tab provides settings to configure the general settings of the TS player application.

**Settings:**

**Running/Position Player [hh:mm:ss:fff]**
Displays the current position in time, while playing the file.

You can set an individual position via Position Player [hh:mm:ss.fff].

Remote command:
:TSGen:CONFigure:SEEK:POSition on page 78

**Select File**
Provides access to the standard "File Select" function of the instrument. The provided navigation possibilities in the dialog are self-explanatory.

See also, chapter "File and Data Management" in the R&S SMCV100B User Manual.

The dialog allows you to select user-defined, predefined and recent files. Table 3-9 lists file extensions of supported files.

*Table 3-9: Supported TS player file types*

| File extension | Stream libraries | Remark | Option |
|---|---|---|---|
| *.atsc_c | ATSC/ATSC & Mobile DTV | Encrypted | R&S SMCVB-KS13 |
| *.dab | T-DMB/DAB | Unencrypted | - |
| *.dab_c | T-DMB/DAB | Encrypted | R&S SMCVB-KS10 |
| *.dabp_c | DAB+ | Encrypted | R&S SMCVB-KS11 |
| *.eti | T-DMB/DAB | Unencrypted | - |
| *.xeti | T-DMB/DAB | Unencrypted | - |
| *.emc_c | EMC | Encrypted | R&S SMCVB-KS15 |
| *.isdbt_c | ISDB-T | Encrypted | R&S SMCVB-KS12 |
| *.pcap | - | Captured IPv4 stream for ATSC 3.0 player | - |
| *.t2mi[1] | - | Unencrypted | - |
| *.t2mi_c | DVB-T2 MI | Encrypted | R&S SMCVB-KS14 |
| *.t2trp_c | DVB-T2 MI | Encrypted | R&S SMCVB-KS14 |
| *.trp | - | Unencrypted | - |
| *.trp_c | - | Encrypted<br>Included in various stream libraries | R&S SMCVB-KS12<br>R&S SMCVB-KS17<br>R&S SMCVB-KS18<br>R&S SMCVB-KS19<br>R&S SMCVB-KS20 |
| *.bin | - | Unencrypted | - |
| *.ts | - | Unencrypted | - |
| *.mpg | - | Unencrypted | - |
| *.t10 | - | - | - |

[1] For T2MI stream files, the data rate of a T2MI file is determined automatically, if the following applies:
- Data rate is not part of the TRP file header information.
- PCR information is not available.
- T2MI TRP file is not encrypted, that means not of type *.t2mi_c.
- TRP file has the *.t2mi file extension.

Remote command:
:TSGen:CONFigure:PLAYfile on page 76
:TSGen:READ:PLAYfile:LENGth? on page 80
:TSGen:READ:FMEMory on page 80

**Start [hh:mm:ss.fff]**

Sets the start position in the loaded player file. Data which chronologically precedes the start position is not replayed by the player.

The entered time stamp must chronologically always precede the entry under Stop.

Remote command:

:TSGen:CONFigure:SEEK:STARt on page 78

**Position Player [hh:mm:ss.fff]**

Displays the current play position in the file.

Remote command:

:TSGen:CONFigure:SEEK:POSition on page 78

**Stop [hh:mm:ss.fff]**

Sets the end position in the player file. Data which chronologically follows the end position is not replayed by the player.

When the player reaches the "Stop" position, it returns to the "Start" position (continuous play).

The entered time stamp must chronologically always follow the entry under Play.

Remote command:

:TSGen:CONFigure:SEEK:STOP on page 78

**Reset Window**

Resets "Start/Stop/Position Player" parameters.

Remote command:

:TSGen:CONFigure:SEEK:RESet on page 78

**Play**

Plays the selected file.

For supported file types, see Table 3-9.

Remote command:

:TSGen:CONFigure:COMMand on page 75

**Pause**

Pauses the player.

After pausing, you can resume playing the file by clicking "Play" again.

Remote command:

:TSGen:CONFigure:COMMand on page 75

**Stop**

Stops the player and returns to the start position.

Remote command:

:TSGen:CONFigure:COMMand on page 75

### 3.7.2 Player output settings

Access:

► Select "TS Player > Player Output".

The tab provides settings to configure the output of the TS player.

#### 3.7.2.1 General settings



The tab provides settings to configure general player output properties.

**Data Rate**

Sets the output data rate of the player.

**Note:** If "Nullpacket Stuffing > Off", we recommend that you set the output data rate equal to the original data rate.

If you want to use a different data rate, activate "Nullpacket Stuffing". The function ensures that the data stream is replayed in the same way as it was recorded. The time references in the tables of the TS stream are also correct during replay.

Remote command:
:TSGen:CONFigure:TSRate on page 80

**Orig. Data Rate**

Displays the calculated original TS data rate.

Remote command:
:TSGen:READ:ORIGtsrate on page 80

**Packet Length**

Requires a `*.trp`, `*.trp_c`, `*.emc` or `*.emc_c` file loaded into the "TS Player" dialog. `*.trp` files are previously recorded files.

Displays the packet length of the loaded TS player file.

Remote command:
`:TSGen:CONFigure:PLENgth` on page 76

**Nullpacket Stuffing**

Requires a `*.trp`, `*.trp_c`, `*.emc` or `*.emc_c` file loaded into the "TS Player" dialog. `*.trp` files are previously recorded files.

Activates nullpacket stuffing.

By default nullpacket stuffing is deactivated. The output data rate of the TS player equals the original data rate as defined in the TS player file. Equal rates ensure that the time references in the tables of the played TS stream are correct during replay.

"On"              Activate stuffing, if you need a higher rate than the original data rate. Null packets are inserted into the data stream.
                  To ensure correct time references in the stream tables, activate program clock reference correction. See "PCR, DTS/PTS" on page 40.

"Off"             Deactivate stuffing, if you want to use the same data rate as the original data rate.

Remote command:
`:TSGen:CONFigure:STUFfing` on page 79

**Stop Data**

Requires a `*.trp`, `*.trp_c`, `*.emc` or `*.emc_c` file loaded into the "TS Player" dialog. `*.trp` files are previously recorded files.
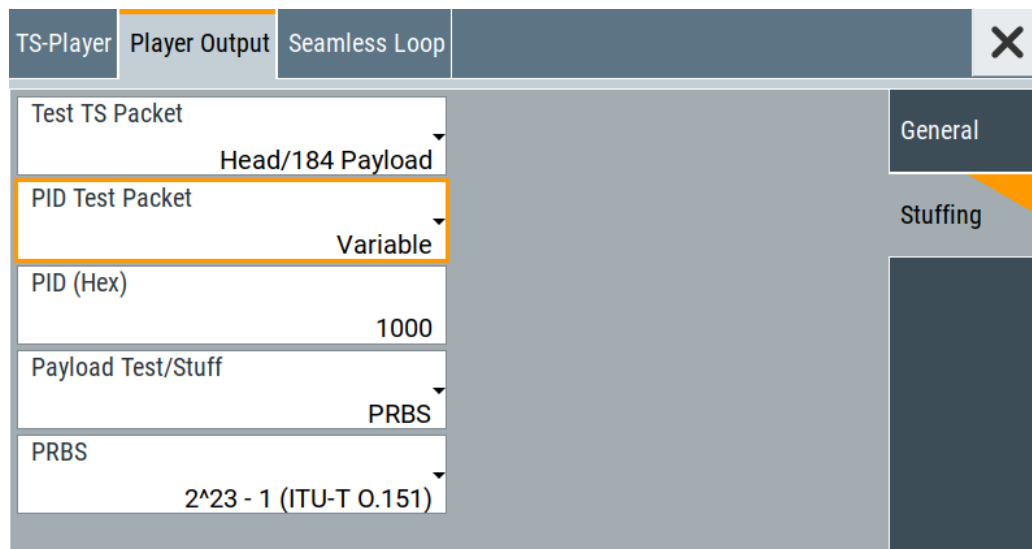
Ensures that a standardized TS data stream is always output at the TS output at the rear of the R&S SMCV100B.

In pause or stop status, the TS generator generates "test packets", which have data and header parts that can be configured using the Test TS Packet.

Remote command:
`:TSGen:CONFigure:STOPdata` on page 79

### 3.7.2.2    Stuffing settings



The tab provides settings to configure stuffing.

**Settings**

**Test TS Packet**

Specifies the structure of the test transport stream packet that is fed to the modulator.

"Head/184 Payload"

> A sync byte (0x47) followed by three header bytes and 184 payload bytes.

"Sync/187 Payload"

> A sync byte (0x47) followed by 187 payload bytes.

"Head/200 Payload"

> A sync byte (0x47) followed by three header bytes and 200 payload bytes.

"Sync/203 Payload"

> A sync byte (0x47) followed by 203 payload bytes.

"Head/204 Payload"

> A sync byte (0x47) followed by three header bytes and 204 payload bytes.

"Sync/207 Payload"

> A sync byte (0x47) followed by 207 payload bytes.

Remote command:

:TSGen:CONFigure:TSPacket on page 79

**PID Test Packet**

If a header is present in the test packet ("Test TS Packet > Head/184 Payload"), you can specify a fixed or variable packet identifier (PID).

"Null"
The header of the test transport stream packets has a fixed setting of null packet header 1FFF (hex).

"Variable"
Uses the header value defined with PID (Hex).

Remote command:
:TSGen:CONFigure:PIDTestpack on page 76

**PID (Hex)**

Sets the PID.

If "PID Test Packet > Null", "PID (Hex) = 1FFF" is fixed.

If "PID Test Packet > Variable", you can edit the value.

Remote command:
:TSGen:CONFigure:PID on page 75

**Payload Test/Stuff**

Defines the payload area content of the TS packet.

"PRBS"
PRBS data in accordance with ITU-T O.151
See also chapter "Internal Modulation Data" in the R&S SMCV100B User Manual.

"0x00"
Exclusively 00 (hex) data

"0xFF"
Exclusively FF (hex) data

Remote command:
:TSGen:CONFigure:PAYLoad on page 75

**PRBS**

Sets the length of the PRBS sequence.

You can select a PRBS 15 or a PRBS 23 sequence as specified by ITU-T O.151.

