# R&S®DVMS Digital TV Monitoring System Family
## Ensuring high quality of digital TV network operation

ROHDE & SCHWARZ

# R&S®DVMS Digital TV Monitoring System Family
# At a glance

The R&S®DVMS family is a professional, attractively priced and compact solution for monitoring digital TV networks. It includes the R&S®DVMS1 and the R&S®DVMS4. Typical fields of applications for the R&S®DVMS family are signal monitoring at the transmitter site, the satellite uplink or the headend.

The R&S®DVMS1 (1 HU, ½ rack width) makes it possible to simultaneously monitor an RF signal and an ASI signal or as an alternative up to four IP flows. The R&S®DVMS4 (1 HU) allows simultaneous monitoring of up to four RF/IP/ASI signals. Interface modules for DVB-T/DVB-T2, DVB-S/DVB-S2 as well as for IP (optical/electrical) are available.

All relevant errors at the RF, IP, TS and T2-MI level are recognized and reported immediately. Thumbnail display and electronic program guide (EPG) simplify visual monitoring of the transmitted contents. Remote access is supported via an integrated web server allowing independent, simultaneous access from different locations. SNMP and SNMP traps are supported for integration into central network management systems.

High-quality analysis functions and easy-to-understand displays complement the system's extensive array of monitoring functions. The analysis functions include program clock reference (PCR) analysis and buffer analysis as well as analysis of data and object carousels as used for system software update (SSU) and HbbTV®, for example. As a result, the R&S®DVMS is also ideal for troubleshooting, for example at a multiplex center or headend. Due to its small size, the R&S®DVMS1 in particular is a versatile and valuable tool for development.

## Key facts
▪ Simultaneous monitoring of up to four signals
▪ RF modules for DVB-T/DVB-T2 and DVB-S/DVB-S2
▪ IP module for electrical and optical (SFP) connections
▪ Support for DVB, ATSC and ISDB-T/ISDB-T$_B$ transport streams
▪ T2-MI and BTS support
▪ Optional functions for detailed analysis
▪ Modular and extremely compact design (1 HU)

| Comparison | | |
| --- | --- | --- |
| | R&S®DVMS1 | R&S®DVMS4 |
| Number of module slots | 1 | 4 |
| Maximum number of simultaneously monitored inputs | 4 (1 × TS and/or 1 × RF or 4 × TS IP) | 4 (TS, RF and TS IP in any combination) |
| TS interfaces integrated in base unit | – | 4 × TS |
| Total maximum bit rates of all inputs used | 360 Mbit/s (IP) 86 Mbit/s (ASI/RF) | 360 Mbit/s (IP + ASI + RF) |
| Integrated display (configure IP address, check firmware version or input status) | – | yes |
| Width | ½ rack | 1 rack |

¹⁾ Depending on content and used/installed inputs.

Front view of the R&S®DVMS4.



Rear view of the R&S®DVMS4.

# R&S®DVMS Digital TV Monitoring System Family Benefits and key features

## Immediate detection of all relevant errors at the RF, IP, TS, T2-MI and BTS level
- Extensive RF measurements for DVB-T/DVB-T2 and DVB-S/DVB-S2 signals
- Extensive IP measurements
- Template function for transmission parameters
- Monitoring of DVB, ATSC and ISDB specific TS
- T2-MI monitoring
- Template function for transport stream characteristics
- Detection of transport stream changes
- Data rate monitoring
- EPG/EIT monitoring
- MIP monitoring in SFN networks
- Encryption monitoring
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Front view of the R&S®DVMS1.

Rear view of the R&S®DVMS1.

## Extensive analysis and visualization functions
- Constellation display
- Spectrum display (DVB-T and DVB-T2)
- Echo pattern display (DVB-T and DVB-T2)
- MDI display (IP flows)
- Thumbnail display
- EPG display
- Graphic display of data rates and table repetition rates
- Table interpreter
- PCR analysis
- PTS analysis
- Elementary stream analysis for video and audio according to the buffer model
- Analysis of DVB object and data carousels
- Analysis of video encoding quality (qPSNR analysis)
▷ page 7

## Simple operation and configuration
- Clearly structured dialogs for all settings (monitoring characteristics, signal input and instrument)
- Detailed configuration capabilities for all monitoring functions and limits
- Convenient callup of measurement functions via the View Selector selection window
- Protection against unauthorized use by defining user-specific operation rights
▷ page 10

## Extensive range of monitoring features
- Monitoring of multiple DVB-T/DVB-H and DVB-S/DVB-S2 signals through a single input with Scheduler Suite
- Triggered recording and archiving of transport stream segments
- Detailed monitoring and error logging
- Different profiles for bit rate measurements for long-term and peak evaluation
- Permanent or temporary suppression of error messages with Hiding of Events function

## Powerful network functions
- Multiple user access via standard web browser (Java-based) or VNC viewer
- Integration in network management systems via built-in SNMP interface
- Simple data exchange using FTP
- Firewall-protected access
- Streaming of a selected program or PID to any point in the network

# Immediate detection of all relevant errors at the RF, IP, TS, T2-MI and BTS level

## Extensive RF measurements for DVB-T/DVB-T2 and DVB-S/DVB-S2 signals

The system monitors the level, frequency offset, bit rate offset, BER and MER. For DVB-T and DVB-T2, the shoulder and SFN characteristics (up to 16 impulses) are monitored and MER measurements typically achieve an accuracy of 38 dB.

## Extensive IP measurements

The measurements include MDI, RTP inter-arrival jitter, IP and TS bit rate to ensure error-free transmission on the IP link.

## Template function for transmission parameters

The transmission parameters can be defined in such a way that an alarm is generated when there is a deviation from the received signal. The parameters include, for example, FFT, constellation, guard interval and code rate.

## Monitoring of DVB, ATSC and ISDB specific TS

ı DVB transport streams are monitored in line with the TR 101 290 measurement guidelines. All measurements [1] specified in the TR 101 290 measurement guidelines under priorities 1, 2 and 3 are carried out simultaneously for every component of all transport streams being monitored

ı Monitoring of ATSC transport streams is derived from TR 101 290 and includes required extensions for PSIP monitoring. The monitoring functions have been implemented in line with A/65 B

ı Monitoring of ISDB-T and ISDB-T$_B$ transport streams is derived from TR 101 290 and includes required extensions to also monitor the transmission link to the transmitter (BTS). The monitoring functions have been implemented according to ARIB STD-B10/Part 2 (ISDB-T) and ABNT NBR 15603-2 (ISDB-T$_B$)

[1] Buffer-related measurements are excluded. They can be performed for a selected video or audio element.
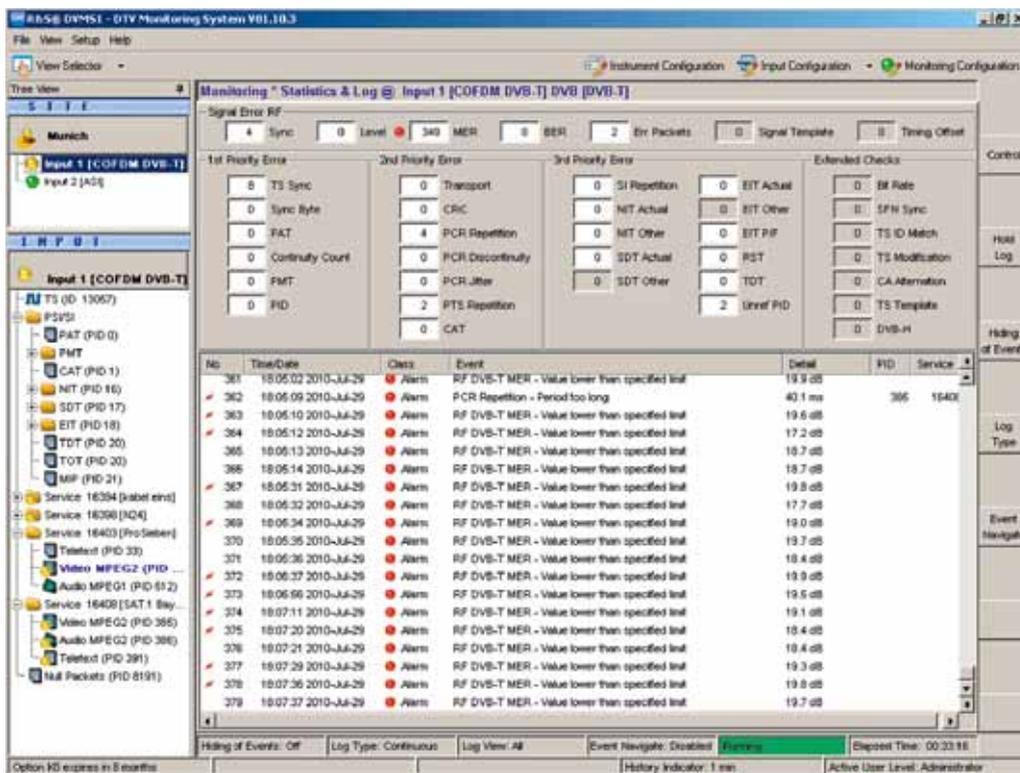


