Digital Radio Mondiale (DRM) is the new digital broadcasting standard for frequencies below 30 MHz. The current version of the R&S®ARGUS spectrum monitoring software now also provides a decoder for ITU-compliant DRM measurements.

R&S®ARGUS Spectrum Monitoring Software

ITU-compliant measurements for Digital Radio Mondiale

DRM – a new broadcasting standard

Digitization of broadcasting worldwide has not slowed down. A successful standard in the frequency range up to 30 MHz is Digital Radio Mondiale (DRM). DRM primarily offers sound broadcasting applications, but can also be used for data services (for details, see box on page 51).

Like all other broadcasting transmitters, DRM transmitters must be planned and licensed. As soon as broadcasting starts, the individual national regulatory authorities are responsible for verifying that the licensing conditions are complied with; moreover, they have to locate and eliminate interference where required. The new DRM module for R&S®ARGUS was specifically developed to handle these tasks.

R&S®ARGUS ready for DRM

R&S®ARGUS is the standard software from Rohde & Schwarz for ITU-compliant measurement and evaluation tasks; the software is successfully deployed around the world and continuously developed and updated. The current version 5.2.2 can now be equipped with a special module for measuring and analyzing DRM signals.

The digital, I/Q-demodulated data stream of the receiver, e.g. of the R&S®ESMB or R&S®EM510 from Rohde & Schwarz, is used as an input signal. As these instruments are already installed in many monitoring stations, there are usually no additional purchasing costs for hardware; only the R&S®ARGUS software module needs to be added.

The software features a well-structured user interface, conveniently presenting all measurement values and further information at a glance (FIG 1). The user merely selects the DRM transmitter frequency; all other settings are handled by R&S®ARGUS. With DRM, as is common with digital modulation methods, multiple services can transmit on the same frequency; in the next step, users can select which of the maximally four services is to be analyzed.

The software displays the most important data such as name and ID of the current service, language, and type of program, as well as data rates and alternative frequencies. The receive level as well as the signal-to-noise ratio and various synchronization and checksum status displays provide information about the quality of the received signal.

The key technical parameters that describe a DRM signal – such as DRM mode and bandwidth, interleaver depth, error correction, DC offset, sample frequency offset, Doppler shift, and delay – are measured and displayed in realtime. All these values can be stored so that they will be available for subsequent offline analysis or documentation. The software also displays numerous parameters graphically – for example, delay, Doppler shift or sample rate history, the SNR spectrum, and the constellation diagram (FIG 2).

In addition to the audio signal, DRM can transmit auxiliary information such as simple text messages as well as multimedia content, for example NewsService Journaline® (FIG 3), or images in multimedia object transfer (MOT) protocol format. All this information can be displayed directly by the software, stored, and displayed again when needed.

Like all other measurement parameters, demodulated audio signals can be stored and replayed when needed. The signals are replayed in sync with the measurement results. Thus, variations in audio quality can be directly correlated with changes in technical parameters, for example.

Automatic measurement mode

In addition to these interactive actions, all measurements can run automatically during user-definable periods. Especially during the setup phase, many DRM transmitters do not yet broadcast around the clock but only a few hours per day. In this case, the automatic measurement mode (AMM) of R&S®ARGUS is the ideal solution. The measurements can be adapted to the current transmission plan as needed. If a transmitter is not in operation at the moment, the monitoring system can perform other tasks. When broadcasting does start, R&S®ARGUS promptly triggers the predefined measurements fully automatically – no user assistance required.

Another advantage provided by the automated measurements is the integrated alarm mechanism. The user can define a specific upper and lower limit for each measurement parameter and for each frequency. While the measurement is running, the software compares the results with the reference values. If the limits are violated (overshoot/undershoot), an alarm is triggered. This may be an entry in a log file, or an acoustic signal. The measurement can also be started fully automatically to thoroughly analyze the signal that triggered the alarm.

DRM up to 120 MHz in the future

At present, DRM transmitters broadcast approximately 800 hours of programming each day worldwide, with the trend increasing. The DRM consortium has decided to expand the frequency range up to 120 MHz in the next few years. This means a lot of work for the regulatory authorities. But with R&S®ARGUS, they can easily step up to the plate.

Thomas Krenz

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

Digital Radio Mondiale

DRM is a new standard for digital broadcasting below 30 MHz. A major advantage over analog broadcast transmitters in this frequency range is the outstanding quality of the audio signal, which is virtually equal to FM quality. As with other digital transmission methods, a wide variety of additional information can be transmitted in addition to the audio signal. For example, it is possible to display the title and artist of the song currently being played. Moreover, news, weather forecasts, and traffic information as well as images and even web pages can be transmitted.