Remote command:
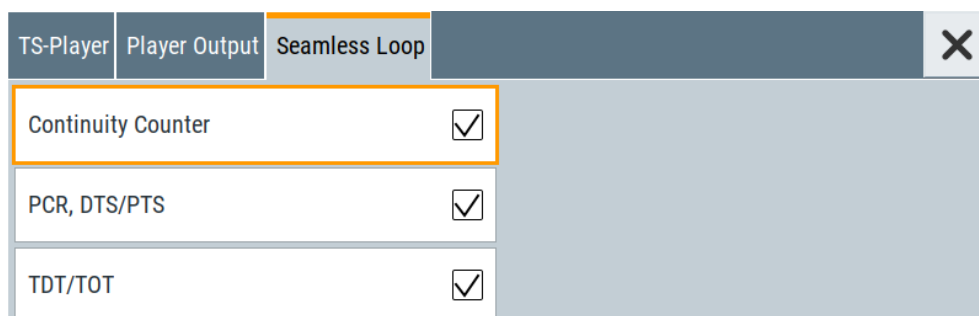:TSGen:CONFigure:PRBS[:SEQuence] on page 76

### 3.7.3  Seamless loop settings

Displaying the tab requires a *.trp, *.trp_c, *.emc or *.emc_c file loaded into the "TS Player" dialog. *.trp files are previously recorded files.

Access:

► Select "TS Player > Seamless Loop".



The tab provides settings to configure settings for playing the file in a loop.

**Settings:**

**Continuity Counter**

Activates the correction of the continuity counters in the replayed TS data stream. The correction allows you to decode the stream without interruption when the play file is looping.

Remote command:

:TSGen:CONFigure:SEAMless:CC on page 77

**PCR, DTS/PTS**

Activates the correction of time stamps in the replayed TS data stream. The correction allows you to decode the stream without interruption when the play file is looping.

If you set "Nullpacket Stuffing = On" and "PCR, DTS/PTS = On", the time stamps in the streams are corrected when nullpackets are inserted into the stream.

Remote command:

:TSGen:CONFigure:SEAMless:PCR on page 77

**TDT/TOT**

Activates the correction of the time and date table in the replayed TS data stream. The correction allows you to decode the stream without interruption when the play file is looping.

Remote command:

:TSGen:CONFigure:SEAMless:TT on page 77

## 3.8  Local IP data network settings

Access:

1. Select "Input Signal > General > Source > External".

2. Select "Input Signal > General > Input > IP"

3. Select "Input Signal > IP Channel x > Local IP Data Network".



The tab provides access to local IP data settings to configure the board address.

The remote commands to configure local IP data network settings are described in Chapter 5.7, "BCIP subsystem", on page 81.

How to: Chapter 4.1.1, "How to apply an external IP input signal", on page 44

**Settings:**

**Network Status**

Indicates that the instrument is connected to the network.

If the instrument is disconnected, try "Restart Network".

Remote command:

:SYSTem:COMMunicate:BCIP<hw>:NETWork:STATus on page 83

**Restart Network**

Terminates the network connection of the instrument and sets it up again later. You can use this function to fix network problems.

**Note:** This function restarts only the connection of the instrument to the network. It does not impact the network itself.

Remote command:
:SYSTem:COMMunicate:BCIP<hw>:NETWork:RESTart on page 83

**Hostname**

Displays the hostname.

Displayed is the board name, that is the name of the IP data board of the R&S SMCV100B, e.g. SMCV100B-123456-IP-Data.

Each instrument is delivered with an assigned hostname, a logical name which can be used instead of the IP address. With the default network settings, the IP address is allocated by the DHCP server. This address can change each time the instrument is reconnected. Unlike the IP address, the hostname name does not change.

**Note:**
This function is password-protected. Unlock the protection level 1 to access it.

We recommend that you do not change the default network settings or the hostname to avoid problems with the network connection.

Remote command:
:SYSTem:COMMunicate:BCIP<hw>:NETWork:COMMon:HOSTname on page 82

**Address Mode**

Selects the mode for assigning the IP address.

"Auto (DHCP)"

Assigns the IP address automatically, provided the network supports DHCP.

"Static"        Enables you to assign the IP address manually.

Remote command:
:SYSTem:COMMunicate:BCIP<hw>:NETWork:IPADdress:MODE on page 82

**IP Address**

Displays the IP address of the instrument in the local IP data network.

By default, the R&S SMCV100B is configured to use dynamic TCP/IP configuration and to obtain the whole address information automatically.

If the network does not support DHCP or the attempt does not succeed, the instrument tries to obtain the IP address via Zeroconf (APIPA) protocol. IP addresses assigned via Zeroconf start with the number blocks 169.254.*.*.

**Note:** An IP address that is assigned via the Zeroconf protocol although the network requires an IP address assigned via the DHCP server can cause network connection failures.

Remote command:
:SYSTem:COMMunicate:BCIP<hw>:NETWork:IPADdress on page 82

**Protocol**

Sets the protocol type of the input IP data.

The current firmware supports UDP and UDP/RTP.

Remote command:

:SYSTem:COMMunicate:BCIP<hw>:NETWork:PROTocol on page 83

**Subnet Mask**

Displays the bit group of the subnet in the host identifier.

To assign the subnet mask manually, select "Address Mode > Static".

Remote command:

:SYSTem:COMMunicate:BCIP<hw>:NETWork:IPADdress:SUBNet:MASK
on page 82

**Show Connector**

Accesses a dialog that displays the physical location of the selected connector on the
front/rear panel of the instrument.

**MAC Address**

Displays the MAC address, a unique identifier of the network adapter in the
R&S SMCV100B.

Remote command:

:SYSTem:COMMunicate:BCIP<hw>:NETWork:MACaddress on page 83

# 4 Performing DVB-T signal generation tasks

This chapter tells you how to configure the R&S SMCV100B to generate signals for simple receiver tests.

## 4.1 Configuring the input signal

This chapter provides an overview of the different input signals, that the R&S SMCV100B uses as modulation data.

### 4.1.1 How to apply an external IP input signal

**To connect the R&S SMCV100B to local IP data network**

1.  Connect the IP source to the "IP Data" connector of the R&S SMCV100B.
    See chapter "Connecting to IP Data Interface" in the R&S SMCV100B Getting Started user manual.

2.  Select "Input Signal > General > Source > External".

3.  Select "Input Signal > General > Input > IP".

4.  In the "IP Channel x" side tab, click "Local IP Data Network".

    By default, the R&S SMCV100B assigns the IP address automatically using DHCP ("Address Mode > Auto (DHCP)").

5.  If "Network Status > Disconnected", try "Restart Network".
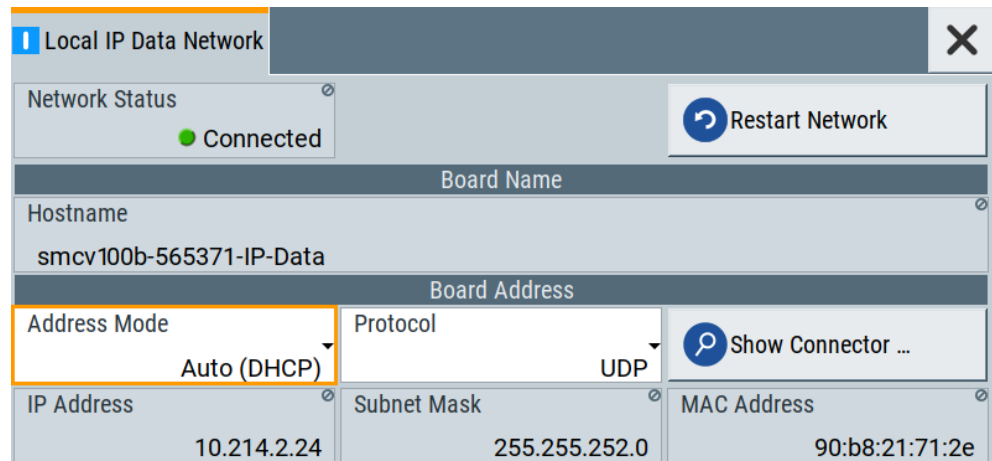
The R&S SMCV100B is connected to the local IP data network.

6. If DHCP does not assign an IP address, assign the IP address manually.
   See chapter "How to Assign the IP Address" in the R&S SMCV100B user manual.

7. Specify the protocol type of the input IP data.
   The current firmware supports UDP and UDP/RTP.

**To configure an external IP input signal**

The R&S SMCV100B is connected to a local IP data network, see "To connect the R&S SMCV100B to local IP data network" on page 44.

1. Specify general IP input signal properties:

   a) Select "Input Signal > General > Source > External".
   b) Select "Input > IP".
   c) Specify the IP TS Channel, e.g. "IP TS Channel > 1".

   The "IP Channel 1" side tab appears, where you can configure the IP connection for channel 1 and channel-independent local IP network settings.
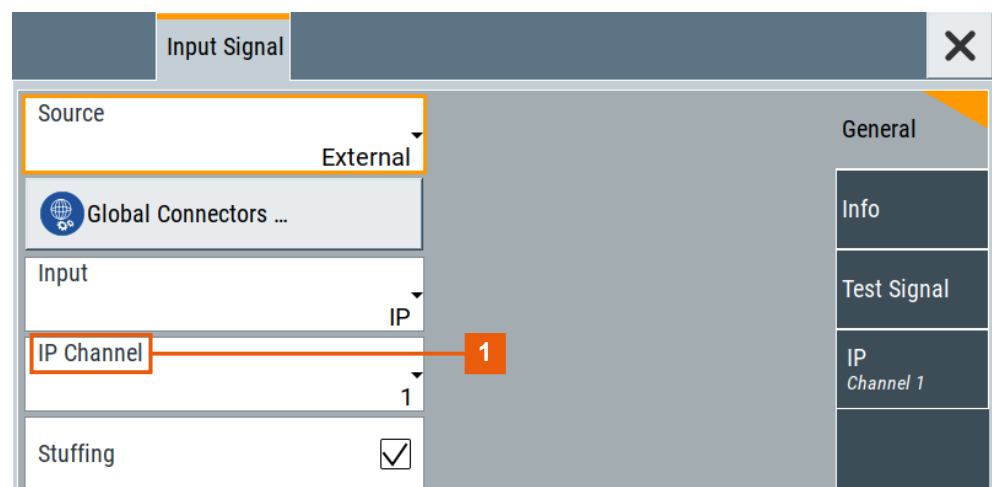


1 = IP channel notation: IP TS Channel

2. Optionally, if supported, activate "Stuffing" to adjust the TS data rate.

3. Specify IP TS channel properties, e.g. for "IP TS Channel > 1":

   a) Define the input type, e.g. "Type > Multicast".
   b) Specify the "Multicast Address" that is the destination IPv4 address of the IP connection.
      **Note:** Use the destination address also in the IP data source, e.g. a stream program.
   c) Specify the port that is the destination port of the IP connection.
      **Note:** Use the destination port also in the IP data source.
   d) Specify the IGMPv3 source address that is the source IPv4 address of the IP connection.
      A source address different from "0.0.0.0" accepts only data originating from the specified IP address.
   e) Optionally, to check availability of the "IGMPv3 Source Address", click "Ping Source Address"
      - If "Ping Result > Ping: Successful", the source address is available.
      - If "Ping Result > Ping: Transmit Failed. Destination Host Unreachable", try another address.
   f) Optionally, specify a name for the IP connection, e.g. "Alias > Service".
   g) Select "Input IP > On", to activate the IP channel.

| Input Signal | | |
|---|---|---|
| **Input IP** ☑ | **Alias** <br> Service | **General** |
| **Type** <br> Multicast | **Multicast Address** <br> 224.3.2.1 | **Info** |
| **Port** <br> 6 002 | **IGMPv3 Source Address** <br> 123.4.5.6 | **Test Signal** |
| ➡ Ping Source Address | 🌐 Local IP Data Network ... | **IP** <br> *Channel 1* |
| **Ping Result** | | |

The R&S SMCV100B is prepared for receiving IP TS data that is input at the "IP Data" connector.

