

# Rohde & Schwarz Solutions for DVB-H Transport Stream Generation and Analysis

## Summary

The new DVB-H transmission standard makes it possible to transmit multimedia content to mobile terminals. DVB-H is based on, and expands, the terrestrial digital TV standard DVB-T.

Testing DVB-H transmission links and receivers requires new, DVB-H-compliant transport streams for checking DVB-H-specific parameters. The DVB-H Stream Library R&S DV-DVBH provides signals that meet this requirement.

The analysis of DVB-H signals requires T&M instruments that support MPEG-2 parameters as well as the new, DVB-H-specific parameters. This is why Rohde & Schwarz is expanding the test capacities of the R&S DVM family.

## DVB-H – a brief overview

The new DVB-H (digital video broadcasting for handheld devices) transmission standard provides a cost-efficient means of transmitting multimedia content to mobile receivers such as mobile phones or laptops. DVB-H is based on terrestrial transmission for digital TV (DVB-T). In addition, it optimizes reception for mobile and battery-operated terminals. This fulfills the following demands:

- power-saving operation of terminals
- interference-free reception even under difficult reception conditions



## Basic technical characteristics of DVB-H

- Multiprotocol encapsulation (MPE): The contents to be transmitted come in the form of IP data. DVB multiprotocol encapsulation allows them to be integrated into an MPEG-2 transport stream.
- Forward error correction (FEC): The data is equipped with additional error protection, improving reception quality in the event of strong signal interference.
- Time slicing: The data is not sent continuously but in bursts. This allows the receiver (e.g. a mobile phone) to switch off when no bursts are being sent, which saves power.
- 4k modulation mode as an alternative to 2k and 8k mode: A compromise between very robust reception especially with mobile use (2k mode: large carrier spacing) and maximum possible spacing between transmitters for single-frequency networks (8k mode: long OFDM symbols and long guard interval).
- Use of TPS bits: These bits signal whether and, if yes, which of the DVB-H features are used.

Whereas 4k and TPS relate to channel coding, time slicing, FEC and MPE expand the transport stream.

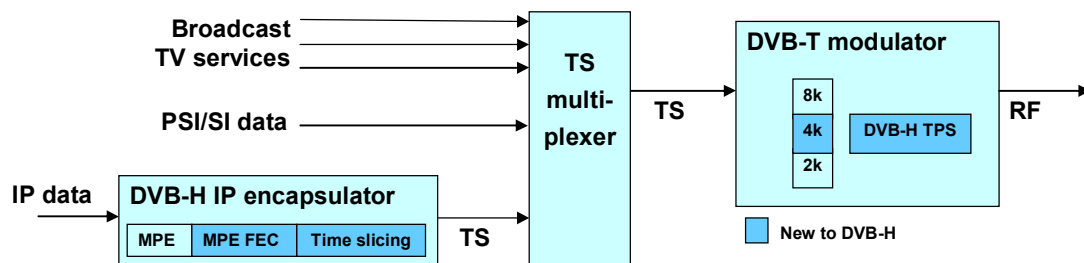


Figure 1: DVB-H/-T playout center (mixed services)



# DVB-H transport stream generation

## Free transport stream for getting a quick start

To get a quick start and perform the first tests, Rohde & Schwarz now provides free of charge a **test signal** for the DTV Recorder Generator R&S DVRG.

## Characteristics of the Stream Library R&S DV-DVBH

The Stream Library R&S **DV-DVBH** contains a wide range of ready-made signals for testing systems with extremely different transmission parameters and signal contents.

All signals contain RS data sections, which means that also the MPE-FEC test in the receiver is supported. Since signals are generated using seamless time slicing, power management in the receiver is not disrupted even at the end of the sequence.

The stream library is available for replay on the following instruments:

- R&S DVRG
- R&S DVM400 with the R&S DVM400-B2 option (TS generator)
- R&S SFU with the R&S SFU-K20 option (TS generator)

For ordering, the serial number (R&S DVM400/SFU) or the hardware address/MAC address (R&S DVRG) of the instrument used is required.

## Specifications of the DVB-H Stream Library R&S DV-DVBH

### Common for all streams:

- RS data sections (MPE-FEC) and PSI/SI signalling (like INT and other tables) included
- Number of MPE-FEC rows = 1024
- Seamless time slicing
- Data rate configurable on generator by insertion of null packets

### Streams 1 to 5

Application: Test of maximum receiver bit rate performance

Characteristic: Variation of burst bit rate and burst length

Content: MPEG-4 video, standard profile, QCIF, 128 kbit/s, IPv4

Timing:

	Burst duration: cycle time	Equivalent bit rate Mbit/s	Cycle time s	Burst bit rate Mbit/s	Burst duration s	Burst size Mbit	Receiver off-time * s
Stream 1	1:12	0.200	7.680	2.400	0.640	1.536	7.040
Stream 2	1:6	0.200	7.680	1.200	1.280	1.536	6.400
Stream 3	1:4	0.200	7.680	0.800	1.920	1.536	5.760
Stream 4	1:2	0.200	7.680	0.400	3.840	1.536	3.840
Stream 5	1:1	0.200	7.680	0.200	7.680	1.536	0.000

\*Minus 0.25 s time offset



**Streams 6 and 7**

Application: Test of receiver power consumption due to different burst cycle time  
 Characteristic: Variation of burst cycle time with a specific burst bit rate  
 Content: MPEG-4 video, standard profile, QCIF, 128 kbit/s, IPv4  
 Timing:

	Burst duration: cycle time	Equivalent bit rate Mbit/s	Cycle time s	Burst bit rate Mbit/s	Burst duration s	Burst size Mbit	Receiver off-time *
Stream 6	1:6	0.200	3.840	1.200	0.640	0.768	3.200
Stream 7	1:6	0.200	7.680	1.200	1.280	1.536	6.400

\*Minus 0.25 s time offset

**Streams 8 and 9**

Application: Test of receiver minimum off time  
 Characteristic: Variation of minimum off time  
 Content: MPEG-4 video, standard profile, QCIF, 128 kbit/s, IPv4  
 Timing:

	Burst duration: cycle time	Equivalent bit rate Mbit/s	Cycle time s	Burst bit rate Mbit/s	Burst duration s	Burst size Mbit	Receiver off-time *
Stream 8	1:3	0.200	1.920	0.600	0.640	0.384	1.280
Stream 9	1:3	0.200	3.840	0.600	1.280	0.768	2.560

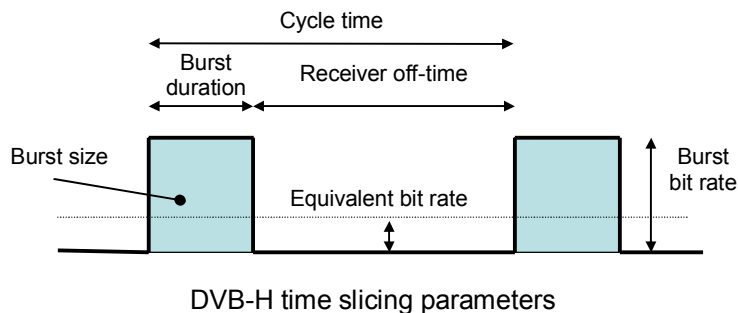
\*Minus 0.25 s time offset

**Streams 10 to 13**

Application: Receiver test with different payload  
 Characteristic: Variation of content  
 Content: Stream 10 - MPEG-4 video, standard profile, CIF, 256 kbit/s, IPv4  
 Stream 11 - MPEG-4 video, standard profile, CIF, 256 kbit/s, IPv6  
 Stream 12 - H264 video, CIF, 256 kbit/s, IPv4  
 Stream 13 - WM9 video, CIF, 256 kbit/s, IPv4  
 Timing:

	Burst duration: cycle time	Equivalent bit rate Mbit/s	Cycle time s	Burst bit rate Mbit/s	Burst duration s	Burst size Mbit	Receiver off-time *
Streams 10 to 13	1:3	0.350	3.840	1.050	1.280	1.344	2.560

\*Minus 0.25 s time offset



**Ordering information**

DV-DVBH

DVB-H STREAM LIBRARY

2085.8704.02

# DVB-H transport stream analysis

## Summary of DVB-H TS analysis options

The DVB-H measurement functions will be available for all instruments of the R&S DVM family. Measurements on DVB-H transport streams are possible using the R&S DVM50 and R&S DVM100 base units as well as the R&S DVM400 equipped with the analyzer option (R&S DVM400-B1). With the in-depth analysis and data broadcast analysis options, the entire range of functions listed below under "Specification" is available for DVB-H measurements.

The in-depth analysis option is available for the instruments of the R&S DVM family as follows:

R&S DVM50: R&S DVM50-K10

R&S DVM100: R&S DVM-K10

R&S DVM400: contained in R&S DVM400-B1

The data broadcast analysis option (R&S DVM-K11) is available for all instruments.

The DVB-H analysis functions are thus fully integrated in existing options.

## Specification of extensions for DVM measurements

### Base unit

Detection of DVB-H service	Signalling of all available DVB-H services in the GUI
INT CRC monitoring	Checking the INT validity
INT table repetition	Monitoring the regularity of table transmission
Data rate	Monitoring the data rate based on the PID

### In-depth analysis (option R&S DVM-K10 / R&S DVM50-K10)

Header MAP	Display of packet distribution within the transport stream, allowing packets outside the slice pattern to be identified
INT table interpreter	Checking table consistency and the contained data

### Data broadcast analysis (option R&S DVM-K11)

TS descriptor on DVB-H service	Checking the references in the transport stream to the DVB-H service
MPE and MPE-FEC section header interpreter	Checking the header data (realtime parameters, information regarding the padding columns parameters and the MAC address)
Provision of a selected IP service on a UDP/RTP socket of an external computer	<ul style="list-style-type: none"><li>• DVB-H IP de-encapsulation with R&amp;S software</li><li>• FEC evaluation with end-to-end BER measurement with R&amp;S software</li><li>• IP analysis with open source analysis tools</li><li>• Decoding of video and audio with application-specific codecs</li><li>• User-specific evaluations</li></ul>

**Note:** The options are expanded in stages. Implementation of the complete range of functions is planned for the second quarter of 2005.

## Ordering information

R&S DVM-K10	IN-DEPTH ANALYSIS	2085.5228.02
R&S DVM50-K10	IN-DEPTH ANALYSIS	2085.5434.02
R&S DVM-K11	DATA BROADCAST ANALYSIS	2085.5311.02



## Specific abbreviations

FEC	Forward error correction
	Algorithm to correct transmission errors on the receiving end
INT	IP/MAC notification table
	Signalling of IP MAC stream in a DVB transport stream
IP	Internet protocol
	Specification of packet format and address scheme
MPE	Multiprotocol encapsulation
	Methods to encode IP datagram stream onto TS
PSI/SI	Program-specific information
	Data required by the receiver to demultiplex and decode the various programs in the TS (e.g. for DVB-H NIT, INT)
NIT	Network information table
	Information about network characteristics

