

# R&S® SMCVB-K165

## ISDB-T/TSB

### User Manual



1179100602  
Version 03

**ROHDE & SCHWARZ**  
Make ideas real



This document describes the following software options:

- R&S®SMCVB-K165 ISDB-T/TSB (1434.3919.xx)

This manual describes firmware version FW 4.90.002.xx and later of the R&S®SMCV100B.

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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

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# 1 Welcome to the ISDB-T/TSB Option

The R&S SMCVB-K165 is a firmware application that adds functionality to generate signals in accordance with the ISDB-T/ISDB-T<sub>SB</sub> digital standard.

The R&S SMCVB-K165 option features:

- ISDB-T/ISDB-T<sub>SB</sub> 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](http://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 ISDB-T/TSB Dialog

### To open the dialog with ISDB-T/TSB settings

- ▶ In the block diagram of the R&S SMCV100B, select "Baseband > ISDB-T/TSB".  
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 Documentation Overview

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

[www.rohde-schwarz.com/manual/smcv100b](http://www.rohde-schwarz.com/manual/smcv100b)

### 1.2.1 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.

## 1.2.2 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.

## 1.2.3 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>

## 1.2.4 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.

## 1.2.5 Printed Safety Instructions

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

## 1.2.6 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](http://www.rohde-schwarz.com/brochure-datasheet/smcv100b)

### 1.2.7 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 open-source acknowledgment document provides verbatim license texts of the used open source software.

See [www.rohde-schwarz.com/firmware/smcv100b](http://www.rohde-schwarz.com/firmware/smcv100b)

### 1.2.8 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](http://www.rohde-schwarz.com/application/smcv100b)

## 1.3 Scope



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

In particular, it includes:

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

For a description of such tasks, see the R&S SMCV100B user manual.

## 1.4 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 ISDB-T/TSB Option

In the 1990s, the Japanese Association of Radio Industries and Business (ARIB) developed a transmission standard for digital terrestrial broadcasting. Unlike the transmission standards already in use in the other parts of the world, the television, radio and data services are to be covered by one standard. The Japanese broadcasting standard ISDB-T (Terrestrial Integrated Services Digital Broadcasting) was established, in which these services can be transmitted separately in many combinations.

Comprehensive test trials proved the system performance. The characteristics of the transmission system were verified in these field trials. The following capabilities should be particularly mentioned: single frequency network (SFN), the positive characteristics in mobile reception and narrowband reception where only a part of the transmitted data is evaluated (partial reception).



Layer-specific parameters are appended with (A|B|C).

### 2.1 Required Options

The equipment layout for generating ISDB-T/TSB signals includes:

- Base unit
- Option Enable Broadcast Standard (R&S SMCVB-K519)
- Option ISDB-T/TSB (R&S SMCVB-K165)

## 3 ISDB-T Configuration and Settings

Access:

- ▶ Select "Baseband > ISDB-T".

The remote commands required to define these settings are described in [Chapter 5, "Remote-Control Commands"](#), on page 58.

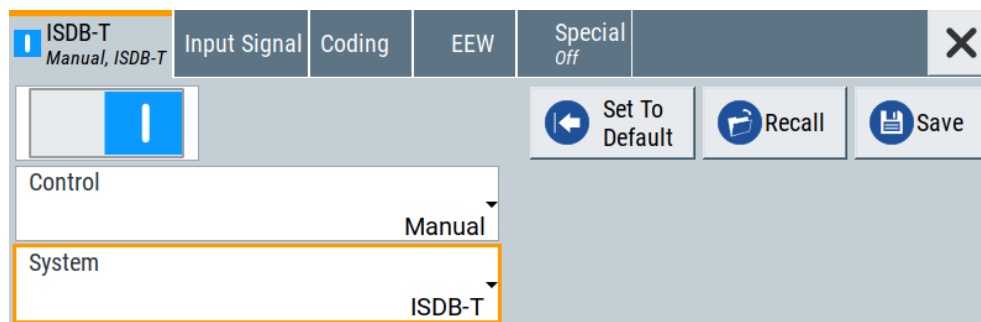
**Settings:**

• <a href="#">General Settings</a> .....	12
• <a href="#">Input Signal Settings</a> .....	14
• <a href="#">Coding Settings</a> .....	26
• <a href="#">EEW Settings</a> .....	32
• <a href="#">Special Settings</a> .....	37
• <a href="#">Global Connector Settings</a> .....	38
• <a href="#">TS Player</a> .....	39
• <a href="#">Local IP Data Network Settings</a> .....	48

### 3.1 General Settings

Access:

- ▶ Select "Baseband > ISDB-T".



This tab provides functionality for calling default settings, save and recall settings and ISDB-T system settings.

**Settings:**

<a href="#">State</a> .....	13
<a href="#">Set To Default</a> .....	13
<a href="#">Save/Recall</a> .....	13
<a href="#">Control</a> .....	13
<a href="#">System</a> .....	13

**State**

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

Remote command:

`[ :SOURce<hw> ] :BB:ISDBt:STATe` on page 59

**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:ISDBt:PRESet` on page 59

**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:ISDBt:SETTing:CATalog` on page 59

`[ :SOURce<hw> ] :BB:ISDBt:SETTing:DELeTe` on page 60

`[ :SOURce<hw> ] :BB:ISDBt:SETTing:LOAD` on page 60

`[ :SOURce<hw> ] :BB:ISDBt:SETTing:STORe` on page 60

**Control**

Defines the configuration mode of the coder.

"Auto"            The coder is configured by the transport stream.

"Manual"         The coder is configured manually.

Remote command:

`[ :SOURce<hw> ] :BB:ISDBt:CONTRol` on page 69

**System**

Sets the ISDB-T system.

ISDB-T<sub>SB</sub> (see [ISDB-TSB](#)) utilizes the same structure of OFDM segments as ISDB-T. However, the number of segments is different.

"ISDB-T"            13 segments. You can set the number of hierarchical layers.  
See "[Segments \(A|B|C\)](#)" on page 30.

"ISDB-TSB (1 SEG)"  
1 segment and 1 hierarchical layer.

"ISDB-TSB (3 SEG)"

3 segments and 2 hierarchical layers.

Remote command:

[ :SOURce<hw> ] :BB:ISDBt:SYSTem on page 70

## 3.2 Input Signal Settings

Access:

- ▶ Select "Baseband > ISDB-T/TSB > Input Signal".

The dialog provides access to settings necessary to configure the input signal.

### Input signal tasks

The settings allow you to perform the following tasks:

- Selecting an [MPEG TS](#) source
- Displaying information about the selected MPEG TS (e.g. data rate)
- Configuring the internal MPEG TS test packets or internal IP test packets

How to: [Chapter 4.1, "Configuring the Input Signal"](#), on page 51.



### Common input signal settings

The setting of the following parameters is used for all broadcast standards.

- "Source"
- "Input/Input Type"
- "IP TS Channel"

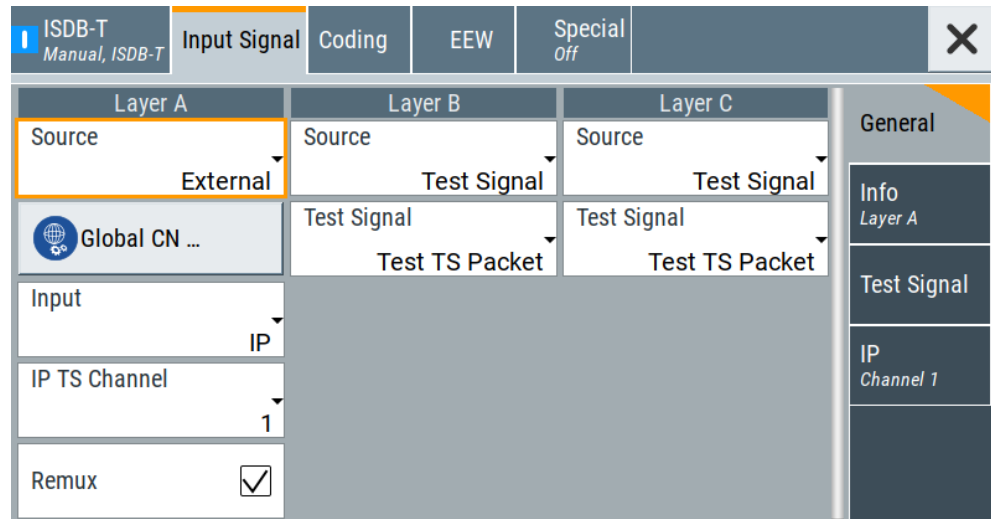
### Settings:

• <a href="#">General Settings</a> .....	15
• <a href="#">Info</a> .....	18
• <a href="#">Test Signal Settings</a> .....	20
• <a href="#">IP Channel x Settings</a> .....	22

### 3.2.1 General Settings

Access:

- ▶ Select "Input Signal > General".



The tab provides general settings necessary to configure the input signal.

**Settings:**

Source (A|B|C)..... 15  
 Input..... 16  
 Input Format..... 16  
 IP TS Channel..... 16  
 Test Signal (A|B|C)..... 17  
 Remux..... 17

**Source (A|B|C)**

Sets the modulation source for the input signal.

You can set the modulation source for layer A, B or C. If "Control > Manual", you can only transmit data in one layer as described in [Table 3-1](#). The table also includes test signal/PRBS data.

*Table 3-1: Data transmission per layer*

Layer	Pattern 1	Pattern 2	Pattern 3	Pattern 4
A	Test/PRBS	Data	Test/PRBS	Test/PRBS
B	Test/PRBS	Test/PRBS	Data	Test/PRBS
C	Test/PRBS	Test/PRBS	Test/PRBS	Data

**Example:**

If pattern 2 is set and layer B is to be set to data (pattern 3), the setting of layer B is first copied to layer A and layer B is set to data.

- "External" Uses a transport stream, that is input at the "TS IN"/"IP Data" interface.
- 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 48.
- "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 39
  - [Supported TS player file types](#)
- "Test Signal" Uses an internal test signal as specified in [Chapter 3.2.3, "Test Signal Settings"](#), on page 20.

Remote command:

`[ :SOURCE<hw> ] :BB:ISDBt:SOURCE:A` on page 61

`[ :SOURCE<hw> ] :BB:ISDBt:SOURCE:B` on page 61

`[ :SOURCE<hw> ] :BB:ISDBt:SOURCE:C` on page 61

### Input

Requires "Source (A|B|C) > External".

Sets the external input interface.

- "TS IN" Input for serial transport stream data. The signal is input at the "User 1" connector.
- "IP" Input for IP-based transport stream data (TSoverIP). The signal is input at the "IP Data" connector.

Remote command:

`[ :SOURCE<hw> ] :BB:ISDBt:INPut` on page 61

### Input Format

Requires "Input > TS IN".

Sets the format of the input signal.

- "ASI" [ASI](#) format
- "SMPTE 310" [SMPTE 310](#) format

Remote command:

`[ :SOURCE<hw> ] :BB:ISDBt:INPut:FORMat` on page 61

### 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 22.



Remote command:

[ :SOURce<hw> ] :BB:ISDBt:INPut:TSChannel on page 61

### Test Signal (A|B|C)

Requires "Source (A|B|C) > Test Signal".

Defines the test signal data.

"Test TS Packet"

Transmits transport stream packets, that have a set PID, see "[PID \(Hex\)](#)" on page 21.

A [PRBS](#) is inserted into the payload of these packets ([MSB](#) first). If "PID ≠ 1FFF", the continuity counter of these packets is incremented.

"PRBS before Conv. Enc."

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 22.

"PRBS after Conv. Enc."

PRBS data used as modulation data with no packet structure. The sequence is inserted after the convolutional encoder.

Remote command:

[ :SOURce<hw> ] :BB:ISDBt:TESTsignal:A on page 65

[ :SOURce<hw> ] :BB:ISDBt:TESTsignal:B on page 65

[ :SOURce<hw> ] :BB:ISDBt:TESTsignal:C on page 65

### Remux

Enables/disables the built-in [TS](#) remultiplexer.

Enabling requires "Control > Manual". If "Control > Auto", "Remux > Off" is fixed setting.

"On"

Processes a conventional [MPEG-2](#) transport stream (usual TS). The remultiplexer operates in accordance with specification [ARIB STD-B31](#), Appendix, section 3.2 "Multiplexed signals for hierarchical transmission".

"Off"

Disabled remultiplexer operation depends on the setting of "Control":

- "Control > Auto": The ISDB-T encoder processes an already remultiplexed TS (broadcast TS).
- "Control > Manual": The remultiplexer processes a conventional MPEG-2 TS.

