Digital Radio Mondiale (DRM) is a digital standard for use on the long, medium, shortwave and VHF bands. These bands span 150 kHz to 240 MHz. DRM can transmit audio in mono or stereo, images as slideshows, files, a simple website, emergency alerts and a digital text service. DRM can have up to four services and usually audio and data are configured as separate services. It is possible to include some data in an audio channel.

Audio

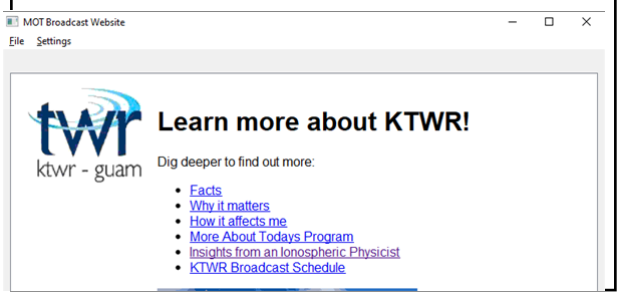
Audio is encoded using **Advanced Audio Coding** in various forms either as mono (basic AAC) or stereo (HE-AAC).

DRM uses **Parametric Stereo (PS)** where the stereo effects are sent as a data signal rather than the actual differences between the audio channels. DRM also uses **Spectral Band Replication (SBR)** to recreate the upper audio frequencies from the lower band.

Using both SBR and PS a stereo audio (L and R) signal of 15 kHz can be reduced to a mono signal (L+R) with a maximum frequency of around 7 kHz plus two data signals describing how to re-build the higher frequencies (still L+R) and restore stereo (L and R).

Multimedia

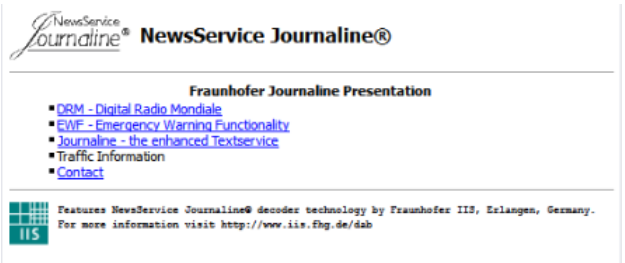
Multimedia is sent in the data stream using a method called **Multimedia Object Transfer (MOT)** protocol. MOT covers images (usually .png and .jpg), HTML pages used to create a website and files (PDF, Word, etc). Data other than simple images require a tablet or PC to use them.



DRM Modes

A mode is a preferred configuration suited to broadcasting on a particular band or where propagation is poor. Mode A and B can use 4.5, 5,9,10,18 and 20 kHz bandwidth, Mode C and D only 10 and 20 kHz and Mode E 100 kHz.

Mode A	Mainly used for long and medium waves during the day.
Mode B	Shortwaves and medium wave at night
Mode C	Shortwave in the polar regions.
Mode D	Shortwave in the tropics
Mode E	For use only on VHF bands



Journaline

Journaline is a text service for radio where data is presented in a menu structure. Journaline entries can be static, presented as ticker or list format that automatically update.

DRM Data Stream

A DRM data stream has three components.

The **Fast Access Channel (FAC)** sends basic information about the transmission to get the receiver ready to decode it.

The **Service Description Channel (SDC)** describes in detail the services (data and audio) contained in the multiplex.

The **Main Service Channel (MSC)** carries the services as a series of data packets.

Simulcasting

DRM uses a simple simulcasting (the transmission of both the analogue audio and the digital copy at the same time) technique.

Whole Channel Offsets where DRM occupies the adjacent one or two channels. Analogue on 1089 kHz and DRM on 1098 kHz (one Channel of 9 kHz) or DRM on both 1098 kHz and 1107 kHz (on wide channel of 18 kHz).

Half Channel Offsets where the analogue and digital both use 4.5/5kHz of a 9/10 kHz bandwidth.

Alternative Frequency Signalling

A DRM receiver is able to switch to another DRM multiplex, FM, AM or DAB station using AFS data.

I/Q Signals

The term is used in some software DRM receivers. The in-phase (I) and the phase shifted signal (Q) are commonly used in communications. Quadrature means a phase difference of 90°.

Channel Coding

Quadrature Amplitude Modulation (QAM)

QAM uses both phase and amplitude changes of a carrier to encode either 2 bits (4-QAM), 4 bits (16-QAM) or 6 bits (64-QAM) of data at a time.

DRM Rules

The FAC always uses 4-QAM making it the easiest to decode; the SDC uses either 4-QAM or 16-QAM and the MSC should then use the next QAM mode up 16-QAM or 64-QAM. Typical configuration of SDC/MSC are 4/16 QAM and 16/64 QAM although 16/16 and 4/64 are used.

DRM Terminology

Robustness

This is adding protection using error correction codes at various points in the DRM transmission chain.

Unequal Error Protection (UEP) refers to much of the audio has higher protection to provide a lower quality audio if necessary. The opposite is **Equal Error Protection (EEP)** where all parts of the audio have the same protection.

Service ID is a unique worldwide ID for every DRM programme. Format ID:A2B000.

Slideshow is a sequence of images.

Service and Programme Information (SPI) is DRM's term for an Electronic Programme Guide (EPG).

Service Label is the displayed name of the service (e.g. BBCWS).