Error counters and report entries for all monitored characteristics.
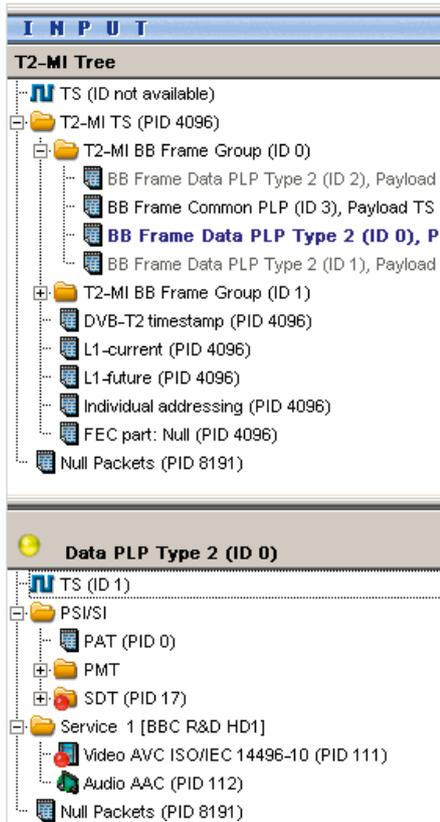
## T2-MI monitoring

T2-MI signals are monitored according to the BlueBook A14-1, an extension to the TR 101 290 measurement guidelines. In addition, up to 16 contained PLPs are monitored (TR 101 290 priorities 1 to 3 as applicable). Limits can individually be adjusted by the user for each PLP.

## Template function for transport stream characteristics

Template monitoring makes it possible to compare numerous transport stream characteristics with predefined values. This allows errors to be detected that might go unnoticed when performing monitoring tasks solely as specified in TR 101 290 (for example, when a program is missing). A special feature offered by this function is the automatic generation of a template based on the transport stream being applied. The template is generated by simply pressing a key, which eliminates cumbersome manual setup.

## Detection of transport stream changes

Even if no template is used for the TS characteristics, the R&S®DVMS still detects changes in the transport stream. These changes, which may be undesired, might remain undetected when monitoring is performed exclusively in accordance with priorities 1, 2 and 3.



Template monitoring results.

## Bit rate monitoring

If no template is used for the TS characteristics, the bit rates for the various elements (video, audio, data and tables) can be monitored with general values for the upper and lower limits.

## EPG/EIT monitoring

A DVB-T receiver generates its EPG using the receivable EIT tables. If tables are missing, the EPG is incomplete. The R&S®DVMS1 uses both the reference data from the SDT tables and the information provided in the TS template to provide extensive monitoring of the EIT tables.

## MIP monitoring in SFN networks

The MIP packet in SFN networks is monitored completely, as specified in TR 101 290.

## Encryption monitoring

Both the status and the CA alternation are monitored.
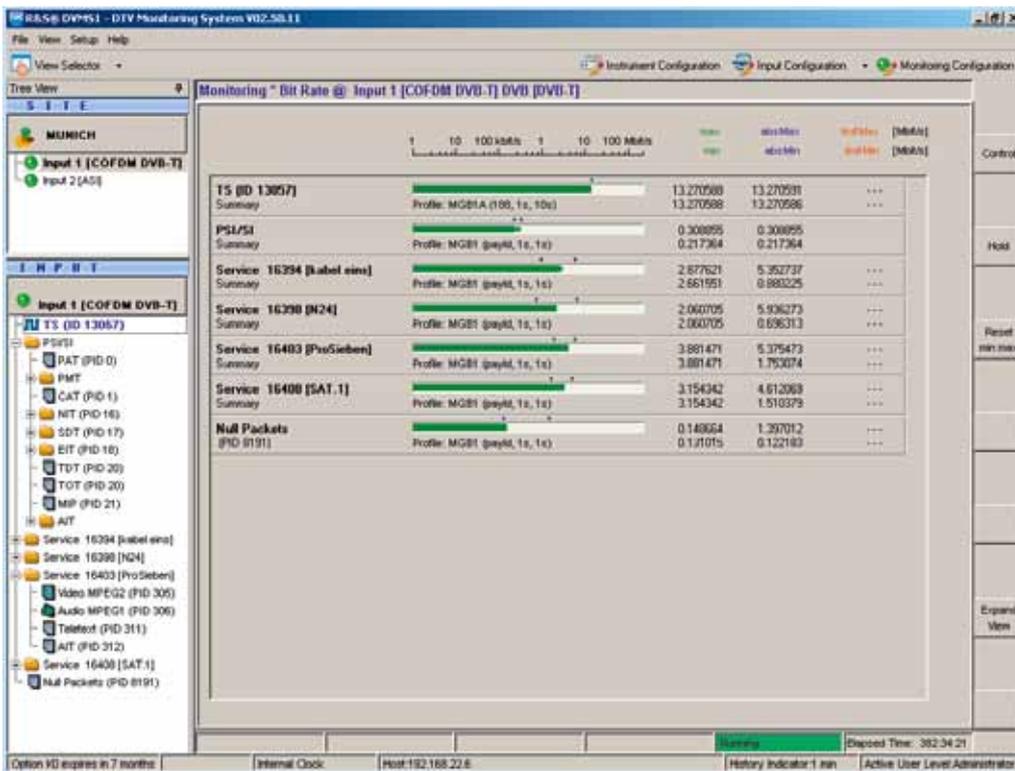


Bit rate monitoring.

# Extensive analysis and visualization functions

## Constellation display
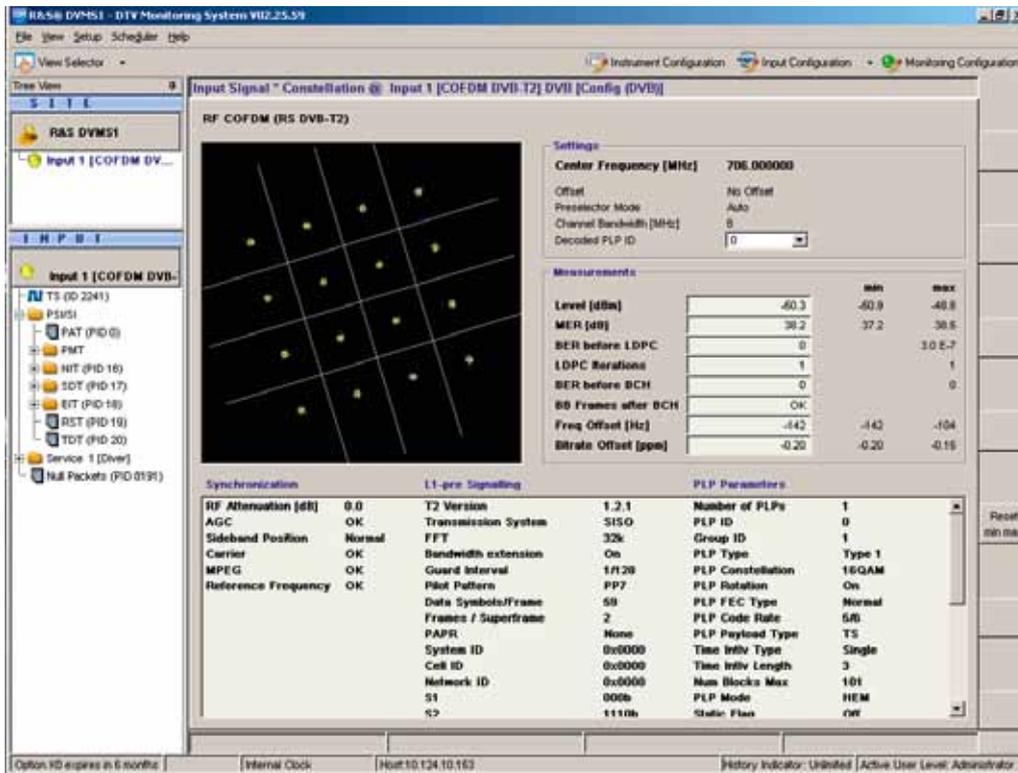A constellation display visualizes the measurement results.

