Video goes mobile – with DVB-H
Mobile radio and television are converging

Digitization is making it all possible. After maintaining separate lives and development tracks over the decades, certain services and technologies are now finding themselves face to face at the bit and byte level. This convergence is the driving force behind many new products, markets and business models. One prime example is the convergence of mobile radio and television. Here, the catch phrase is “DVB-H”. These two worlds coexisted before with practically no contact, but DVB-H is bringing them together in terms of culture and technology. This can be a trying process, but Rohde & Schwarz is a great resource as we have been at home in both worlds since their early days. We have expert knowledge of the technologies, we speak their respective languages, and we know what is needed and expected in both “camps”. Of course, we offer a wide range of technical solutions that will be useful for implementing new products and services in the future.
**Typical DVB-H scenario**

- **Video goes mobile**

**Selected products**

- **Radiocommunications and protocol testing**
  - Universal Radio Communication Tester (UFT™)
  - Universal Physical Test Set (UPTS™)

- **Digital Video Measurement System (DVM400)**
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  - DTV data de-encapsulation
  - DVB/H data broadcast analysis
  - Playing and recording of DVB/DVB-H TS
  - Realtime and in-depth analysis of DVB/DVB-H transport

- **RF/baseband**
  - TV Test System (TTS) 144
  - USB OTN tester
  - 2G/3G standards
  - DVB-T streaming
  - DVB/H data broadcast analysis
  - Playing and recording of DVB/DVB-H TS

- **Modulator/transmitter**
  - Baseband/Source Modulator/transmitter
  - Realtime data insertion with up to 15 Mbit/s
  - Utilization of dedicated MPEG-2 resources (null packets)
  - Transport stream
  - Insertion of additional data (IP packets) into an MPEG-2 DVB-H-compliant data stream

- **Universal Potocol Tester (UPTU)**
  - Intuitive user interface with graphical display of signal flow
  - Electronic attenuator up to 6 GHz
  - Very short frequency setting times
  - Up to two complete generators in one unit

- **Vector Signal Generator (VSG)**
  - ASI, SPI, SMPTE 310M inputs and test signals
  - BER measurement
  - Up to 40 paths channel simulation (fading)

- **Vector Signal Analyzer (VSA)**
  - Supports all 2/2.5/3G standards
  - 2k and 8k modes supported
  - Display of interleaver mode
  - Display of DVB-H signaling (TPS bits)

- **Broadcast Test System (BTS) SFU**
  - High-performance spectrum analyzer
  - Multicarrier-capable code domain analyzer
  - Realtime demodulation, analysis and monitoring

- **DVB-H**
  - Baseband encoder
  - DVB/H data broadcast analysis
  - Playing and recording of DVB/DVB-H TS
  - Realtime and in-depth analysis of DVB/DVB-H transport

- **Modulator/transmitter**
  - DVB/T Transmitter families
  - DVB/T1/2/3/4/5/6/7/12/16/21/22/23/24/25/26/27/28/29/30/31/32/33/34/35/36/37/38/39/40/41
  - Support for modulation and channel coding according to DVB/T1/2/3/4/5/6/7/8/9/10/11/12
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- **RF/baseband**
  - DVB/H**
The best of both worlds

DVB-H: two technologies, one market leader

If you are just now finding yourself face to face with DVB-H, get ready to deal with two different cultures: broadcasting and mobile radio. Both have their own traditions, technologies, terminology and market structure. In “cross-cultural” situations of this kind, you need a “bilingual” partner who is capable of providing the necessary “translation” services and who offers a complete portfolio of equipment for both sides of the DVB-H equation.

Rohde & Schwarz has decades of experience in the fields of mobile radio and broadcasting, and we have developed pioneering and reference solutions in these fields time and time again. Today, we are the international leader in the areas of mobile radio and TV test and measurement as well as digital terrestrial broadcasting.

Made for one another: mobile radio and Rohde & Schwarz

Not long after its invention, the microprocessor was put to good use in a test instrument from Rohde & Schwarz. Naturally, it was a radio test system. Radio test technology has been one of our main fields from the very start. Of course, mobile radio (analog in its early days) found fertile ground at Rohde & Schwarz. The “Groupe Spécial Mobile” came to us in the 1980s with an order to build a simulator for a revolutionary digital mobile radio system which would set the stage for the most successful technology in the history of radiocommunications: GSM. Many other mobile radio standards have since come into use, and mobile phones can do just about anything nowadays. Throughout this evolution, however, one thing has remained constant: Rohde & Schwarz is still the leading supplier of test equipment for all types of wireless communications. A large share of mobile phones around the globe are developed and manufactured using our equipment. This reflects the confidence that our customers have in us, and it also acts as a driving force to keep us developing innovative products.

“3G television” from Rohde & Schwarz – your partner for 3G mobile radio

All the way from the heyday of tubes to the analog transistor and finally the age of digital broadcasting, Rohde & Schwarz has been a prominent leader in this field. The first FM transmitter in Europe was developed in a Rohde & Schwarz laboratory. Later, we played a major role in the introduction of the RDS radio data system. Moreover, our TV insertion signal test method became a de facto standard and was copied around the world. Another recent development from Rohde & Schwarz involves nationwide DVB-T transmitter networks. In fact, whenever there is a mention of innovation in the area of broadcasting, the name Rohde & Schwarz tends to follow close behind. If you are seeking to gain market shares in a new field like DVB-H, you are making a wise choice by selecting Rohde & Schwarz.
From DVB-T to DVB-H

Making DVB-T mobile and Internet-compatible

DVB-H is an adaptation of the digital terrestrial TV standard DVB-T (which has enjoyed great success worldwide) to the requirements of mobile applications, particularly with battery-powered handheld equipment. The following development objectives were pursued and achieved with DVB-H:

- **Low power consumption**
  One of the greatest challenges when building battery-powered user equipment is how to extend the amount of time the device can run on a single charge. Of course, video applications tend to be particularly power-hungry. In the case of DVB-H, the solution has been to employ the familiar timeslot technology used in mobile radio standards such as GSM (see figure). Data is transmitted as bursts and not continuously. During the pauses in transmission (i.e., when data is being transmitted for other DVB-H users), the mobile phone can turn off parts of its circuitry and save a lot of energy. These pauses are also useful for handling handover procedures.

- **Reliability of transmission**
  Although DVB-T was designed with mobile applications in mind, further measures have been taken with DVB-H to ensure reliable reception with good performance even in vehicles moving at high speeds. This includes forward error correction (FEC) and an additional type of modulation (4k mode).

All of these measures are specified in the DVB-H standard, but the details of the implementation are left open. This means that in the simplest case (no time slicing, no FEC, no 4k mode), DVB-H and DVB-T use an identical transmission method. We will have to wait to see which of these configurations turn out to be the most practical and popular.

- **Retrofitting DVB-T broadcast equipment is easy**
  The embedding of DVB-H program content in the DVB data stream and DVB-H signaling are handled independently of the transmission method. A graphical representation of a playout center for combined DVB-T/H operation shows where DVB-H-specific extensions are required (see figure). Products currently available from Rohde & Schwarz include the Data Inserter R&S®DIP010 (= DVB-H IP Encapsulator) plus relevant upgrades for our transmitters. The availability of these products should speed up expansion of the first DVB-H networks.

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