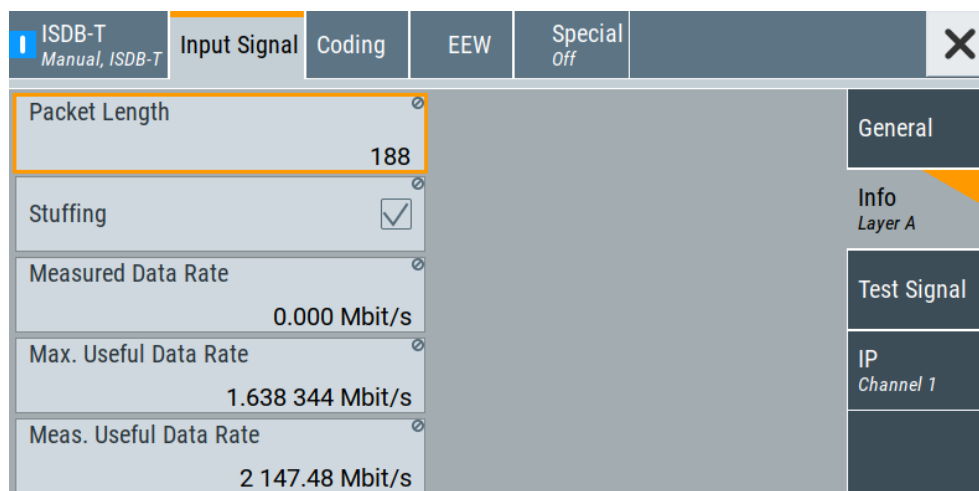
Remote command:

[ :SOURce<hw> ] :BB:ISDBt:REMux on page 62

### 3.2.2 Info

Access:

- ▶ Select "Input Signal > Info Layer".



The tab displays information on the input signal.

#### Input signal information

The displayed information comprises common layer settings and layer-specific settings:

- "Control > Auto": Stuffing state, packet length and measured data rate is displayed for all layers.  
Layer-specific information is displayed for the maximum useful data rate and the measured useful data rate.
- "Control > Manual": Displays layer-specific information only.  
Information is displayed for the layer, that has a setting "Source > External/TS Player".

See also "[Source \(A|B|C\)](#)" on page 15.

#### Settings:

<a href="#">Packet Length</a> .....	18
<a href="#">Stuffing</a> .....	19
<a href="#">Measured Data Rate</a> .....	19
<a href="#">Max. Useful Data Rate (A B C)</a> .....	19
<a href="#">Meas. Useful Data Rate (A B C)</a> .....	20

#### 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 and parallel input.
"204"	204 byte packets specified for serial input and parallel input.
"Invalid"	Packet length $\neq$ 188 bytes, 204 bytes or 208 bytes, i.e. the length is not as specified.

Remote command:

[\[:SOURCE<hw>\]:BB:ISDBt:PACKetlength?](#) on page 62

### Stuffing

Requires "Source > External/TS Player" and "ISDB-T > System > ISDB-T".

Activates stuffing.

You can enable/disable stuffing by setting "ISDB-T > Control":

- "Control > Auto" disables stuffing.
- "Control > Manual" enables stuffing.  
The transport stream is stuffed as follows: First all MPEG-2 null packets are removed. Next the transport stream is brought to the desired data rate by adding MPEG-2 null packets while simultaneously correcting the PCR values.

### Example: Transport stream stuffing

1. All MPEG-2 null packets are removed.
2. MPEG-2 null packets are added into the transport stream increasing the desired data rate.
3. Simultaneously, PCR values are corrected.

Remote command:

[\[:SOURCE<hw>\]:BB:ISDBt:STUFFing?](#) on page 62

### Measured Data Rate

Displays the measured value of the data rate  $r_{\text{meas}}$  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  $r_{\text{meas}}$  equals the sum of useful data rate  $r_{\text{useful}}$  and the rate of null packets  $r_0$ :

If "Stuffing > Off", ensure that the measured data rate equals the maximum useful data rate ( $r_{\text{meas}} = r_{\text{max. useful}}$ ).

Remote command:

[\[:SOURCE<hw>\]:BB:ISDBt\[:INPut\]:DATarate?](#) on page 63

### Max. Useful Data Rate (A|B|C)

Displays the transport stream 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.

If "Control > Auto", the tab also displays the maximum useful data rate for the specific layer.

Remote command:

[ :SOURce<hw> ] :BB:ISDBt:USEFul [ :RATE ] :MAX:A? on page 63

[ :SOURce<hw> ] :BB:ISDBt:USEFul [ :RATE ] :MAX:B? on page 63

[ :SOURce<hw> ] :BB:ISDBt:USEFul [ :RATE ] :MAX:C? on page 63

**Meas. Useful Data Rate (A|B|C)**

Displays the data rate measured in the specific layer.

If the measured data rate exceeds the maximum permissible data rate ("Max. Useful Data Rate (A|B|C)"), an overflow occurs. Data losses can occur during transmission.

Remote command:

[ :SOURce<hw> ] :BB:ISDBt:USEFul [ :RATE ] :A? on page 63

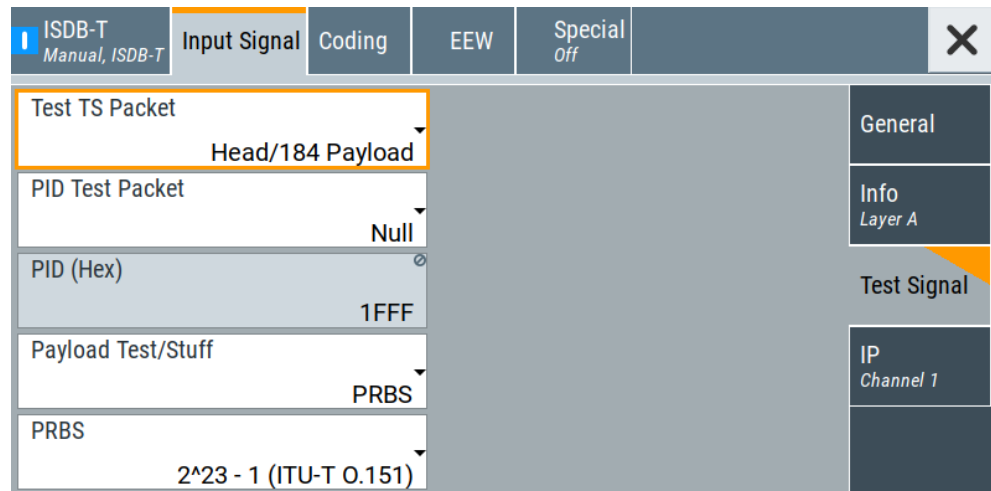
[ :SOURce<hw> ] :BB:ISDBt:USEFul [ :RATE ] :B? on page 63

[ :SOURce<hw> ] :BB:ISDBt:USEFul [ :RATE ] :C? on page 63

**3.2.3 Test Signal Settings**

Access:

- ▶ Select "Input Signal > Test Signal".



The tab provides settings necessary to configure the input test signal.

**Settings:**

Test TS Packet..... 20

PID Test Packet..... 21

PID (Hex)..... 21

Payload Test/Stuff..... 22

PRBS..... 22

**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".

Set the content of the payload area via ["Payload Test/Stuff"](#) on page 22.

**Note:** According to the ISDB-T standard, the [PAT](#), [NIT](#) and [CAT MPEG-2](#) tables have to be transmitted on the most robust hierarchical layer. For [PMT](#) and [PCR](#) packets, special transmission rules have to be applied also.

For details see specification [ARIB STD-B31](#), "Appendix: Operation guidelines for Digital terrestrial television broadcasting". The following example shows the impact on the bit error rate measurement:

**Example:**

Assume a transmission system with three layers. Layer A is fed with an external transport stream, layers B and C are fed with test TS packets. Layer C is configured as the most robust layer. In this configuration, some MPEG-2 tables are also transmitted on layer C. This means that not all transport stream packets of layer C carry the PRBS, but some packets carry MPEG-2 tables. The BER tester has to apply a PID filter to find the wanted packets. In consequence, "Sync/187 Payload" cannot be used, because there is no PID available in this setting. In contrast, the content of layer B stays untouched and can be evaluated without a PID filter.

"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:ISDBt:TSPackets:A](#) on page 65

**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:ISDBt:PIDTestpack](#) on page 64

**PID (Hex)**

Sets the [PID](#).

If "PID Test Packet > Variable", you can define the PIDs for each layer as follows:

- Layer A: PID a range = "0" to "1FFF"
- Layer B: PID B range = (PID A + 1) mod<sup>1)</sup> 0x2000
- Layer C: PID C range = (PID A + 2) mod<sup>1)</sup> 0x2000

<sup>1)</sup> mod = modulo operator

**Table 3-2: PID example calculations**

PID A	PID B	PID C
0x1FFD	0x1FFE	0x1FFF
0x1FFE	0x1FFF	0x0000
0x1FFF	0x0000	0x0001
0x0000	0x0001	0x0002

Remote command:

[ :SOURCE<hw> ] :BB:ISDBt:PID on page 64

### Payload Test/Stuff

Defines the payload area content of the TS packet.

The TS packet is the test signal "Test TS Packet" or a null packet.

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

If "Stuffing > On", the packet is a null packet. Null packets are inserted into the external transport stream to adapt the stream data rate. The rate is adapted to a value, that fits the current modulation parameter settings.

"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:ISDBt:PAYLoad:A on page 64

### 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:ISDBt:PRBS [ :SEQUENCE ] on page 64

## 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 &gt; IP Channel x"

Input IP <input type="checkbox"/>	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 necessary 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 3-3: IP channel configuration support in broadcast standards**

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

See also:

- [Chapter 4.1.1, "How to Apply an External IP Input Signal"](#), on page 51
- [Chapter 3.8, "Local IP Data Network Settings"](#), on page 48

## 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 youFurthermore, we recommend that you use a separate LAN infrastructure to stream the transport streams via IP to the IP connector of the base-band board. We recommend that you avoid TS packet losses during IP transmission.

## Settings:

Input IP.....	24
Alias.....	24
Type.....	24
Multicast Address.....	24
Port.....	25
IGMPv3 Source Address.....	25
Ping Source Address.....	25
Ping Result.....	25
Local IP Data Network.....	25

## Input IP

Activates/deactivates the IP input.

Remote command:

[ :SOURce<hw> ] :BB: INPut : IP<ch> [ :STATe ] on page 66

## 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 66

## 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.<br>Set "Multicast Address" and "Port". |

Remote command:

[ :SOURce<hw> ] :BB: INPut : IP<ch> : TYPE on page 67

## 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:ADDRes on page 67

### 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 67

### 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 ] :ADDRes on page 68

### 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 68

### 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 68

### Local IP Data Network

Accesses local IP data network settings, see [Chapter 3.8, "Local IP Data Network Settings"](#), on page 48.

### 3.3 Coding Settings

Access:

- ▶ Select "Baseband > ISDB-T/TSB > Coding".

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



Editing most of the coding parameters requires "Control > Manual". If "Control > Auto", the ISDB-T encoder extracts the information from the TS. Relevant parameters display the coding information from the stream.

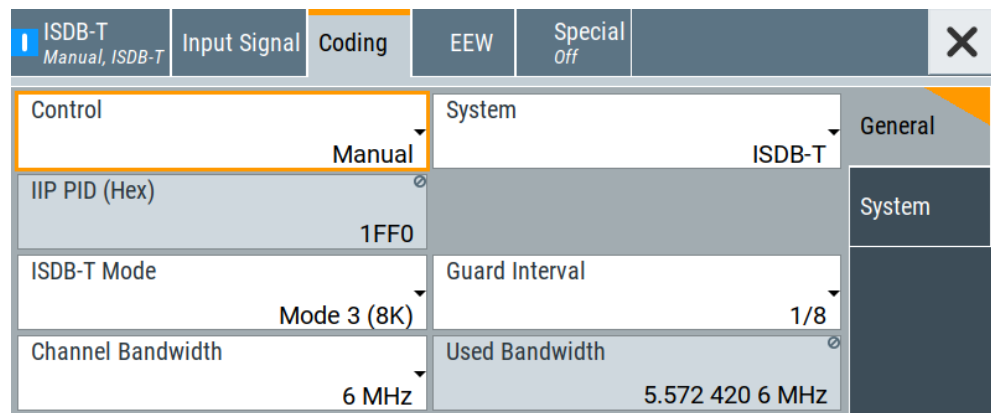
**Settings:**

- [General Settings](#)..... 26
- [System Settings](#)..... 29

#### 3.3.1 General Settings

Access:

- ▶ Select "Coding > General".



The tab provides general coding settings.

**Settings:**

- [Control](#).....27
- [System](#).....27
- [IIP PID \(Hex\)](#).....27
- [ISDB-T Mode](#).....27
- [Guard Interval](#).....27
- [Subchannel](#).....28
- [Channel Bandwidth](#).....28
- [Used Bandwidth](#).....28

**Control**

Defines the configuration mode of the coder.

"Auto"                   The coder is configured by the transport stream.

"Manual"                 The coder is configured manually.

Remote command:

[\[:SOURCE<hw>\]:BB:ISDBt:CONTROL](#) on page 69

**System**

Sets the ISDB-T system.

ISDB-T<sub>SB</sub> (see [ISDB-TSB](#)) utilizes the same structure of OFDM segments as ISDB-T. However, the number of segments is different.

"ISDB-T"                 13 segments. You can set the number of hierarchical layers. See "[Segments \(A|B|C\)](#)" on page 30.

"ISDB-TSB (1 SEG)"         1 segment and 1 hierarchical layer.

"ISDB-TSB (3 SEG)"         3 segments and 2 hierarchical layers.

Remote command:

[\[:SOURCE<hw>\]:BB:ISDBt:SYSTEM](#) on page 70

**IIP PID (Hex)**

Requires "Control > Auto".