## Spectrum display (DVB-T and DVB-T2)
The spectrum of the selected channel is shown, and upper and lower shoulder values are calculated.



Constellation diagram of a DVB-T2 signal.
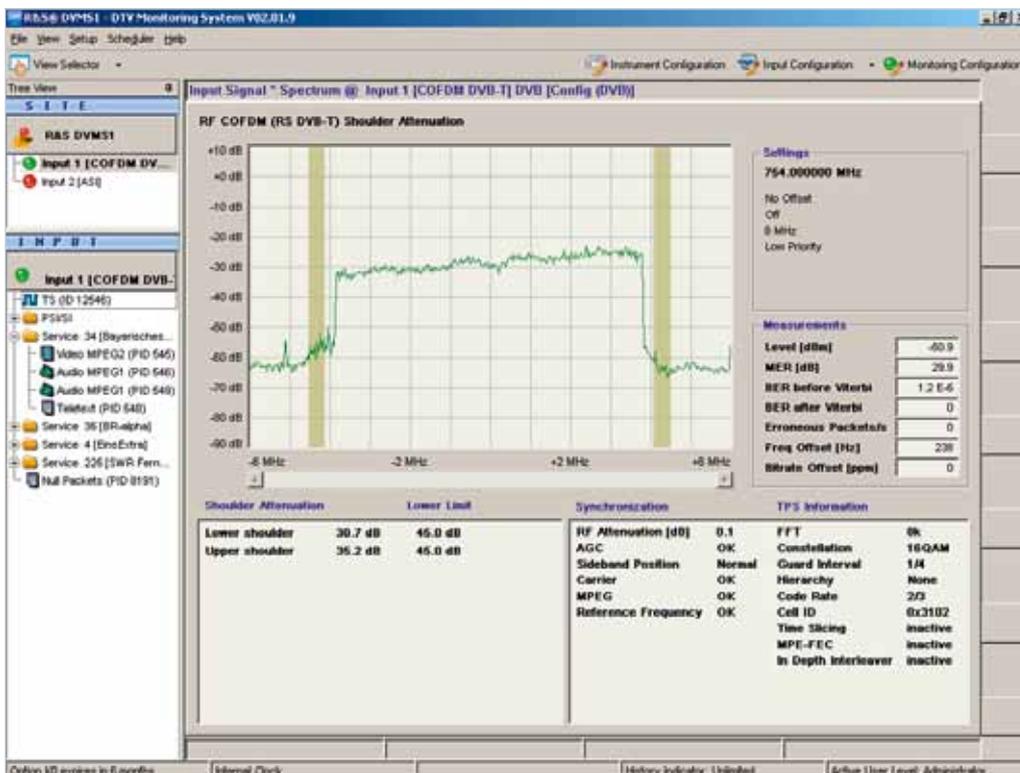


Spectrum of a DVB-T signal.

## Echo pattern display (DVB-T and DVB-T2)

Up to 16 impulses are shown in graphical and tabular form. For ease of use, the user-defined limits are indicated.

## MDI display (IP flows)

Display of the MDI delay factor and the MDI media loss rate over time.

## Thumbnail display

This display shows SD and HD signals with both MPEG-2 and MPEG-4/H.264/AVC coding. The volume of the accompanying audio data is visualized for each channel using bargraphs (MPEG-2 and Dolby Digital).
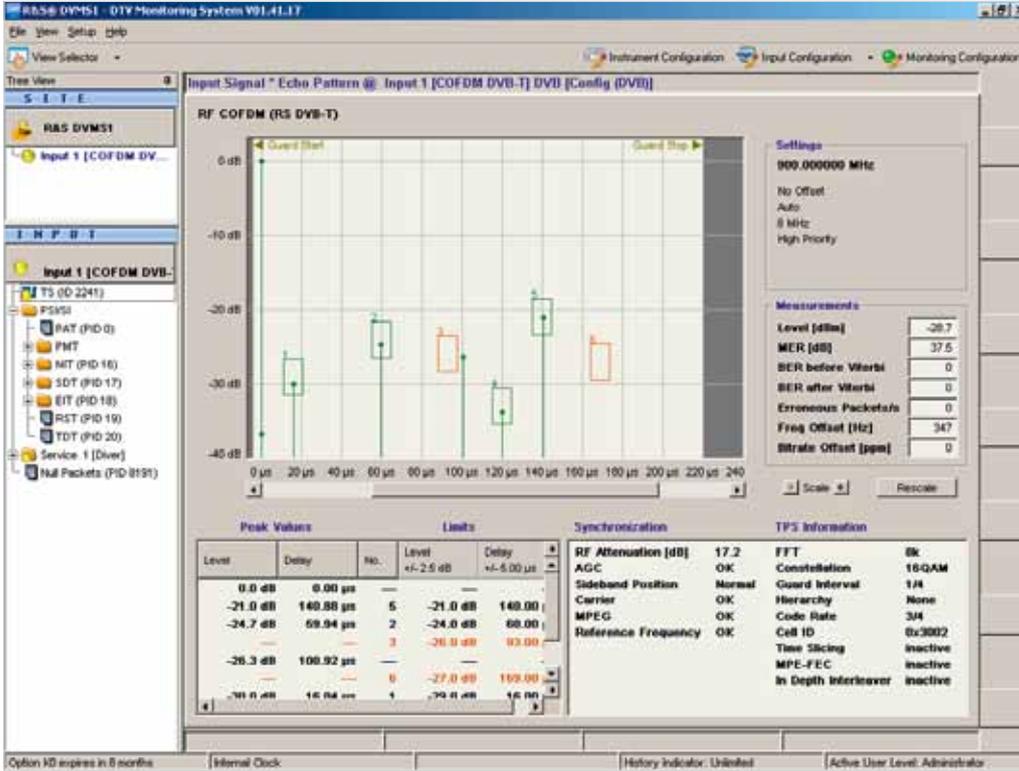


Echo pattern of a DVB-T signal.



Thumbnails and audio levels.

## EPG display

All EIT tables (actual and other) are evaluated (DVB and ATSC). A clearly structured display – the EPG display – is generated from this data. For analysis purposes, the data can be easily referenced to the individual tables.

## Graphic display of data rates and table repetition rates

For all PIDs and tables, the corresponding value is represented as a bargraph. Maximum and minimum values are also shown.

## Table interpreter

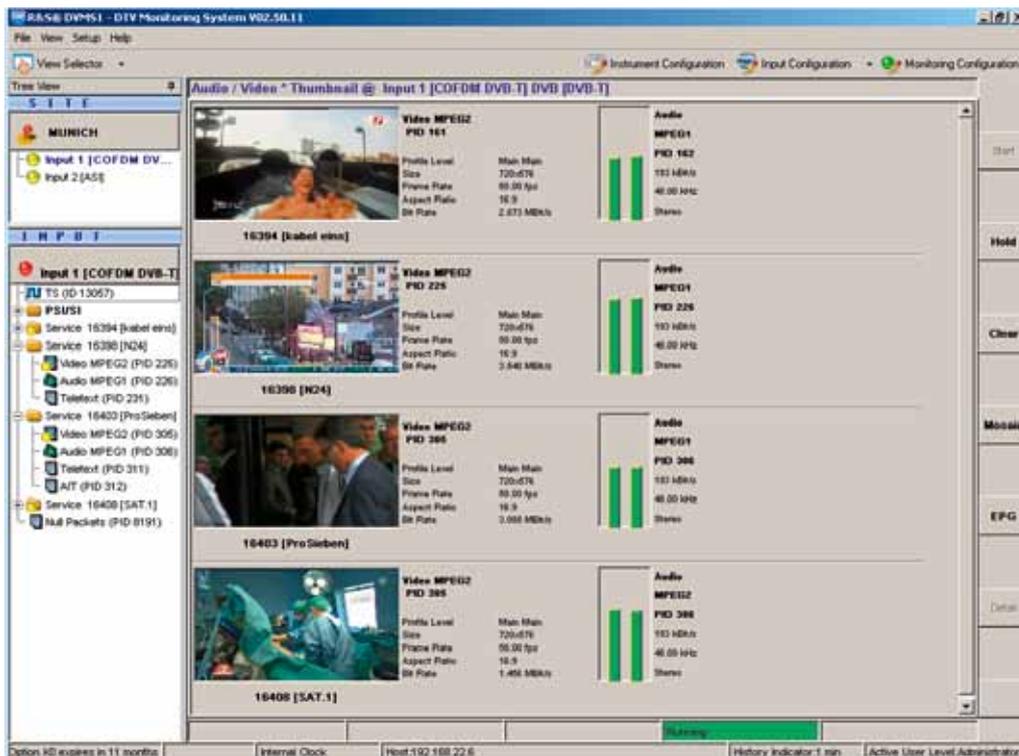Table contents (SI/PSI/PSIP) can be represented in an easy-to-read form.

