

# Monitoring DVB-H signals with ESG analysis

The DVB-H measurement functions of the R&S®DVM family for DTV measurements have been greatly expanded. They now contain comprehensive ESG analysis and permit uninterrupted monitoring of DVB-H signals for the first time.

## A complex structure: the electronic service guide in DVB-H

The electronic service guide (ESG) transmitted as part of the DVB-H standard allows viewers to navigate among DVB-H programs and to select programs. The receiver cannot select programs if the ESG is faulty. Whereas with DVB-T access to the individual programs is controlled through the data in the PAT and PMT tables, the structure used in DVB-H is a good deal more complex, as in this case the transport stream (TS) level and the Internet protocol (IP) level are interwoven. At the TS level, all the IP addresses used must be linked with the packet IDs (PID) of the transport stream packets via the IP/MAC notification table (INT). The INT contains target and operational descriptors that lead to the correct PID reference in the correct PMT using the service ID and the component tag. This is the link between the IP world and the MPEG world.

The ESG now makes it possible to navigate within the DVB-H IP streams at the IP level. In the first place, it describes programs (services) and assigns video/audio streams to them, but it also offers a large number of further functions for displaying TV contents on a mobile phone, such as:

- Display of the program provider with logo, name, link to website, etc.
- List of transmitted programs with title, time, background information, program clips, etc.
- Data for the decoder required for access to the program via the session description protocol (SDP) (IP address, ports, coding parameters, etc.)
- Data relating to encryption of the content and for communications with the service provider in order to pay for the service
- Data for interactive facilities (voting, home shopping, etc.)

## The R&S®DVM family of instruments for monitoring and analyzing DTV signals

The instruments in the R&S®DVM family unite all the functions required for complete monitoring and analysis of DTV signals. A large number of RF interfaces, including the new DVB-S2 satellite standard, and a Gigabit Ethernet interface for IPTV applications are available. The instruments support comprehensive measurements for monitoring and analyzing signals. This involves not only the RF and IP levels, but also the transmitted MPEG-2 transport stream, including its content. The detailed analysis of video and audio elementary streams (MPEG-2, MPEG-4/AVC/H.264, AAC and AC-3), of various data services such as teletext, subtitles and system software updates (SSU) as well as of DVB-H signals is easily possible. A hardware decoder for SD and HD signals allows fast, easy visual checking of video content that is

encoded in line with MPEG-2 or MPEG-4/AVC/H.264. The instruments are extremely compact, and feature flexible configuration. Only one instrument is needed to analyze all the levels of a DTV signal; the simultaneous monitoring of several signals or of different standards is also supported. This saves space in monitoring applications and allows portable use for analysis tasks. A large number of supplementary functions are implemented, particularly for monitoring applications: user administration including rights management, measurement value query, full remote operation over a network, and many more.



The R&S®DVM100L takes up only one unit in height, but can monitor up to four signals simultaneously.

There are at present two ESG standards: the *IPDC standard* from DVB (the broadcasting organization), and the *BCAST standard* from the Open Mobile Alliance (OMA), an association of leading service and product providers from the wireless communications field. Under both standards, the primary purpose of the ESG is to provide references to the programs, but the ESGs differ in the additional functions they provide. Their common characteristics are as follows:

- IP/UDP/FLUTE protocols for transferring data (files)
- A bootstrap format allowing both standards to be used in one transport stream
- Container structures that support selective access to the data elements
- XML used as syntax for the service guide
- The use of IDs or URLs for linking the various elements
- The SDP as an access (or acquisition) element to other IP addresses, e.g. for the video/audio player, as well as to logos and other data (FLUTE sessions)

The complexity of the electronic service data clearly shows that a thorough analysis of the ESG is essential for fast verification and fault determination.

## The new ESG analysis functions

The new analysis functions for the ESG support both the *IPDC* and the *BCAST standards*. They automatically detect and analyze all the ESGs contained in a transport stream, check all the links, and organize the data. Two windows make it easy to get an overview. The *ESG Service View* clearly displays the programs (services) of a DVB-H platform plus the associated information, e.g. the current and scheduled content (FIG 1). Everything of interest to the viewer is shown here, including of course the video and audio content that can be played with the player that is included in the R&S®DVM. The individual DVB-H signals are simply selected for decoding by mouse click.