Defines the **PID** for **MPEG TS** packets, that contain ISDB-T initialization packet (IIP) data.

Remote command:

[\[:SOURCE<hw>\]:BB:ISDBt:IIP:PID](#) on page 70

**ISDB-T Mode**

Sets the ISDB-T mode.

The setting is not layer-specific, but applies to the entire transmission. Use the mode, e.g., to select the length of the **IFFT**, that affects the OFDM symbol duration.

Also, the setting affects time interleaving, see "[Time Interleaving \(A|B|C\)](#)" on page 31.

"Mode 1 (2K)"         Implies IFFT length of 2K

"Mode 2 (4K)"         Implies IFFT length of 4K

"Mode 3 (8K)"         Implies IFFT length of 8K

Remote command:

[\[:SOURCE<hw>\]:BB:ISDBt:FFT:MODE](#) on page 69

**Guard Interval**

Sets the guard interval length.

The guard interval is a cyclic extension of the OFDM symbol by factor "1/4", "1/8", "1/16" or "1/32".

Disable the guard interval via [Segments \(A|B|C\)](#), so that only the useful component of OFDM symbols is transmitted continuously.

#### Example: Selecting the guard interval length

The guard interval length affects the receiving characteristics, that are influenced by multipath propagation:

Using a large guard interval, you can eliminate long echo delays.

Using a small guard interval, the echoes of an OFDM symbol can emit into the OFDM symbol that follows.

Remote command:

`[ :SOURCE<hw> ] :BB:ISDBt:GUARd` on page 69

#### Subchannel

Requires "System > ISDB-TSB (1 SEG)"/" or ISDB-TSB (3 SEG).

Sets the subchannel of the ISDB-T<sub>SB</sub> signal.

Specification [ARIB STD-B29](#) defines 42 subchannels within a 6 MHz RF channel. Each subchannel has a width of 1/7 MHz.

One OFDM segment comprises three subchannels. The parameter defines the center subchannel of the center OFDM segment. The RF frequency is not modified. The subchannel determines the initial value of the  $W_1$  PRBS register. See specification ARIB STD-B29, chapter 3.13.1.

Remote command:

`[ :SOURCE<hw> ] :BB:ISDBt:SUBChannel` on page 70

#### 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 .

As the number of the OFDM carriers remains constant, the carrier spacing and the OFDM symbol duration are adapted accordingly.

Remote command:

`[ :SOURCE<hw> ] :BB:ISDBt:CHANnel [ :BANDwidth ]` on page 69

#### Used Bandwidth

Displays the used bandwidth.

The value depends on ISDB-T mode and the channel bandwidth. If you change the ISDB-T mode, the used bandwidth value adapts automatically. The correlation is shown in [Table 3-4](#), where:

- $\Delta f_{\text{Channel}}$ : Channel bandwidth
- $\Delta f_{\text{Used}}$ : Used bandwidth

Table 3-4: ISDB-T mode and used bandwidth at constant channel bandwidths

ISDB-T mode	$\Delta f_{\text{Channel}} = 6 \text{ MHz}$	$\Delta f_{\text{Channel}} = 7 \text{ MHz}$	$\Delta f_{\text{Channel}} = 8 \text{ MHz}$
"Mode 1 (2K)"	$\Delta f_{\text{Used}} = (39000 / 7 + 250 / 63) \text{ kHz} \approx 5.575397 \text{ MHz}$	$\Delta f_{\text{Used}} \approx 6.504630 \text{ MHz}$	$\Delta f_{\text{Used}} \approx 7.433862 \text{ MHz}$
"Mode 2 (4K)"	$(\Delta f_{\text{Used}} = 39000 / 7 + 125 / 63) \text{ kHz} \approx 5.573413 \text{ MHz}$	$\Delta f_{\text{Used}} \approx 6.502315 \text{ MHz}$	$\Delta f_{\text{Used}} \approx 7.431217 \text{ MHz}$
"Mode 3 (8K)"	$\Delta f_{\text{Used}} = (39000 / 7 + 125 / 126) \text{ kHz} \approx 5.572421 \text{ MHz}$	$\Delta f_{\text{Used}} \approx 6.501157 \text{ MHz}$	$\Delta f_{\text{Used}} \approx 7.429894 \text{ MHz}$

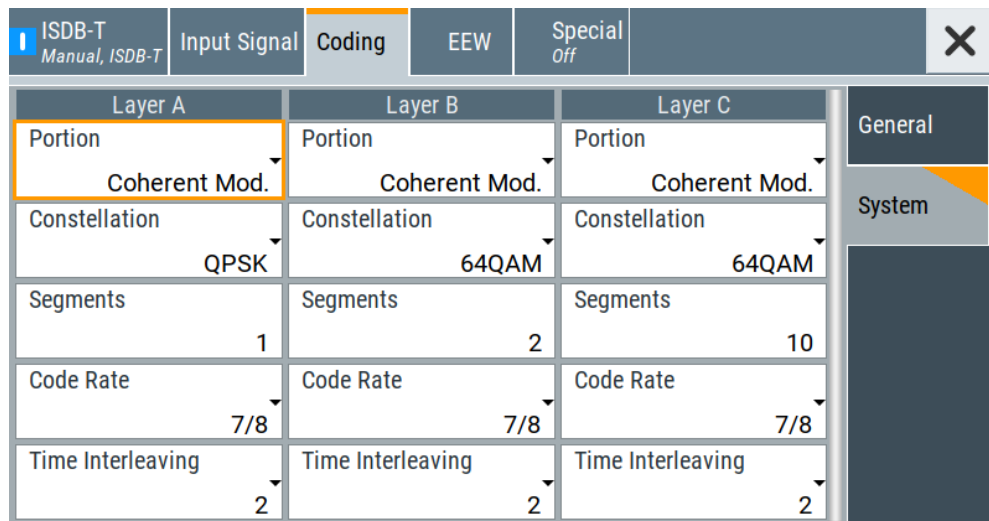
Remote command:

[ :SOURce<hw> ] :BB:ISDBt:BANDwidth? on page 69

### 3.3.2 System Settings

Access:

- ▶ Select "Coding > System".



The tab provides coding system settings.

**Settings:**

Portion (A|B|C)..... 29

Constellation (A|B|C)..... 30

Segments (A|B|C)..... 30

Code Rate (A|B|C)..... 31

Time Interleaving (A|B|C)..... 31

**Portion (A|B|C)**

Requires "System > ISDB-T".

Sets the modulation types of the respective hierarchical layers.

As specification [ARIB STD-B31](#) does not allow all combinations, an automatic correction is applied.

"Partial Reception"

Only available for layer A.

"Differential Modulation"

Only available for layer B and C, if layer A ≠ "Coherent Modulation".

"Coherent Modulation"

If selected for layer A, layer B and layer C are automatically set to this value, too.

Remote command:

`[ :SOURce<hw> ] :BB:ISDBt:PORTion:A` on page 71

`[ :SOURce<hw> ] :BB:ISDBt:PORTion:B` on page 71

`[ :SOURce<hw> ] :BB:ISDBt:PORTion:C` on page 71

### Constellation (A|B|C)

Defines the constellation.

The constellation value depends on the portion as [Table 3-5](#) illustrates. If you set a portion and the set constellation is not possible, the constellation adjusts automatically.

**Table 3-5: Portion and constellation restrictions**

"Portion"	Constellation
"Partial Reception"	DQPSK, QPSK, 16QAM, 64QAM
"Differential Modulation"	DQPSK
"Coherent Modulation"	QPSK, 16QAM, 64QAM

Remote command:

`[ :SOURce<hw> ] :BB:ISDBt:CONStel:A` on page 71

`[ :SOURce<hw> ] :BB:ISDBt:CONStel:B` on page 71

`[ :SOURce<hw> ] :BB:ISDBt:CONStel:C` on page 71

### Segments (A|B|C)

Sets the number of segments for layers A, B and C.

The number depends on the ISDB-T system:

- If "System > ISDB-T", assigns the desired number of segments to each of the 3 layers. The sum of all segments is always 13.
- If "System > ISDB-TSB (1 SEG)/ISDB-TSB (3 SEG)", you cannot set the number of segments per hierarchical layer. The following setting is fixed:  
"Segments (A) > 1", "Segments (B) > 2"

To disable a layer, assign it zero segments. Layer A cannot be disabled. Layer B can only be disabled if layer C has been disabled. Layer C can only be enabled if layer B has been enabled.

If "Portion (A|B|C) > Partial Reception", it is always on layer A, which is assigned exactly one segment.

Remote command:

[ :SOURce<hw> ] :BB:ISDBt:SEGMents:A on page 71

[ :SOURce<hw> ] :BB:ISDBt:SEGMents:B on page 71

[ :SOURce<hw> ] :BB:ISDBt:SEGMents:C on page 71

### Code Rate (A|B|C)

Sets the code rate.

You can define the code rate of the convolutional coders of each layer separately. The setting affects the maximum data rate of the respective layer, see "[Max. Useful Data Rate \(A|B|C\)](#)" on page 19.

If you transmit more useful data, i.e. if less redundancy is inserted, troubleshooting becomes more difficult. If you transmit less useful data, transmission reliability is higher.

### Example: Coding procedure

The convolutional coder first adds the same quantity of redundancy bits to the data stream. Bits are removed during subsequent puncturing.

The code rate specifies the ratio of input bits to output bits. With a code rate of 1/2, two output bits correspond to one input bit; the puncturer is therefore disabled (maximum error protection). With a code rate of 7/8, seven input bits correspond to eight output bits, i.e. the puncturer again removes many redundancy bits (minimum error protection).

Remote command:

[ :SOURce<hw> ] :BB:ISDBt:RATE:A on page 71

[ :SOURce<hw> ] :BB:ISDBt:RATE:B on page 71

[ :SOURce<hw> ] :BB:ISDBt:RATE:C on page 71

### Time Interleaving (A|B|C)

Sets the time interleaving depth of each layer separately.

The possible depths depend on the ISDB-T mode and ISDB-T system. The correlation is shown in [Table 3-6](#) and is defined conforming with specification [ARIB STD-B31](#).

If you change the ISDB-T mode, the time interleaving depth can change. If the depth is not available for the selected ISDB-T mode, the depth adapts automatically.

**Table 3-6: ISDB-T mode and time interleaving depth restrictions**

ISDB-T mode	Time interleaving depth
"Mode 1 (2K)"	0, 4, 8, 16, 32 <sup>*)</sup>
"Mode 2 (4K)"	0, 2, 4, 8, 16 <sup>*)</sup>
"Mode 3 (8K)"	0, 1, 2, 4, 8 <sup>*)</sup>
<sup>*)</sup> : Not available for "System" = "ISDB-T".	

Remote command:

[ :SOURce<hw> ] :BB:ISDBt:TIME [ :INTerleaving ] :A on page 72

[ :SOURce<hw> ] :BB:ISDBt:TIME [ :INTerleaving ] :B on page 72

[ :SOURce<hw> ] :BB:ISDBt:TIME [ :INTerleaving ] :C on page 72

### 3.4 EEW Settings

Access:

- ▶ Select "Baseband > ISDB-T/TSB > EEW".

The dialog provides settings necessary to configure the simulation of the earthquake early warning system (EEW).

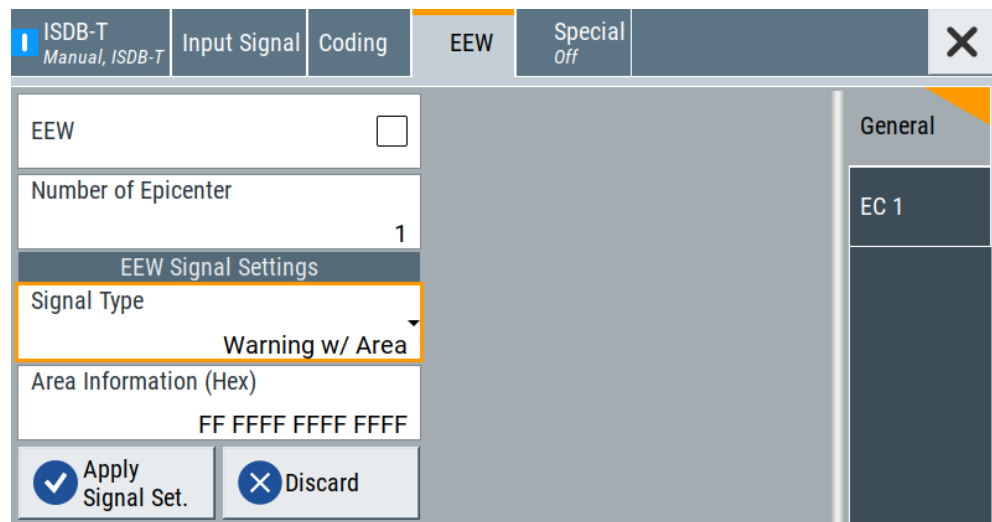
Settings:

- [General Settings](#)..... 32
- [EC 1/2 Settings](#)..... 35

#### 3.4.1 General Settings

Access:

- ▶ Select "EEW > General".



The tab provides general settings necessary to configure the EEW.