## PCR analysis

The following parameters are measured and displayed graphically over time in line with TR 101 290: PCR offset, PCR drift rate, PCR overall jitter, PCR accuracy and PCR repetition. For the measurements, one of three profiles (MGF1, MGF2 or MGF3) can be selected.

## PTS analysis

The difference between PCR and PTS is shown graphically.

## Analysis of DVB object and data carousels

The carousels are used, for example, for system software update (SSU) and HbbTV®. The structure, syntax and timing of the carousels are analyzed and displayed.

## Elementary stream analysis for video and audio according to the buffer model

A display shows the extent to which the transport buffer, multiplex buffer and elementary buffer are filled over time. SD and HD signals are supported in both MPEG-2 and MPEG-4/H.264/AVC coding. For audio signals, MPEG-1 layer 2 is supported. The analysis is performed according to the video buffer verifier (VBV) method or the leak method.

## Analysis of video encoding quality (qPSNR analysis)

The encoding quality of MPEG-2 SD signals is determined in realtime and displayed graphically as a value over time and as a histogram. Both the measurement values and the video sequences that have a value below the defined limit are recorded on the hard drive for subsequent analysis. The analysis can be performed at any point along the transmission path, because no reference signal is required.
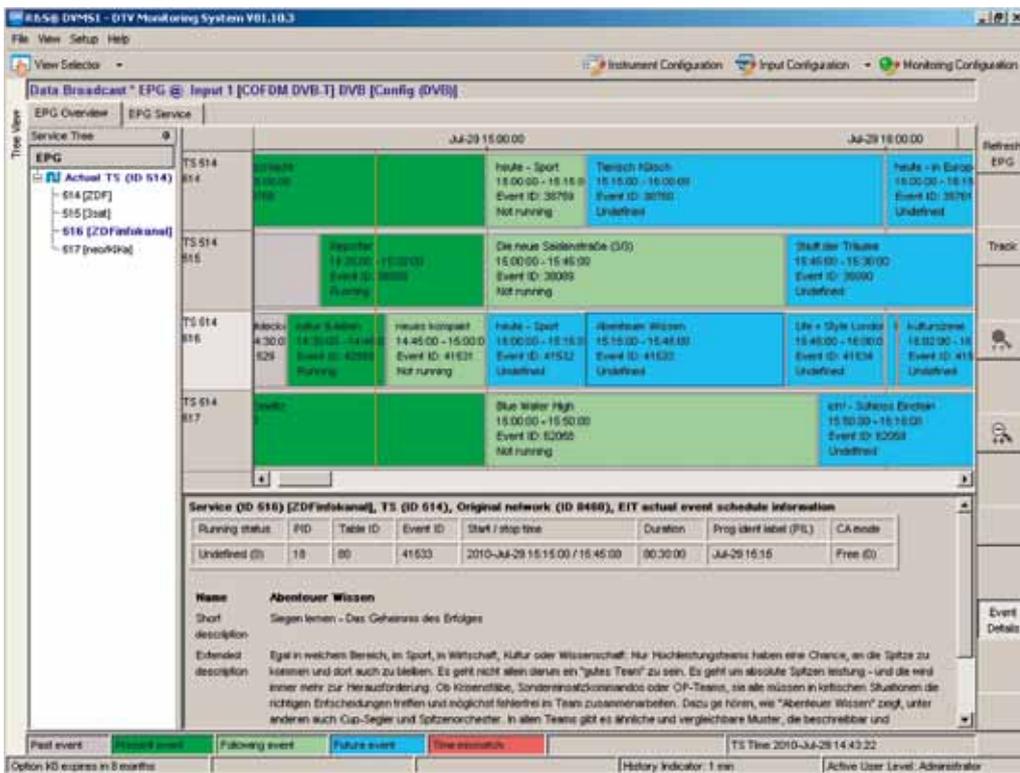


Electronic program guide (EPG) in tabular form.

# Simple operation and configuration

The user interface has a clear structure and is very easy to operate. Configuration and operation are distinctly separated from each other. This makes work for the user fast and efficient. All monitoring functions and limits can be configured down to the very last detail. Protection against unauthorized use is provided by defining user-specific operation rights.

## Operating concept

**Instrument Configuration**
Configuration of all instrument settings

**View Selector**
Selection of the measurement view

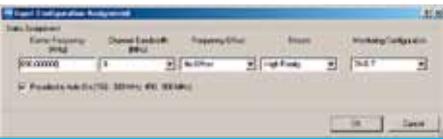Measurement view selection

Input selection

Element selection

The clearly structured dialogs for all settings are one of the instrument's special highlights:

ı View Selector:
Icons enable the user to easily select the different measurement views and to quickly activate them

ı Instrument Configuration:
This dialog provides all the settings for the instrument

ı Input Configuration:
This dialog is used to set the parameters for signal reception

ı Monitoring Configuration:
The settings for all measurements can be selected in a clearcut window (e.g. measurement active, measurement not active, limits, class, alarm line). The Hiding of Events function makes it possible to suppress individual measurements for specific PIDs

**Input Configuration**
Configuration of the selected measurement input



**Monitoring Configuration**
Configuration of all measurements (RF and TS) for monitoring the selected input
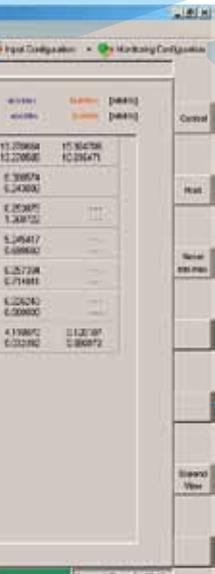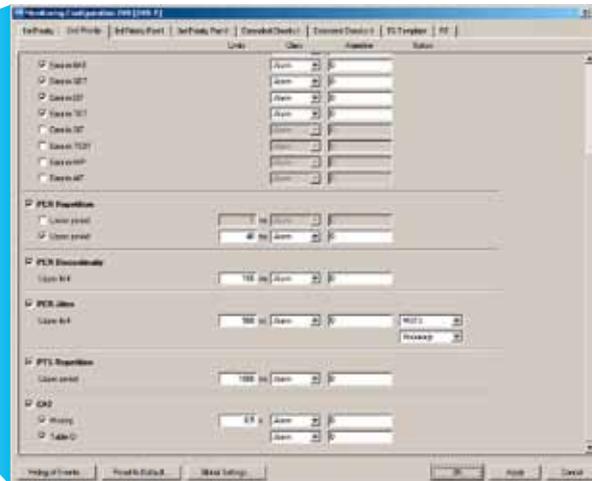


Operation of the selected measurement view

# Use cases

**Monitoring of a single DVB-T2 transmitter including related transmitter feed**

The R&S®DVMS1 is used to monitor both the broadcast signal (RF and PLP characteristics) and the T2-MI signal fed to the transmitter.

