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

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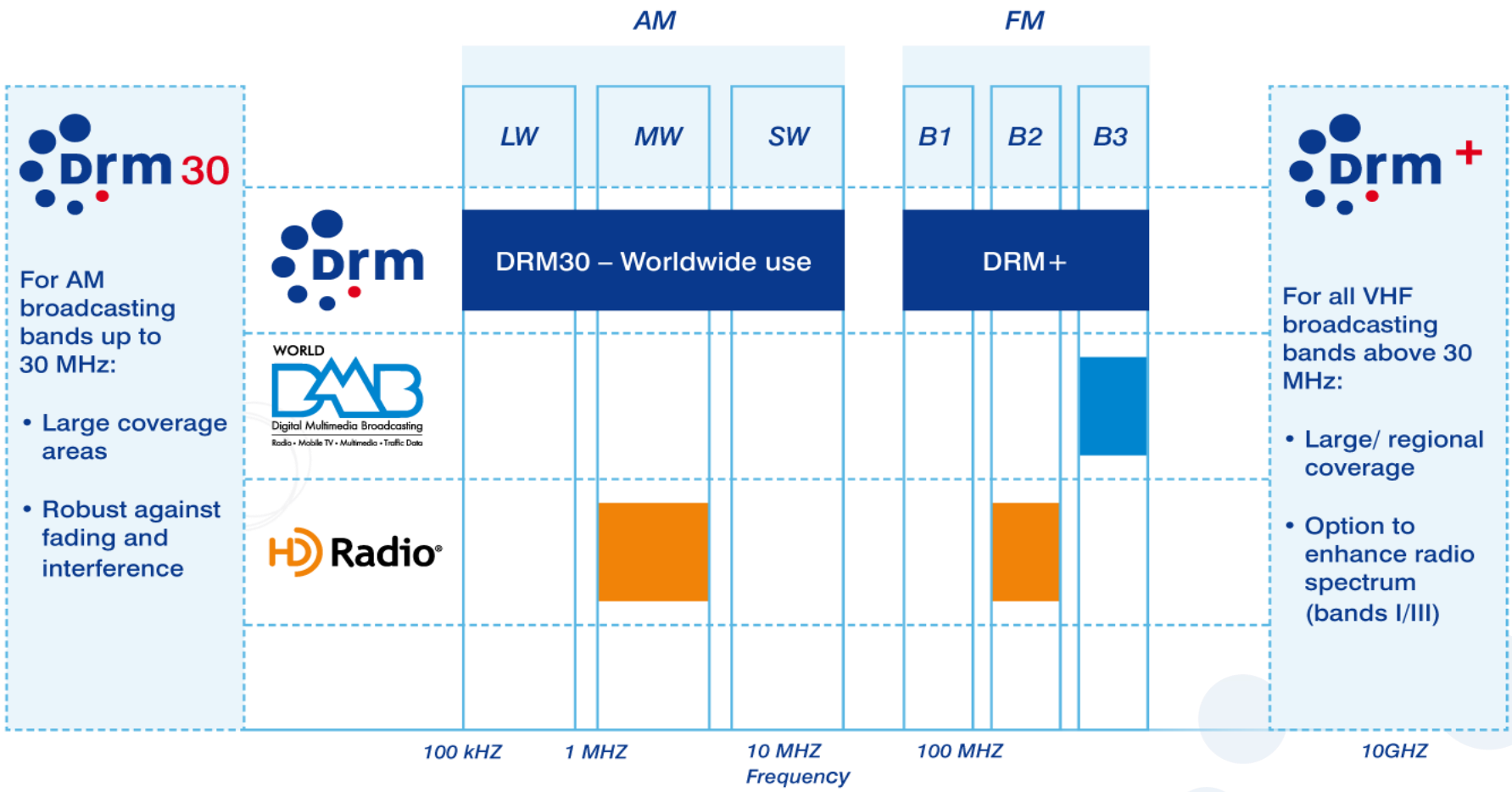
DRM is the Global Digital Radio Standard for all Bands Below and Above 30 MHz!