Settings:

- [EEW](#)..... 33
- [Number of Epicenters](#)..... 33
- [EEW Signal Settings](#)..... 33
  - [Signal Type](#)..... 33
  - [Area Information \(Hex\)](#)..... 33
  - [Apply Signal Set.](#)..... 34
  - [Discard](#)..... 34



**EEW**

Enables/disables the **EEW** system.

Remote command:

[ :SOURCE<hw> ] :BB:ISDBt:EEW:EEW on page 73

**Number of Epicenters**

Identifies the total number of seismic motion information being transmitted.

Remote command:

[ :SOURCE<hw> ] :BB:ISDBt:EEW:NUMepicenter on page 74

**EEW Signal Settings**

The panel provides EEW signal settings.

**Signal Type ← EEW Signal Settings**

Identifies the type of seismic motion warning.

- "Warning w/ Area" A seismic motion warning is issued with a target area within the broadcasting area.
- "Warning w/o Area" A seismic motion warning is issued with no target area within the broadcasting area.
- "Test w/ Area" A seismic motion warning test signal is issued with a target area within the broadcasting area.
- "Test w/o Area" A seismic motion warning test signal is issued with no target area within the broadcasting area.

Remote command:

[ :SOURCE<hw> ] :BB:ISDBt:EEW:SIGNAltype on page 74

**Area Information (Hex) ← EEW Signal Settings**

Sets the target area of the seismic motion warning in hexadecimal presentation.

The information comprises a 56-bit value. Assignment of the bits is illustrated in [Table 3-7](#). Bit 56 is the most significant bit, and bit 111 is the least significant bit. A "0"-bit designates an active target area, while a "1"-bit designates an inactive target area.

**Table 3-7: Area information for seismic motion event**

Bit	Area	Bit	Area	Bit	Area
56	Hokkaido Center	75	Niigata Prefecture	94	Hiroshima Prefecture
57	Hokkaido South	76	Toyama Prefecture	95	Tokushima Prefecture
58	Hokkaido North	77	Ishikawa Prefecture	96	Kagawa Prefecture
59	Hokkaido East	78	Fukui Prefecture	97	Ehime Prefecture
60	Aomori Prefecture	79	Yamanashi Prefecture	98	Kochi Prefecture
61	Iwate Prefecture	80	Nagano Prefecture	99	Yamaguchi Prefecture
62	Miyagi Prefecture	81	Gifu Prefecture	100	Fukuoka Prefecture
63	Akita Prefecture	82	Shizuoka Prefecture	101	Saga Prefecture
64	Yamagata Prefecture	83	Aichi Prefecture	102	Nagasaki Prefecture

Bit	Area	Bit	Area	Bit	Area
65	Fukushima Prefecture	84	Mie Prefecture	103	Kumamoto Prefecture
66	Ibaraki Prefecture	85	Shiga Prefecture	104	Oita Prefecture
67	Tochigi Prefecture	86	Kyoto Prefecture	105	Miyazaki Prefecture
68	Gunma Prefecture	87	Osaka Prefecture	106	Kagoshima
69	Saitama Prefecture	88	Hyogo Prefecture	107	Amami Islands
70	Chiba Prefecture	89	Nara Prefecture	108	Okinawa main islands
71	Tokyo	90	Wakayama Prefecture	109	Daito Island
72	Izu Islands	91	Tottori Prefecture	110	Miyako Island
73	Ogasawara	92	Shimane Prefecture	111	Yaeyama
74	Kanagawa Prefecture	93	Okayama Prefecture		

For more detailed area information, refer to the [ARIB STD-B46](#) standard.

Remote command:

[\[:SOURCE<hw>\]:BB:ISDBt:EEW:AREAinfo](#) on page 73

#### **Apply Signal Set. ← EEW Signal Settings**

Issues a seismic motion warning based on the information of "Area Information Hex".

Remote command:

[\[:SOURCE<hw>\]:BB:ISDBt:EEW:APAI](#) on page 72

#### **Discard ← EEW Signal Settings**

Resets the setting of "Area Information (Hex)"

Remote command:

n.a.

### 3.4.2 EC 1/2 Settings

To access "EC 1" settings:

- ▶ Select "EEW > EC".

ISDB-T <i>Manual, ISDB-T</i>	Input Signal	Coding	EEW	Special <i>Off</i>	X
Information Type Issued	Warning ID 0		General		
Latitude (-South +North) 0.0 deg	Longitude (-West +East) 0.0 deg		EC 1		
Depth 0 km	Occurrence Time 0 s				
		Apply	Discard		

The tab provides epicenter 1 settings.

To access "EC 2" settings:

1. Select "EEW > General > Number of Epicenters > 2".
2. Select "EEW > EC 2".

ISDB-T <i>Manual, ISDB-T</i>	Input Signal	Coding	EEW	Special <i>Off</i>	X
Information Type Issued	Warning ID 1		General		
Latitude (-South +North) 0.1 deg	Longitude (-West +East) 0.1 deg		EC 1		
Depth 1 km	Occurrence Time 1 s		EC 2		
		Apply	Discard		

The tab provides epicenter 2 settings.

**Settings:**

Information Type.....	36
Warning ID.....	36
Latitude (-South +North).....	36
Longitude (-West +East) /deg.....	36
Depth.....	36
Occurrence Time.....	36
Apply.....	36
Discard.....	36

**Information Type**

Provides information about the validity of the seismic motion warning.

"Issued"           The seismic motion warning is issued.

"Canceled"        The seismic motion warning is canceled.

Remote command:

[\[:SOURCE<hw>\]:BB:ISDBt:EEW:INFotype<ch>](#) on page 73

**Warning ID**

Sets the individual identification number of the seismic motion warning.

The number is a 9-bit value in decimal representation.

Remote command:

[\[:SOURCE<hw>\]:BB:ISDBt:EEW:WARNid<ch>](#) on page 75

**Latitude (-South +North)**

Sets the geographical latitude of the epicenter of the seismic event.

Negative values indicate southern latitude, positive values indicate northern latitude.

Remote command:

[\[:SOURCE<hw>\]:BB:ISDBt:EEW:LATitude<ch>](#) on page 73

**Longitude (-West +East) /deg**

Sets the geographical longitude of the epicenter of the seismic event.

Negative values indicate western longitude, positive values indicate eastern longitude.

Remote command:

[\[:SOURCE<hw>\]:BB:ISDBt:EEW:LONGitude<ch>](#) on page 74

**Depth**

Sets the depth of the epicenter of the seismic event.

You can set integer values for the depth of up to 1023 kilometers.

Remote command:

[\[:SOURCE<hw>\]:BB:ISDBt:EEW:DEPTH<ch>](#) on page 73

**Occurrence Time**

Sets the occurrence time of the seismic event.

You can set integer values for the time of up to 1023 seconds.

Remote command:

[\[:SOURCE<hw>\]:BB:ISDBt:EEW:OCCurrence<ch>](#) on page 74

**Apply**

Issues a seismic motion warning based on the "EC1"/"EC2" settings.

The warning is issued either for epicenter 1 or 2.

Remote command:

[\[:SOURCE<hw>\]:BB:ISDBt:EEW:APE1](#) on page 72

**Discard**

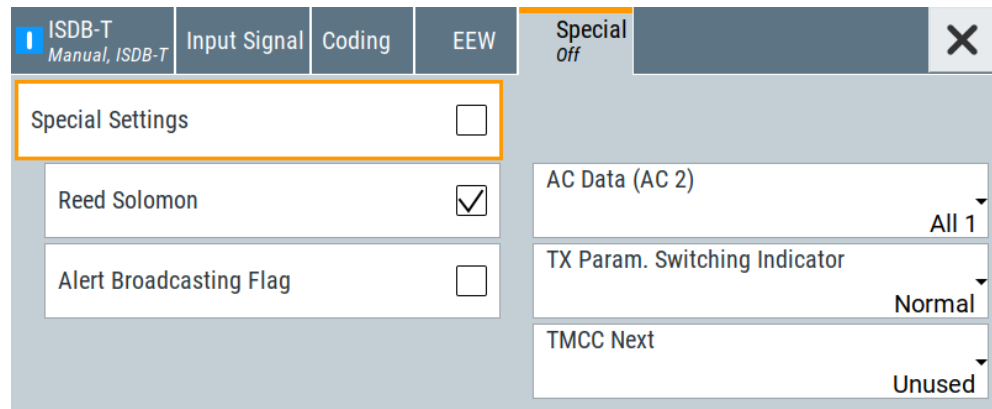
Resets the current "EC1"/"EC2" configuration.

Remote command:  
n.a.

### 3.5 Special Settings

Access:

- ▶ Select "Baseband > ISDB-T/TSB > 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 left to the parameter.

If special settings are active, decoding by a DUT is maybe not successful.

#### Settings:

Special Settings.....	37
Reed Solomon.....	38
Alert Broadcasting Flag.....	38
AC Data (AC2).....	38
TX Param. Switching Indicator.....	38
TMCC Next.....	38

#### 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:ISDBt [ :SPECial ] :SETTings [ :STATe ]` on page 76

**Reed Solomon**

Enables/disables the Reed-Solomon encoder.

"On" Enables the Reed-Solomon encoder.

"Off" Inverts the 16 parity bytes.

Remote command:

[\[:SOURCE<hw>\]:BB:ISDBt\[:SPECial\]:REEDsolomon](#) on page 75

**Alert Broadcasting Flag**

Enables or disables the alert broadcasting flag in the **TMCC** data.

Remote command:

[\[:SOURCE<hw>\]:BB:ISDBt\[:SPECial\]:ALERT\[:BROadcast\]](#) on page 75

**AC Data (AC2)**

Sets the **AC** carrier modulation.

"All 1" Set all AC carriers to 1

"PRBS" Sets PRBS modulated AC carriers  
You can set the **PRBS** length via "**PRBS**" on page 22.

Remote command:

[\[:SOURCE<hw>\]:BB:ISDBt\[:SPECial\]:ACData<ch>](#) on page 75

**TX Param. Switching Indicator**

Defines the statical setting of the transmission parameter switching indicator.

Use the setting for test purposes.

"Normal" Broadcast standard-compliant setting.

"1" to "15" Broadcast standard non-compliant setting.

Remote command:

[\[:SOURCE<hw>\]:BB:ISDBt\[:SPECial\]:TXParam](#) on page 76

**TMCC Next**

Sets the **TMCC** next information bits.

"Unused" Unused hierarchical layer.

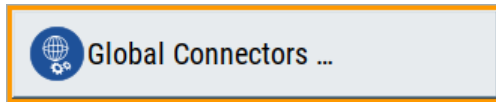
"Current" Current information bits.

Remote command:

[\[:SOURCE<hw>\]:BB:ISDBt\[:SPECial\]:TMCC:NEXT](#) on page 76

## 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 3-8](#).

### 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 stream files includes:

- Base unit, including arbitrary waveform generator (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)
- Optional 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 "How to Work with Waveform Libraries" in the R&S SMCV100B user manual.

For information on the content of a stream library, see 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](http://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 > ISDB-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	"T-DMB/DAB"	Yes
"ATSC 3.0"	Yes	"DVB-S"	Yes
"DTMB"	Yes	"DVB-S2"	Yes
"DVB-T"	Yes	"DRM"	No
"DVB-T2"	Yes	"Audio AM"	No
"ISDB-T"	Yes	"Audio FM"	No

The remote commands required to define these settings are described in [Chapter 5.6, "TSGen Subsystem"](#), on page 76.

#### Settings:

- [TS Player Settings](#)..... 40
- [Player Output Settings](#)..... 43
- [Seamless Loop Settings](#)..... 47

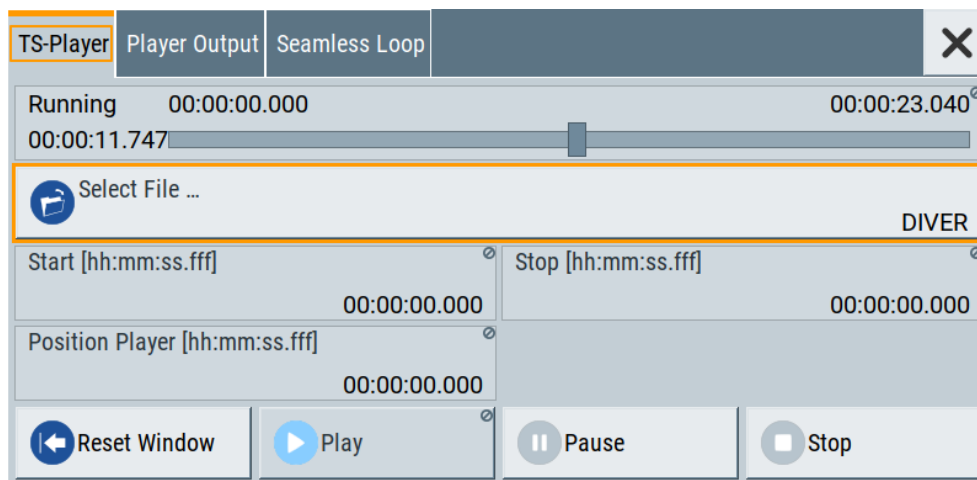
### 3.7.1 TS Player Settings

Access:

1. Follow the steps in ["To access the "TS Player" application"](#) on page 39.



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



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

**Settings:**

Running/Position Player [hh:mm:ss.fff]..... 41  
 Select File..... 41  
 Start [hh:mm:ss.fff]..... 42  
 Position Player [hh:mm:ss.fff]..... 43  
 Stop [hh:mm:ss.fff]..... 43  
 Reset Window..... 43  
 Play..... 43  
 Pause..... 43  
 Stop..... 43

**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 81

**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 3-8](#) lists file extensions of supported files.

**Table 3-8: 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	-

File extension	Stream libraries	Remark	Option
*.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 <sup>1)</sup>	-	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 Included in various stream libraries	R&S SMCVB-KS12 R&S SMCVB-KS17 R&S SMCVB-KS18 R&S SMCVB-KS19 R&S SMCVB-KS20
*.bin	-	Unencrypted	-
*.ts	-	Unencrypted	-
*.mpg	-	Unencrypted	-
*.t10	-	-	-

<sup>1)</sup> 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 79

[:TSGen:READ:PLAYfile:LENGth?](#) on page 84

[:TSGen:READ:FMEMory](#) on page 83

### 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 81

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

Displays the current play position in the file.