Monitored signals:
- Transmitter feed (T2-MI over ASI)
- Transmitter output (DVB-T2)

| Required modules | | |
|---|---|---|
| **Quantity** | **Type** | **Designation** |
| 1 | R&S®DVMS-B55 | DVB-T/DVB-T2 receiver module |

## Monitoring of one MUX at a transmitter site



### Monitoring of one MUX at the transmitter site

The R&S®DVMS4 is used for monitoring one MUX at a transmitter site. The SFN characteristics are monitored using directional antennas to receive the signals from all transmitters in the SFN.
Monitored signals:
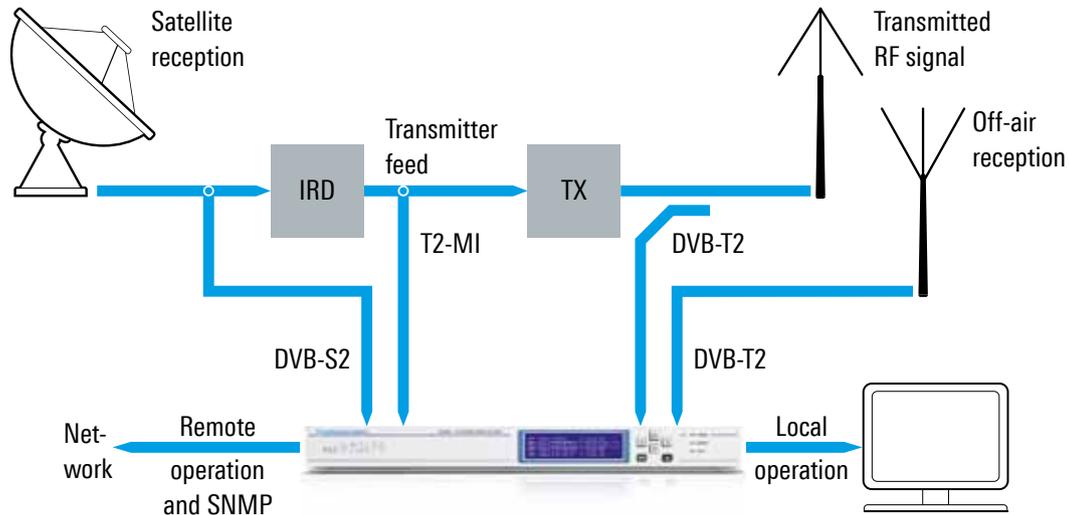ı Signal reception (DVB-S2)
ı Transmitter feed (T2-MI over IP)
ı Transmitter output (DVB-T2)
ı SFN characteristics (DVB-T2)

| Required modules | | |
|---|---|---|
| **Quantity** | **Type** | **Designation** |
| 2 | R&S®DVMS-B55 | DVB-T/DVB-T2 receiver module |
| 1 | R&S®DVMS-B51 | DVB-S/DVB-S2 receiver module |
| 1 | R&S®DVMS-B40 | IP module |

## Simultaneous monitoring of one DVB-T and one DVB-T2 transmitter and related transmitter feeds
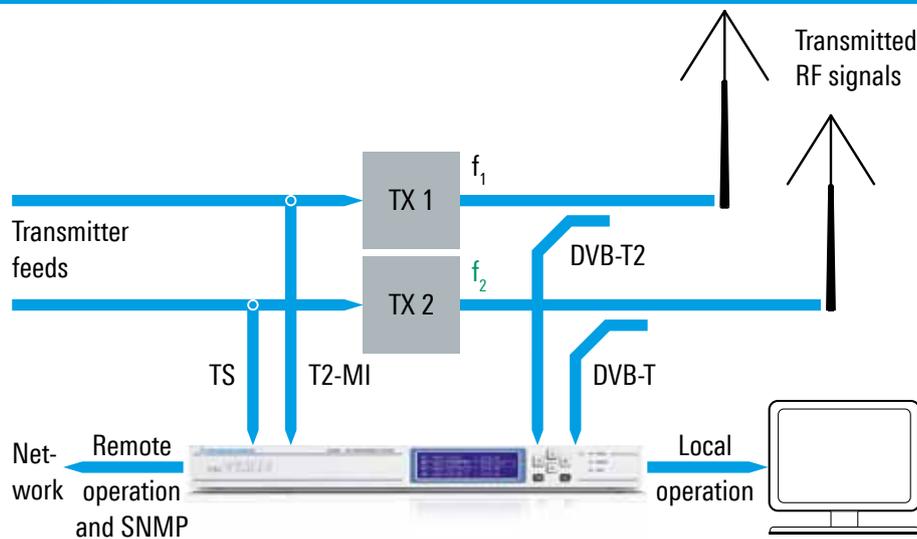


### Simultaneous monitoring of one DVB-T and one DVB-T2 transmitter and related transmitter feeds

The R&S®DVMS4 is used to monitor both the broadcast signals (RF and PLP/TS characteristics) and the T2-MI/TS signals fed to the transmitter. Monitored signals:
ı 2 × transmitter feed (T2-MI over IP and TS over IP)
ı 2 × transmitter output (DVB-T and DVB-T2)

| Required modules | | |
|---|---|---|
| **Quantity** | **Type** | **Designation** |
| 2 | R&S®DVMS-B55 | DVB-T/DVB-T2 receiver module |
| 1 | R&S®DVMS-B40 | IP module |

# Use cases

**Simultaneous monitoring of four DVB-T/DVB-T2 transmitters**



Transmitted RF signals

$f_1$

$f_2$

$f_3$

$f_4$

TX 1
TX 2
TX 3
TX 4

Transmitter feeds

DVB-T2
DVB-T2
DVB-T
DVB-T

Network Remote operation and SNMP

Local operation
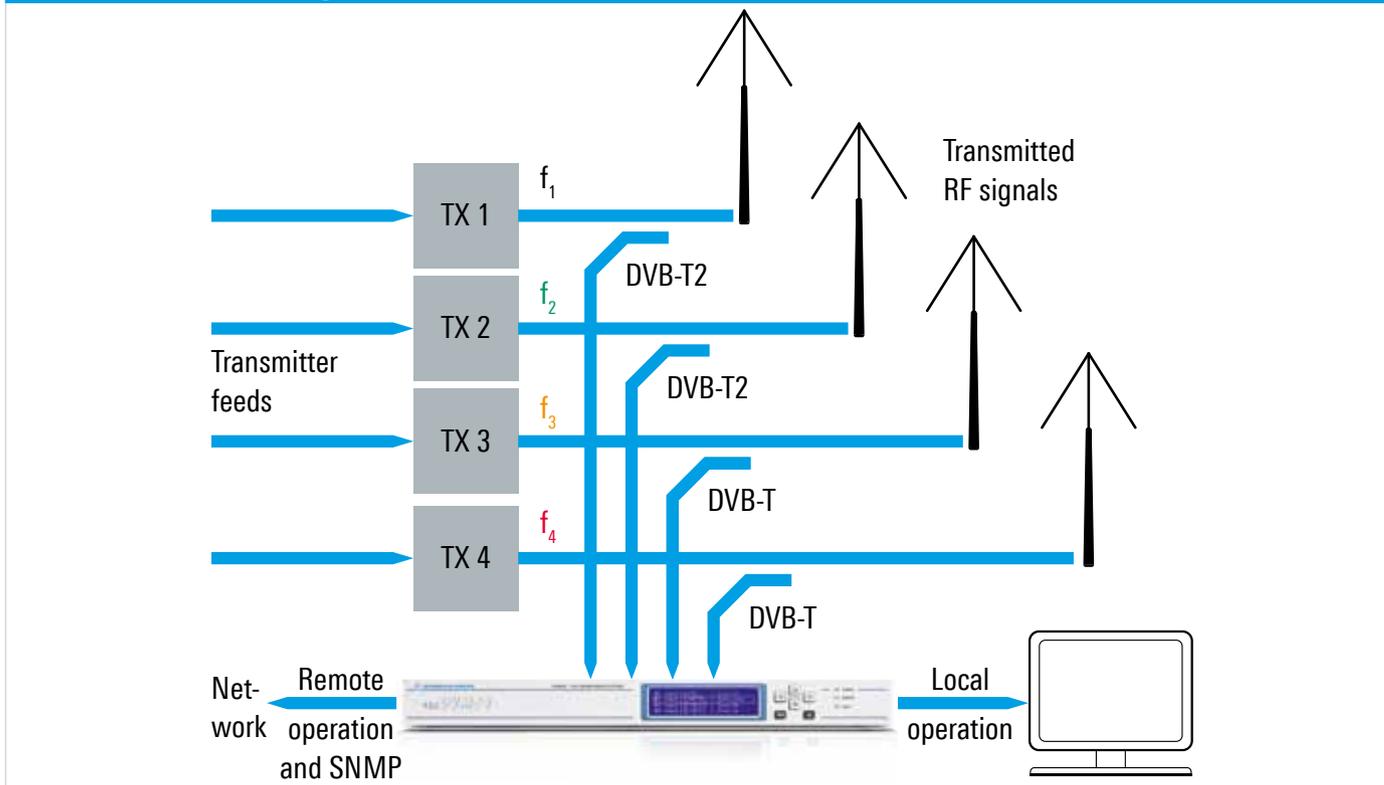
## Simultaneous monitoring of four DVB-T/DVB-T2 transmitters