DRM 30

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)

www.drm.org

Challenges to convert to Digital Radio

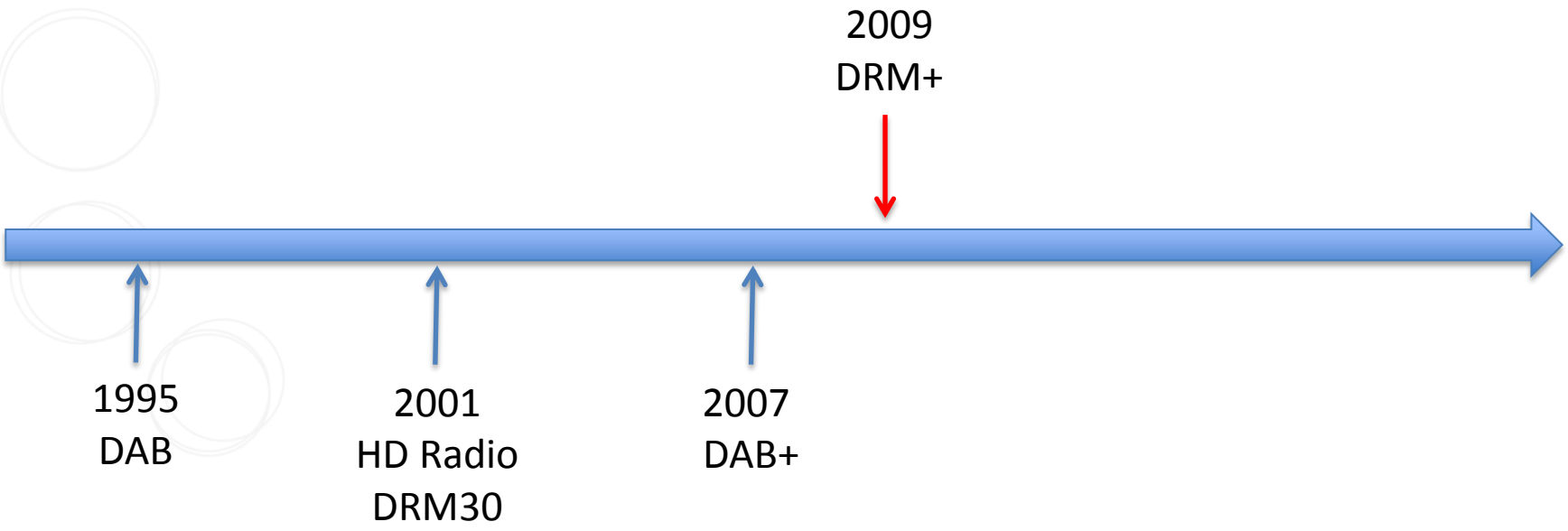
Digital Radio follows similar rules as for DTT, some aspects to consider :

- 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 !