Remote command:

[:TSGen:CONFigure:SEEK:POSition](#) on page 81

**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 82

**Reset Window**

Resets "Start/Stop/Position Player" parameters.

Remote command:

[:TSGen:CONFigure:SEEK:RESet](#) on page 81

**Play**

Plays the selected file.

For supported file types, see [Table 3-8](#).

Remote command:

[:TSGen:CONFigure:COMMand<ch>](#) on page 78

**Pause**

Pauses the player.

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

Remote command:

[:TSGen:CONFigure:COMMand<ch>](#) on page 78

**Stop**

Stops the player and returns to the start position.

Remote command:

[:TSGen:CONFigure:COMMand<ch>](#) on page 78

### 3.7.2 Player Output Settings

Access:

- ▶ Select "TS Player > Player Output".

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

### 3.7.2.1 General Settings

TS-Player	Player Output	Seamless Loop		
Data Rate	5.018 502 Mbit/s	Orig. Data Rate	5.018 502 Mbit/s	General
Packet Length	188			Stuffing
Nullpacket Stuffing	<input type="checkbox"/>			
Stop Data	None			

The tab provides settings necessary to configure general player output properties.

Data Rate.....	44
Orig. Data Rate.....	44
Packet Length.....	44
Nullpacket Stuffing.....	44
Stop Data.....	45

#### 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 83

#### Orig. Data Rate

Displays the calculated original TS data rate.

Remote command:

`:TSGen:READ:ORIGtsrate` on page 83

#### 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:TSPacket` on page 83

#### Nullpacket Stuffing

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

Enables or disables nullpacket stuffing.

The output data rate of the TS player equals the original data rate. The equality ensures 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 ("PCR, DTS/PTS > On").
- "Off"                    Deactivate stuffing, if you want to use the same data rate as the original data rate.

Remote command:

[:TSGen:CONFigure:STUFFing](#) on page 82

### Stop Data

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

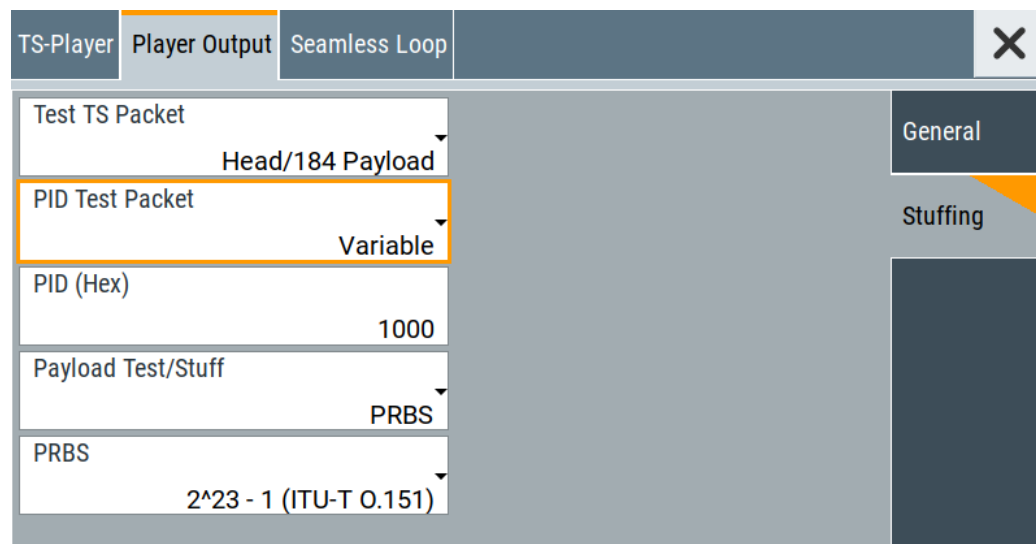
Ensures that a standardized TS data stream is always output at the TS output at the rear of the R&S SMCV100B.

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 82

### 3.7.2.2 Stuffing Settings



The tab comprises settings necessary to configure stuffing.

**Settings**

<a href="#">Test TS Packet</a> .....	46
<a href="#">PID Test Packet</a> .....	46
<a href="#">PID (Hex)</a> .....	46
<a href="#">Payload Test/Stuff</a> .....	46
<a href="#">PRBS</a> .....	47

**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 ) 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 ) followed by 207 payload bytes.

Remote command:

[:TSGen:CONFigure:TSPacket](#) on page 83

**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 79

**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 79

**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 79

**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](#).

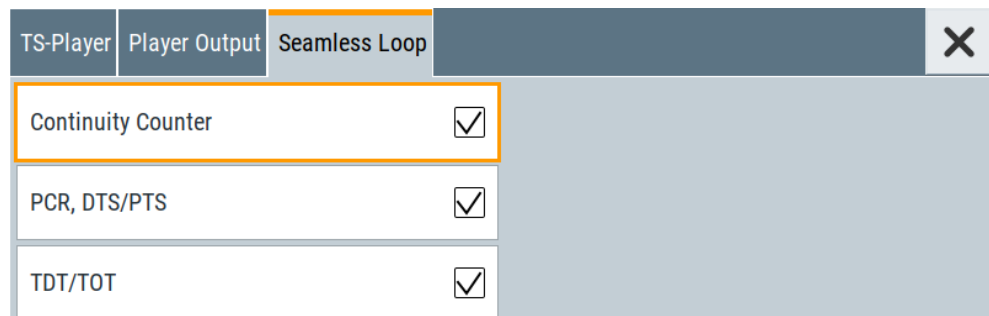
Remote command:  
[:TSGen:CONFigure:PRBS\[:SEquence\]](#) on page 80

**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 necessary to configure settings for playing the file in a loop.

**Settings:**

<a href="#">Continuity Counter</a> .....	47
<a href="#">PCR, DTS/PTS</a> .....	48
<a href="#">TDT/TOT</a> .....	48

**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 80

**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 80

**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 81

## 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".

Board Address		
Address Mode	Protocol	Show Connector ...
Auto (DHCP)	UDP	
IP Address	Subnet Mask	MAC Address
10.214.2.24	255.255.252.0	90:b8:21:71:2e

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

The remote commands necessary to configure local IP data network settings are described in [Chapter 5.7, "BCIP Subsystem"](#), on page 84.

How to: [Chapter 4.1.1, "How to Apply an External IP Input Signal"](#), on page 51



**Settings:**

Network Status.....	49
Restart Network.....	49
Hostname.....	49
Address Mode.....	49
IP Address.....	50
Protocol.....	50
Subnet Mask.....	50
Show Connector.....	50
MAC Address.....	50

**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 87

**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 87

**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 85

**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 86

### 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 85

### 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 86

### 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 86

### 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 86

## 4 Performing ISDB-T/TSB Signal Generation Tasks

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

- [Configuring the Input Signal](#).....51
- [Monitoring the Input Signal](#)..... 56

### 4.1 Configuring the Input Signal

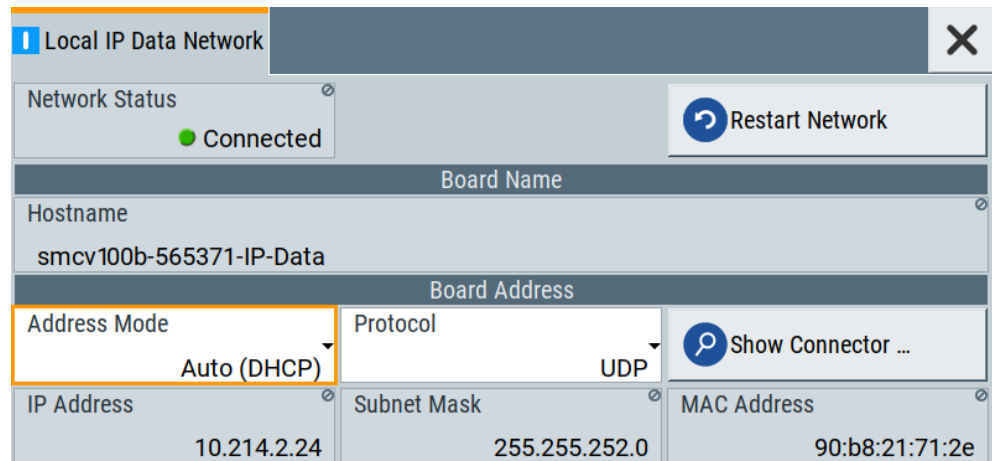
This chapter provides an overview of the different input signals, that the R&S SMCV100B uses as modulation data.

- [How to Apply an External IP Input Signal](#)..... 51
- [How to Apply an External TS Input Signal](#)..... 54
- [How to Generate an Internal TS Signal](#)..... 55

#### 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.

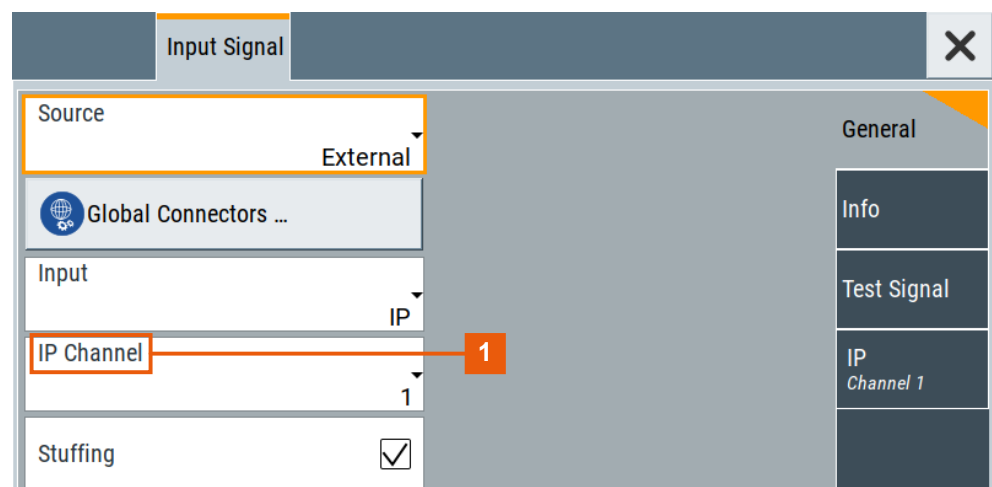
6. If DHCP does not assign an IP address, assign the IP address manually.  
See chapter "How to Assign the IP Address" in the R&S SMCV100B user manual.
7. Specify the protocol type of the input IP data.  
The current firmware supports [UDP](#) and [UDP/RTP](#).

#### 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 51.

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) Activate the IP channel, select "Input IP > On".

Input Signal		
Input IP <input checked="" type="checkbox"/>	Alias	General
Type	Service	
Multicast	Multicast Address	Info
6 002	224.3.2.1	
Port	IGMPv3 Source Address	Test Signal
	123.4.5.6	
Ping Source Address	Local IP Data Network ...	IP 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 56.

## 4.1.2 How to Apply an External TS Input Signal

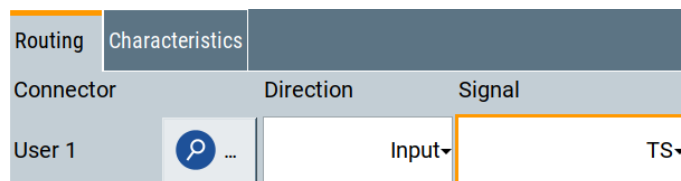
### To connect to the external TS input interface

1. Use a double-shielded 75  $\Omega$  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 non-screwable connectors (BNC)" 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".

