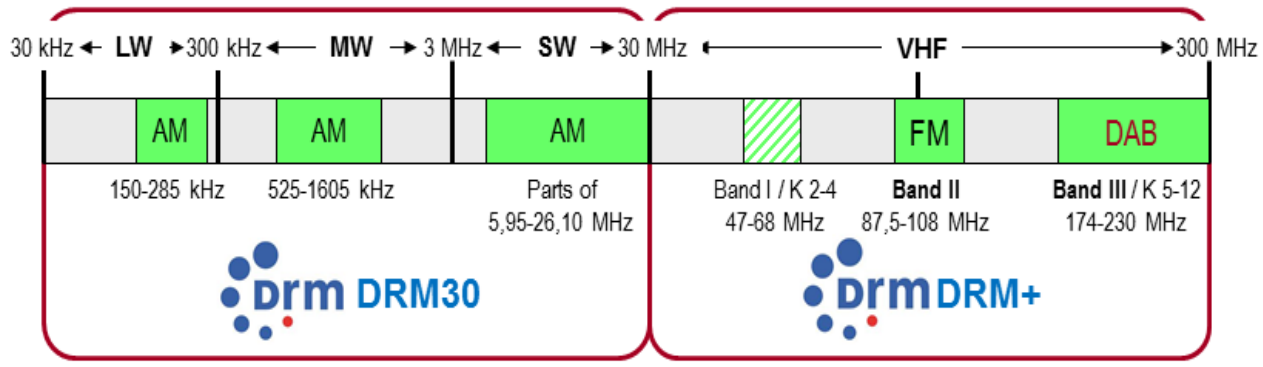
DRM – The Digital Future of FM

What is DRM – Digital Radio Mondiale?

The DRM terrestrial radio broadcasting standard has been created by broadcasters for broadcasters. It has been designed specifically as a high quality digital replacement for current analogue radio broadcasting in **all the frequency bands, the AM as well as the FM/VHF bands**; as such it can be operated with the same channelling and spectrum allocations as the former analogue transmissions. The simulcast option allows for a smooth transition from analogue FM and MW to an all-digital DRM broadcast.

The DRM standard comprises two **operating modes:**

a. **'DRM30'** configurations, which are specifically designed for the AM broadcast bands below 30 MHz, and
b. '**DRM+'** configurations, which serve the spectrum **above 30 MHz up to and including VHF band III, centred on the FM broadcast band II.**



These modes optimize DRM's baseband (COFDM) parameters for each supported broadcast frequency, while all service layer functionality relevant to listeners is identically available for all broadcast bands.

DRM has received the recommendations from the ITU for worldwide deployment, hence providing the international regulatory support for transmissions to take place. DRM also benefits from being an **open standard**. All manufacturers and interested parties have free access to the complete technical specifications and are able to design and manufacture equipment on an equitable basis.

Why go Digital with DRM?

The introduction of DRM services in the FM bands allows a broadcaster to provide listeners with significant improvements in service reliability, audio quality and, most importantly, usability, i.e. those features that enhance the listener experience. This includes advanced data application such as DRM Text Messages, Journaline advanced text with listener interactivity and geo-referenced information, Slideshow, EPG, TPEG/TMC etc. Listeners no longer need to select bands or memorise frequencies, but conveniently pick their service from the list of available stations by label; it is then the receiver's task to automatically select the best available reception method for the selected service, and to switch to alternative frequencies and even broadcast standards once the listener leaves the coverage area.

How does DRM fit with DAB(+)?

DRM and DAB are similar (but not identical) standards that provide listeners with an equivalent radio experience. DRM and DAB programmes are selectable from the receiver's service list. Both standards are open (with full and free access to all technical specifications), hosted by ETSI and ITU recommended for worldwide adoption. Data applications are shared and identical, from DRM Text Messages/DAB Dynamic Labels to Journaline, Slideshow, EPG, TPEG, etc.

Both standards deploy the MPEG AAC audio codec (however DRM is the only standard to have adopted the most modern audio codec xHE-AAC), they share the basic baseband modulation scheme (COFDM), and provide full service cross-linking between analogue AM/FM and the digital DRM and DAB(+) transmissions for automatic service following.

These similarities allow for efficient multi-standard receiver and chipset implementations, as current developments from many manufacturers prove – including latest solutions from Korean companies.

