Multichannel Video Quality Analyzer DVQM

Multichannel monitoring in digital TV broadcasting networks

The introduction of the European DVB standard produced a virtually overnight increase in available TV programs. This meant new requirements for automatic, continuous monitoring of picture and sound quality in digital TV broadcasting networks in terms of price and space efficiency. Rohde & Schwarz has taken up the challenge and, with Multichannel Video Quality Analyzer DVQM, presents a highly compact but powerful test platform for simultaneously monitoring up to twelve TV channels.

Modelled on DVQ

DVQM is a multichannel extension of the successful Digital Video Quality Analyzer DVQ [1] (FIG 1), whose measurement principle won it the EMMY award of the National Academy of Television Arts and Sciences in the USA (Newsgrams on page 46). DVQM does away with all components for manual operation. The hardware concept of DVQ was adopted unchanged to form the basis for each measurement channel in the multichannel DVQM. Even the DVQ firmware
remains unaltered for use in DVQM. So a measurement system consisting of individual DVQs can be ported to DVQM and extended to maximally twelve channels without modifying the remote-control software.

Flexible and compact

DVQM is accommodated in a 19" rack of eight height units (Fig 2). The basic model contains two DVQ boards; the compact rack can hold up to twelve measurement modules. Thanks to a simple plug-in design, the boards can be retrofitted or modified by the user. Compared to a solution with single DVQs, the 70% space saving is impressive, since twelve DVQs would require 24 height units.

Monitoring functions

DVQM offers the following measuring and monitoring functions for each of a maximum of twelve channels:
- Automatic, cyclic program sequencing (SCAN) in the transport stream multiplex
- Detection of picture loss, picture freeze and sound loss
- Internal error report
- Internal MPEG2 decoding (also professional profile 4:2:2 with max. 50 Mbit/s)
- Signal inputs TS-ASI (max. 70 Mbit/s) and ITU-R BT601 (SDI)
- Remote-control protocols SCPI (via RS-232-C or 10BaseT) and SNMP (via 10BaseT)
- Realtime picture quality analysis, with or without reference signal (option)

Integral remote control

DVQM is entirely remotely controlled, each of a maximum twelve modules separately. The front panel has just four LEDs per channel for visually signalling important devices statuses. The instrument has all the protocols and interfaces required by the market at present. It supports the SCPI protocol (standard commands for programmable instruments), and each measurement module provides remote-control SNMP (simple network management protocol), which is used for the management of systems, such as communication or transmission networks, installed wide apart.

Remote control via the 10BaseT network interface offers a higher transfer rate and the benefit of simpler system configuration. For example, the twelve modules are connected to an Ethernet hub (standard PC accessory) by a network cable and another network cable is linked to a local PC.

New PC software for MPEG2 monitoring

Rohde & Schwarz offers the DTV NetView software for DVQM, which clearly displays the status of all channels monitored in a network. The program also presents the results of detailed MPEG2 protocol analyses, determined...
with MPEG2 Measurement Decoder DVMD or Realtime Monitor DVRM, in a separate window. For detailed analysis of the picture quality of single TV channels over a long period of time, Rohde & Schwarz Quality Monitor™ software can be directly started by mouse click from the DTV NetView user interface.

The network topology including all Rohde & Schwarz measuring instruments is communicated to the software by a configuration file. FIG 3 illustrates as an example the software user interface with a network comprising one Realtime Monitor DVRM and four DVQ modules in DVQM.

Numerous applications

The major field of application of DVQM is automatic monitoring of central nodes in digital TV transmission networks. At these points, such as satellite uplinks, the number of programs is highest, and use of the multichannel analyzer is most useful here to ensure QoS.

The following scenarios are possible for use of DVQM, assuming that the input signal is a transport stream multiplex of several TV programs:

One DVQM channel per TV program

The asset of this scenario is continuous monitoring of all programs, but it requires a larger number of monitoring channels. The concept is only useful if very few transport streams (TS) are to be monitored or permanent and interruption-free monitoring of all programs is essential.

One DVQM channel per transport stream

This is an optimum comprise between investment in test equipment and reliable detection in good time of picture and sound degradation in transmission networks with a large number of TS. The programs of a TS are not decoded and monitored permanently but instead cyclically with an automatically sequencing program (SCAN) for a set time interval.

Options for CA systems

The options for CA (conditional access) systems extend the field of application of DVQM to the monitoring of transmission channels with encrypted content [2]. The five major CA systems are currently supported, others are in preparation (FIG 4).

The CA options need one slot in DVQM to form a functional unit together with a DVQ board. When fully configured, one DVQM therefore includes up to six such pairs, which can also be retrofitted by the user.

It was in no small part thanks to the CA options that Rohde & Schwarz won a first large-scale order from Europe’s leading satellite operator SES-Astra for video and sound quality monitoring in a digital TV transmission network [3].

Thomas Bichlmaier

Condensed data of DVQM

<table>
<thead>
<tr>
<th><strong>Basic unit</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Modules (channels)</td>
<td>2 (max. 12)</td>
</tr>
<tr>
<td>Enclosure</td>
<td>19&quot;, 8 HU</td>
</tr>
<tr>
<td>Weight</td>
<td>approx. 25 kg</td>
</tr>
<tr>
<td>Power consumption</td>
<td>max. 300 W</td>
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</tbody>
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<table>
<thead>
<tr>
<th><strong>CA options</strong></th>
<th></th>
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<tbody>
<tr>
<td>Standards</td>
<td>see FIG 4</td>
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<tr>
<td>Input</td>
<td>TS-ASI (DVB A010), 75 Ω, max. 50 Mbit/s</td>
</tr>
<tr>
<td>Output</td>
<td>TS-ASI (DVB A010), 75 Ω, max. 50 Mbit/s</td>
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FIG 4 CA standards available for DVQM

REFERENCES