The R&S®DVMS4 is used to monitor the broadcast signals. Monitored signals:
- 2 × transmitter output (DVB-T)
- 2 × transmitter output (DVB-T2)

| Required modules | | |
| --- | --- | --- |
| Quantity | Type | Designation |
| 4 | R&S®DVMS-B55 | DVB-T/DVB-T2 receiver module |

## Monitoring of four DVB-T/DVB-T2 transmitters (round robin)

The R&S®DVMS1 is used to monitor the broadcast signals. Scheduler Suite is used to sequentially monitor several signals with one DVB-T/DVB-T2 module. Monitored signals:
▮ 4 x transmitter output, sequentially (DVB-T/DVB-T2)

| Required modules | | |
|---|---|---|
| **Quantity** | **Type** | **Designation** |
| 1 | R&S®DVMS-B55 | DVB-T/DVB-T2 receiver module |

# Use cases

TX 1

TX 2

TX 3

TX 4

Satellite
uplink

DVB-S
DVB-S2

Net-
work

Remote
operation
and SNMP

R&S®DVMS4

Local
operation

## Simultaneous monitoring of four DVB-S/DVB-S2 uplinks

The R&S®DVMS4 is used to monitor four DVB-S/DVB-S2 signals. Monitored signals:
❙ 4 x satellite uplink (DVB-S/DVB-S2)

| Required modules | | |
|---|---|---|
| Quantity | Type | Designation |
| 4 | R&S®DVMS-B51 | DVB-S/DVB-S2 receiver module |

## Simultaneous monitoring of four IP flows containing TS or T2-MI signals

Hub/
switch

IP network

Ethernet
(electrical
or optical)
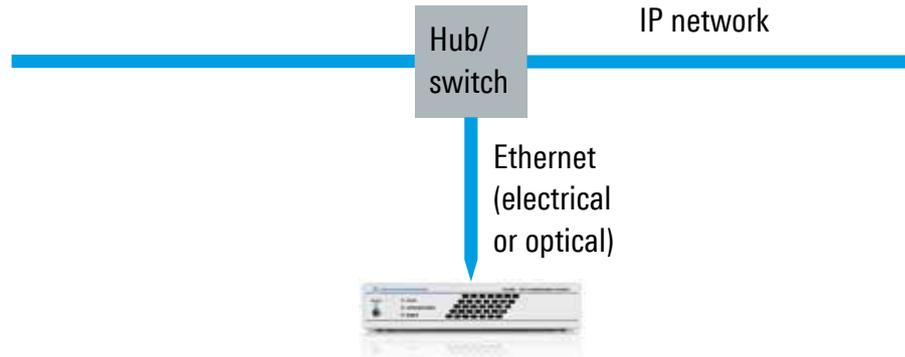
### Simultaneous monitoring of four IP flows containing TS or T2-MI signals

The R&S®DVMS1 is used to monitor four TS or T2-MI IP flows. Monitored signals:

ı 4 × IP flow (TS or T2-MI)

| Required modules | | |
|---|---|---|
| Quantity | Type | Designation |
| 1 | R&S®DVMS-B40 | IP module |

## R&S®DVMS in research and development

DUT

TS / BTS / T2-MI

ASI / IP / RF

Local operation

### R&S®DVMS in research and development

The R&S®DVMS1 or R&S®DVMS4 is used for detailed stream analysis.

Examples of devices under test:

ı Encoder
ı Multiplexer
ı Gateway
ı Transmitter

Supported stream characteristics:

ı DVB/T2-MI
ı ATSC
ı ISDB-T/$T_B$/BTS

Signal connections:

ı ASI
ı IP (electrical and optical)
ı RF (DVB-T/DVB-T2 and/or DVB-S/DVB-S2)

| Required modules |
|---|
| Depends on required interfaces |

# Use of multiple R&S®DVMS in one system

The instruments of the R&S®DVMS family have a powerful SNMP interface. As a result, they can easily be integrated into SNMP-based network management software (see figure on this page). For using multiple R&S®DVMS in one system, Rohde&Schwarz offers the following two software solutions:

## R&S®DTV monitoring manager software
This software makes it easy to use multiple R&S®DVMS and/or R&S®DVM in one network.

### Key features
ı Good overview of the status of all signals that are monitored
ı Simple access to the instrument by a mouse click on the associated icon

All the instruments can be located in the same room (for example, in a rack) or distributed across a country. To integrate the measuring instruments into the software, only their IP address must be known. No other settings or SNMP knowledge is required.

### Display features
ı Measurement symbols on user-defined maps
ı Various map layers for convenient monitoring of large networks

## Connection to a central monitoring station via SNMP
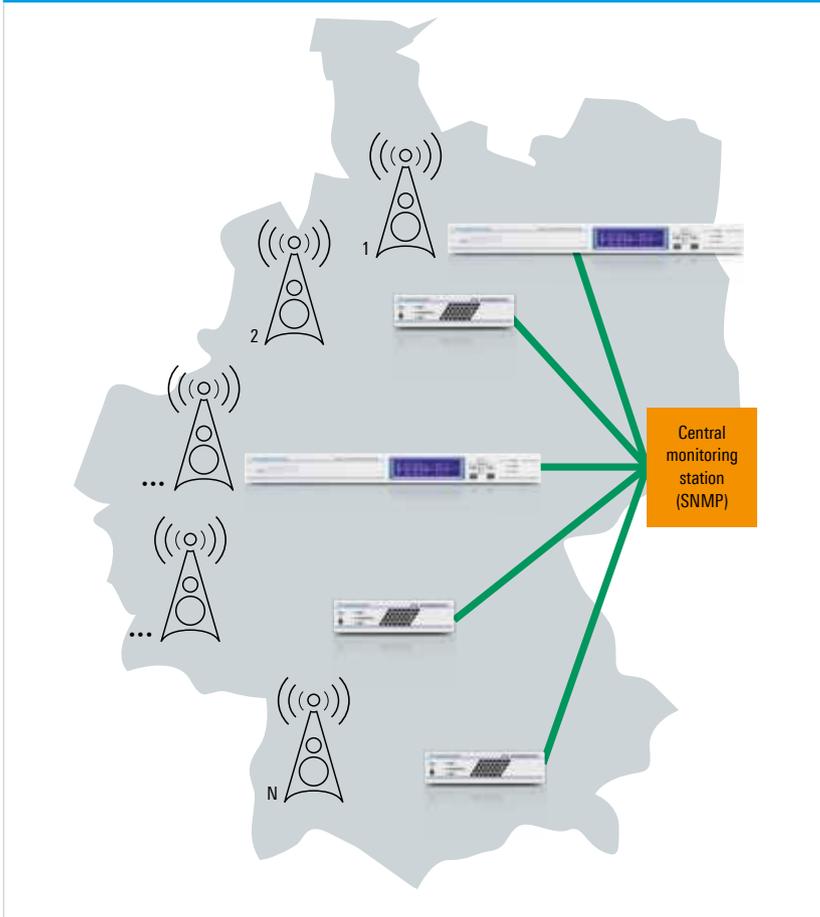
## R&S®TS4570 broadcast network monitoring and control software

For applications requiring additional functions or equipment in addition to the R&S®DVMS or R&S®DVM, Rohde & Schwarz offers another, extremely flexible solution – the R&S®TS4570 broadcast network monitoring and control system. This open system allows the rapid integration of any instruments with SNMP interface. The MIBs of all instruments are interpreted by the system. As a result, the user can easily implement functions without detailed SNMP or programming knowledge.

