

# In Tune

## The BBC's Lindsay Cornell takes a look at Digital Radio Standards and their similarities and differences.

Both DAB and DRM are digital transmission systems designed primarily for radio using OFDM for robust transmission and psycho-acoustic audio coding for efficiency. OK, but what do they do? Basically, both these digital systems provide some key features:

- simple to use receivers;
- good audio quality;
- worldwide open standards;
- good spectral efficiency;
- digital enhancements.

DAB has three variants for radio: the original DAB, with MPEG layer 2 audio; DAB+, with HE AAC audio; and DMB radio, also with HE AAC audio. All three of these radio variants provide the same core features. The DMB variant can also deliver mobile TV, and indeed this was its original purpose; around 40 million DMB-TV terminals have been sold in South Korea.

DRM has two variants - DRM30, for the AM bands; and DRM+ for the VHF bands. In both cases the audio coder is HE AAC, although DRM30 also allows two speech only coders which operate at very low bitrates. Both variants have the same feature set. DRM also has a nascent small scale video application called Diveemo, but this cannot be compared to DMB-TV since it operates at much lower frame rates and resolutions.

Both DAB and DRM allow audio and data services to be carried and they allow users to access those services in an intuitive way. They both provide station names of up to 16 characters in length for service selection: no frequencies need to be remembered. And they provide additional information - a text message of up to 128 characters is common to both standards.

In common with all digital systems, there is a relationship between the audio quality achieved and the bitrate allocated to

the service, and the broadcaster's decision on what is acceptable to the audience is one of some debate amongst audio enthusiasts. The raw numbers cannot be directly compared, however, even when the AAC coder is in use, because of differences in the super-framing and error recovery mechanisms in the different standards and variants. When an analogue station goes digital, the change in audio quality will be greater for an AM station than for an FM station, simply because FM fidelity is so much higher - in audio bandwidth, in the opportunity for stereo, in terms of interference. The difference has much less to do with the digital system than with the analogue starting point and the chosen digital bitrate.

DAB and DRM are internationally agreed open standards that have been designed to work across the globe. DAB principally uses band III and L-Band spectrum, although it could be deployed in other frequency bands too. Coverage from a single transmitter may be up to around 75 km, but this can be extended by using multiple transmitters in a single frequency network (SFN). It's a wideband system, using 1.536MHz per transmission, and a multiplex structure which typically carries around 10 DAB services or 16 DAB+ services. DRM30 uses the bands below 30 MHz and is designed to fit within the ITU AM spectrum mask in 9 and 10 kHz channels, although it also has modes that can use 18 or 20 kHz channels giving more capacity or more ruggedness. Coverage can be very large, and indeed can be out-of-area, using the sky-wave propagation characteristic of the MF and HF bands. DRM+ is designed for the VHF bands, using 100 kHz per transmission. Coverage from a single transmitter is similar to DAB; DRM can also be configured as an SFN to enhance coverage. DRM allows up



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to four services per transmission, but this is only really feasible for DRM+ because of the bitrate requirements.

Digital radio also offers the opportunity for broadcasters to enhance their audio programmes with text, programme guides, images, time-shifting and many other features that are attractive to audiences, especially younger audiences. The data applications designed for DAB can also be used with DRM, so there's a lot of commonality for content generation which is good news for broadcasters and receiver manufacturers alike.

So overall, there are far more similarities and synergies between the two systems than differences. In 2006 Morphy Richards produced a small batch of DAB/DRM30/FM/AM radios. This product is no longer available, but demonstrated the idea of introducing multi-standard products to enable reception of all radio stations with a single device. This concept is still alive with Frontier Silicon announcing at IBC2011 that they were demonstrating their Kino 3 processor with DRM30/DRM+ added to the existing DAB/DAB+/DMB/FM capabilities.

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01. Morphy Richards multi-standard radio  
02. Frontier Silicon's Kino 3 processor