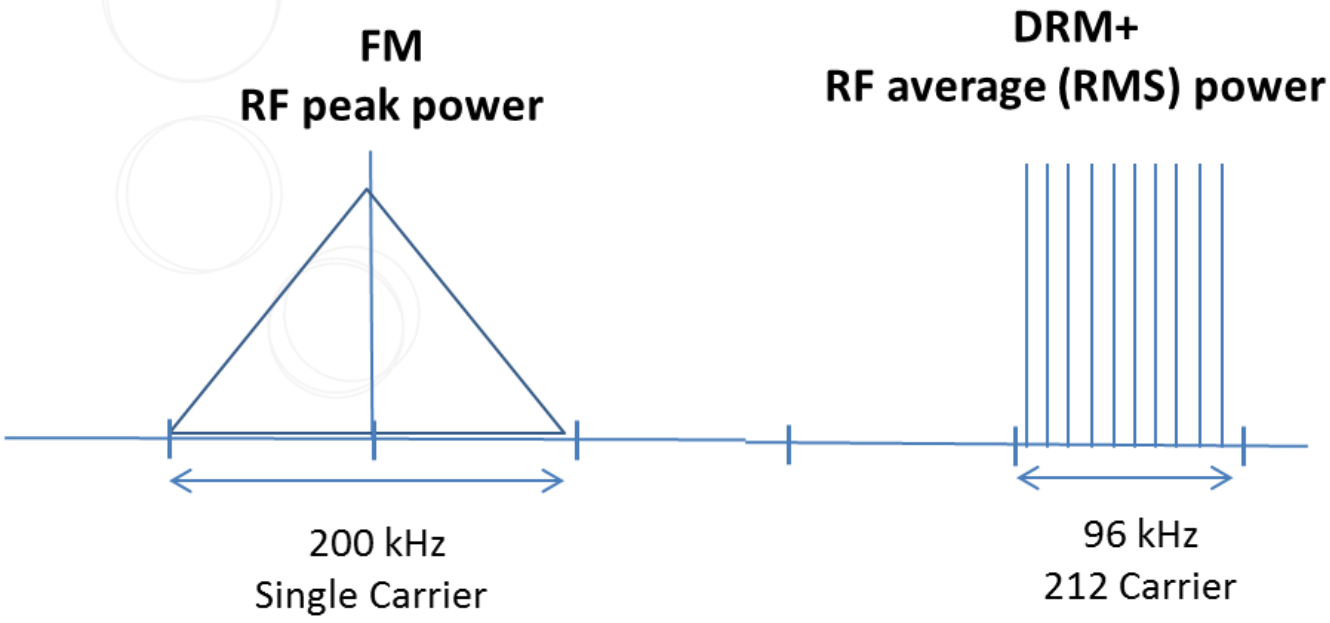
DRM+ latest Technology

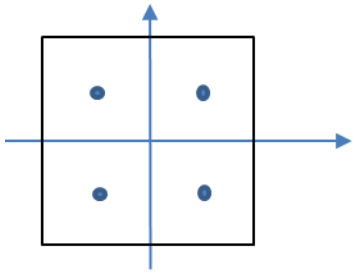
- DRM+ is the most actual ITU confirmed Digital Radio Standard



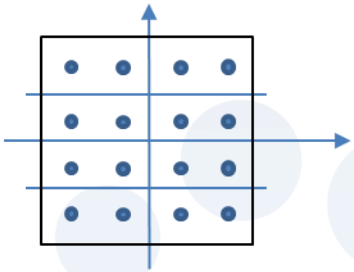
DRM+ fits in existing FM raster

- 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!)





4-QAM Modulation



16-QAM Modulation

DRM+ Key Parameter

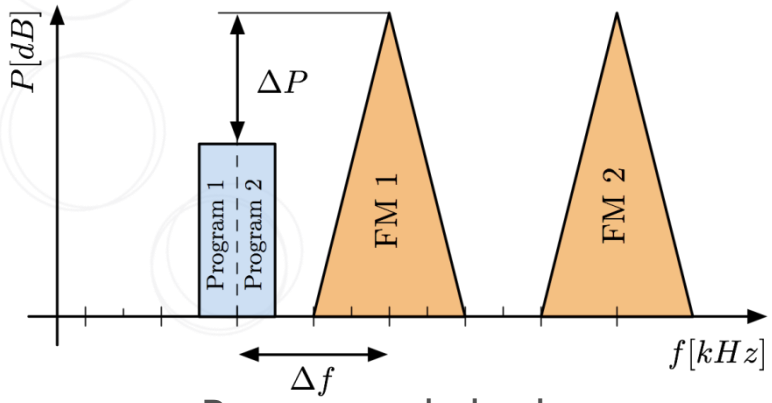
Most important general parameter of DRM+

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

Migration Scenarios for DRM+

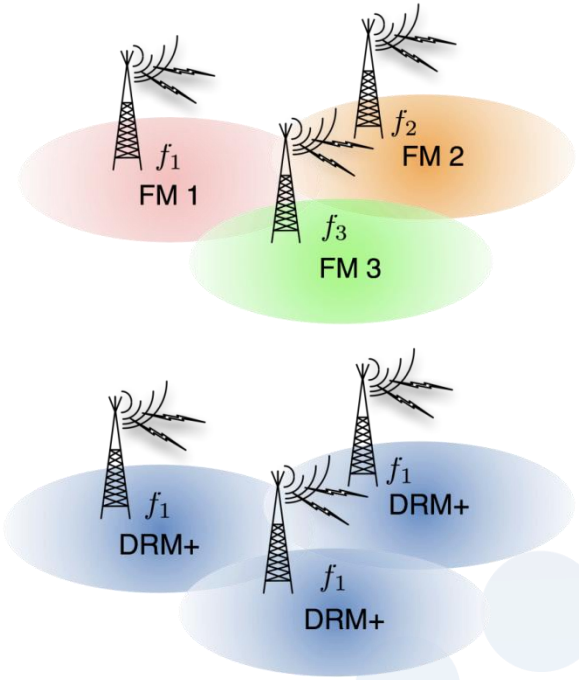
Introduction scenarios:

