The new digital TV standard DVB-H, an expansion of DVB-T, enables you to efficiently transmit multimedia content to mobile receivers [1].

Rohde & Schwarz supports the development of new services by offering an all-round portfolio of operating and measurement equipment.

**Video goes mobile**

The mobile radio industry and broadcasting network operators want to increasingly offer multimedia content such as TV and video streaming for mobile receivers. DVB-H is ideal for this purpose since data is not broadcast continuously but rather bundled in data packets (IP encapsulation), i.e. in bursts. This keeps the energy consumption of user equipment (UE) low. Owing to this timeslot technique, UE can switch off between data packets, thus saving up to 90% in energy. An additional error correction at the IP level (MPE forward error correction) improves reception quality even in the event of high packet loss. In addition to the modulation modes that are commonly used with DVB-T, DVB-H offers a further modulation mode: the 4k mode. This compromise between 8k (limited speed, large single-frequency networks (SFN)) and 2k (very high speed, small SFNs) ensures stable mobile reception even if the speed is very high. Transmission parameter signaling (TPS) bits signal whether the receiver uses DVB-H features and which ones.
Implementation of DVB-H Networks

There are several scenarios describing how DVB-H networks may be implemented. Combined DVB-T/DVB-H networks are very likely to be set up specifically for initial implementation phases that need to be cost-efficient. In such cases, DVB-H services would be implemented in existing DVB-T networks (see figure).

Initial DVB-H pilot projects, most of which use Rohde & Schwarz products, have already been started in various countries. Rohde & Schwarz supports its customers in many ways to make existing products DVB-H-compatible. A brief overview of the main operating and measurement products is provided below. For further details, see the box on pages 52 and 53.

Measurement equipment

MPEG-2 recorder / generator

With the DTV Recorder Generator R&S®DVRG you can record and play digital MPEG-2 video streams of many formats. A comprehensive DVB-H stream library providing reference DVB-H signals for testing is available for the R&S®DVRG. This library also contains video content that was coded with MPEG-4, WM9 (VC1) or H264.

Test receiver

The realtime TV Test Receiver R&S®EFA for analog and digital systems identifies error sources fast and specifically. A DVB-T demodulator analyzes the RF signal, demodulates it and provides a realtime MPEG-2 signal for further processing at the output. The DVB-H specific TPS signaling will be evaluated.

MPEG-2 analyzer family

In the digital baseband (MPEG-2), the MPEG-2 Monitoring System R&S®DVM helps to analyze, monitor and check DVB-H implementations. The transmitted DVB-H services are displayed. The data broadcast option enables you to check the data structure and the content and to carry out timing measurements. You can extract and stream the IP content of the DVB-H service merely by pressing a button. Thus, the R&S®DVM offers all functions for complete protocol analysis.

Operating equipment

Datacasting

The DTV IP Inserter and Generator R&S®DIP010 is a key element within a DVB-H system. It inserts the multimedia IP content of the DVB-H services into the DVB transport streams. If the option R&S®DIPH is installed, it performs time slicing, MPE-FEC and multiprotocol encapsulation for standard-conforming DVB-H data streams and supports the current IPv4 Internet protocol as well as the future IPv6 protocol.

From DVB-T to DVB-H

DVB-H (digital video broadcasting for handhelds) adapts the digital terrestrial TV standard DVB-T, which has been implemented successfully all over the world, to the requirements of mobile operation, especially battery-powered handhelds. The following goals were achieved with DVB-H:

- Transmission of multimedia services
- Energy savings for UE due to time slicing
- Optimum performance for mobile reception due to 4k modulation mode
- Optimum reception quality even in case of high packet loss due to additional error protection (MPE-FEC)
Transmitters
The TV Transmitter Family R&S®Nx7000 provides solutions for digital and analog transmitters, VHF and UHF, in the power classes ranging from 10 W to 20 kW.

All DVB-T TV transmitters for low, medium and high power including the Exciters R&S®SV700 and R&S®SV702 can be upgraded for DVB-H. Only a software and firmware upgrade is required in order to support the 4k modulation mode and TPS signaling. The transmitters of the R&S®Nx7000 family are thus fully compatible with DVB-H.

Simone Gerstl
Modulator / transmitter

**DVB-T Transmitter Families R&S® NV/NW 7000 / R&S® SV 7002**
- Full compatibility with DVB-H (4k and TPS)
- Software upgrade of existing transmitters
- Output powers from 10 W to 10 kW
- Complete solutions for VHF and UHF
- Many common features among the various families save costs for spare parts, maintenance and training
- Easy adaptation to modifications of the standard
- Outstanding remote-control characteristics: Web server, SNMP, parallel bus, bit bus
- Various redundancy concepts: exciter standby, passive and active standby, N+1 standby
- Compact and flexible solutions in the low-power range

**Broadcast Test System R&S® SFU**
- Standard-conforming generation of DVB-H signals: in-depth interleaver, TPS carrier signaling
- DTV multistandard test platform (100 kHz to 3 GHz)
- Large output level range for receiver and chip test applications
- Digital noise source (AWGN) for transmission simulations
- Fading simulator with up to 40 paths
- Internal baseband signal generation
- BER measurement
- Inputs for ASI, SPI, SMPTE 310M and test signals

**Digital Video Measurement System R&S® DVM 400**
- Realtime and detail analysis of MPEG-2 / DVB-H transport streams
- Simultaneous monitoring of up to 20 transport streams
- Playing and recording of MPEG-2 / DVB-H transport streams
- DVB-H data broadcast analysis
- Streaming of DVB-H IP contents