Since existing AM frequency bands can be used and since AM transmitters require only minor modifications to be DRM-compatible, the use of the DRM standard is set to expand. The DRM signal is defined in such a way that it fits into existing AM frequency plans with 9 kHz or 10 kHz bandwidth. There are also other modes that use only 4.5 kHz or 5 kHz bandwidth. To achieve good audio quality despite these comparatively narrow bandwidths, highly efficient audio compression methods such as MPEG-4 AAC, MPEG-4 CELP, and HVXC are used.

The coded orthogonal frequency division multiplex (COFDM) method is used for transmission. This method allows, for example, the number of carriers to be varied in order to flexibly respond to requirements such as coverage, quality, and bandwidth.

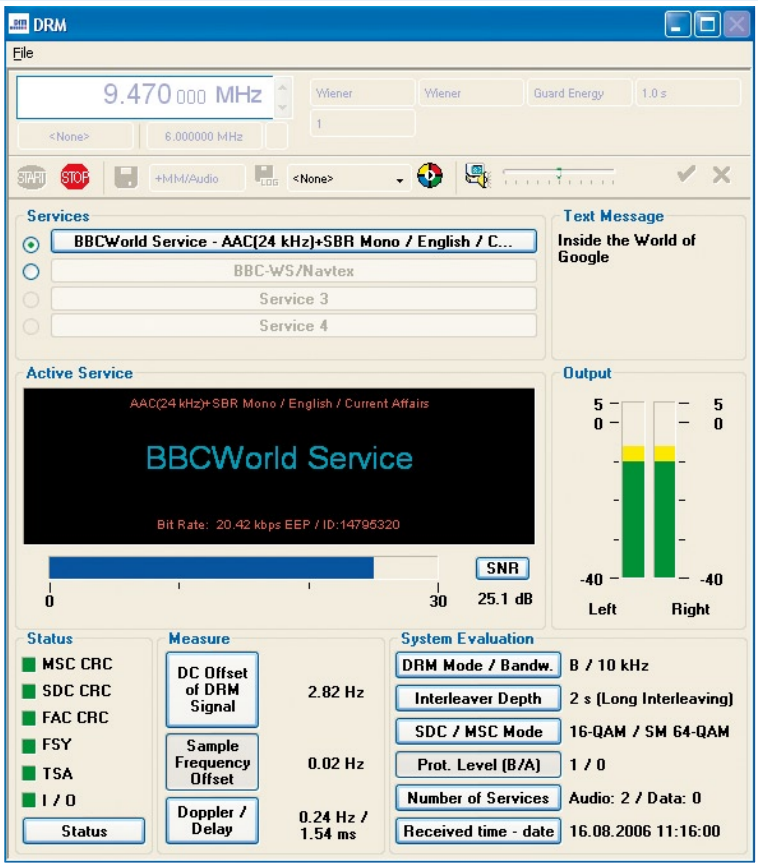

FIG 1 Key parameters at a glance: the R&S®ARGUS software user interface.

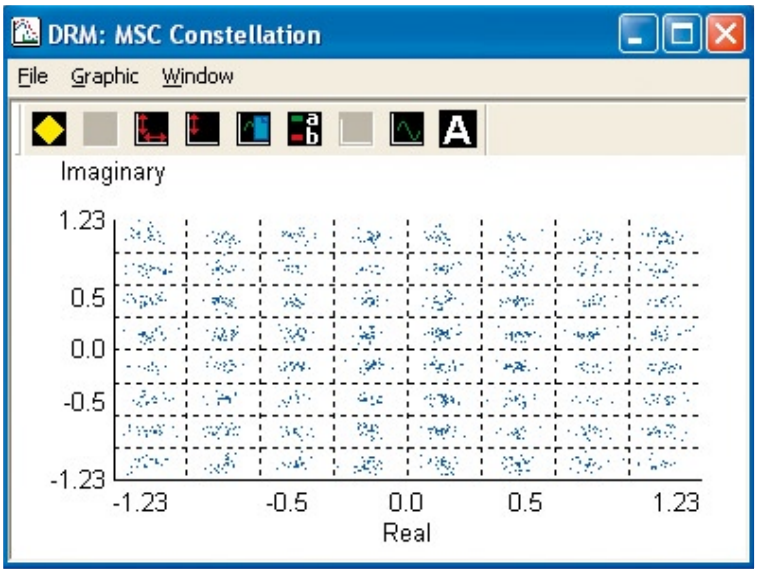

FIG 2 Constellation diagram.

FIG 3
R&S®ARGUS also displays the multimedia content of DRM transmissions, such as NewsService Journaline®.