

# The first T-DMB broadcast network in South Korea

T-DMB is in the process of revolutionizing transmitter technology in South Korea: A state-of-the-art broadcast network derived from the "old" DAB technology is now using a new encoding method to transmit moving pictures to mobile devices. This is the world's first T-DMB network and it uses broadcasting equipment from **ROHDE & SCHWARZ FTK GmbH.**



Photo: FTK

Three T-DMB transmitter stations on the mountains around the capital city of Seoul ensure coverage.

Following a successful test deployment in 2005, South Korea decided to set up a nationwide network. During the initial stage of deployment, the region around the capital city of Seoul was equipped with T-DMB transmitters. The network operator Korean Broadcasting System (KBS) initially ordered liquid-cooled T-DMB high-power transmitter systems. This was followed by additional orders for transmitters from the R&S®NA/NL6000 series with air cooling as well as the R&S®NA7000 series with liquid cooling. The operators are continuing to expand the country's network with full nationwide coverage expected by 2009. Rohde & Schwarz is supplying the broadcasting equipment for all six T-DMB networks.

Digital multimedia broadcasting (DMB) allows transmission of television programs to mobile devices such as mobile phones, handhels and pocket PCs. The information is transmitted in MPEG-4 AVC format via digital audio broadcasting (DAB). A DAB data stream contains a bouquet with up to three TV programs, each of which can be encoded using a data rate of up to 700 kbit/s. In South Korea, DAB frequencies were available in band III, and thus ready for use.

ROHDE & SCHWARZ FTK GmbH with 80 employees in Berlin is well acquainted with the new technology due to its many years of experience with audio broadcasting, datacasting and R&D services. It began business in 1992 with transmission systems for FM and later added DAB. In 2000, South Korea became interested in digital broadcasting. Jens Stockmann, product manager at Rohde & Schwarz FTK, recalls: "DAB in South Korea? That made me curious. The DAB standard had been developed

## T-DMB transmitters from Rohde & Schwarz

	R&S®SLA8000	R&S®NA6000	R&S®NL6000	R&S®NA7000
<b>Frequency</b>	VHF band III	VHF band III	L band	VHF band III
<b>Output power</b>	75 W to 300 W	150 W to 2500 W	115 W to 1600 W	900 W to 7200 W
<b>Cooling</b>	air	air	air	liquid

in Europe in the 1980s and by 2000 had reached a low point in Germany. And now South Korea was interested in it."

But it was more than mere interest. The South Koreans adapted the idea behind DMB and enhanced the technology on the basis of new coding methods. The result was the South Korean T-DMB standard, and Rohde & Schwarz FTK got involved again. "What impressed me was the South Korean government's broad support for driving this development", says Stockmann. The standard was nearly finished when a T-DMB test run was to be performed in Seoul. Two major manufacturers, Samsung and LG, developed the required receivers.

Elsewhere Rohde & Schwarz was involved in the introduction of DAB right from the start. The company played an active role in the early days in Germany and in many other European countries such as Great Britain and Belgium. The equipment and the know-how for the entire DAB transmission path were available. Suitable equipment was available in the form of T-DMB transmitters with their wide range of output power and the liquid-cooled transmitters with high output powers and compact dimensions.

KBS was also the first broadcast operator interested in implementing this technology. A delegation from KBS did very extensive research, traveling across Europe and contacting a number of institutions, companies and network operators to obtain detailed information about DAB and investigate the possible partners. The delegation visited Rohde & Schwarz again to discuss the specifications in greater detail. At the same time, Rohde & Schwarz expanded its South Korean office and was able to

provide the necessary on-site assistance. After all, a broadcasting network operator that has to be on the air 24 hours a day needs direct contact to support and service with rapid access to spare parts.

The city of Seoul has a population of over 10 million and lies in a valley. To suit this topography, three transmitter stations were set up in the neighboring mountains, ensuring full coverage of the region. The equipment was transported by a funicular railway and helicopters. The T-DMB transmitters and all the associated system components were customized to suit local conditions. The existing buildings saw optimal usage due to the space-saving, flexible design of the equipment. The transmitter systems were connected to existing antenna

Rohde & Schwarz customers in South Korea have been very happy with the development of the T-DMB project so far. During the launch celebration held by operator U1media, Rohde & Schwarz received an award for outstanding service during the installation phase. This award also cited the excellent cooperation between Rohde & Schwarz FTK, the production facility in Teisnach and the on-site team.

installations, and the GPS antennas were positioned for free reception to suit local conditions. Other broadcasters can be smoothly integrated into the system. One challenge, however, was related to the very close spacing of transmit frequencies in adjacent DAB channels.

The cooling systems were specially adapted to handle the climatic conditions so that operations would not be impaired by cold weather or high temperatures. Due to space constraints, some cooling units/aggregates were housed separately from the transmitters outside of the buildings. For this reason, additional pumps were necessary. All of the transmitters were implemented with passive standby to ensure high failsafety. Rohde & Schwarz has also developed a

special redundant system of combiners to further increase reliability.

Depending on the region, the broadcasters provide at least three video programs as well as numerous audio programs and data services. The TV broadcasters are committed to developing new content that is different from normal TV programs. The main focus is on the needs of the different users and their mobility. In South Korea, T-DMB programs are currently free of charge to everyone and many types of receivers are available. Besides mobile phones, there exist integrated solutions for navigation devices and handheld computers.

The new broadcast system has enjoyed a successful startup in South Korea, and this trend is expected to continue. For example, there has been regular T-DMB service in the L band in 17 major cities in Germany since Football World Cup 2006.

Elke Schulze