Deutsches DRM Forum

Considerations for the Digital Transition of Local and Regional Terrestrial Broadcast Radio in Germany

1 Summary

As part of the transition from analogue FM to digital radio broadcast, it is important to consider all broadcasters and their various coverage areas for national, federal state, regional and local programmes. With digital distribution, terrestrial radio broadcasting can improve as concerns the technical quality and - given sufficient frequency resources - the range of existing programmes or new coverage. This may be implemented with the digital broadcasting systems Digital Audio Broadcasting (DAB/DAB+) in VHF Band III, and with Digital Radio Mondiale (DRM in mode E/DRM+) in VHF Band II (the FM Band) and alongside DAB in VHF band III.

DAB is the preferred system for digital broadcasting of numerous programmes in identical large distribution areas and is already established on the market. However, DAB is not optimal for replicating the existing distribution areas of local broadcasters, because the limited number of programmes in a local area makes its deployment uneconomical and spectrally inefficient. There is also a lack of available frequency resources in VHF Band III.

DRM is particularly well suited for digital distribution of regional and local programmes and offers an opportunity for local and community media for transitioning into digital distribution in addition to the national, federal state and regional DAB offerings, and thus facilitates conversion of all terrestrial radio broadcasting to digital.

DAB and DRM supplements each other in VHF Band III. Large-area distribution with a multitude of broadcast programmes on DAB to open the market, and the subsequent introduction of regional and local broadcasting in their original analogue FM distribution areas as a common digital radio offering in Band III, will open up the opportunity to accelerate digitalisation of terrestrial radio broadcasting as a whole.

The use of DRM in VHF Band II (the FM band) is currently not feasible, as the FM stations have not gone off air in order to free the necessary spectrum. There are also technical problems such as intermodulation products in FM radio receivers and negative impact on aeronautical radio navigation services. Digital transmission with DRM+ in VHF band II will only be possible after FM services have been discontinued and the interference problems have been resolved. This process requires a European-wide coordination and planning effort.

The market prerequisites for DRM have yet to be created. Low interest in digital distribution from the private broadcasters has so far made the digitalisation of local terrestrial radio a long-term proposition. Following the present market introduction to digital radio with DAB, there remain nonetheless a number of decisive questions to be answered for the market introduction of DRM in order to establish the market prerequisites and business models, in particular the transmitter infrastructure and the availability of DRM+ capable digital radio

receivers. On the regulatory side, the broadcaster's access to simulcast distribution should be improved.

The future introduction of DRM can be advanced. Although the market relevance of local broadcasters is not high enough to provide sufficient impetus for the industry, an introduction of DRM in Germany and large parts of Europe could be promoted through the presently ongoing international developments and media policy efforts to provide multi-standard digital receivers.

2 Situation of FM Radio Broadcasting

2.1 Distribution of radio broadcasts through FM is insufficient

A large number of programmes are transmitted on the VHF band II (FM band 87.5-108 MHz), which is the main means of radio broadcasting in Europe. However, there are no economically viable FM frequencies left for new services. The FM band is fully allocated and therefore cannot offer a basis for an increased diversity in the radio broadcasting landscape nor offer an increase in the range of the licensed broadcasters.

This applies in particular to local FM radio as well as the community and training media that are broadcast in analogue on the FM band. For these broadcasters, the general rule is that their license areas can be only partially covered. This is particularly due to the strong interference on the FM frequencies used for local radio broadcasting, and additional economically viable FM frequencies are not available due to full allocation of the FM band.

2.2 Terrestrial distribution of radio broadcasts can be optimised with digital systems

Digital radio systems make it possible to obtain an increase in the diversity of offerings that will even allow new radio broadcasters a chance for economically viable coverage as well as a qualitative and quantitative improvement in the range of private programmes in the dual systems.

These suitable radio frequency ranges are available.

- The VHF band II (FM band 87.5-108 MHz)
- The VHF band III (VHF-Band III 174-230 MHz)

These suitable transmission systems are available:

- Digital Audio Broadcasting (DAB/DAB+)
- Digital Radio Mondiale (DRM in mode E, DRM+)

The suitability of these systems for the digitalisation of local and regionalised terrestrial radio broadcasting in the frequency ranges mentioned is described in the following.