Monitor IP data stream properties in the "Info" side tab, see Chapter 4.2.1, "How to monitor external IP input data", on page 50.

## 4.1.2 How to apply an external TS input signal

**To connect to the external TS input interface**

1.  Use a double-shielded 75 Ω BNC cable for connection between R&S SMCV100B and the external MPEG TS data source.
    See also Section "Cable selection and electromagnetic interference (EMI)" in the R&S SMCV100B Getting Started user manual.

2.  At the R&S SMCV100B, connect the cable to the "User 1" connector.
    The connector is on the rear panel of the R&S SMCV100B.
    How to: Section "To connect to pluggable connectors" in the R&S SMCV100B Getting Started user manual.

**To specify the TS input interface at the R&S SMCV100B**

The R&S SMCV100B is connected to an MPEG TS data source via the "User 1" connector.

1.  Select "Input Signal > General > Source > External".

2.  Select "General > Global Connectors".

3.  In the "Global Connectors" dialog, configure the "User 1" connector for a TS input signal:

    a)  Select "Direction > Input".
    b)  Select "Signal > TS".
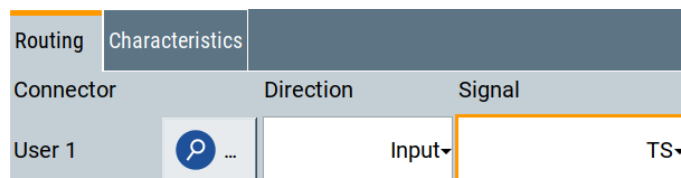


**To configure an external TS input signal**

The R&S SMCV100B is prepared for receiving a TS input signal at the "User 1" connector.

1.  Specify general TS input signal properties:

    a)  Select "Input Signal > General > Source > External".
    b)  Select "Input > TS IN".
    c)  Specify the format of the input signal:
    - Select "ASI", if you have a source supporting ASI format.
    - Select "SMPTE 310", if you have a source supporting SMPTE 310 format.

2.  Optionally, activate "Stuffing" to adjust the TS data rate.

You can further specify the payload of the stuffing data, see "Test Signal > Payload Test/Stuff."
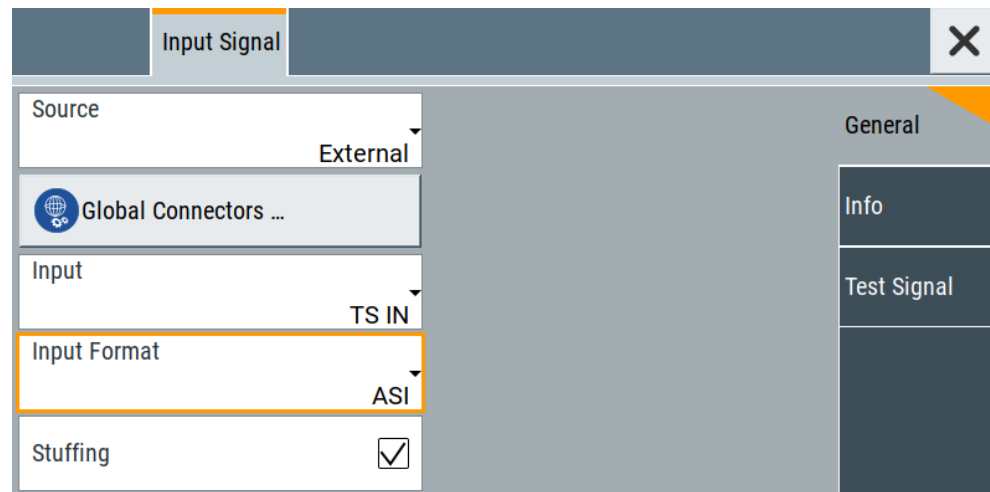


The R&S SMCV100B is prepared for receiving TS data that is input at the "User 1" connector.

Monitor TS data stream properties in the "Info" side tab, see Chapter 4.2.2, "How to monitor an external TS input signal", on page 50.

### 4.1.3 How to generate an internal TS signal

**To play a TS file with the "TS Player"**

1. Select "Input Signal > Source > TS Player".

   The "TS Player" button appears below.

2. Click "TS Player".

   The "TS Player" dialog for playing TS data files opens.

3. Click "Play" to play the default file `DIVER.trp`.
   Playing the file requires no option.

**To load and play a stream library file**

1. Load the file from its storage location:

   ● External storage device (HDD, memory stick): Load the file from the `/usb/` directory.
   ● Internal memory (SSD): Load the file from the user directory `/var/user/`

   **Note:** Library files are encrypted files. Loading the library file at the R&S SMCV100B requires installation of the corresponding library option. See "Required options" on page 31.

2. To load the file at the R&S SMCV100B, open the "TS Player" application in digital broadcast standard ("<Broadcast_Standard>") dialogs:

   a) Select "Baseband" > "<Broadcast_Standard>" > "Input Signal".
   b) Select "Source" > "TS Player".
   c) Select "TS Player" button.
   d) Select "Select File".

3. To select the file, navigate to the storage location (1).

4. Select "TS-Player" > "Play".
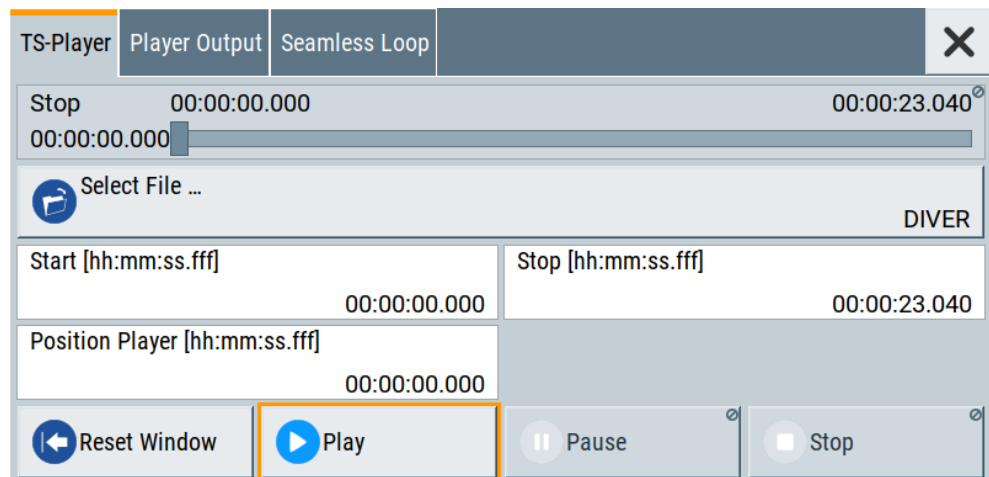


The R&S SMCV100B processes the stream file.

5. Select "<Broadcast_Standard>" > "State" > "On", to activate the baseband signal.

6. In the block diagram, select "RF" > "On".

The stream file is modulated onto the RF carrier and output at the "RF 50 Ω" connector.

## 4.2 Monitoring the input signal

This chapter provides an overview of the different input signals, that the R&S SMCV100B uses as modulation data.

### 4.2.1 How to monitor external IP input data

The R&S SMCV100B receives external IP input data as described in Chapter 4.1.1, "How to apply an external IP input signal", on page 44.

► Select "Input Signal > Info"



The "Info" side tab displays physical properties of the input IP stream data.

The standard packet length is 188 byte. The maximum useful data rate is specified by the broadcast standard.

The measured data rate is lower and depends on the TS source settings. The useful data rate is lower than the measured data rate due to null packets present in the transport stream.

If "Stuffing > On", the useful data rate can be lower than the maximum useful data rate.

### 4.2.2 How to monitor an external TS input signal

The R&S SMCV100B receives external TS input data as described in Chapter 4.1.2, "How to apply an external TS input signal", on page 47.

► Select "Input Signal > Info"

The "Info" side tab displays physical properties of the input TS stream data.

### 4.2.3 How to monitor an internal TS player signal

The R&S SMCV100B receives internal TS input data as described in Chapter 4.1.3, "How to generate an internal TS signal", on page 48.

► Select "Input Signal > Info"
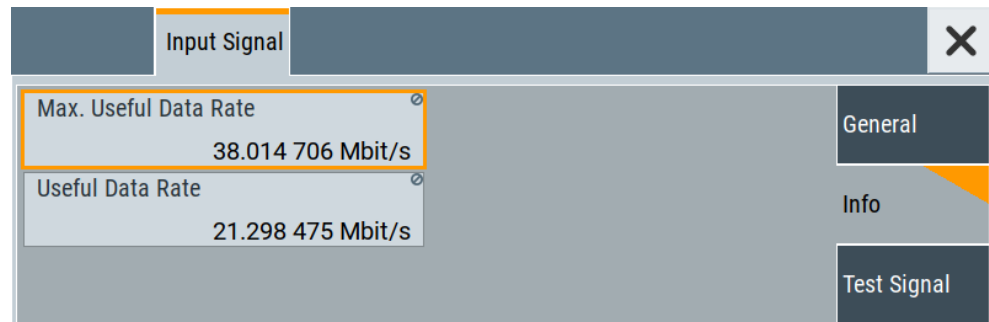


The "Info" side tab displays physical properties of the TS player stream data.