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



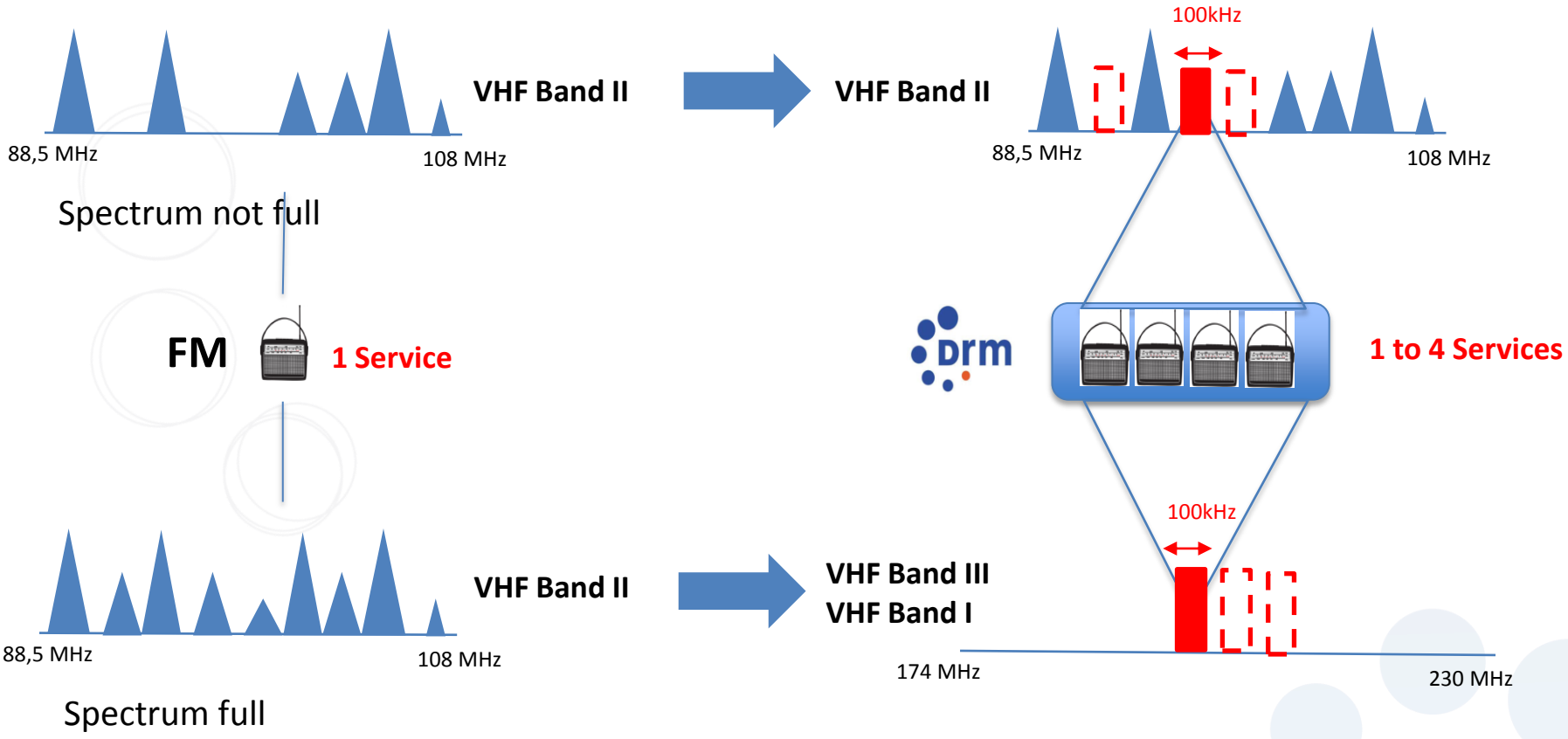
Recommended values:
Δf = min. 150 kHz
ΔP >20 dB for Δf=150 kHz