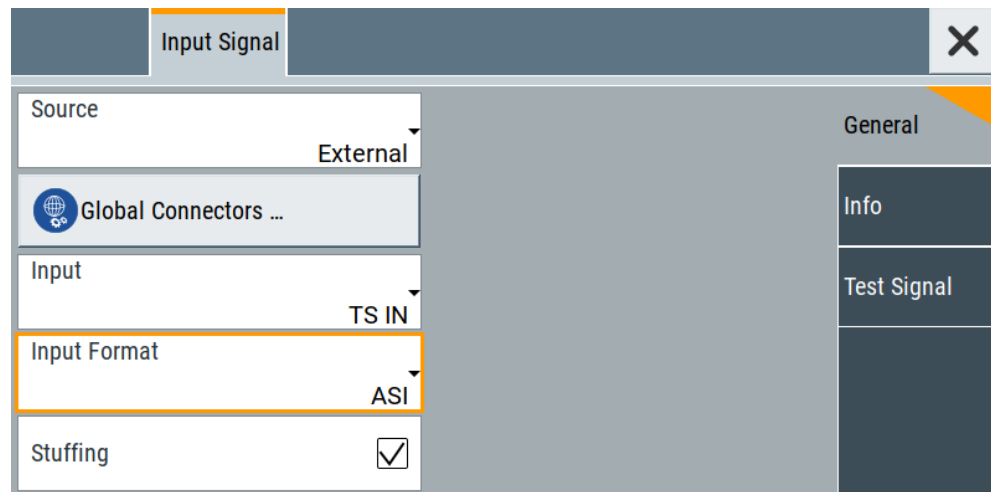


### To configure an external TS input signal

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 57.

### 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 play a file of stream library with the "TS Player"

1. Download the
2. Select "Input Signal > Source > TS Player".  
The "TS Player" button appears below.
3. Click "TS Player".  
The "TS Player" dialog for playing TS data files opens.
4. Click "Play" to play the default file `DIVER.trp`.

Playing the file requires no option.

## 4.2 Monitoring the Input Signal

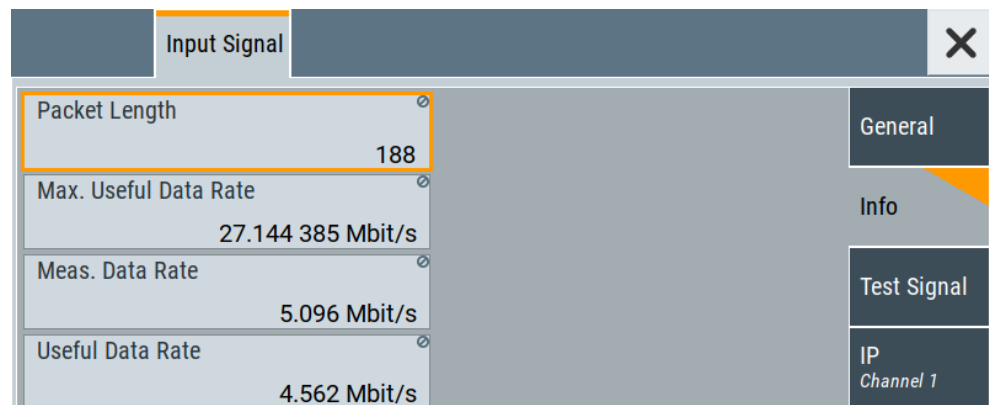
This chapter provides an overview of the different input signals, that the R&S SMCV100B uses as modulation data.

- [How to Monitor External IP Input Data](#).....56
- [How to Monitor an External TS Input Signal](#)..... 57
- [How to Monitor an Internal TS Player Signal](#)..... 57

### 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 51.

- ▶ 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 54.

- ▶ Select "Input Signal > Info"

Input Signal		General
Packet Length	188	Info
Max. Useful Data Rate	19.392 659 Mbit/s	Test Signal
Measured Data Rate	13.058 Mbit/s	
Useful Data Rate	12.998 Mbit/s	

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 55.

- ▶ Select "Input Signal > Info"

Input Signal		General
Max. Useful Data Rate	38.014 706 Mbit/s	Info
Useful Data Rate	21.298 475 Mbit/s	Test Signal

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

## 5 Remote-Control Commands

The following commands are required to generate signals with the ISDB-T/TSB 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 are assumed.



### Conventions used in SCPI command descriptions

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

### Common suffixes

The following common suffixes are used in the remote commands:

Suffix	Value range	Description
SOURce<hw>	1	Available baseband signals
<ch>	1 to 2	Epicenter 1 or 2

### 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 ISDB-T/TSB are described here:

• <a href="#">General Commands</a> .....	59
• <a href="#">Input Commands</a> .....	60
• <a href="#">Coding Commands</a> .....	68
• <a href="#">EEW Commands</a> .....	72
• <a href="#">Special Commands</a> .....	75
• <a href="#">TSGen Subsystem</a> .....	76
• <a href="#">BCIP Subsystem</a> .....	84

## 5.1 General Commands

### Example: Saving current configuration

```
:SOURce1:BB:ISDBt:SETTing:STORe "/var/user/my_isdbt"
// Saves the file "my_isdbt.isdbt" in the directory as above.
```

```
*RST
```

```
:SOURce1:BB:ISDBt:SETTing:CATalog?
// Response: "my_isdbt"
:SOURce1:BB:ISDBt:SETTing:LOAD "/var/user/my_isdbt"
:SOURce1:BB:ISDBt:STATe ON
:SOURce1:BB:ISDBt:SETTing:DELeTe "/var/user/my_isdbt"
```

### Commands

<a href="#">[:SOURce&lt;hw&gt;]:BB:ISDBt:PRESet</a> .....	59
<a href="#">[:SOURce&lt;hw&gt;]:BB:ISDBt:STATe</a> .....	59
<a href="#">[:SOURce&lt;hw&gt;]:BB:ISDBt:SETTing:CATalog</a> .....	59
<a href="#">[:SOURce&lt;hw&gt;]:BB:ISDBt:SETTing:DELeTe</a> .....	60
<a href="#">[:SOURce&lt;hw&gt;]:BB:ISDBt:SETTing:LOAD</a> .....	60
<a href="#">[:SOURce&lt;hw&gt;]:BB:ISDBt:SETTing:STORe</a> .....	60

---

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

**Usage:** Event

**Manual operation:** See ["Set To Default"](#) on page 13

---

### **[:SOURce<hw>]:BB:ISDBt:STATe <State>**

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

**Parameters:**

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

**Manual operation:** See ["State"](#) on page 13

---

### **[:SOURce<hw>]:BB:ISDBt:SETTing:CATalog**

**Manual operation:** See ["Save/Recall"](#) on page 13

**[:SOURce<hw>]:BB:ISDBt:SETTing:DELeTe <Delete>**

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

**Parameters:**

<Filename>                    "<filename>"  
 Filename or complete file path; file extension can be omitted

**Example:**                    See [Example "Saving current configuration"](#) on page 59.

**Usage:**                        Setting only

**Manual operation:**    See ["Save/Recall"](#) on page 13

**[:SOURce<hw>]:BB:ISDBt:SETTing:LOAD <IsdbtRecall>**

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.

**Parameters:**

<IsdbtRecall>                string

**Manual operation:**    See ["Save/Recall"](#) on page 13

**[:SOURce<hw>]:BB:ISDBt:SETTing:STORe <IsdbtSave>**

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.

**Parameters:**

<IsdbtSave>                    string

**Manual operation:**    See ["Save/Recall"](#) on page 13

## 5.2 Input Commands

- [General Commands](#)..... 61
- [Info Commands](#)..... 62
- [Test Signal Commands](#)..... 64
- [IP Subsystem](#)..... 65

## 5.2.1 General Commands

<code>[:SOURce&lt;hw&gt;]:BB:ISDBt:SOURce:A</code> .....	61
<code>[:SOURce&lt;hw&gt;]:BB:ISDBt:SOURce:B</code> .....	61
<code>[:SOURce&lt;hw&gt;]:BB:ISDBt:SOURce:C</code> .....	61
<code>[:SOURce&lt;hw&gt;]:BB:ISDBt:INPut</code> .....	61
<code>[:SOURce&lt;hw&gt;]:BB:ISDBt:INPut:FORMat</code> .....	61
<code>[:SOURce&lt;hw&gt;]:BB:ISDBt:INPut:TSCChannel</code> .....	61
<code>[:SOURce&lt;hw&gt;]:BB:ISDBt:REMuX</code> .....	62
<code>[:SOURce&lt;hw&gt;]:BB:ISDBt:STUFfing?</code> .....	62

---

**`[:SOURce<hw>]:BB:ISDBt:SOURce:A` <SourceA>**  
**`[:SOURce<hw>]:BB:ISDBt:SOURce:B` <SourceB>**  
**`[:SOURce<hw>]:BB:ISDBt:SOURce:C` <SourceC>**

Sets the modulation source for layer A, B or C.

**Parameters:**

<SourceC>            TESTsignal | TSGenerator | EXTERNAL  
 \*RST:            TESTsignal

**Manual operation:** See "[Source \(A|B|C\)](#)" on page 15

---

**`[:SOURce<hw>]:BB:ISDBt:INPut` <Input>**

Sets the external input interface.

**Parameters:**

<Input>            TS | ASIFront | ASIRear | SPIFront | SPIRear | IP

**Manual operation:** See "[Input](#)" on page 16

---

**`[:SOURce<hw>]:BB:ISDBt:INPut:FORMat` <InputFormat>**

Sets the format of the input signal.

**Parameters:**

<InputFormat>    ASI | SMPTE  
 \*RST:            ASI

**Manual operation:** See "[Input Format](#)" on page 16

---

**`[:SOURce<hw>]:BB:ISDBt:INPut:TSCChannel` <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 22.

**Parameters:**

<TSChannel> 1 | 2 | 3 | 4  
 \*RST: 1

**Manual operation:** See "IP TS Channel" on page 16

**[[:SOURce<hw>]:BB:ISDBt:REMUx <Remux>**

Enables/disables the built-in TS remultiplexer.

**Parameters:**

<Remux> 0 | 1 | OFF | ON  
 \*RST: 1

**Manual operation:** See "Remux" on page 17

**[[:SOURce<hw>]:BB:ISDBt:STUFFing?**

Activates stuffing.

**Return values:**

<Stuffing> 0 | 1 | OFF | ON

**Usage:** Query only

**Manual operation:** See "Stuffing" on page 19

## 5.2.2 Info Commands

[[:SOURce<hw>]:BB:ISDBt:PACKetlength?.....	62
[[:SOURce<hw>]:BB:ISDBt:USEFUl[:RATE]:A?.....	63
[[:SOURce<hw>]:BB:ISDBt:USEFUl[:RATE]:B?.....	63
[[:SOURce<hw>]:BB:ISDBt:USEFUl[:RATE]:C?.....	63
[[:SOURce<hw>]:BB:ISDBt:USEFUl[:RATE]:MAX:A?.....	63
[[:SOURce<hw>]:BB:ISDBt:USEFUl[:RATE]:MAX:B?.....	63
[[:SOURce<hw>]:BB:ISDBt:USEFUl[:RATE]:MAX:C?.....	63
[[:SOURce<hw>]:BB:ISDBt[:INPut]:DATarate?.....	63

**[[:SOURce<hw>]:BB:ISDBt:PACKetlength?**

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

**Return values:**

<PacketLength> INValid | P208 | P188 | P204

**P188|P204|P208**

188/204/208 byte packets specified for serial input and parallel input.

**INValid**

Packet length does not match the specified length.

\*RST: INValid

**Usage:** Query only

**Manual operation:** See "[Packet Length](#)" on page 18

**[ :SOURce<hw>]:BB:ISDBt:USEFul[:RATE]:A?**

**[ :SOURce<hw>]:BB:ISDBt:USEFul[:RATE]:B?**

**[ :SOURce<hw>]:BB:ISDBt:USEFul[:RATE]:C?**

Displays the data rate measured in the specific layer.

**Return values:**

<MeasUseDRataC> integer

Range: 0 to 9999

\*RST: 0

**Usage:** Query only

**Manual operation:** See "[Meas. Useful Data Rate \(A|B|C\)](#)" on page 20

**[ :SOURce<hw>]:BB:ISDBt:USEFul[:RATE]:MAX:A?**

**[ :SOURce<hw>]:BB:ISDBt:USEFul[:RATE]:MAX:B?**

**[ :SOURce<hw>]:BB:ISDBt:USEFul[:RATE]:MAX:C?**

Displays the maximum useful data rate in the specific layer.

**Return values:**

<MaxUseDRateC> integer

Range: 0 to 999

\*RST: 0

**Usage:** Query only

**Manual operation:** See "[Max. Useful Data Rate \(A|B|C\)](#)" on page 19

**[ :SOURce<hw>]:BB:ISDBt[:INPut]:DATarate?**

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  $r_{\text{meas}}$  and the rate of null packets  $r_0$ :

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

**Return values:**

<MeasDRate> integer

Range: 0 to 9999

\*RST: 0

**Usage:** Query only

**Manual operation:** See "[Measured Data Rate](#)" on page 19

### 5.2.3 Test Signal Commands

<code>[[:SOURce&lt;hw&gt;]:BB:ISDBt:PAYLoad:A</code> .....	64
<code>[[:SOURce&lt;hw&gt;]:BB:ISDBt:PID</code> .....	64
<code>[[:SOURce&lt;hw&gt;]:BB:ISDBt:PIDTestpack</code> .....	64
<code>[[:SOURce&lt;hw&gt;]:BB:ISDBt:PRBS[:SEquence]</code> .....	64
<code>[[:SOURce&lt;hw&gt;]:BB:ISDBt:TESTsignal:A</code> .....	65
<code>[[:SOURce&lt;hw&gt;]:BB:ISDBt:TESTsignal:B</code> .....	65
<code>[[:SOURce&lt;hw&gt;]:BB:ISDBt:TESTsignal:C</code> .....	65
<code>[[:SOURce&lt;hw&gt;]:BB:ISDBt:TSPackets:A</code> .....	65

---

**`[[:SOURce<hw>]:BB:ISDBt:PAYLoad:A <Payload>`**

Defines the payload area content of the **TS** packet.