## 4.3 Calculating the input data rate

The calculation of the input data rate depends on the coding hierachy, see "Hierarchy" on page 12.

**Input data rate for nonhierarchical coding**

$f\_in = (987/1207) * CR * (1/(1+GI)) * q * (PL/188) * BW$

where

$f\_in$ = input data rate in [Mbit/s]

CR = code rate [1/2, 2/3, 3/4, 5/6, 7/8]

GI = guard interval [1/4, 1/8, 1/16, 1/32, off = 0]

q = bits per carrier constellation (QPSK: q=2, 16QAM: q=4, 64QAM: q=6)

PL = packet length [188, 204]

BW = used bandwidth [MHz]

**Input data rate for hierarchical coding**

16QAM:

$f\_in\_HP = (987/1207) * CR\_HP * (1/(1+GI)) * (4/2) * (PL/188) * BW$

$f\_in\_LP = (987/1207) * CR\_LP * (1/(1+GI)) * (4/2) * (PL/188) * BW$

64QAM:

$f\_in\_HP = (987/1207) * CR\_HP * (1/(1+GI)) * (6/3) * (PL/188) * BW f\_in\_LP = (987/1207) * CR\_LP * (1/(1+GI)) * (12/3) * (PL/188) * BW$

where

$f\_in\_HP$ = input data rate of high-priority path in [Mbit/s]

$f\_in\_LP$ = input data rate of low-priority path in [Mbit/s]

$CR\_HP$ = code rate of high-priority path [1/2, 2/3, 3/4, 5/6, 7/8]

$CR\_LP$ = code rate of low-priority path [1/2, 2/3, 3/4, 5/6, 7/8]

GI = guard interval [1/4, 1/8, 1/16, 1/32, off = 0]

PL = packet length [188, 204]

BW = used bandwidth [MHz]

# 5 Remote-control commands

The following commands are required to generate signals with the DVB-T option in a remote environment. We assume that the R&S SMCV100B has already been set up for remote operation in a network as described in the R&S SMCV100B documentation. A knowledge about the remote control operation and the SCPI command syntax is assumed.

**ⓘ** **Conventions used in SCPI command descriptions**

For a description of the conventions used in the remote command descriptions, see section "Remote-Control Commands" in the R&S SMCV100B user manual.

**Common suffixes**

The following common suffixes are used in the remote commands:

| Suffix | Value range | Description |
|---|---|---|
| SOURce&lt;hw&gt; | 1 | Available baseband signals |

**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 preset/reset 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 DVB-T are described here:

## 5.1 General commands

**Example: Saving current configuration**

```
SOURce1:BB:DVBT:SETTing:STORe "/var/user/my_dvbt"
// Saves the file "my_dvbt.dvbt" in the directory as above.
*RST
SOURce1:BB:DVBT:SETTing:CATalog?
// Response: "my_dvbt"
SOURce1:BB:DVBT:SETTing:LOAD "/var/user/my_dvbt"
SOURce1:BB:DVBT:HIERarchy?
// Response: "A2"

SOURce1:BB:DVBT:STATe 1
SOURce1:BB:DVBT:SETTing:DELete "my_dvbt"
```

**Commands**

**[:SOURce<hw>]:BB:DVBT: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:DVBT:STATe`.

| | |
|---|---|
| **Example:** | See Example"Saving current configuration" on page 54. |
| **Usage:** | Event |
| **Manual operation:** | See "Set To Default" on page 12 |

**[:SOURce<hw>]:BB:DVBT:STATe** <State>

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

**Parameters:**

| | |
|---|---|
| <State> | 1 \| ON \| 0 \| OFF |
| | *RST:   0 |
| **Example:** | See Example"Saving current configuration" on page 54. |
| **Manual operation:** | See "State" on page 12 |

**[:SOURce<hw>]:BB:DVBT:SETTing:CATalog?**

Queries the files with settings in the default directory. Listed are files with the file extension `*.dvbt`.

**Example:**            See Example"Saving current configuration" on page 54.

**Usage:**              Query only

**Manual operation:**   See "Save/Recall" on page 12

**[:SOURce<hw>]:BB:DVBT:SETTing:DELete** <Delete>

Deletes the selected file from the default or the specified directory. Deleted are files with extension `*.dvbt`.

**Setting parameters:**
<Delete>                "<filename>"

                        Filename or complete file path; file extension can be omitted

**Example:**            See Example"Saving current configuration" on page 54.

**Usage:**              Setting only

**Manual operation:**   See "Save/Recall" on page 12

**[:SOURce<hw>]:BB:DVBT:SETTing:LOAD** <DvbtRecall>

Loads the selected file from the default or the specified directory. Loaded are files with extension `*.dvbt`.

**Parameters:**
<DvbtRecall>            "<filename>"

                        Filename or complete file path; file extension can be omitted

**Example:**            See Example"Saving current configuration" on page 54.

**Manual operation:**   See "Save/Recall" on page 12

**[:SOURce<hw>]:BB:DVBT:SETTing:STORe** <DvbtSave>

Saves the current settings into the selected file; the file extension (`*.dvbt`) is assigned automatically.

**Parameters:**
<DvbtSave>              "<filename>"

**Example:**            See Example"Saving current configuration" on page 54.

**Manual operation:**   See "Save/Recall" on page 12

**[:SOURce<hw>]:BB:DVBT:HIERarchy** <Hierarchy>

Selects the coding hierarchy.

**Parameters:**

| | |
|---|---|
| <Hierarchy> | A4 \| A2 \| A1 \| NONHier |
| | *RST:　　　NONHier |

**Example:** 　　　　　　　See Example"Saving current configuration" on page 54.

**Manual operation:** 　　See "Hierarchy" on page 12

## 5.2　Input commands

### 5.2.1　General commands

**Example: Configuring general input signal properties**

```
********************************************************************************
// Configure general input signal parameters for hierarchical coding.
********************************************************************************
SOURce1:BB:DVBT:HIERarchy A1
SOURce1:BB:DVBT:SOURce:HIGH EXT
SOURce1:BB:DVBT:SOURce:LOW?
// Response: "TEST"
SOURce1:BB:DVBT:INPut:HIGH?
// Response: "TS"
SOURce1:BB:DVBT:INPut:FORmat?
// Response: "ASI"
SOURce1:BB:DVBT:STUFfing:HIGH?
// Response: "1"

********************************************************************************
// Configure general input signal parameters for non-hierarchical coding.
********************************************************************************
SOURce1:BB:DVBT:HIERarchy NONHier
SOURce1:BB:DVBT:SOURce:HIGH EXT
SOURce1:BB:DVBT:INPut:HIGH IP
// IP input requires non-hierarchical coding.
SOURce1:BB:DVBT:INPut:TSCHannel:HIGH 1
SOURce1:BB:DVBT:STUFfing:HIGH?
// Response: "1"
// Stuffing is always activated for HP path and LP path.
```

**Commands**

**[:SOURce<hw>]:BB:DVBT:SOURce:LOW** <SourceLP>
**[:SOURce<hw>]:BB:DVBT:SOURce[:HIGH]** <SignalSourceHp>

Sets the modulation source for the input signal.

**Parameters:**

| | |
|---|---|
| <SignalSourceHp> | TSPLayer \| EXTernal \| TESTsignal |
| | *RST:          EXTernal |

| | |
|---|---|
| **Example:** | See Example"Configuring general input signal properties" on page 56. |

| | |
|---|---|
| **Manual operation:** | See "Source" on page 14 |

**[:SOURce<hw>]:BB:DVBT:INPut:LOW** <InputLP>
**[:SOURce<hw>]:BB:DVBT:INPut[:HIGH]** <Input>

Sets the external input interface.

**Parameters:**

| | |
|---|---|
| <Input> | IP \| TS |
| | **TS** |
| | Input for serial transport stream data. The signal is input at the "User 1/2" connectors. |
| | **IP** |
| | Supported for high priority path (HP) only, i.e. setting requires non-hierarchical coding. |
| | Input for IP transport stream data. The signal is input at the "IP Data" connector. |
| | *RST:          TS |

| | |
|---|---|
| **Example:** | See Example"Configuring general input signal properties" on page 56. |

| | |
|---|---|
| **Manual operation:** | See "Input" on page 15 |

**[:SOURce<hw>]:BB:DVBT:INPut:FORMat:LOW** <InputFormatLP>
**[:SOURce<hw>]:BB:DVBT:INPut:FORMat** <InputFormat>

Sets the format of the input signal.

**Parameters:**

<InputFormat>       ASI | SMPTE

                            *RST:       ASI

**Example:**       See Example"Configuring general input signal properties" on page 56.

**Manual operation:**       See "Input Format" on page 15

---

**[:SOURce<hw>]:BB:DVBT:INPut:TSCHannel[:HIGH]** <TSChannel>

Selects the IP-based transport stream (TS) channel. You can select 1 out of 4 IP TS channels as input at the "IP Data" interface.

To configure a particular channel, see Chapter 3.2.4, "IP channel x settings", on page 20.

**Parameters:**

<TSChannel>       1 | 2 | 3 | 4

                            *RST:       1

**Example:**       See Example"Configuring general input signal properties" on page 56.

**Manual operation:**       See "IP TS Channel" on page 15

---

**[:SOURce<hw>]:BB:DVBT:STUFfing:LOW?**
**[:SOURce<hw>]:BB:DVBT:STUFfing[:HIGH]?**

Queries the stuffing state that is active for HP path and LP path.

