Use of DRM + in the FM Band
87.5-108 MHz

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**DRM is the Global Digital Radio Standard for all Bands Below and Above 30 MHz!**

<table>
<thead>
<tr>
<th>AM</th>
<th>FM</th>
</tr>
</thead>
<tbody>
<tr>
<td>LW</td>
<td>B1</td>
</tr>
<tr>
<td>MW</td>
<td>B2</td>
</tr>
<tr>
<td>SW</td>
<td>B3</td>
</tr>
</tbody>
</table>

**Drm30**

- For AM broadcasting bands up to 30 MHz:
  - Large coverage areas
  - Robust against fading and interference

**Drm+**

- For all VHF broadcasting bands above 30 MHz:
  - Large/ regional coverage
  - Option to enhance radio spectrum (bands I/III)

For more information, visit [www.drm.org](http://www.drm.org)
Challenges to convert to Digital Radio

Digital Radio follows similar rules as for DTT, some aspects to consider:

- Available spectrum
- Size of the area to cover (country size, regional and local foot prints)
- Capacity for Programs & Services (for actual and future)
- Costs for new infrastructure
- Cost for simulcast period
- Choice & price of receivers

DRM+ offers very flexible and cost efficient solution to adopt all scenarios!
DRM+ is the most actual ITU confirmed Digital Radio Standard
DRM+ fits into the FM channel raster

- DRM+ RF signal needs less Spectrum bandwidth compared to FM
- More RF channel possible in VHF Band II as for FM (spectrum efficient!)

**Diagram:**
- FM RF peak power
- DRM+ RF average (RMS) power
  - 200 kHz Single Carrier
  - 96 kHz 212 Carrier
  - 4-QAM Modulation
  - 16-QAM Modulation

[www.drm.org](http://www.drm.org)
## DRM+ Key Parameter

Most important general parameter of DRM+

<table>
<thead>
<tr>
<th>General Parameter</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency Range</td>
<td>47MHz to 240 MHz</td>
</tr>
<tr>
<td>RF Channel Bandwidth</td>
<td>96 kHz, conform to FM raster (100kHz)</td>
</tr>
<tr>
<td>Audio Coding</td>
<td>MPEG xHE-AAC; MPEG 4 HE AAC (surround),</td>
</tr>
<tr>
<td>Data Rate</td>
<td>37 kbit/s to 186 kbit/s (scalable)</td>
</tr>
<tr>
<td>Modulation</td>
<td>COFDM</td>
</tr>
<tr>
<td>Sub-Carrier Modulation</td>
<td>4 QAM / 16 QAM</td>
</tr>
<tr>
<td>Transmission Power</td>
<td>-8 dB to -20 dB to coordinated FM Power</td>
</tr>
<tr>
<td>Services</td>
<td>Up to 4 (Audio, Data)</td>
</tr>
</tbody>
</table>
**Introduction scenarios:**

- **Anywhere in the VHF bands** (seamless receiver switching)
- **Adjacent to linked FM signal:**

  Recommended values:
  \[ \Delta f = \text{min. } 150 \text{ kHz} \]
  \[ \Delta P > 20 \text{ dB for } \Delta f = 150 \text{ kHz} \]

**SFN Support**

(Single Frequency Network)

→ Efficient spectrum usage
DRM+ flexible for different spectrum situations using VHF Band I, II and III

Spectrum not full

FM  1 Service

Spectrum full

VHF Band II  VHF Band II

1 Service

1 to 4 Services

www.drm.org
Assumption:
- Same coverage
- Stationary reception profile in acc. to ITU-R
- Same Antenna Gain
Coverage DRM+ vs. FM

Assumption:
- Same transmitter power
- Stationary reception profile in acc. to ITU-R
- Same Antenna Gain
Transmitter Power DRM+ vs. FM

- DRM+ ready FM Transmitter can be converted into DRM+
- the DRM+ RF power is approx. factor 2.5 lower than FM due to different amplification class
- FM class C (peak power); DRM+ class AB (average power rms)

FM

- 10 kW
- 1 kW

DRM+

- 4 kW
- 400 W

~ 2.5 : 1
Implementation of DRM+

- Major transmitter companies have off-the-shelf or concept-proven DRM+ Tx
- Monitoring and measurement receivers available
- Commercial receiver → SDR kits, chip sets and prepared chip-sets available
DRM+ Benefits for the Broadcaster

- Up to 4 Service per frequency channel
- Use of Existing Transmission System & Equipment
- Wide use of spectrum in VHF Band I, II and III (30MHz to 230MHz)
- Significant lower Total Cost of Ownership (TCO),
- Better coverage using Single Frequency Network design
- Opportunities for value-add services with data, text and other services
- Increased Audience Interest Results in Increased Advertising Interest