## Key components

ı Hierarchal network overview: via geographical maps and individual workflow diagrams
ı Quality of service reporter: to log and measure performance data to prove service level agreements (SLA)
ı Graphical system configuration tool: provides easy-to-use system design capabilities
ı SNMP agent: enables interface to other management systems
ı Web server: ensures remote access

For detailed information about the system, see the following brochure: R&S®TS4570 Broadcast Network Monitoring and Control Software – flexible SNMP-based network management solution (available under PD 5214.3881.12 or at www.rohde-schwarz.com).
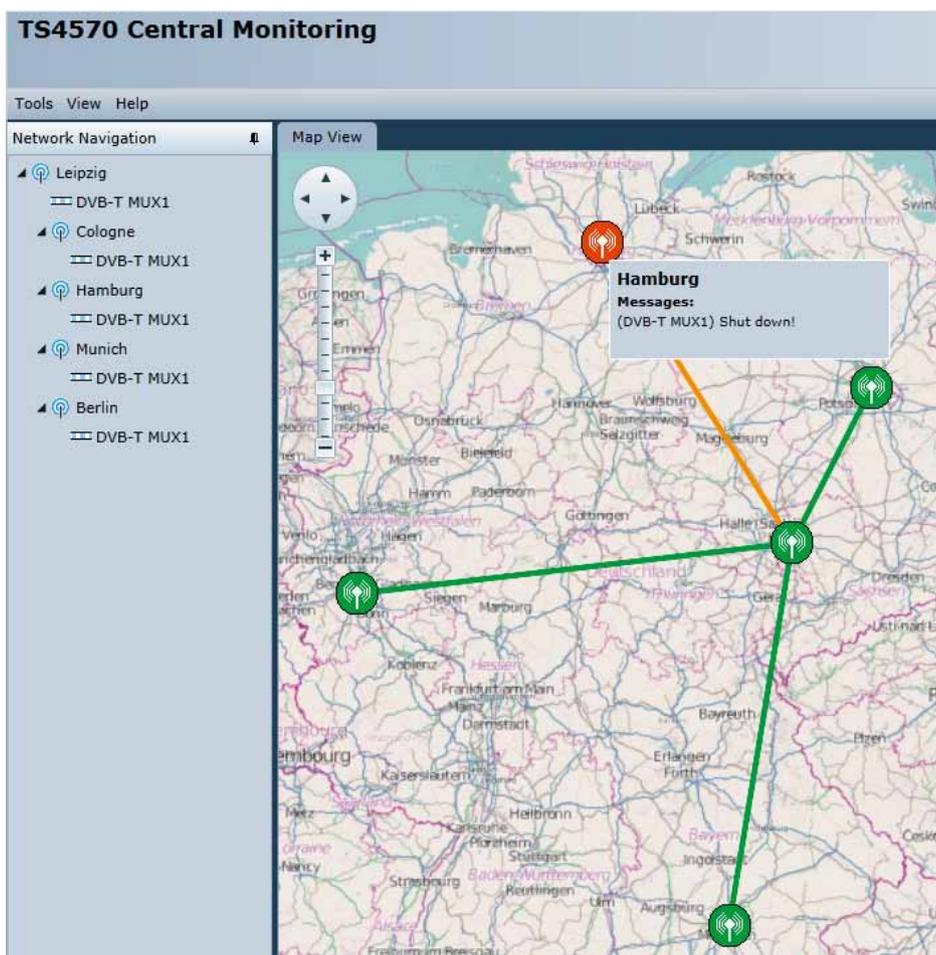


Map view of R&S®TS4570.

# Ordering information

| Designation | Type | Order No. |
|---|---|---|
| **Base unit** | | |
| DTV Monitoring System | R&S®DVMS1 | 2113.9305.02 |
| DTV Monitoring System | R&S®DVMS4 | 2113.7560.02 |
| Included: CD-ROM with firmware, software and manual; power cord; printed quick start guide | | |
| **Modules and module options** | | |
| DVB-T/DVB-T2 Receiver Module | R&S®DVMS-B55 | 2113.8850.02 |
| DVB-T2 Demodulator | R&S®DVMS-K54 | 2113.9292.02 |
| DVB-T Demodulator | R&S®DVMS-K53 | 2113.9286.02 |
| Spectrum and Shoulder Attenuation | R&S®DVMS-K57 | 2113.9228.02 |
| Echo Pattern | R&S®DVMS-K58 | 2113.9192.02 |
| High-Quality MER Measurement | R&S®DVMS-K59 | 2113.9205.02 |
| DVB-S/DVB-S2 Receiver Module | R&S®DVMS-B51 | 2113.8950.02 |
| IP Module | R&S®DVMS-B40 | 2113.8938.02 |
| Single TS Input Module | R&S®DVMS-B11 | 2113.8896.02 |
| **TS monitoring** | | |
| TS Monitoring | R&S®DVMS-K1 | 2113.9028.02 |
| **Instrument options** | | |
| **Monitoring** | | |
| Advanced TS Monitoring | R&S®DVMS-K11 | 2113.9034.02 |
| T2-MI Extension | R&S®DVMS-K3 | 2113.9234.02 |
| TS Template Monitoring | R&S®DVMS-K12 | 2113.9040.02 |
| TS Capture | R&S®DVMS-K18 | 2113.9086.02 |
| **Analysis** | | |
| EPG Display | R&S®DVMS-K16 | 2113.9063.02 |
| Thumbnail Display | R&S®DVMS-K17 | 2113.9070.02 |
| PCR/PTS Analysis | R&S®DVMS-K19 | 2113.9092.02 |
| Interpreter | R&S®DVMS-K20 | 2113.9105.02 |
| qPSNR Analysis | R&S®DVMS-K21 | 2113.9111.02 |
| Carousel and MPE Analysis | R&S®DVMS-K22 | 2113.9128.02 |
| DVB-H Analysis | R&S®DVMS-K23 | 2113.9134.02 |
| Buffer Analysis | R&S®DVMS-K24 | 2113.9140.02 |
| **Miscellaneous** | | |
| Calibration Documentation | R&S®DVMS-DCV | 2082.0490.35 |
| Printout of DCV | R&S®DCV-ZP | 1173.6506.02 |
| 19" Adapter for 1 × R&S®DVMS1 in 1 HU | R&S®ZZA-DVMS1 | 2113.9886.00 |
| 19" Adapter for 2 × R&S®DVMS1 in 1 HU | R&S®ZZA-DVMS1 | 2113.9805.02 |
| US Keyboard with USB Connector | R&S®PSL-Z2 | 1157.6870.04 |
| Optical Mouse with USB Connector | R&S®PSL-Z10 | 1157.7060.04 |
| **Option packages** | | |
| Monitoring Option Package (including R&S®DVMS-K11, R&S®DVMS-K12 and R&S®DVMS-K18) | R&S®DVMS-PK01 | 2113.9240.02 |
| Analysis Option Package (including R&S®DVMS-K16, R&S®DVMS-K17, R&S®DVMS-K19 and R&S®DVMS-K20) | R&S®DVMS-PK02 | 2113.9257.02 |

| Service options | | |
|---|---|---|
| Extended Warranty, one year | R&S®WE1DVMS | Please contact your local Rohde & Schwarz sales office. |
| Extended Warranty, two years | R&S®WE2DVMS | |
| Extended Warranty, three years | R&S®WE3DVMS | |
| Extended Warranty, four years | R&S®WE4DVMS | |
| Extended Warranty with Calibration Coverage, one year | R&S®CW1DVMS | |
| Extended Warranty with Calibration Coverage, two years | R&S®CW2DVMS | |
| Extended Warranty with Calibration Coverage, three years | R&S®CW3DVMS | |
| Extended Warranty with Calibration Coverage, four years | R&S®CW4DVMS | |

**For data sheet, see PD 5214.4788.22 and www.rohde-schwarz.com.**

**Legend**

- Hardware option
- Software option up to 4 times per base unit
- Software option only required once per base unit

- TS inputs can handle TS, BTS or T2-MI (R&S®DVMS-K3) signals
- Maximum input bit rate across all IP flows: 360 Mbit/s (equally divided across all signals/IP flows)
- Maximum input bit rate across all RF/ASI inputs: 66 Mbit/s (equally divided across all signals)
- Maximum number of simultaneously monitored PLPs per R&S®DVMS: 16