**Return values:**

<StuffingHP>       1 | ON | 0 | OFF

                            *RST:       1

**Example:**       See Example"Configuring general input signal properties" on page 56.

**Usage:**       Query only

**Manual operation:**       See "Stuffing" on page 15

## 5.2.2   Info commands

**Example: Querying input signal properties**

```
SOURce1:BB:DVBT:SOURce:HIGH EXT

********************************************************************************
// Query properties of high priority input signals at TS IN interface.
********************************************************************************
SOURce1:BB:DVBT:INPut:HIGH TS
```

```
SOURce1:BB:DVBT:PACKetlength:HIGH?
// Response: "P188"
SOURce1:BB:DVBT:USEFul:RATE:MAX:HIGH?
// Response in MBit/s: "19.392659"
SOURce1:BB:DVBT:USEFul:RATE:HIGH?
// Response in MBit/s: "17.654321"
SOURce1:BB:DVBT:INPut:DATArate:HIGH?
// Response in MBit/s: "18.765432"

// **********************************************************************************
// Query properties of non-hierarc. coded input signals at IP Data interface.
// **********************************************************************************
SOURce1:BB:DVBT:HIERarchy NONHier
SOURce1:BB:DVBT:INPut:HIGH IP
// You can query input signal properties for one IP TS channel only.
// Query properties for , e.g., IP TS channel 2.
SOURce1:BB:DVBT:INPut:TSCHannel:HIGH 2
SOURce1:BB:DVBT:PACKetlength?
// Response: "P188"
SOURce1:BB:DVBT:USEFul:RATE:MAX:HIGH?
// Response in MBit/s: "432.109876"
SOURce1:BB:DVBT:USEFul:RATE:HIGH?
// Response in MBit/s: "400.000000"
SOURce1:BB:DVBT:INPut:DATArate:HIGH?
// Response in MBit/s: "399.876543"

// **********************************************************************************
// Query properties of internal TS player input signals.
// **********************************************************************************
SOURce1:BB:DVBT:SOURce:LOW TSPL
SOURce1:BB:DVBT:SOURce:HIGH?
// Response: "TEST"
// If you change the low priority input signal source to "EXT"/"TSPL", the high
// priority source changes automatically to test signal and vice versa.
SOURce1:BB:DVBT:USEFul:RATE:MAX:HIGH?
// Response in MBit/s: "19.392659"
SOURce1:BB:DVBT:USEFul:RATE?
// Response in MBit/s: "17.654321"
```

For configuring IP channel settings and local IP data network parameters, see:

**Commands**

**[:SOURce<hw>]:BB:DVBT:PACKetlength:LOW?**
**[:SOURce<hw>]:BB:DVBT:PACKetlength[:HIGH]?**

Queries the packet length of the external transport stream in bytes.

**Return values:**

<PacketLengthHP>    P188 | P204 | INValid

**P188|P204**
188/204 byte packets specified for serial input and parallel input.

**INValid**
Packet length does not match the specified length.

*RST:        INValid

**Example:**        See Example"Querying input signal properties" on page 58.

**Usage:**        Query only

**Manual operation:**    See "Packet Length" on page 17

**[:SOURce<hw>]:BB:DVBT:USEFul[:RATE]:LOW?**
**[:SOURce<hw>]:BB:DVBT:USEFul[:RATE][:HIGH]?**

Queries the data rate of useful data $r_{useful}$ of the external transport stream. The data rate is measured at the input of the installed input interface.

**Return values:**

<UseDRHP>        float

Range:      0  to  9999999999
Increment:   1000
*RST:        0

**Example:**        See Example"Querying input signal properties" on page 58.

**Usage:**        Query only

**Manual operation:**    See "Useful Data Rate" on page 18

**[:SOURce<hw>]:BB:DVBT:USEFul[:RATE]:MAX:LOW?**
**[:SOURce<hw>]:BB:DVBT:USEFul[:RATE]:MAX[:HIGH]?**

Queries the maximum data rate, that is derived from the current modulation parameter settings.

The value is the optimal value at the TS input interface, that is necessary for the modulator.

**Return values:**

<MaxUseDRHP>        integer

Range:   0  to  9999999999
*RST:     0

**Example:**              See Example"Querying input signal properties" on page 58.

**Usage:**                Query only

**Manual operation:**     See "Max. Useful Data Rate" on page 18

---

**[:SOURce<hw>]:BB:DVBT[:INPut]:DATarate:LOW?**
**[:SOURce<hw>]:BB:DVBT[:INPut]:DATarate[:HIGH]?**

Queries the measured value of the data rate of one of the following:

- External transport stream including null packets input at "User 1" connector
- External transport stream including null packets input at "IP Data/LAN" connector (TSoverIP)

The value equals the sum of useful data rate $r_{meas}$ and the rate of null packets $r_0$:

$$r_{meas} = r_{meas} + r_0$$

**Return values:**

<MeasDRHP>                float

|              |                     |
|--------------|---------------------|
| Range:       | 0  to  9999999999   |
| Increment:   | 1000                |
| *RST:        | 0                   |

**Example:**              See Example"Querying input signal properties" on page 58.

**Usage:**                Query only

**Manual operation:**     See "Measured Data Rate" on page 18

## 5.2.3  Test signal commands

**Example: Configuring test signal properties**

```
SOURce1:BB:DVBT:SOURce:HIGH TEST
SOURce1:BB:DVBT:TESTsignal:HIGH TTSP
// Sets a test TS packet as test signal of the HP input data stream.

********************************************************************************
// Alternatively, set more specific test signals with PRBS parts within the
// test packet.
********************************************************************************
SOURce1:BB:DVBT:TESTsignal PBEC
// Inserts the PRBS sequence before the convolutional encoder.
SOURce1:BB:DVBT:TESTsignal PAFC
// Inserts the PRBS sequence after the convolutional encoder.

********************************************************************************
// Configure test signal properties.
********************************************************************************
SOURce1:BB:DVBT:TSPacket H184
SOURce1:BB:DVBT:PIDTestpack NULL
```

```
SOURce1:BB:DVBT:PID?
// Response in decimal representation: "8191"
// Response in hexadecimal representation: "1FFF"
SOURce1:BB:DVBT:PIDTestpack VAR
SOURce1:BB:DVBT:PID 4607
// Corresponds to "11FF" in hexadecimal representation.
SOURce1:BB:DVBT:PAYLoad PRBS
SOURce1:BB:DVBT:PRBS P23_1
```

## Commands

### [:SOURce<hw>]:BB:DVBT:PAYLoad <Payload>

Defines the payload area content of the TS packet.

**Parameters:**

| | |
|---|---|
| <Payload> | HFF \| H00 \| PRBS |
| | *RST:       PRBS |

**Example:**            See Example"Configuring test signal properties" on page 61.

**Manual operation:**    See "Payload Test/Stuff" on page 20

### [:SOURce<hw>]:BB:DVBT:PID <PID>

Sets the PID.

**Parameters:**

| | |
|---|---|
| <PID> | integer |
| | Range:      #H0000 to #H1FFF |
| | *RST:       #H1FFF |

**Example:**            See Example"Configuring test signal properties" on page 61.

**Manual operation:**    See "PID (Hex)" on page 20

### [:SOURce<hw>]:BB:DVBT:PIDTestpack <PidTestPacket>

If a header is present in the test packet ("Test TS Packet > Head/184 Payload"), you can specify a fixed or variable packet identifier (PID).

**Parameters:**

| | |
|---|---|
| <PidTestPacket> | NULL \| VARiable |
| | *RST:        NULL |

**Example:**              See Example"Configuring test signal properties" on page 61.

**Manual operation:**     See "PID Test Packet" on page 19

---

**[:SOURce<hw>]:BB:DVBT:PRBS[:SEQuence]** <PRBS>

Sets the length of the PRBS sequence.

You can select a PRBS 15 or a PRBS 23 sequence as specified by ITU-T O.151.

**Parameters:**

<PRBS>                P15_1 | P23_1

                       *RST:       P23_1

**Example:**              See Example"Configuring test signal properties" on page 61.

**Manual operation:**     See "PRBS" on page 20

---

**[:SOURce<hw>]:BB:DVBT:TESTsignal:LOW** <TestSignalLP>
**[:SOURce<hw>]:BB:DVBT:TESTsignal[:HIGH]** <TestSignalHP>

Defines the test signal data.

**Parameters:**

<TestSignalHP>       TTSP | PBEC | PAFC

                       **TTSP**
                       Test TS packet with standardized packet data used as modulation data in the transport stream.

                       **PBEC**
                       PRBS before convolutional encoder
                       Pure pseudo-random bit sequence (PRBS) data used as modulation data with no packet structure. The sequence is inserted before the convolutional encoder. PRBS data conforms with ITU-T O.151 specification.

                       **PAFC**
                       PRBS after convolutional encoder
                       Pure pseudo-random bit sequence (PRBS) data used as modulation data with no packet structure. The sequence is inserted after the convolutional encoder.

                       *RST:       TTSP

**Example:**              See Example"Configuring test signal properties" on page 61.

**Manual operation:**     See "Test Signal" on page 16

---

**[:SOURce<hw>]:BB:DVBT:TSPacket** <TSPacket>

Specifies the structure of the test transport stream packet that is fed to the modulator.

**Parameters:**

<TSPacket>           S187 | H184

                       *RST:       H184

| | |
|---|---|
| **Example:** | See Example"Configuring test signal properties" on page 61. |
| **Manual operation:** | See "Test TS Packet" on page 19 |

## 5.2.4 IP subsystem

The `SOURce:BB:INPut:IP` subsystem contains the commands for configuring input IP data from a local IP data network.

To configure local IP data network parameters, see Chapter 5.7, "BCIP subsystem", on page 81.

**Common suffixes**

The following common suffixes are used in the `SOURce:BB:INPut:IP` remote commands:

| Suffix | Value range | Description |
|---|---|---|
| `IP<ch>` | 1 to 4 | IP channel number |

**Example: Configure IP channel 2 properties**

```
// Use the data from IP channel 2 as input for modulation data.
SOURce1:BB:INPut:IP2:STATe ON
// Specify alias as "Alias 2".
SOURce1:BB:INPut:IP2:ALIas "Alias 2"


//*******************************************************************************
// Define Unicast properties.
//*******************************************************************************
SOURce1:BB:INPut:IP2:TYPe UNI
// Local IP data interface is configured for Unicast reception
SOURce1:BB:INPut:IP2:PORT 6002

//*******************************************************************************
// Define multicast properties.
//*******************************************************************************
SOURce1:BB:INPut:IP2:TYPe MULT
// Local IP data interface is configured for Multicast reception
SOURce1:BB:INPut:IP2:MULTicast:ADDRess?
// Response: "226.0.0.0"
SOURce1:BB:INPut:IP2:IGMP:SOURce:ADDRess?
// Response: "0.0.0.0"
SOURce1:BB:INPut:IP2:IGMP:SOURce:ADDRess "192.168.10.1"
SOURce1:BB:INPut:IP2:IGMP:SOURce:PING
SOURce1:BB:INPut:IP2:IGMP:SOURce:RESult?
// Response: "Ping: Successful"
```

**Commands**

**[:SOURce<hw>]:BB:INPut:IP<ch>[:STATe]** <Alias>

Activates/deactivates the "IP Channel x" as IP input.

Specify the current IP TS Channel with the command
`SOURce1:BB:DigStd:INPut:TSCHannel`. `DigStd` stands for the IP TS Channel in the corresponding broadcast standard.