The core differences between DRM and DAB are:

a. DRM+ fits with the current band-II channelization (100 kHz bandwidth), whereas DAB is a multiplex solution requiring roughly 1500 kHz bandwidth for the transmission signal.
As a consequence, the DAB standard forces broadcasters to either fill a multiplex (with roughly 16 services on one transmitter) on their own or share the platform with other broadcasters, while *DRM allows broadcasters to stay in control of their own broadcast infrastructure* (offering a small multiplex of 1—3 audio programmes plus data services). For the distribution of individual radio stations in small heterogeneous coverage areas with a few programme offerings, the transmission capacity of DAB is far too high. As the transmission capacity cannot be completely filled, such use is not frequency efficient for DAB broadcasts. Furthermore, for the supply of the same coverage area, the lower bandwidth and fewer channels of DRM+ means that it needs only about 10% radiated transmitter power compared to DAB, which implies a **substantial economic advantage for DRM+.**

b. a reduction in infrastructure costs could be achieved, if the broadcaster operated the transmitters itself. An initial comparison between the distribution costs of DRM+ and DAB shows that with the distribution of only one, two or three programmes, the **total network costs for distribution within a given coverage area are substantially lower with DRM+ than with DAB.**

c. While the DAB multiplex of 1.5 MHz is transmitted in VHF band III (or L-band), the DRM signal fits with the current AM and FM channelisation (4.5 to 20 kHz bandwidth in the AM bands, 96 kHz bandwidth in the FM band or VHF band III) and can be rolled out in simulcast mode (efficiently enhancing existing AM/FM services and transmission infrastructure with a digital component during the transition period). Besides the FM band-II, DRM+ also supports band-III transmissions, where a single DAB frequency slot (with a common coverage area for all contained services) is split into 15 DRM+ transmission frequency assignments with individual coverage areas and optionally shared transmitter infrastructure.

Therefore both the **DRM** and DAB standard could be considered simultaneously for national adoption and must NOT be seen as mutually exclusive options, as the two standards combined provide complementing solutions and thus allow each broadcaster to choose its most efficient and most cost effective transmission mechanism for satisfying its coverage needs.

Listeners of DRM broadcasts now enjoy also the benefits of the newly available audio codec xHE-AAC, with excellent, undistorted sound. Please see the reference to this below.

Modern radio chipsets support both **DRM** and DAB+ simultaneously, which combined with identical service layer components such as data applications, make multi-standard receiver implementations efficient and almost automatic.

So the choice between **DRM** and DAB+ should be based exclusively on individual coverage needs and infrastructure cost-efficiency considerations.

Depending on the broadcasters' needs, a simple decision making path to be considered before opting for a DRM (DRM30/DRM+) and/or DAB+ transmission infrastructure could therefore look like this:

1. **Wide-area/national/international coverage required?**

   If YES, then → **DRM** (DRM30)
   If NO (local/regional coverage only) then please go to question 2

2. **VHF band III frequencies available?**

   If NO, then → **DRM** (DRM+)
   If YES, then please go to question 3

3. **Upgrade of current FM transmitter equipment / single-transmitter-simulcast (with FM) desired?**

   If YES, then → **DRM** (DRM+)
   If NO (new transmitter infrastructure needed), then please go to question 4

4. **Broadcasters need/want to stay in control over their own transmitter infrastructure (just like with FM)?**

   If YES, then → **DRM** (DRM+)
   If NO (OK to have outsourced infrastructure), please go to question 5

5. **Limited number of services with identical coverage area (less than 10)?**

   If YES, then → **DRM** (DRM+)
   If NO (more like 10-20 services), then please go to question 6

6. **Broadcasters agree on a common platform operation (i.e. often a third party service provider with revenue goals)?**

   If YES, then → **DAB**+
   If NO, then → **DRM** (DRM+)

DRM for the FM/VHF bands offers an attractive package of benefits for broadcasters

Advanced listener services

a. DRM offers advanced services, **revolutionising the radio experience for the next generations of listeners**:

- convenient service selection by station label – gone is the need to memorize and manually select bands and frequencies
- better-than-FM audio quality with optional 5.1 MPEG Surround sound
- a range of standardized data applications such as DRM Text Messages, Journaline advanced text, Slideshow, EPG, TPEG traffic updates, etc.
- all DRM text content (service labels, Text Messages, Journaline) is Unicode based, thus supporting all languages and scripts worldwide

b. **DRM is the first global digital radio standard to embrace the most advanced MPEG audio codec, xHE-AAC, which is the first audio codec to combine speech and general-purpose audio coding in a unified system. This allows for high quality delivery of any type of audio content at very low bit rate. xHE-AAC is a superset of HE-AAC v2, which remains part of the DRM standard as well.**

c. DRM provides built-in AFS functionality (**Automatic Frequency Checking & Switching**), allowing a receiver to stay tuned to the selected service even if the listener leaves the coverage area of the current transmission. The DRM AFS functionality also integrates services transmitted on analogue AM and FM, as well as DAB(+), just as DAB(+) transmissions cross-link to DRM services.

d. **DRM, as the only global 'all frequency bands' digital radio standard**, natively supports **emergency alert signalling for immediate mass-notification in case of impeding disasters (EWF – DRM Emergency Warning Feature)**. DRM receivers are triggered to automatically re-tune to the emergency transmission (including optional auto-switch-on), while flashing the screen and increasing audio volume. The emergency programme

combines audio content with detailed multi-lingual text instructions (Journaline), thus serving hearing-impaired listeners and those speaking different languages. DRM EWF benefits from DRM's capability of covering affected areas from outside (e.g. using it's long-distance AM modes).

Transmission network efficiency and cost savings

e. DRM transmissions can carry **up to 3 radio programmes along with data services on a single frequency** – either allowing for more diversified offerings, or drastically reducing the amount of dedicated FM transmitter networks and thus installation/maintenance/running cost for a given set of programmes.

f. **DRM gives full control to broadcasters over their own broadcast infrastructure** (studios, transmitters, antennas). Broadcasters therefore do not need to rely on possibly expensive services of third parties (multiplex operators) or share the operational facilities with other broadcasters, thus potentially opening the door for competitors. Being in full control of their own infrastructure and transmissions, broadcasters ensure that their costs are not going up but could even get reduced substantially.

g. **DRM can utilise the existing transmission infrastructure** of a broadcaster, such as transmitters and antennas, which may only need some modifications and/or upgrades for digital broadcasting. Only a few digital transmitters can cover an entire country or large geographical area, unlike hundreds of transmitters which today are needed for FM or equivalent digital broadcasts. Digital DRM transmitters are significantly more energy efficient than analogue ones and allow for massive operational savings.

h. DRM supports single-frequency network operation (SFN) to serve a region or even the whole country on a single broadcast frequency for optimized listener coverage.

i. **DRM is available to digitise VHF band I, band II (the FM band) and also band III**. Depending on the local regulations, there might not even be the need to have a change in broadcast licencing; therefore broadcasters can be on air very quickly by providing more efficient services to their listeners.

CONCLUSIONS

1. DRM is a perfect standard for digitising FM services, keeping broadcasters in full control of their transmission infrastructure and optimized for the broadcast's individual coverage needs. DRM's advanced features revolutionize the radio experience for listeners, allowing broadcasters to develop new revenue streams and to intensify listener engagement.

2. DRM for the FM band is a complementary solution to DAB(+) multiplex networks, including full service linking. Receiver and chipset manufacturers are ready with combined multi-standard receiver solutions.

3. Successful DRM+ trials have been supported for the past few years in Germany, UK, India, the Vatican, Norway, Sri Lanka, Brazil and France (in bands I, II and III). Currently there is a DRM+ trial going on in Sweden.

4. **Now is the time for radio broadcasters to form their own opinion by evaluating DRM and its benefits.** The DRM Consortium and its members along with major domestic receiver chipset companies are ready to support local trials.

Please contact us by sending an email to: **projectoffice@drm.org**

For further information, please visit our website: **www.drm.org** and stay up-to-date on latest DRM developments around the globe through our newsletters: **www.drm.org/?page_id=320**

The recently updated **DRM Introduction & Implementation Guide (DIG)** provides an efficient functionality overview and particularly focusses on the benefits of DRM for broadcasters. The document is available as a free download from the DRM web site:

www.drm.org/wp-content/uploads/2013/09/DRM-guide-artwork-9-2013-1.pdf

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