Rohde & Schwarz has developed a multimedia broadcast/multicast service (MBMS) test scenario for the R&S® CRTU-W protocol test platform. Manufacturers of mobile radio terminals and corresponding chipsets can now test the functionality of their products.

**Powerful test environment**

MBMS [1][2] is an expansion of UMTS defined in 3GPP release 6. It allows simultaneous broadcasting of various multimedia content to large receiver groups within a network (for details see box on right). This could already be demonstrated in real networks at this year’s 3GSM World Congress in Barcelona [3]. With the R&S® CRTU-W protocol test platform, you can now test MBMS in the laboratory. Rohde & Schwarz is thus among the first to provide such a solution for the development of MBMS-capable terminal equipment. The solution offers a wide range of test system configurations and is thus a powerful test environment.

**Detailed and reproducible tests**

You can use the R&S® CRTU-W for a variety of MBMS tests. The integrated packet data convergence protocol (PDCP) data generator allows you to verify the basic characteristics of MBMS-compatible terminals. If an external streaming server is connected to the Ethernet interface of the tester, the system setup is capable of simulating a real 3G network (FIG 1). This system setup allows you to perform detailed and reproducible MBMS-compatibility tests of terminal equipment including the display of the transmitted video and audio data.

To use the MBMS functionality of the R&S® CRTU-W protocol test platform, you only have to update the software. Example scenarios are included in the R&S® CRTU-WT02 C++ programming.

**FIG 1** Test system setup for MBMS with the R&S® CRTU-W protocol test platform.

- **Streaming server**
- **Ethernet**
- **R&S® CRTU-W protocol test platform**
- **MBMS-compatible terminal**

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**News from Rohde & Schwarz**

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MBMS was standardized by the 3G Partnership Project (3GPP) as an expansion of UMTS and GSM networks. It allows the simultaneous and resource-saving broadcasting of various multimedia content to a random number of receivers within a mobile radio network. Established mobile radio services, e.g. voice connections or text messages (SMS), are not impaired by MBMS and can be used at the same time.

The use of the Internet protocol (IP) throughout MBMS helps ensure easy data transfer between the content provider and the receivers. The content provider can be situated in the mobile radio core network or can be connected via the public network (FIG 2).

The multicasting of IP packets allows the efficient and resource-saving transfer of data in the core network. The IP multicast protocol generates a distribution tree from a transmitter to all its receivers in the network. IP data is generated once at the transmitter and only replicated at the network nodes where the distribution tree branches off, e.g. at the serving GPRS support node (SGSN). Compared with the conventional transfer of IP data, during which each packet has to be separately generated and sent for each receiver, efficiency is thus clearly increased.

At the air interface, the MBMS content is always transmitted in the packet-switched mode. Data can be transmitted to individual receivers via dedicated DCH channel connections (point-to-point mode) but also to all the receivers in a cell by means of a broadcast channel (FACH channel, point-to-multipoint mode). Depending on the number of receivers in a cell, the most resource-saving option is activated at any time (FIG 3).

As MBMS implies, the expansion was mainly developed to transmit audio and video streams. However, its use is not limited to these streams: Text messages, pictures, and data can also be sent and content can be broadcast in a repetitive sequence (carousel mode).

An optional electronic program guide (EPG) provides information about the scheduled broadcasting of multimedia content, e.g. about radio or TV programs. It contains program information for users (e.g. content, broadcasting times, channels) as well as all information required for configuring the terminal. You can download the latest EPG from a specific website or directly receive it via SMS/MMS.

MBMS and DVB-H: comparison

MBMS and DVB-H are two different technologies with similar applications that compete with each other for the same target group. DVB-H (H for handheld) is an expansion of the DVB-T TV standard for reception on portable units. The standard was designed as a broadcasting-only service for national or regional coverage areas. The reception equipment is based on state-of-the-art technology. Due to the optimization defined in the standard, the power consumption of reception equipment can be minimized. Since DVB-T transmit infrastructures are already available, it is not necessary to set up additional transmitter systems.

MBMS, on the contrary, is an expansion of the UMTS cellular mobile radio standard which can address individual cells as coverage areas in the network and thus covers small local user groups. It can also provide services that go beyond simple broadcasting. Although new terminals are required for MBMS, these terminals do not have to be equipped with additional receivers since MBMS reuses the existing physical interfaces of UMTS.
interface. The R&S®CRTU-WZ08 option additionally allows you to perform more general and additional MBMS test cases. This software option also includes the complete source code: The customer can thus conveniently adapt the test cases to individual requirements. Plus, the first signaling conformance test cases for MBMS are available based on the 3GPP standard TS34.123.

Characteristics of the R&S®CRTU-W test system

The R&S®CRTU-W protocol test platform allows you to test the MBMS compatibility of terminal equipment with the internal data generator and in conjunction with an externally connected streaming server. If an external PC is used, the streaming application implemented is user-selectable. The R&S®CRTU-W also supports a variety of multimedia content types, e.g. streams for video, audio, and text or a combination of all these. Depending on the software-specific equipment of the external server and the terminal equipment, IP data can also be transferred via MBMS by means of the FLUTE protocol [4].

The R&S®CRTU-W can transmit the internally generated or received data to up to four independent MBMS point-to-multipoint traffic channels (MTCH). A maximum data rate of 256 kbit/s is possible per channel. You can limit the maximum possible transmission rate by parameterizing the individual channels.

In addition to testing pure MBMS capabilities, you can also test other parallel services at the same time while MBMS is running, e.g. voice and packet-based connections or the reception and transmission of SMS and MMS messages.

The complete data transfer between the protocol test platform and the terminal equipment is recorded during the test run. You can thus thoroughly analyze the exchanged messages and data packets during the test run or immediately after it and quickly localize a functional error of the terminal.

Characteristics of the protocol stack used

For signaling, the R&S®CRTU-W supports the MBMS notification indicator channel (MICH) and the optional MBMS point-to-multipoint scheduling channel (MSCH). The physical channel MICH and the logical channel MSCH were introduced to keep the power consumption of terminal equipment to a minimum during MBMS reception. The MICH therefore informs the terminal that new information is available on the continuously operated MBMS control channel (MCCH). The MSCH, on the contrary, signals a status change on the MTCH, e.g. when a service is started or terminated.

Since the R&S®CRTU-W can manage up to four MTCHs, the incoming IP data has to be assigned to the available MTCHs. A configuration file in the protocol test platform maps the individual IP data streams to the corresponding MTCH. The R&S®CRTU-W can then assign every incoming IP packet to an MTCH by means of the destination addresses included.

Future prospects

The box on page 19 shows the specific pros and cons of DVB-H [5] and MBMS and how the two standards complement each other. The BCAST application enabler [6] is currently being developed to meet the requirements of both standards. The BCAST enabler provides uniform interfaces at the transmitter and receiver end and always offers the optimum technology for the reception of multimedia content. You do not have to bother about actual selections.

Although the MBMS standard has now been adopted, it will continue to be developed further. MBMS, which is going to be an integral part of the standard, is currently been expanded for long term evolution (LTE). With LTE, several base stations can be operated as a single frequency network, and reception can be improved by means of soft-combining.

Dr Ingo Gruber

More information and data sheet at www.rohde-schwarz.com (search term: CRTU-W)

REFERENCES

[1] 3GPP TS 22.146, “Multimedia Broadcast / Multicast Service (MBMS); Stage 1”, October 2006