**Parameters:**

<Alias>                    1 | ON | 0 | OFF

                           *RST:        0

**Example:**               See Example"Configure IP channel 2 properties" on page 64.

**Manual operation:**      See "Input IP" on page 22

**[:SOURce<hw>]:BB:INPut:IP<ch>:ALIas** <Alias>

Specifies an alias, i.e. name for the IP connection.

**Parameters:**

<Alias>                    string

**Example:**               See Example"Configure IP channel 2 properties" on page 64.

**Manual operation:**      See "Alias" on page 22

**[:SOURce<hw>]:BB:INPut:IP<ch>:PORT** <Port>

Sets the port of the input IP data at the "IP Data" connector.

**Parameters:**

<Port>                     integer

                           Range:     0  to  65535
                           *RST:      6002

**Example:**               See Example"Configure IP channel 2 properties" on page 64.

**Manual operation:**      See "Port" on page 23

**[:SOURce\<hw\>]:BB:INPut:IP\<ch\>:TYPE** \<Type\>

Sets the IP input type.

**Parameters:**

\<Type\>                    UNIcast | MULTicast

**UNIcast**
Analyzes all unicast IP packets that arrive at the specified port.
See `[:SOURce<hw>]:BB:INPut:IP<ch>:PORT` on page 65.

**MULTicast**
When an IP address is in the multicast address range, an attempt is made to join a multicast group using IGMP. Set multicast address and port.
See:
`[:SOURce<hw>]:BB:INPut:IP<ch>:MULticast:ADDRess`
on page 66
`[:SOURce<hw>]:BB:INPut:IP<ch>:PORT` on page 65

*RST:          UNIcast

**Example:**           See Example"Configure IP channel 2 properties" on page 64.

**Manual operation:**   See "Type" on page 22

---

**[:SOURce\<hw\>]:BB:INPut:IP\<ch\>:MULticast:ADDRess**

Sets the destination IP address (IPv4) of the IP connection.

**Parameters:**

\<Address\>               string

Range:      224.0.0.0  to  239.255.255.255

**Example:**           See Example"Configure IP channel 2 properties" on page 64.

**Manual operation:**   See "Multicast Address" on page 22

---

**[:SOURce\<hw\>]:BB:INPut:IP\<ch\>:IGMP[:SOURce]:ADDRess**

Specifies the IGMP source address of the network.

**Parameters:**

\<Address\>               string

**Example:**           See Example"Configure IP channel 2 properties" on page 64.

**Manual operation:**   See "IGMPv3 Source Address" on page 23

---

**[:SOURce\<hw\>]:BB:INPut:IP\<ch\>:IGMP[:SOURce]:PING**

Triggers pinging of the IGMP source address in the local IP data network. Query the result via `[:SOURce<hw>]:BB:INPut:IP<ch>:IGMP[:SOURce]:RESult?` on page 67.

| **Example:** | See Example"Configure IP channel 2 properties" on page 64. |
|---|---|
| **Usage:** | Event |
| **Manual operation:** | See "Ping Source Address" on page 23 |

---

**[:SOURce<hw>]:BB:INPut:IP<ch>:IGMP[:SOURce]:RESult?**

Queries the result of pinging the IGMP source address.

See `[:SOURce<hw>]:BB:INPut:IP<ch>:IGMP[:SOURce]:PING` on page 66.

**Return values:**

| <PingResult> | string |
|---|---|
| | Returns ping messages. |
| **Example:** | See Example"Configure IP channel 2 properties" on page 64. |
| **Usage:** | Query only |
| **Manual operation:** | See "Ping Result" on page 23 |

## 5.3 Coding commands

**Example: Configuring coding properties**

```
SOURce1:BB:DVBT:HIERarchy?
// Response: "NONHierarchical"

SOURce1:BB:DVBT:CONstel T64
SOURce1:BB:DVBT:CHANnel:BANDwidth BW_8
SOURce1:BB:DVBT:CHANnel:USED:BANDwidth?
// Response in Hz: "7607142.9"
SOURce1:BB:DVBT:CHANnel:USED:BANDwidth 7607142.7
SOURce1:BB:DVBT:CHANnel:BANDwidth?
// Response: "BW_V"
SOURce1:BB:DVBT:FFT:MODE M8K
SOURce1:BB:DVBT:GUARd:INTerval G1_32
SOURce1:BB:DVBT:DVHState 1
SOURce1:BB:DVBT:DVBH:SYMBol:INTerleaver IND
SOURce1:BB:DVBT:RATE:HIGH R5_6

SOURce1:BB:DVBT:HIERarchy A1
SOURce1:BB:DVBT:RATE:HIGH?
// Response: "R5_6"
SOURce1:BB:DVBT:RATE:LOW R3_4
```

**Commands**

**[:SOURce<hw>]:BB:DVBT:CHANnel[:BANDwidth]** <ChannelBW>

Selects the channel bandwidth.

**Parameters:**

<ChannelBW>            BW_Var | BW_8 | BW_7 | BW_5 | BW_6

                      *RST:        BW_8

**Example:**            See Example"Configuring coding properties" on page 67.

**Manual operation:**   See "Channel Bandwidth" on page 25

**[:SOURce<hw>]:BB:DVBT:CONStel** <Constel>

Defines the constellation.

**Parameters:**

<Constel>             T64 | T16 | T4

                      *RST:        T64

**Example:**            See Example"Configuring coding properties" on page 67.

**Manual operation:**   See "Constellation" on page 25

**[:SOURce<hw>]:BB:DVBT:DVBH:SYMBol[:INTerleaver]** <SymbInterleaver>

Sets the symbol interleaver.

**Parameters:**

<SymbInterleaver>     INDepth | NATive

                      *RST:        NATive

**Example:**            See Example"Configuring coding properties" on page 67.

**Manual operation:**   See "Symbol Interleaver" on page 26

**[:SOURce<hw>]:BB:DVBT:DVHState** <DVHState>

Enables or disables DVB-H.

**Parameters:**

<DVHState>                     1 | ON | 0 | OFF

                               *RST:          0

**Example:**                   See Example"Configuring coding properties" on page 67.

**Manual operation:**          See "DVB-H State" on page 26

---

**[:SOURce<hw>]:BB:DVBT:FFT:MODE** <FFTMode>

Sets the fast fourier transform (FFT) window to determine the number of carriers per OFDM symbol.

To find out the number of carriers for a given FFT window, see Table 3-3.

**Parameters:**

<FFTMode>                      M8K | M4K | M2K

                               *RST:          M8K

**Example:**                   See Example"Configuring coding properties" on page 67.

**Manual operation:**          See "FFT-Mode" on page 25

---

**[:SOURce<hw>]:BB:DVBT:GUARd:INTerval** <Guardint>

Sets the guard interval. The interval is expressed in fractions of the useful part of the OFDM symbol period $T_u$.

**Parameters:**

<Guardint>                     G1_32 | G1_16 | G1 | G1_ | G1_8 | G1_4

                               *RST:          G1_32

**Example:**                   See Example"Configuring coding properties" on page 67.

**Manual operation:**          See "Guard Interval" on page 26

---

**[:SOURce<hw>]:BB:DVBT:RATE:LOW** <CodeRateLP>
**[:SOURce<hw>]:BB:DVBT:RATE[:HIGH]** <CoderateHP>

Sets the code rate.

**Parameters:**

<CoderateHP>                   R1_2 | R2_3 | R3_4 | R5_6 | R7_8

                               *RST:          R3_4

**Example:**                   See Example"Configuring coding properties" on page 67.

**Manual operation:**          See "Code Rate" on page 27

---

**[:SOURce<hw>]:BB:DVBT:USED[:BANDwidth]** <UsedBW>

Defines the used bandwidth.

**Parameters:**

<UsedBW>　　　　　　　float

　　　　　　　　　　　　Range:　　　1000000　to　10000000
　　　　　　　　　　　　Increment:　0.1
　　　　　　　　　　　　*RST:　　　　66562500

**Example:**　　　　　　　See Example"Configuring coding properties" on page 67.

**Manual operation:**　　See "Used Bandwidth" on page 25

## 5.4　TPS commands

**Example: Configuring transmission parameter signaling properties**

```
SOURce1:BB:DVBT:CELL:ID #H0
SOURce1:BB:DVBT:TPSReserved:STATe 1
SOURce1:BB:DVBT:TPSReserved:VALue #H0
SOURce1:BB:DVBT:HIERarchy A1

SOURce1:BB:DVBT:TIMeslice:HIGH 1
SOURce1:BB:DVBT:TIMeslice:LOW 0
SOURce1:BB:DVBT:MPEFec:HIGH 0
SOURce1:BB:DVBT:MPEFec:LOW 1
```

**Commands**

**[:SOURce<hw>]:BB:DVBT:CELL:ID** <CellID>

Sets the cell ID in four-digit hexadecimal format.

**Parameters:**

<CellID>　　　　　　　integer

　　　　　　　　　　　　Range:　　　#H0000　to　#HFFFF
　　　　　　　　　　　　*RST:　　　　#H000

**Example:**　　　　　　　See Example"Configuring transmission parameter signaling
　　　　　　　　　　　　properties" on page 70.

**Manual operation:**　　See "TPS Cell ID (Hex)" on page 27

**[:SOURce\<hw\>]:BB:DVBT:MPEFec:LOW** \<MPEFecLP\>
**[:SOURce\<hw\>]:BB:DVBT:MPEFec[:HIGH]** \<MPEFecHP\>

Enables/disables MPE FEC.

If enabled, 1 TPS bit (s49) is used to signal that MPE FEC is used in at least one data stream.

**Parameters:**

| | |
|---|---|
| \<MPEFecHP\> | 1 \| ON \| 0 \| OFF |
| | *RST: 0 |

| | |
|---|---|
| **Example:** | See Example"Configuring transmission parameter signaling properties" on page 70. |
| **Manual operation:** | See "MPE FEC" on page 29 |

**[:SOURce\<hw\>]:BB:DVBT:TIMeslice:LOW** \<TimeSlicingLP\>
**[:SOURce\<hw\>]:BB:DVBT:TIMeslice[:HIGH]** \<TimeSlicingHP\>

Enables/disables time slicing.

If enabled, 1 TPS bit (s48) is used to signal that at least one data stream with time slicing exists in the multiplex.