- **SFN Support**
  (Single Frequency Network)
  → Efficient spectrum usage



Migration Scenarios for DRM+

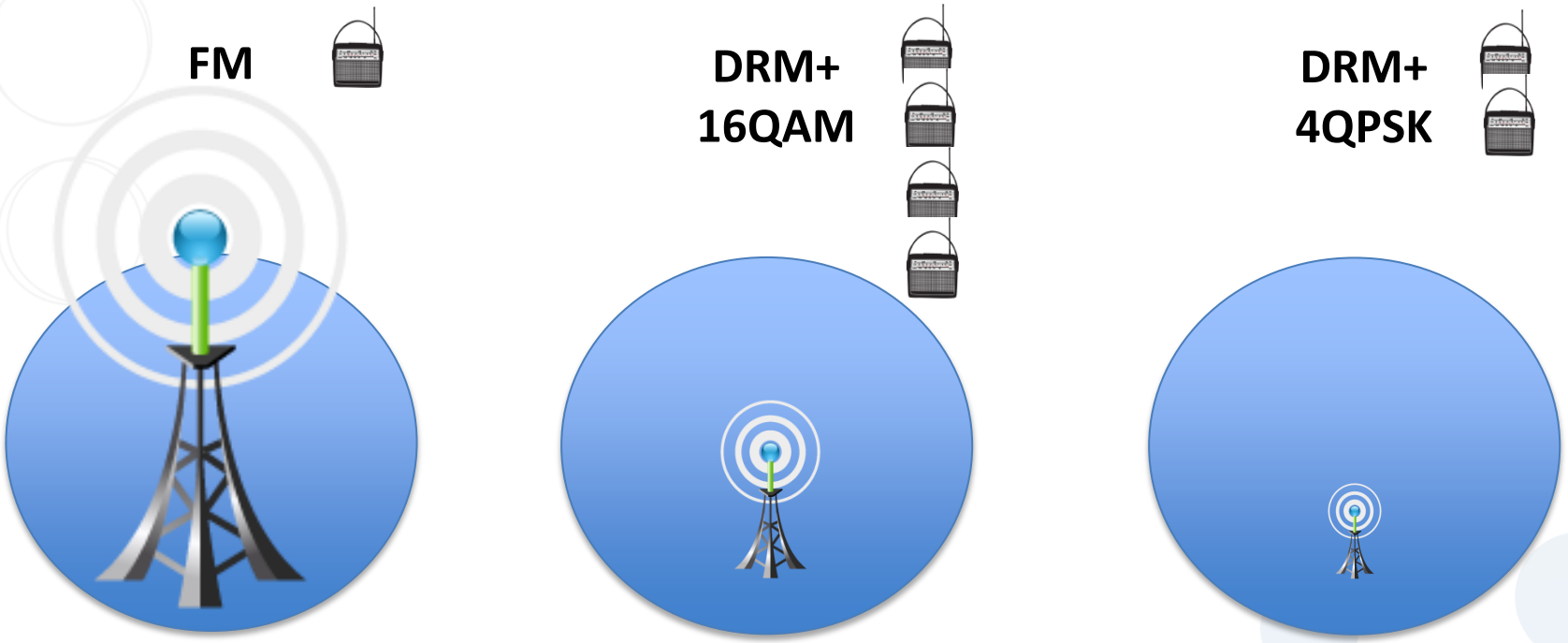
DRM+ flexible for different spectrum situations using VHF Band I, II and III



Coverage DRM+ vs. FM

Assumption:

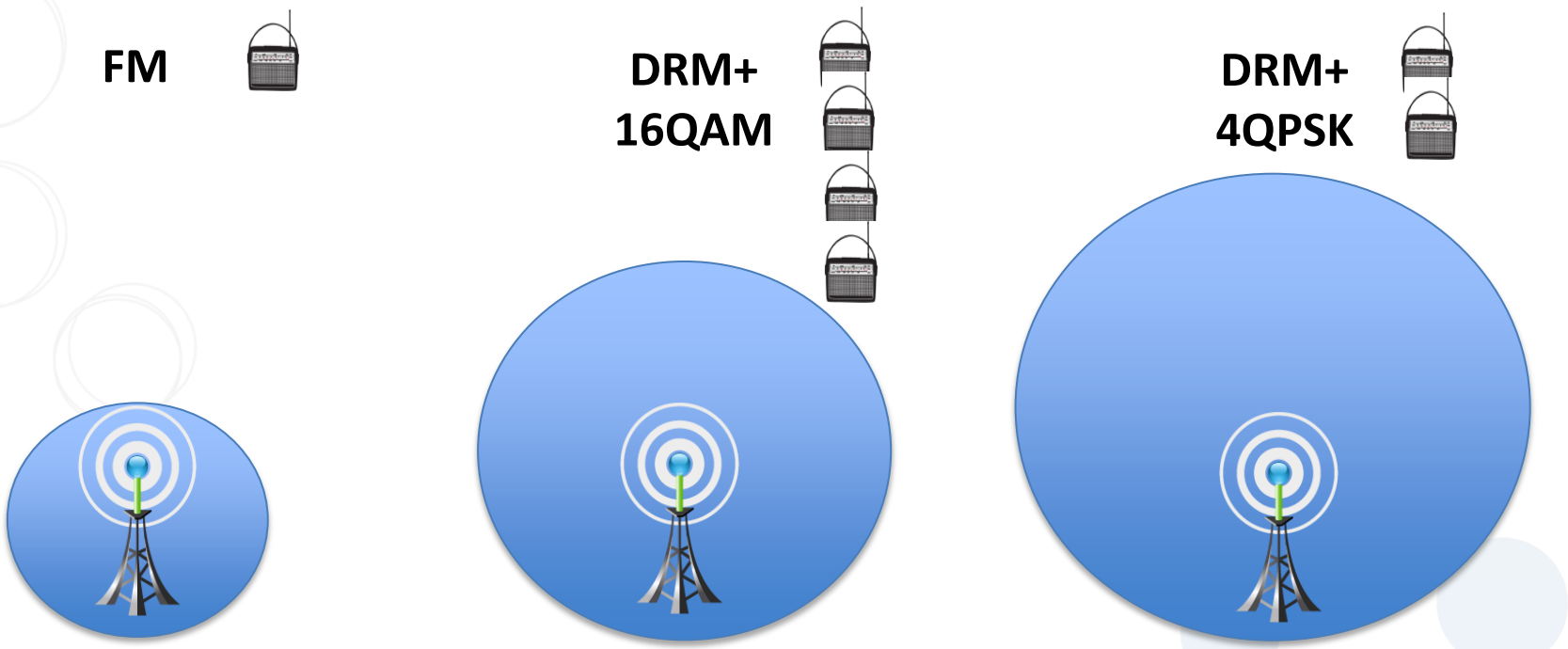
- Same coverage
- Stationary reception profile in acc. to ITU-R
- Same Antenna Gain