**Parameters:**

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

**Manual operation:**    See "[Payload Test/Stuff](#)" on page 22

---

**`[[:SOURce<hw>]:BB:ISDBt:PID <PiD>`**

Sets the **PID**.

**Parameters:**

<PiD>                integer  
                          Range:        #H000 to #H1FFF  
                          \*RST:        #H1FFF

**Manual operation:**    See "[PID \(Hex\)](#)" on page 21

---

**`[[:SOURce<hw>]:BB:ISDBt:PIDTestpack <Testpack>`**

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:**

<Testpack>            VARIable | NULL  
                          \*RST:        NULL

**Manual operation:**    See "[PID Test Packet](#)" on page 21

---

**`[[:SOURce<hw>]:BB:ISDBt: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

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

```
[:SOURce<hw>]:BB:ISDBt:TESTsignal:A <TestSignalA>
[:SOURce<hw>]:BB:ISDBt:TESTsignal:B <TestSignalB>
[:SOURce<hw>]:BB:ISDBt:TESTsignal:C <TestSignalC>
```

Defines the test signal data.

**Parameters:**

<TestSignalC> PAFC | PBEC | TTSP  
 \*RST: TTSP

**Manual operation:** See "Test Signal (A|B|C)" on page 17

```
[:SOURce<hw>]:BB:ISDBt:TSPackets:A <TestTSPacket>
```

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

**Parameters:**

<TestTSPacket> S187 | H184  
 \*RST: H184

**Manual operation:** See "Test TS Packet" on page 20

## 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 84.

### 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:ADDRes?
// Response: "226.0.0.0"
:SOURce1:BB:INPut:IP2:IGMP:SOURce:ADDRes?
// Response: "0.0.0.0"
:SOURce1:BB:INPut:IP2:IGMP:SOURce:ADDRes "192.168.10.1"
:SOURce1:BB:INPut:IP2:IGMP:SOURce:PING
:SOURce1:BB:INPut:IP2:IGMP:SOURce:RESult?
// Response: "Ping: Successful"

```

### Commands

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<a href="#">[:SOURce&lt;hw&gt;]:BB:INPut:IP&lt;ch&gt;:ALias</a> .....	66
<a href="#">[:SOURce&lt;hw&gt;]:BB:INPut:IP&lt;ch&gt;:PORT</a> .....	67
<a href="#">[:SOURce&lt;hw&gt;]:BB:INPut:IP&lt;ch&gt;:TYPe</a> .....	67
<a href="#">[:SOURce&lt;hw&gt;]:BB:INPut:IP&lt;ch&gt;:MULTicast:ADDRes</a> .....	67
<a href="#">[:SOURce&lt;hw&gt;]:BB:INPut:IP&lt;ch&gt;:IGMP[:SOURce]:ADDRes</a> .....	68
<a href="#">[:SOURce&lt;hw&gt;]:BB:INPut:IP&lt;ch&gt;:IGMP[:SOURce]:PING</a> .....	68
<a href="#">[:SOURce&lt;hw&gt;]:BB:INPut:IP&lt;ch&gt;:IGMP[:SOURce]:RESult?</a> .....	68

---

#### **[\[:SOURce<hw>\]: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>                    0 | 1 | OFF | ON  
                           \*RST:        0

**Example:**                See [Example "Configure IP channel 2 properties"](#) on page 65.

**Manual operation:**    See ["Input IP"](#) on page 24

---

#### **[\[:SOURce<hw>\]: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 65.

**Manual operation:** See ["Alias"](#) on page 24

---

**[ :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 65.

**Manual operation:** See ["Port"](#) on page 25

---

**[ :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 67.

**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 67

[\[ :SOURce<hw>\]:BB:INPut:IP<ch>:PORT](#) on page 67

\*RST: UNicast

**Example:** See [Example "Configure IP channel 2 properties"](#) on page 65.

**Manual operation:** See ["Type"](#) on page 24

---

**[ :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 65.

**Manual operation:** See ["Multicast Address"](#) on page 24

---

#### **[ :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 65.

**Manual operation:** See ["IGMPv3 Source Address"](#) on page 25

---

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

Triggers ping 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 68.

**Example:**                      See [Example "Configure IP channel 2 properties"](#) on page 65.

**Usage:**                          Event

**Manual operation:** See ["Ping Source Address"](#) on page 25

---

#### **[ :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 68.

**Return values:**

<PingResult>                      string  
Returns ping messages.

**Example:**                      See [Example "Configure IP channel 2 properties"](#) on page 65.

**Usage:**                          Query only

**Manual operation:** See ["Ping Result"](#) on page 25

## 5.3 Coding Commands

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- [System Commands](#).....70

### 5.3.1 General Commands

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<a href="#">[:SOURce&lt;hw&gt;]:BB:ISDBt:IIP:PID</a> .....	70
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<a href="#">[:SOURce&lt;hw&gt;]:BB:ISDBt:SYSTem</a> .....	70

---

### **[\[:SOURce<hw>\]:BB:ISDBt:BANDwidth?](#)**

Displays the used bandwidth.

#### **Return values:**

<UsedBW>                    integer  
                                  Range:        0 to 9999  
                                  \*RST:        0

**Usage:**                    Query only

**Manual operation:**    See "[Used Bandwidth](#)" on page 28

---

### **[\[:SOURce<hw>\]:BB:ISDBt:CHANnel\[:BANDwidth\] <ChannelBW>](#)**

Selects the channel bandwidth.

#### **Parameters:**

<ChannelBW>                BW\_8 | BW\_6 | BW\_7  
                                  \*RST:        BW\_6

**Manual operation:**    See "[Channel Bandwidth](#)" on page 28

---

### **[\[:SOURce<hw>\]:BB:ISDBt:CONTRol <Control>](#)**

Defines the configuration mode of the coder.

#### **Parameters:**

<Control>                    AUTO | MANual  
                                  \*RST:        MANual

**Manual operation:**    See "[Control](#)" on page 13

---

### **[\[:SOURce<hw>\]:BB:ISDBt:FFT:MODE <ISDBTMode>](#)**

Sets the ISDB-T mode.

#### **Parameters:**

<ISDBTMode>                M3\_8K | M2\_4K | M1\_2K  
                                  \*RST:        M3\_8K

**Manual operation:**    See "[ISDB-T Mode](#)" on page 27

---

### **[\[:SOURce<hw>\]:BB:ISDBt:GUARd <GuardInt>](#)**

Sets the guard interval length.

**Parameters:**

<GuardInt> G1\_32 | G1\_16 | G1\_8 | G1\_4  
 \*RST: G1\_8

**Manual operation:** See ["Guard Interval"](#) on page 27

**[:SOURce<hw>]:BB:ISDBt:IIP:PID <IIPPID>**

Defines the **PID** for **MPEG TS** packets, that contain ISDB-T initialization packet (IIP) data.

**Parameters:**

<IIPPID> integer  
 Range: #H0000 to #H1FFF  
 \*RST: #H1FF0

**Manual operation:** See ["IIP PID \(Hex\)"](#) on page 27

**[:SOURce<hw>]:BB:ISDBt:SUBChannel <Subchannel>**

Sets the subchannel of the ISDB-T<sub>SB</sub> signal.

**Parameters:**

<Subchannel> integer  
 Range: 0 to 41  
 \*RST: 22

**Manual operation:** See ["Subchannel"](#) on page 28

**[:SOURce<hw>]:BB:ISDBt:SYSTEM <System>**

Sets the ISDB-T system.

**Parameters:**

<System> TSB3 | TSB1 | T  
 \*RST: T

**Example:** See [Example "Saving current configuration"](#) on page 59.

**Manual operation:** See ["System"](#) on page 13

### 5.3.2 System Commands

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---

```

[:SOURce<hw>]:BB:ISDBt:CONStel:A <ConstelA>
[:SOURce<hw>]:BB:ISDBt:CONStel:B <ConstelB>
[:SOURce<hw>]:BB:ISDBt:CONStel:C <ConstelC>

```

Defines the constellation.

**Parameters:**

```

<ConstelC>          C_DQPSK | C_QPSK | C_16QAM | C_64QAM
                    *RST:      C_64QAM

```

**Manual operation:** See "[Constellation \(A|B|C\)](#)" on page 30

---

```

[:SOURce<hw>]:BB:ISDBt:PORTion:A <PortionA>
[:SOURce<hw>]:BB:ISDBt:PORTion:B <PortionB>
[:SOURce<hw>]:BB:ISDBt:PORTion:C <PortionC>

```

Sets the modulation types of the respective hierarchical layers.

**Parameters:**

```

<PortionC>          PCM | PDM | PRR
                    *RST:      PCM

```

**Manual operation:** See "[Portion \(A|B|C\)](#)" on page 29

---

```

[:SOURce<hw>]:BB:ISDBt:RATE:A <CodeRateA>
[:SOURce<hw>]:BB:ISDBt:RATE:B <CodeRateB>
[:SOURce<hw>]:BB:ISDBt:RATE:C <CodeRateC>

```

Sets the code rate.

**Parameters:**

```

<CodeRateC>        R7_8 | R5_6 | R3_4 | R2_3 | R1_2
                    *RST:      R7_8

```

**Manual operation:** See "[Code Rate \(A|B|C\)](#)" on page 31

---