**Parameters:**

| | |
|---|---|
| \<TimeSlicingHP\> | 1 \| ON \| 0 \| OFF |
| | *RST: 0 |

| | |
|---|---|
| **Example:** | See Example"Configuring transmission parameter signaling properties" on page 70. |
| **Manual operation:** | See "Time Slicing" on page 28 |

**[:SOURce\<hw\>]:BB:DVBT:TPSReserved:STATE** \<TPSReserved\>

Enables or disables the reserved TPS bits.

**Parameters:**

| | |
|---|---|
| \<TPSReserved\> | 1 \| ON \| 0 \| OFF |
| | *RST: OFF |

| | |
|---|---|
| **Example:** | See Example"Configuring transmission parameter signaling properties" on page 70. |
| **Manual operation:** | See "TPS Reserved State" on page 28 |

**[:SOURce\<hw\>]:BB:DVBT:TPSReserved:VALue** \<ReservedBits\>

Sets the reserved bits in one-digit hexadecimal format.

**Parameters:**

| | |
|---|---|
| <ReservedBits> | integer |
| | Range: #H0 to #HF |
| | *RST: #H0 |

| | |
|---|---|
| **Example:** | See Example"Configuring transmission parameter signaling properties" on page 70. |
| **Manual operation:** | See "TPS Reserved Bits (Hex)" on page 28 |

## 5.5 Special commands

The section contains commands to configure settings. Enable special settings to test deviations from the broadcast standard specification.

**Example: Configuring special settings**

```
*******************************************************************************
// Standard-compliant configuration.
*******************************************************************************
SOURce1:BB:DVBT:SPECial:REEDsolomon:HIGH?
// Response: "1"
SOURce1:BB:DVBT:SPECial:REEDsolomon:LOW?
// Response: "1"
SOURce1:BB:DVBT:SPECial:SETTings:STATe?
// Response: "0"

*******************************************************************************
// Non-standard configuration.
*******************************************************************************
SOURce1:BB:DVBT:SPECial:REEDsolomon:HIGH 0
SOURce1:BB:DVBT:SPECial:REEDsolomon:LOW 0
SOURce1:BB:DVBT:SPECial:SETTing:STATe 1
```

**Commands**

**[:SOURce<hw>]:BB:DVBT[:SPECial]:REEDsolomon:LOW** <ReedSolomonLow>
**[:SOURce<hw>]:BB:DVBT[:SPECial]:REEDsolomon[:HIGH]** <ReedSolomonHigh>

Enables/disables the Reed-Solomon encoder.

**Parameters:**

| | |
|---|---|
| <ReedSolomonHigh> | OFF | ON | 1 | 0 |
| | *RST: ON |

| | |
|---|---|
| **Example:** | See Example"Configuring special settings" on page 72. |

**Manual operation:** See "Reed Solomon" on page 30

---

**[:SOURce<hw>]:BB:DVBT[:SPECial]:SETTing[:STATe]** <Settings>

Enables/disables special settings.

The setting allows you to switch between standard-compliant and user-defined channel coding.

**Parameters:**

<Settings>          1 | ON | 0 | OFF

                   *RST:      0

**Example:**        See Example"Configuring special settings" on page 72.

**Manual operation:** See "Special Settings" on page 30

## 5.6 TSGen subsystem

The TSGen subsystem contains the commands for configuring the TS player.

**Example: Playing a TS player file**

```
//********************************************************************************
// Select a file, e.g. a user-defined setting.
//********************************************************************************
TSGen:CONFigure:PLAYfile "/var/user/my_test_player_test.trp"
// Selects the file "my_test_player_test" with extension *.trp.


//********************************************************************************
// Within the file, define a section, that you want to play.
// You can set start/stop position for a maximum section length of 10 hours.
//********************************************************************************
TSGen:CONFigure:SEEK:STARt 60000 // milliseconds
// Section start is after one minute from the original file start.
// The first minute is ignored.
TSGen:CONFigure:SEEK:STOP 120000 // milliseconds
// Section stop is after one minute from the original file start.
// The total section length is one minute.


//********************************************************************************
// Navigate to a certain position within the file/section of the file.
//********************************************************************************
TSGen:CONFigure:SEEK:POSition 100000 // milliseconds
// The current player position of file/section of the file is at 1 minute 40 seconds.

//********************************************************************************
// Reset play-related settings
//********************************************************************************
TSGen:CONFigure:SEEK:RESet
```

```
//*********************************************************************************
// Pause, stop, play the file.
//*********************************************************************************
TSGen:CONFigure:COMMand PAUS
// Pauses playing the file.
TSGen:CONFigure:COMMand STOP
// Stops playing the file.
TSGen:CONFigure:COMMand PLAY
// Activates playing the file.
```

### Example: Configuring and monitoring TS player output

```
//*********************************************************************************
// Configure general and stuffing parameters of the TS player output.
//*********************************************************************************
TSGen:CONFigure:STUFfing ON
TSGen:CONFigure:STOPdata TTSP
TSGen:CONFigure:TSPacket H184
TSGen:CONFigure:PIDTestpacket VAR
TSGen:CONFigure:PID 8100
// Corresponds to a PID = 1FA4 in hexadecimal representation.
TSGen:CONFigure:PAYLoad PRBS
TSGen:CONFigure:PRBS:SEQuence P23_1


//*********************************************************************************
// Monitor TS player output data.
//*********************************************************************************
// You can only change the data rate, if you stop the TS player.
TSGen:CONFigure:COMMand STOP
TSGen:CONFigure:TSRate 350E6
// Corresponds to a net data rate of 350 MBit/s.
TSGen:CONFigure:COMMand PLAY

TSGen:CONFigure:PLENgth?
// Response: "P188"
// Packet length is 188 bytes.
TSGen:READ:ORIGtsrate?
// Response in bit/s: "5018502"
```

### Example: Configuring seamless loop parameters

```
TSGen:CONFigure:SEAMless:CC ON
TSGen:CONFigure:SEAMless:PCR OFF
TSGen:CONFigure:SEAMless:TT ON
```

### Commands

**:TSGen:CONFigure:COMMand** <PlayerStatus>

Triggers playing, pausing and stopping of the TS player file selected with `:TSGen:CONFigure:PLAYfile`.

**Parameters:**

<PlayerStatus>     STOP | PAUSe | PLAY | RESet

                              *RST:         STOP

**Example:**          See Example"Playing a TS player file" on page 73.

**Manual operation:**  See "Play" on page 35
                                See "Pause" on page 35
                                See "Stop" on page 35

**:TSGen:CONFigure:PAYLoad** <PayLoad>

Determines the payload of the test packet. Also influences the payload of the generated stuffing packets while the TS player is running.

**Parameters:**

<PayLoad>          HFF | H00 | PRBS

                              *RST:         PRBS

**Example:**          See Example"Configuring and monitoring TS player output" on page 74.

**Manual operation:**  See "Payload Test/Stuff" on page 39

**:TSGen:CONFigure:PID** <PID>

The available values depend on the settings of `:TSGen:CONFigure:PIDTestpack`.

If `:TSGen:CONFigure:PIDTestpack` is set to `NULL`,
then `:TSGen:CONFigure:PID` is `1FFF(hex)`.

Otherwise the values are variable.

**Parameters:**

<PID>                    integer

Range:     0  to  8191
*RST:      8191

**Example:**            See Example"Configuring and monitoring TS player output"
on page 74.

**Manual operation:**   See "PID (Hex)" on page 39

---

**:TSGen:CONFigure:PIDTestpack** <PIDTestpack>

Sets the PID, if `:TSGen:CONFigure:TSPacket` is `H184|H200|H204`.

**Parameters:**

<PIDTestpack>            VARiable | NULL

*RST:           NULL

**Example:**            See Example"Configuring and monitoring TS player output"
on page 74.

**Manual operation:**   See "PID Test Packet" on page 39

---

**:TSGen:CONFigure:PLAYfile** <PlayFile>

Specifies the file path and filename of the TS player file.

**Parameters:**

<PlayFile>              string

**Example:**            See Example"Playing a TS player file" on page 73.

**Manual operation:**   See "Select File" on page 33

---

**:TSGen:CONFigure:PLENgth** <PLength>

Queries the packet length of the loaded file.

**Parameters:**

<PLength>               P188 | P204 | P208 | INV

*RST:           INV

**Example:**            See Example"Configuring and monitoring TS player output"
on page 74.

**Manual operation:**   See "Packet Length" on page 37

---

**:TSGen:CONFigure:PRBS[:SEQuence]** <PRBS>

Sets the length of the PRBS sequence.

**Parameters:**

| | |
|---|---|
| <PRBS> | P15_1 \| P23_1 |
| | *RST:      P23_1 |

| | |
|---|---|
| **Example:** | See Example"Configuring and monitoring TS player output" on page 74. |
| **Manual operation:** | See "PRBS" on page 39 |

---

**:TSGen:CONFigure:SEAMless:CC** <CC>

Activates the correction of the continuity counters in the replayed TS data stream. The correction allows you to decode the stream without interruption when the play file is looping.

**Parameters:**

| | |
|---|---|
| <CC> | 1 \| ON \| 0 \| OFF |
| | *RST:      0 |

| | |
|---|---|
| **Example:** | See Example"Configuring seamless loop parameters" on page 74. |
| **Manual operation:** | See "Continuity Counter" on page 40 |

---

**:TSGen:CONFigure:SEAMless:PCR** <PCR>

Activates the correction of time stamps in the replayed TS data stream. The correction allows you to decode the stream without interruption when the play file is looping.

**Parameters:**

| | |
|---|---|
| <PCR> | 1 \| ON \| 0 \| OFF |
| | *RST:      0 |

| | |
|---|---|
| **Example:** | See Example"Configuring seamless loop parameters" on page 74. |
| **Manual operation:** | See "PCR, DTS/PTS" on page 40 |

---

**:TSGen:CONFigure:SEAMless:TT** <TT>

Activates the correction of the time and date table in the replayed TS data stream. The correction allows you to decode the stream without interruption when the play file is looping.

**Parameters:**

| | |
|---|---|
| <TT> | 1 \| ON \| 0 \| OFF |
| | *RST:      0 |

| | |
|---|---|
| **Example:** | See Example"Configuring seamless loop parameters" on page 74. |
| **Manual operation:** | See "TDT/TOT" on page 40 |

**:TSGen:CONFigure:SEEK:POSition** <Position>

Sets the position, that is the current playing time position.

You can select a value in a 10-hour range.