Coverage DRM+ vs. FM

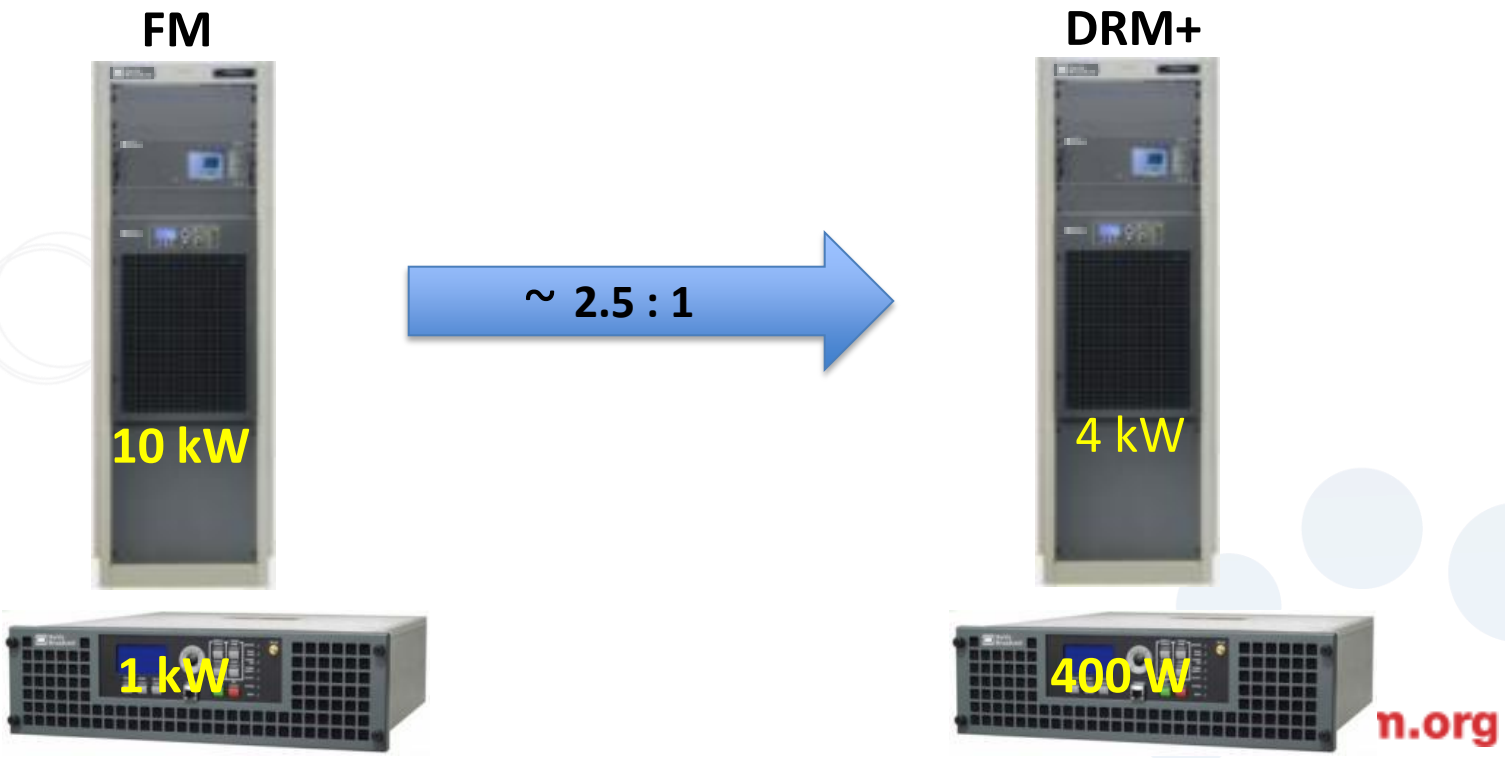
Assumption:

- Same transmitter power
- Stationary reception profile in acc. to ITU-R
- Same Antenna Gain



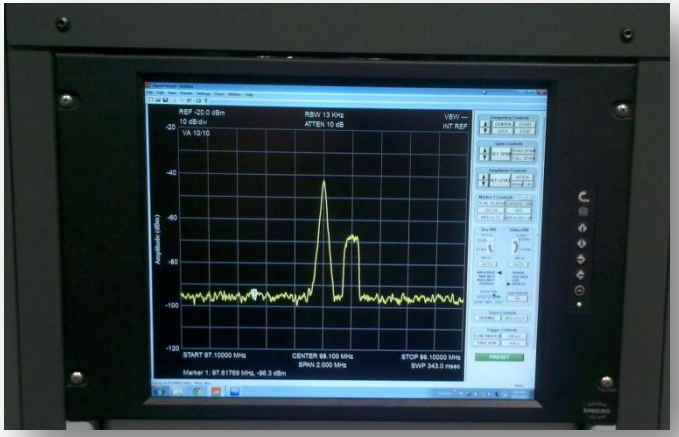
Transmitter Power DRM+ vs. FM

- 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)



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



Summary benefits of DRM+

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