```

[:SOURce<hw>]:BB:ISDBt:SEGMents:A <SegmentsA>
[:SOURce<hw>]:BB:ISDBt:SEGMents:B <SegmentsB>
[:SOURce<hw>]:BB:ISDBt:SEGMents:C <SegmentsC>

```

Sets the number of segments for layers A, B and C.

**Parameters:**

<SegmentsC> integer  
 Range: 0 to 11  
 \*RST: 0

**Manual operation:** See "[Segments \(A|B|C\)](#)" on page 30

**[ :SOURce<hw>]:BB:ISDBt:TIME[:INTerleaving]:A** <TimeIntA>  
**[ :SOURce<hw>]:BB:ISDBt:TIME[:INTerleaving]:B** <TimeIntB>  
**[ :SOURce<hw>]:BB:ISDBt:TIME[:INTerleaving]:C** <TimeIntC>

Sets the time interleaving depth of each layer separately.

**Parameters:**

<TimeIntC> 0 | 1 | 16 | 2 | 32 | 4 | 8  
 \*RST: 2

**Manual operation:** See "[Time Interleaving \(A|B|C\)](#)" on page 31

## 5.4 EEW Commands

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### **[ :SOURce<hw>]:BB:ISDBt:EEW:APAI**

Issues a seismic motion warning based on the information of "Area Information Hex".

**Usage:** Event

**Manual operation:** See "[Apply Signal Set.](#)" on page 34

### **[ :SOURce<hw>]:BB:ISDBt:EEW:APE1**

Issues a seismic motion warning based on the "EC1"/"EC2" settings.

**Usage:** Event

**Manual operation:** See "[Apply](#)" on page 36



---

**[:SOURce<hw>]:BB:ISDBt:EEW:APE2**

**Usage:** Event

---

**[:SOURce<hw>]:BB:ISDBt:EEW:AREAINfo <AreaInf>**

Sets the target area of the seismic motion warning in hexadecimal presentation.

**Parameters:**

<AreaInf> integer  
 Range: #H0000000000000000 to #HFFFFFFFFFFFFFFF  
 \*RST: #HFFFFFFFFFFFFFFF

**Manual operation:** See "[Area Information \(Hex\)](#)" on page 33

---

**[:SOURce<hw>]:BB:ISDBt:EEW:DEPTH<ch> <Depth>**

Sets the depth of the epicenter of the seismic event.

**Parameters:**

<Depth> float  
 Range: 0 M to 1023 M  
 Increment: 1 M  
 \*RST: 0 M

**Manual operation:** See "[Depth](#)" on page 36

---

**[:SOURce<hw>]:BB:ISDBt:EEW:EEW <EEW>**

Enables/disables the [EEW](#) system.

**Parameters:**

<EEW> 0 | 1 | OFF | ON  
 \*RST: 0

**Manual operation:** See "[EEW](#)" on page 33

---

**[:SOURce<hw>]:BB:ISDBt:EEW:INFotype<ch> <InfoType>**

Provides information about the validity of the seismic motion warning.

**Parameters:**

<InfoType> CANCELED | ISSUED  
 \*RST: ISSUED

**Manual operation:** See "[Information Type](#)" on page 36

---

**[:SOURce<hw>]:BB:ISDBt:EEW:LATitude<ch> <Latitude>**

Sets the geographical latitude of the epicenter of the seismic event.

**Parameters:**

<Latitude> float  
 Range: -90.0 DEG to 90 DEG  
 Increment: 0.1 DEG  
 \*RST: 0.0 DEG

**Manual operation:** See "[Latitude \(-South +North\)](#)" on page 36

**[:SOURCE<hw>]:BB:ISDBt:EEW:LONGitude<ch>** <Longitude>

Sets the geographical longitude of the epicenter of the seismic event.

**Parameters:**

<Longitude> float  
 Range: -180.0 DEG to 180.0 DEG  
 Increment: 0.1 DEG  
 \*RST: 0.0 DEG

**Manual operation:** See "[Longitude \(-West +East\) /deg](#)" on page 36

**[:SOURCE<hw>]:BB:ISDBt:EEW:NUMepicenter** <NumEpicenter>

Identifies the total number of seismic motion information being transmitted.

**Parameters:**

<NumEpicenter> integer  
 Range: 1 to 2  
 \*RST: 1

**Manual operation:** See "[Number of Epicenters](#)" on page 33

**[:SOURCE<hw>]:BB:ISDBt:EEW:OCCurrence<ch>** <Occurrence>

Sets the occurrence time of the seismic event.

**Parameters:**

<Occurrence> float  
 Range: 0 S to 1023 S  
 Increment: 1 S  
 \*RST: 0 S

**Manual operation:** See "[Occurrence Time](#)" on page 36

**[:SOURCE<hw>]:BB:ISDBt:EEW:SIGNaltype** <SignalType>

Identifies the type of seismic motion warning.

**Parameters:**

<SignalType> WWA | WWOA | TWA | TWOA  
 \*RST: WWA

**Manual operation:** See ["Signal Type"](#) on page 33

---

**[:SOURce<hw>]:BB:ISDBt:EEW:WARNid<ch>** <WarningID>

Sets the individual identification number of the seismic motion warning.

**Parameters:**

<WarningID>            integer  
                           Range:        0 to 511  
                           \*RST:        0

**Manual operation:** See ["Warning ID"](#) on page 36

## 5.5 Special Commands

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---

**[:SOURce<hw>]:BB:ISDBt[:SPEcial]:ACData<ch>** <ACData2>

Sets the [AC](#) carrier modulation.

**Parameters:**

<ACData2>            ALL1 | PRBS  
                           \*RST:        ALL1

**Manual operation:** See ["AC Data \(AC2\)"](#) on page 38

---

**[:SOURce<hw>]:BB:ISDBt[:SPEcial]:ALERT[:BROadcast]** <AlertBCFlag>

Enables or disables the alert broadcasting flag in the [TMCC](#) data.

**Parameters:**

<AlertBCFlag>        0 | 1 | OFF | ON  
                           \*RST:        0

**Manual operation:** See ["Alert Broadcasting Flag"](#) on page 38

---

**[:SOURce<hw>]:BB:ISDBt[:SPEcial]:REEDsolomon** <ReedSolomon>

Enables/disables the Reed-Solomon encoder.

**Parameters:**

<ReedSolomon>        0 | 1 | OFF | ON  
                           \*RST:        1

**Manual operation:** See ["Reed Solomon"](#) on page 38

---

**[:SOURce<hw>]:BB:ISDBt[:SPECial]:SETTings[:STATe] <Settings>**

Enables/disables special settings.

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

**Parameters:**

<Settings>            0 | 1 | OFF | ON  
                          \*RST:        0

**Manual operation:** See ["Special Settings"](#) on page 37

---

**[:SOURce<hw>]:BB:ISDBt[:SPECial]:TMCC:NEXT <MTCCNext>**

Sets the [TMCC](#) next information bits.

**Parameters:**

<MTCCNext>            UNUSed | CURRent  
                          \*RST:        UNUSed

**Manual operation:** See ["TMCC Next"](#) on page 38

---

**[:SOURce<hw>]:BB:ISDBt[:SPECial]:TXParam <TXParamSWInd>**

Defines the statical setting of the transmission parameter switching indicator.

**Parameters:**

<TXParamSWInd>      N1 | N2 | N11 | N12 | N13 | N14 | N15 | NORMal | N2 | N4 | N5 |  
                          N6 | N7 | N8 | N9 | N10  
                          \*RST:        NORMal

**Manual operation:** See ["TX Param. Switching Indicator"](#) on page 38

## 5.6 TSGen Subsystem

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

**Example: Play 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: Configure and monitor 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:PIDTestpack VAR
:TSGen:CONFigure:PID 8100
// Corresponds to a PID = 1FA4 in hexadecimal format.
:TSGen:CONFigure:PAYLoad PRBS
:TSGen:CONFigure:PRBS:SEQuence P23_1

//*****
// Monitor TS player output data.
//*****
:TSGen:CONFigure:COMMand STOP
// TSPRate can only be changed if player is in stop mode
:TSGen:CONFigure:TSPRate 350E6 // net data rate = 350 MBit/s
:TSGen:CONFigure:COMMand PLAY

```

```
:TSGen:CONFigure:PLENght?
// Response: P188 // packet length = 188 byte
:TSGen:READ:ORIGtsrate?
// Response: 5018502 bit/s
```

### Example: Configure seamless loop parameters

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

### Commands

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---

### :TSGen:CONFigure:COMMand<ch>

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

#### Setting parameters:

```
<PlayerStatus>   STOP | PLAY | PAUSE
                  *RST:   STOP
```

**Example:** See [Example "Play a TS player file"](#) on page 76.

**Usage:** Event

**Manual operation:** See ["Play"](#) on page 43

---

**: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 "Configure and monitor TS player output"](#) on page 77.

**Manual operation:** See ["Payload Test/Stuff"](#) on page 46

---

**: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 "Configure and monitor TS player output"](#) on page 77.

**Manual operation:** See ["PID \(Hex\)"](#) on page 46

---

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

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

**Parameters:**

<PIDTestpack>        VARIable | NULL  
                          \*RST:        NULL

**Example:**            See [Example "Configure and monitor TS player output"](#) on page 77.

**Manual operation:** See ["PID Test Packet"](#) on page 46

---

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

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

**Parameters:**

<PlayFile>            string

**Example:**            See [Example "Play a TS player file"](#) on page 76.

**Manual operation:** See ["Select File"](#) on page 41

---

**:TSGen:CONFigure:PLENgtH** <PLength>

Queries the packet length of the loaded file.

**Parameters:**

<PLength> P188 | P204 | P208 | INV  
\*RST: INV

**Example:** See [Example "Configure and monitor TS player output"](#) on page 77.

---

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

Sets the length of the PRBS sequence.

**Parameters:**

<PRBS> P15\_1 | P23\_1  
\*RST: P23\_1

**Example:** See [Example "Configure and monitor TS player output"](#) on page 77.

**Manual operation:** See ["PRBS"](#) on page 47

---

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

**Example:** See [Example "Configure seamless loop parameters"](#) on page 78.

**Manual operation:** See ["Continuity Counter"](#) on page 47

---

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

**Example:** See [Example "Configure seamless loop parameters"](#) on page 78.



**Manual operation:** See ["PCR, DTS/PTS"](#) on page 48

#### **: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>                    0 | 1 | OFF | ON  
 \*RST:                 0

**Example:** See [Example "Configure seamless loop parameters"](#) on page 78.

**Manual operation:** See ["TDT/TOT"](#) on page 48

#### **: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 "Play a TS player file"](#) on page 76.

**Manual operation:** See ["Running/Position Player \[hh:mm:ss:fff\]"](#) on page 41

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

Resets the following parameters to their default state:

- [:TSGen:CONFigure:SEEK:START](#) on page 81
- [:TSGen:CONFigure:SEEK:STOP](#) on page 82

**Example:** See [Example "Play a TS player file"](#) on page 76.

**Manual operation:** See ["Reset Window"](#) on page 43

#### **: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 "Play a TS player file"](#) on page 76.

**Manual operation:** See ["Start \[hh:mm:ss.fff\]"](#) on page 42

**: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 "Play a TS player file"](#) on page 76.

**Manual operation:** See ["Stop \[hh:mm:ss.fff\]"](#) on page 43

**: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 "Configure and monitor TS player output"](#) on page 77.

**Manual operation:** See ["Stop Data"](#) on page 45

**:TSGen:CONFigure:STUFFing <Stuffing>**

Enables or disables nullpacket stuffing.

**Parameters:**

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

**Example:** See [Example "Configure and monitor TS player output"](#) on page 77.

**Manual operation:** See ["Nullpacket Stuffing"](#) on page 44

---

**: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 "Configure and monitor TS player output"](#)  
on page 77.

**Manual operation:**    See "[Packet Length](#)" on page 44

---

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

Sets the output data rate of the player.

**Parameters:**

<TSRate>            integer  
 Range:            1 to 35E7  
 \*RST:            5018502

**Example:**            See [Example "Configure and monitor TS player output"](#)  
on page 77.

**Manual operation:**    See "[Data Rate](#)" on page 44

---

**:TSGen:READ:FMEMemory <FMemory>**

Queries the file size of the TS player file.

**Parameters:**

<FMemory>           integer  
 Range:            0 to 10  
 \*RST:            0

**Example:**            See [Example "Configure and monitor TS player output"](#)  
on page 77.

**Manual operation:**    See "[Select File](#)" on page 41

---

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

Displays the calculated original TS data rate.

**Parameters:**

<ORIGtsrate> integer  
 Range: 1 to 350000000  
 \*RST: 5018502

**Example:** See [Example "Configure and monitor TS player output"](#) on page 77.

**Manual operation:** See ["Orig. Data Rate"](#) on page 44

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

Queries calculated original loop time.

**Return values:**

<Length> integer  
 Range: 0 to 100  
 \*RST: 0

**Example:** See [Example "Configure and monitor TS player output"](#) on page 77.

**Usage:** Query only

**Manual operation:** See ["Select File"](#) on page 41

## 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 disconnected 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"
```

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---

#### :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 84.

**Manual operation:**   See ["Hostname"](#) on page 49

---

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

Sets the IP address.

#### Parameters:

<IpAddress>            string  
                           Range:        0.0.0.0 to 255.255.255.255  
                           \*RST:        0.0.0.0

**Example:**            See [Example "Retrieving information on local network-related settings"](#) on page 84.

**Manual operation:**   See ["IP Address"](#) on page 50

---

**: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 84.

**Manual operation:**    See ["Address Mode"](#) on page 49

---

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

Sets the subnet mask.

**Parameters:**

<Mask>            string  
Range:            0.0.0.0 to 255.255.255.255  
\*RST:            0.0.0.0

**Example:**            See [Example "Retrieving information on local network-related settings"](#) on page 84.

**Manual operation:**    See ["Subnet Mask"](#) on page 50

---

**: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 84.

**Manual operation:**    See ["MAC Address"](#) on page 50

---

**: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 84.

**Manual operation:**    See ["Protocol"](#) on page 50

---

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

Triggers a restart of the network.

**Example:** See [Example "Retrieving information on local network-related settings"](#) on page 84.

**Usage:** Event

**Manual operation:** See ["Restart Network"](#) on page 49

---

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

Queries the network connection state.

**Parameters:**

<NetworkStatus> 0 | 1 | OFF | ON

\*RST: n.a. (no preset. default: 0)

**Example:** See [Example "Retrieving information on local network-related settings"](#) on page 84.

**Manual operation:** See ["Network Status"](#) on page 49

## Glossary: Abbreviations

### A

**AC:** Auxiliary Channel

**ARIB:** Association of Radio Industries and Businesses

**ASI:** Asynchronous Serial Interface

### C

**CAT:** Conditional Access Table

### D

**DHCP:** Dynamic Host Configuration Protocol

### E

**EEW:** Earthquake Early Warning system

### F

**FFT:** Fast Fourier Transform

### I

**IFFT:** Inverse Fast Fourier Transform

**IGMP:** Internet Group Management Protocol

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

**IIP:** ISDB-T Initialization Packet

**ISDB-T:** Integrated Service Digital Broadcasting - Terrestrial

**ISDB-TSB:** [ISDB-T](#) Sound Broadcasting

### M

**MAC:** Media Access Control

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

**MSB:** Most Significant Bit

### N

**NIT:** Network Information Table



**O**

**OFDM:** Orthogonal Frequency-Division Multiplexing

**P**

**PAT:** Program Association Table

**PCR:** Programme Clock Reference

**PID:** Packet Identifier

**PMT:** Program Map Table

**PRBS:** Pseudo-Random Bit Sequence

**Q**

**QAM:** Quadrature Amplitude Modulation

**QPSK:** Quaternary Phase Shift Keying

**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

**TMCC:** Transmission and Multiplexing Configuration Control

**TS:** Transport Stream

**U**

**UDP:** User Datagram Protocol

## Glossary: Specifications

### A

**ARIB STD-B29:** Transmission System for Digital Terrestrial Sound Broadcasting  
[https://www.arib.or.jp/english/std\\_tr/broadcasting/desc/std-b29.html](https://www.arib.or.jp/english/std_tr/broadcasting/desc/std-b29.html)

**ARIB STD-B31:** Transmission System for Digital Terrestrial Television Broadcasting  
[https://www.arib.or.jp/english/std\\_tr/broadcasting/std-b31.html](https://www.arib.or.jp/english/std_tr/broadcasting/std-b31.html)

**ARIB STD-B46:** Transmission System for Terrestrial Mobile Multimedia Broadcasting based on Connected Segment Transmission  
[https://www.arib.or.jp/english/std\\_tr/broadcasting/desc/std-b46.html](https://www.arib.or.jp/english/std_tr/broadcasting/desc/std-b46.html)

### I

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

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