The *ESG Transport Analysis* view displays the structure of the transmission (transport) of the ESG, e.g. the container, image and SDP files as well as the associated file description table (FDT), and the division of the overall data into the bootstrap and other FLUTE sessions (FIG 2). This display is of particular interest for fault finding. It is very straightforward and permits direct access, by mouse click, both to the transmitted files (containers, image files, SDP files, etc.) and to lower-level contents (container fragments such as XML elements). These files, just like the analysis report can, of course, also be saved to the hard disk.

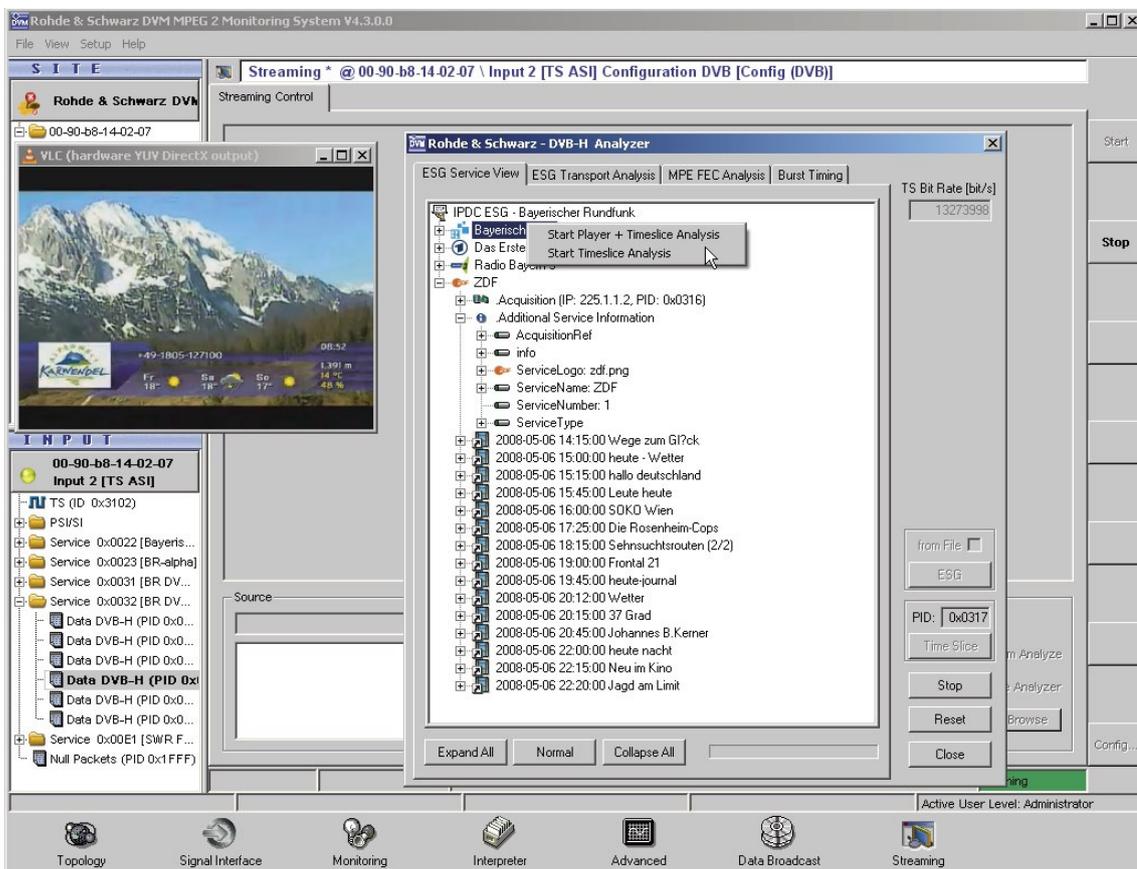
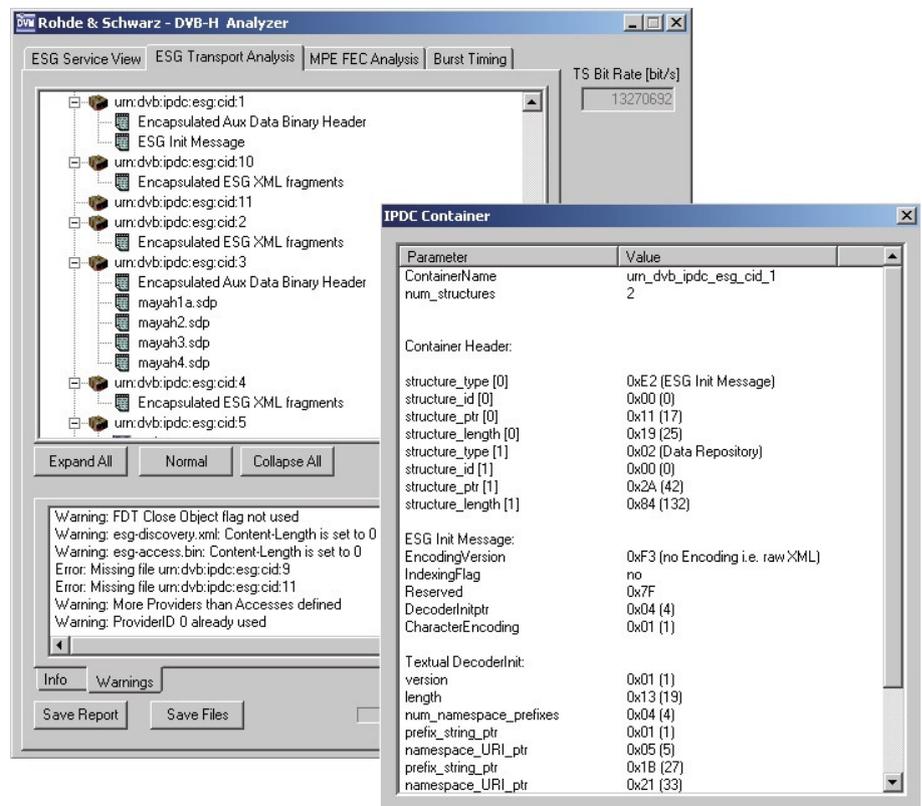