**R&S®DVMS1**

Module slot

**Base unit**

- R&S®DVMS1 requires one module option
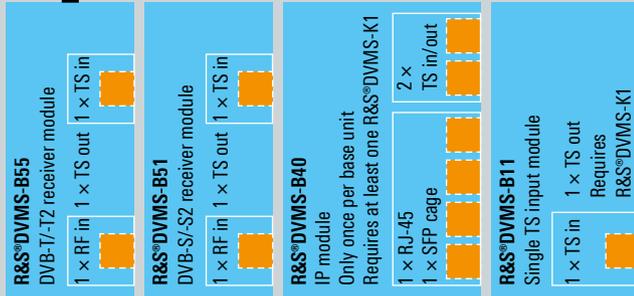- Maximum number of simultaneously used inputs / IP flows: 4 in total

**TS monitoring**

- Up to 4 times per base unit (depending on installed module)
- Use of TS inputs / IP flows requires assignment of R&S®DVMS-K1

**R&S®DVMS-K1** TS monitoring

**Modules**

- RF modules include RF monitoring
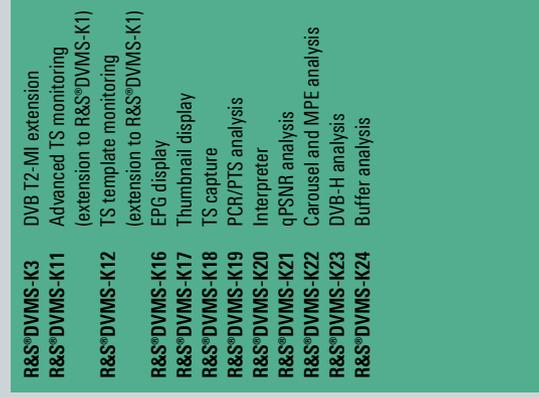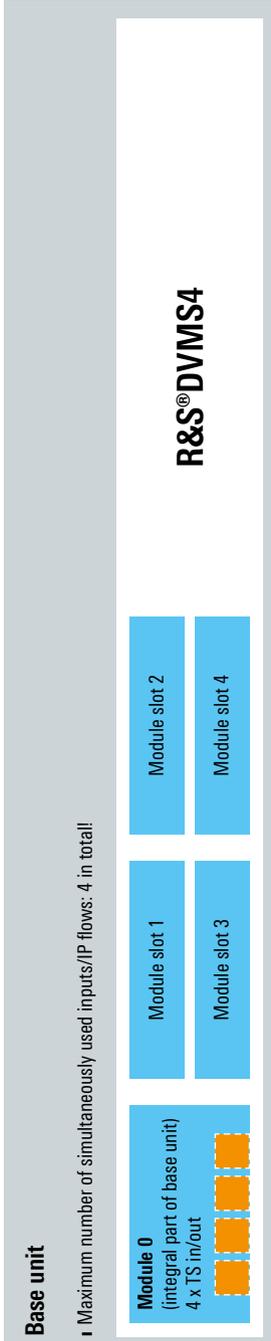- TS monitoring requires R&S®DVMS-K1 (one per input)

**R&S®DVMS-B55** DVB-T/-T2 receiver module
1 × RF in    1 × TS out    1 × TS in

**R&S®DVMS-B51** DVB-S/-S2 receiver module
1 × RF in    1 × TS out    1 × TS in

**R&S®DVMS-B40** IP module
Only once per base unit
Requires at least one R&S®DVMS-K1
1 × RJ-45
1 × SFP cage
2 × TS in/out

**R&S®DVMS-B11** Single TS input module
1 × TS in    1 × TS out
Requires R&S®DVMS-K1

**Module options**

- Each R&S®DVMS-B55 requires at least one R&S®DVMS-K53 or -K54

**R&S®DVMS-K53** DVB-T demodulator
**R&S®DVMS-K54** DVB-T2 demodulator

**R&S®DVMS-K57** Spectrum and shoulder attenuator
**R&S®DVMS-K58** Echo pattern
**R&S®DVMS-K59** High-quality MER measurement

**Instrument options**

| Option | Description |
|---|---|
| R&S®DVMS-K3 | DVB T2-MI extension |
| R&S®DVMS-K11 | Advanced TS monitoring (extension to R&S®DVMS-K1) |
| R&S®DVMS-K12 | TS template monitoring (extension to R&S®DVMS-K1) |
| R&S®DVMS-K16 | EPG display |
| R&S®DVMS-K17 | Thumbnail display |
| R&S®DVMS-K18 | TS capture |
| R&S®DVMS-K19 | PCR/PTS analysis |
| R&S®DVMS-K20 | Interpreter |
| R&S®DVMS-K21 | qPSNR analysis |
| R&S®DVMS-K22 | Carousel and MPE analysis |
| R&S®DVMS-K23 | DVB-H analysis |
| R&S®DVMS-K24 | Buffer analysis |

# R&S®DVMS4 configuration guide

## Base unit

- Maximum number of simultaneously used inputs/IP flows: 4 in total!

**Module 0** (integral part of base unit)
4 × TS in/out

Module slot 1
Module slot 2
Module slot 3
Module slot 4

## R&S®DVMS4

- TS inputs can handle TS, BTS or T2-MI (R&S®DVMS-K3) signals
- Maximum input bit rate across all inputs/IP flows: 360 Mbit/s (equally divided across all signals/IP flows)
- Maximum number of simultaneously monitored PLPs per R&S®DVMS: 16

## TS monitoring

- At least one R&S®DVMS-K1 required if no module is selected
- Use of TS inputs/IP flows requires assignment of R&S®DVMS-K1

**R&S®DVMS-K1**
TS monitoring

## Modules

- RF modules include RF monitoring
- TS monitoring requires R&S®DVMS-K1 (one per input)

**R&S®DVMS-B55**
DVB-T/-T2 receiver module
1 × RF in   1 × TS out   1 × TS in

**R&S®DVMS-B51**
DVB-S/-S2 receiver module
1 × RF in   1 × TS out   1 × TS in

**R&S®DVMS-B40**
IP module
Only once per base unit
Requires at least one R&S®DVMS-K1
1 × RJ-45
1 × SFP cage
2 ×
TS in/out

## Module options

- Each R&S®DVMS-B55 requires at least one R&S®DVMS-K53 or -K54

**R&S®DVMS-K53**
DVB-T demodulator
**R&S®DVMS-K54**
DVB-T2 demodulator

**R&S®DVMS-K57**
Spectrum and shoulder attenuator
**R&S®DVMS-K58**
Echo pattern
**R&S®DVMS-K59**
High-quality MER measurement

## Instrument options

| | |
|---|---|
| R&S®DVMS-K3 | DVB T2-MI extension |
| R&S®DVMS-K11 | Advanced TS monitoring (extension to R&S®DVMS-K1) |
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| R&S®DVMS-K19 | PCR/PTS analysis |
| R&S®DVMS-K20 | Interpreter |
| R&S®DVMS-K21 | qPSNR analysis |
| R&S®DVMS-K22 | Carousel and MPE analysis |
| R&S®DVMS-K23 | DVB-H analysis |
| R&S®DVMS-K24 | Buffer analysis |

**Hardware option**

**Software option** up to 4 times per base unit

**Software option** only required once per base unit

Your local Rohde & Schwarz expert will help you determine the optimum solution for your requirements.
To find your nearest Rohde & Schwarz representative, visit www.sales.rohde-schwarz.com.
An electronic product configurator is available on the Internet pages for the R&S®DVMS family (www.rohde-schwarz.com, search term: DVMS).

## About Rohde & Schwarz

Rohde & Schwarz is an independent group of companies specializing in electronics. It is a leading supplier of solutions in the fields of test and measurement, broadcasting, radiomonitoring and radiolocation, as well as secure communications. Established more than 75 years ago, Rohde & Schwarz has a global presence and a dedicated service network in over 70 countries. Company headquarters are in Munich, Germany.

## Environmental commitment
ı Energy-efficient products
ı Continuous improvement in environmental sustainability
ı ISO 14001-certified environmental management system

Certified Quality System
ISO 9001

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