Findings of the investigations with DRM+ in VHF band III

► *Motivation for the DRM+ field trial in VHF band III in Kaiserslautern*

Prof. Dr. Andreas Steil
University of Applied Sciences of Kaiserslautern

Joachim Lehnert
Media Authority of Rhineland-Palatinate (LMK)

► *Short review – Investigations of DRM+ in FM VHF band II (87.5 – 108 MHz)*

Lab measurements and two field trials in Kaiserslautern in 2008 and in 2009 with DRM+ in FM VHF band II successfully completed

Objectives:
- ☑ Investigations on **compatibility** between FM and DRM+
- ☑ Determination of **DRM+ coverage** for fixed and mobile reception

Positive technical results:
- ☺ DRM+ transmitters could be coordinated (**compatible with existing FM networks**)
- ☺ DRM+ transmitters show a **better coverage** than FM transmitters (equal ERPs) especially, in the service area, for mobile and portable reception
- ☺ DRM+ is **frequency economic** since SFN is possible

Negative regulatory results:
- ☹ **Available frequencies are not foreseeable** for a long time in VHF band II
- ☹ **Potential restrictions of aeronautical services** block the deployment as long as ITU-Recs for compatibility with digital systems in VHF band II are missing
- ☹ **Multinational coordination procedures** in Europe are missing

The - somewhat sad – conclusion is obvious:
- ☹ **Deploying DRM+ in FM VHF band II in Europe is impossible (mid/long term).**

► *Considerations of the deployment of DRM+ in VHF band III*

Is there another fitting broadcasting service band for DRM+ in Europe with a chance of a quicker deployment as in FM VHF band II?

VHF Band I (47- 68 MHz)	VHF Band III (174 – 230 MHz)
☹ Not a digital broadcasting services band of RRC-06	☺ Allocated to the digital sound broadcasting service in RRC-06
☹ Other services operate in VHF band I	☺ Huge amount of available frequencies without affecting the use of DAB
☹ Extensive network infrastructures, lack of clarity of the RX design (RF frontend, reception antennas)	☺ Digital radios for VHF band III are in the market for DAB reception.
☹ Propagation conditions are problematic; no frequency coordiniation agreements	☺ Coordination regulatories of RRC-06 are applicable for DRM+
☺ VHF band I is currently included in the DRM+ ETSI standard	☹ VHF band III is NOT currently included in the DRM+ ETSI standard – it's not a technical motivated border, more a fictive border to protect the DAB frontyard
☹ not feasable ☹	**☺ fitting candidate ☺**

► *Considerations of the deployment of DRM+ in VHF band III*

MOTIVATION for deploying DRM+ in VHF band III:
Acceleration of the digitalization of the sound broadcasting with DRM+ in addition to DAB+ in VHF band III, especially for local and regional sound broadcasters (DAB is uneconomical)

First: Clarifications on the technical level:

? Is DRM+ applicable with its system parameters in frequencies up to 230 MHz for **mobile reception** due to the OFDM subcarrier spacing?

? Is DRM+ **compatible to existing DAB networks**?

? Is DRM+, with its coverage and network infrastructure, an **alternative or even better solution** to **DAB/DAB+** for **local and regional sound broadcasters**?

? Can **DAB+ radios be updated for DRM+ reception** with low cost (antenna and RF frontend work in the same frequency band, audio decoding is the same, signal processing is similar) ?

► *Investigations of DRM+ in VHF band III (174 – 230 MHz)*

To clarify the questions regarding coverage and system parameters for a good mobile reception:
Laboratory measurements and field trials in Kaiserslautern were performed

Objectives (same as in the FM VHF band II inverstigations)**:**
☑ Investigations of **compatibility** between DAB/DAB+ and DRM+
☑ Determination of **DRM+ coverage** for fixed and mobile reception at high speed

Approach:
1.: Laboratory measurements with channel simulations
2.: Field trial under real conditions

Concept and results of the lab measurements and the field trial after the coffee break!