FIG 1 Overview of the services of a DVB-H platform.

FIG 2 Transport analysis of a DVB-H platform. Left: the structure of the ESG's FLUTE sessions; right: structure of a container.



The system also determines all the burst-specific measurement parameters (DVB-H being transmitted via bursts), analyzing the timing and magnitude of the bursts as well as the signaled timing parameters. The graphic display of the bursts provides a quick overview. The structure of the MPE FEC with its columns, rows and puncturing is displayed in an additional window. The MPE FEC analyzes the faults that have occurred in a transmission, and determines whether they can be corrected.

## Monitoring functions

In addition to the detailed analysis and visual check of the DVB-H signals, the R&S®DVM can also seamlessly monitor important parameters, allowing it to detect faulty programs at an early stage and minimize downtimes. The system monitors all the DVB-H signals in all the transport streams at the same time and checks whether the time slicing is in line with specifications, and whether the transmitted contents have been received completely and without errors.

When time slicing is monitored, the burst and the constant bit rate are monitored and the value of the transmitted  $\Delta t$  margin is compared with the measured value. The system checks for the completeness of a DVB-H program and its freedom from errors by checking whether the sections are complete and by determining the number of faulty packets.

## Summary

With its new functions for DVB-H, the R&S®DVM is ideally suited for analyzing and monitoring DVB-H signals. The ESG, which is necessary for displaying the programs on the receiver, is analyzed completely and displayed in a simply readable manner. Automated evaluation of the SDP file allows the transmitted video to be viewed directly on the R&S®DVM at the push of a button. These functions are extremely valuable in research and development, but are also helpful for analyzing DVB-H signals on air.

The DVB-H-specific monitoring functions are an important facility. They detect and report faults in the transmitted signal immediately. This allows the provider to take action straight away, so minimizing downtimes. This function makes the R&S®DVM the ideal tool for continuously monitoring DVB-H networks.

Thomas Tobergte; Harald Weigold

The new functions are available now. The data broadcast analysis option (R&S®DVM-K11) is required to use the analysis functions and display the picture. Only the basic TS monitoring function (R&S®DVM-K1) is required to use the DVB-H-monitoring functions.