**Parameters:**

<Position>                   float

                             Range:        0  to  36000000
                             Increment:    0.1
                             *RST:         0

**Example:**                 See Example"Playing a TS player file" on page 73.

**Manual operation:**        See "Running/Position Player [hh:mm:ss:fff]" on page 33
                             See "Position Player [hh:mm:ss.fff]" on page 35

**:TSGen:CONFigure:SEEK:RESet**

Resets the following parameters to their default state:

- :TSGen:CONFigure:SEEK:STARt on page 78
- :TSGen:CONFigure:SEEK:STOP on page 78

**Example:**                 See Example"Playing a TS player file" on page 73.

**Usage:**                   Event

**Manual operation:**        See "Reset Window" on page 35

**:TSGen:CONFigure:SEEK:STARt** <Start>

Sets an individual start time.

You can select a value in a 10-hour range.

**Parameters:**

<Start>                      float

                             Range:        0  to  36000000
                             Increment:    0.1
                             *RST:         0

**Example:**                 See Example"Playing a TS player file" on page 73.

**Manual operation:**        See "Start [hh:mm:ss.fff]" on page 35

**:TSGen:CONFigure:SEEK:STOP** <Stop>

Sets an individual stop time.

You can select a value in a 10-hour range.

**Parameters:**

| | |
|---|---|
| <Stop> | float |

Range:    0 to 36000000
Increment:  0.1
*RST:      23040.2

| | |
|---|---|
| **Example:** | See Example"Playing a TS player file" on page 73. |
| **Manual operation:** | See "Stop [hh:mm:ss.fff]" on page 35 |

---

**:TSGen:CONFigure:STOPdata** <StopData>

Ensures that a standardized TS data stream is always output at the TS output at the rear of the R&S SMCV100B.

**Parameters:**

| | |
|---|---|
| <StopData> | TTSP | NONE |
| | *RST:      NONE |

| | |
|---|---|
| **Example:** | See Example"Configuring and monitoring TS player output" on page 74. |
| **Manual operation:** | See "Stop Data" on page 37 |

---

**:TSGen:CONFigure:STUFfing** <Stuffing>

Activates nullpacket stuffing.

**Parameters:**

| | |
|---|---|
| <Stuffing> | 1 | ON | 0 | OFF |
| | *RST:      0 |

| | |
|---|---|
| **Example:** | See Example"Configuring and monitoring TS player output" on page 74. |
| **Manual operation:** | See "Nullpacket Stuffing" on page 37 |

---

**:TSGen:CONFigure:TSPacket** <TSPaket>

Sets the structure of the generated test packets in pause or stop status.

**Parameters:**

| | |
|---|---|
| <TSPaket> | H184 | H200 | H204 | S187 | S203 | S207 |

**S187|S203|S207**
A sync byte (0x47) followed by 187/203/207 payload bytes.

**H184|H200|H204**
A sync byte (0x47) followed by three header bytes and 184/200/204 payload bytes.
*RST:      H184

| | |
|---|---|
| **Example:** | See Example"Configuring and monitoring TS player output" on page 74. |

**Manual operation:**     See "Test TS Packet" on page 38

---

**:TSGen:CONFigure:TSRate** <TSRate>

Sets the output data rate of the player.

**Parameters:**

<TSRate>                  integer

                          Range:    1 to 35E7
                          *RST:     5018502

**Example:**              See Example"Configuring and monitoring TS player output"
                          on page 74.

**Manual operation:**     See "Data Rate" on page 36

---

**:TSGen:READ:FMEMory** <FMemory>

Queries the file size of the TS player file.

**Parameters:**

<FMemory>                 integer

                          Range:    0 to 10
                          *RST:     0

**Example:**              See Example"Configuring and monitoring TS player output"
                          on page 74.

**Manual operation:**     See "Select File" on page 33

---

**:TSGen:READ:ORIGtsrate** <ORIGtsrate>

Displays the calculated original TS data rate.

**Parameters:**

<ORIGtsrate>              integer

                          Range:    1 to 350000000
                          *RST:     5018502

**Example:**              See Example"Configuring and monitoring TS player output"
                          on page 74.

**Manual operation:**     See "Orig. Data Rate" on page 36

---

**:TSGen:READ:PLAYfile:LENGth?**

Queries calculated original loop time.

**Return values:**

<Length>                  integer

                          Range:    0 to 100
                          *RST:     0

| **Example:** | See Example"Configuring and monitoring TS player output" on page 74. |
|---|---|
| **Usage:** | Query only |
| **Manual operation:** | See "Select File" on page 33 |

## 5.7 BCIP subsystem

The `SYSTem:COMMunicate:BCIP` subsystem contains the commands for configuring local IP data network parameters.

**Common suffixes**

The following common suffixes are used in the remote commands:

| Suffix | Value range | Description |
|---|---|---|
| `BCIP<hw>` | 1 | Available local IP LAN interfaces |

**Example: Retrieving information on local network-related settings**

```
//*******************************************************************************
// Monitor IP interface 1 local network status.
//*******************************************************************************
SYSTem:COMMunicate:BCIP1:NETWork:STATus?
// Response: "0"
// The instrument is diconnected from the local IP network.
SYSTem:COMMunicate:BCIP1:NETWork:RESTart
SYSTem:COMMunicate:BCIP1:NETWork:STATus?
// Response: "1"


//*******************************************************************************
// Query local IP data network properties.
//*******************************************************************************
SYSTem:COMMunicate:BCIP1:NETWork:COMMon:HOSTname?
// Response: "SMCV100B-123456-IP-Data"
SYSTem:COMMunicate:BCIP1:NETWork:IPADdress:MODE STAT
SYSTem:COMMunicate:BCIP1:NETWork:IPADdress "10.113.0.104"
SYSTem:COMMunicate:BCIP1:NETWork:IPADdress:SUBNet:MASK "255.255.252.0"
SYSTem:COMMunicate:BCIP1:NETWork:MACaddress?
// Response: "00 90 B8 21 89 F8"
SYSTem:COMMunicate:BCIP1:NETWork:PROTocol?
// Response: "UDP"
```

**Commands**

**:SYSTem:COMMunicate:BCIP<hw>:NETWork:COMMon:HOSTname** <Hostname>

Sets an individual hostname for the vector signal generator.

**Note:**We recommend that you do not change the hostname to avoid problems with the network connection. If you change the hostname, be sure to use a unique name.

**Parameters:**
<Hostname>                string

**Example:**                See Example"Retrieving information on local network-related settings" on page 81.

**Manual operation:**     See "Hostname" on page 42

**:SYSTem:COMMunicate:BCIP<hw>:NETWork:IPADdress**

Sets the IP address.

**Example:**                See Example"Retrieving information on local network-related settings" on page 81.

**Manual operation:**     See "IP Address" on page 42

**:SYSTem:COMMunicate:BCIP<hw>:NETWork:IPADdress:MODE** <IPMode>

Selects manual or automatic setting of the IP address.

**Parameters:**
<IPMode>                  AUTO | STATic

                          *RST:          AUTO

**Example:**                See Example"Retrieving information on local network-related settings" on page 81.

**Manual operation:**     See "Address Mode" on page 42

**:SYSTem:COMMunicate:BCIP<hw>:NETWork:IPADdress:SUBNet:MASK**

Sets the subnet mask.

**Example:**                See Example"Retrieving information on local network-related settings" on page 81.

**Manual operation:**     See "Subnet Mask" on page 43

**:SYSTem:COMMunicate:BCIP\<hw\>:NETWork:MACaddress** \<MACAddress\>

Queries the MAC address of the network adapter.

**Parameters:**

| | |
|---|---|
| \<MACAddress\> | string |
| | Range: 00:00:00:00:00:00 to ff:ff:ff:ff:ff:ff |

| | |
|---|---|
| **Example:** | See Example"Retrieving information on local network-related settings" on page 81. |
| **Manual operation:** | See "MAC Address" on page 43 |

---

**:SYSTem:COMMunicate:BCIP\<hw\>:NETWork:PROTocol** \<Protocol\>

Specifies the network protocol.

**Parameters:**

| | |
|---|---|
| \<Protocol\> | UDP |
| | *RST: UDP |

| | |
|---|---|
| **Example:** | See Example"Retrieving information on local network-related settings" on page 81. |
| **Manual operation:** | See "Protocol" on page 43 |

---

**:SYSTem:COMMunicate:BCIP\<hw\>:NETWork:RESTart**

Triggers a restart of the network.

| | |
|---|---|
| **Example:** | See Example"Retrieving information on local network-related settings" on page 81. |
| **Usage:** | Event |
| **Manual operation:** | See "Restart Network" on page 42 |

---

**:SYSTem:COMMunicate:BCIP\<hw\>:NETWork:STATus** \<NetworkStatus\>

Queries the network connection state.

**Parameters:**

| | |
|---|---|
| \<NetworkStatus\> | 1 \| ON \| 0 \| OFF |
| | *RST: n.a. (no preset. default: 0) |

| | |
|---|---|
| **Example:** | See Example"Retrieving information on local network-related settings" on page 81. |
| **Manual operation:** | See "Network Status" on page 41 |

# Glossary: Abbreviations

**A**

**ASI:** Asynchronous Serial Interface

**D**

**DHCP:** Dynamic Host Configuration Protocol

**DVB-H:** Digital Video Broadcast - Handheld

**DVB-T:** Digital Video Broadcast - Terrestrial

**F**

**FEC:** Forward Error Correction

**I**

**IGMP:** Internet Group Management Protocol

**IGMPv3:** Internet Group Management Protocol version 3

**M**

**MAC:** Media Access Control

**MPE FEC:** Multiprotocol encapsulation forward error correction

**MPEG:** Moving Picture Experts Group
https://mpeg.chiariglione.org/

**O**

**OFDM:** Orthogonal Frequency-Division Multiplexing

**P**

**PID:** Packet Identifier

**PRBS:** Pseudo-Random Bit Sequence

**R**

**RTP:** Real-Time Transport Protocol

**S**

**SFN:** Single-frequency Network

**SMPTE:** Society of Motion Picture and Television Engineers
https://www.smpte.org/

## T

**TCP:** Transmission Control Protocol

**TPS:** Transmission Parameter Signalling

**TS:** Transport Stream

## U

**UDP:** User Datagram Protocol

## V

**VSB:** Vestigial Sideband Modulation

# Glossary: Specifications

**E**

**ETSI EN 300 744:** Digital Video Broadcasting (DVB); Framing structure, channel coding and modulation for digital terrestrial television
https://www.etsi.org/deliver/etsi_en/300700_300799/300744/

**I**

**ITU-T O.151:** ITU-T Recommendation O.151
https://www.itu.int/rec/T-REC-O.151-199210-I/en

# List of commands

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