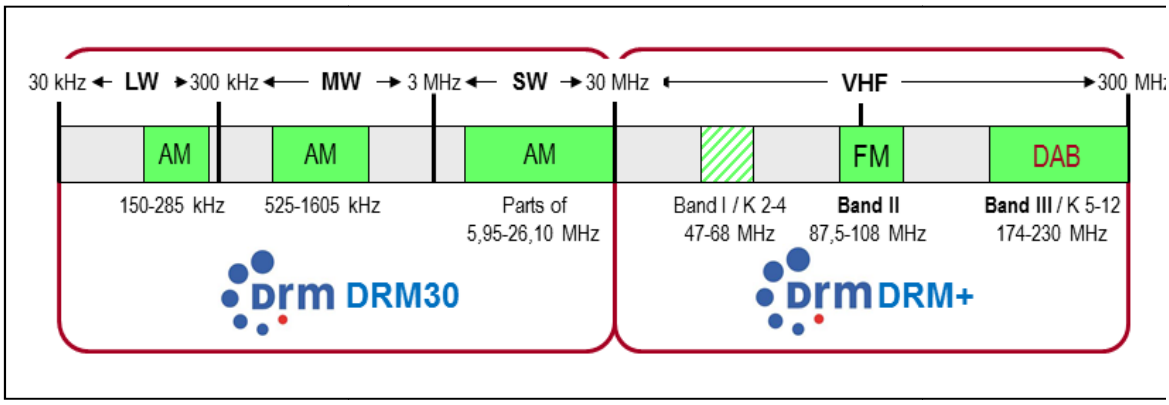
3 Systems Descriptions of DRM and DAB

3.1 The DRM standard

Digital Radio Mondiale (DRM) is a narrow-band digital transmission system, which was originally designed by the international DRM Consortium for digitalisation of the AM bands up to 30 MHz (long, medium and short wave). DRM was standardised with the OFDM modes A through D by ETSI in 2001 and this configuration is often referred to as "DRM30".

In 2009, the DRM standard was extended with a mode E, which permits DRM to also be used in the VHF bands above 30 MHz. This part of the DRM standard is often referred to with the colloquial term "DRM+", and is used in the following instead of the standards-compliant term "DRM mode E". The extension of the DRM standard for VHF frequencies was recommended by the ITU in 2011 as a digital audio broadcasting system for worldwide use in the frequency range 30-300 MHz, and in ETSI standards for use in all VHF bands up to 300 MHz - i.e. both in VHF-Band II and VHF band III - completed in June 2012 (see Figure 1).

Figure 1: Frequency ranges for the DRM system.



3.2 Systems comparison between DRM and DAB

DRM+ and DAB (the term "DAB" is used in the following to include the "DAB+" variant) share many features.

- Both are open European ETSI technical standards with common interfaces and are recommended by the ITU for worldwide use
- Both offer co-channel capability (SFN) and mobile reception at high speeds
- The range is significantly longer as compared to an FM transmitter with the same radiated power and both systems are also less sensitive to interference due to their digital implementation
- Audio encoding with MPEG-4 HE- AAC v2 (the encoding used in the DAB variant "DAB+").
- The range of services that can be transmitted in addition to the radio programme is identical (Journaline, Text Messages/Dynamic Labels, TPEG, slideshow, etc.).
- Modulation is OFDM.

Thus, both systems are so closely related that they can in principle be processed on the same receiver architecture (see Table 1).

The major difference between DRM+ and DAB is the occupied bandwidth (96 kHz and 1536 kHz, respectively) and consequently the transmission capacity. With DRM+ it is typically possible to transmit two to three radio services at high quality, plus additional services. Compared to DAB (typically 16 programme channels) this limits DRM to fairly small multiplexes. Therefore, DRM is especially suitable for the coverage of areas with lower capacity requirements such as regional and local distribution of digital radio programmes, but even this can be over large coverage areas if a Single Frequency Network (SFN) with several transmitters on the same frequency is used.

	FM radio	DRM+	DAB
Programme channels	1 programme in HiFi stereo	Approx. 2-3 programmes (max. 4 services)	Approx. 16 programmes (max. 64 services)
Additional services	RDS	Simple web pages (Journaline), rich multimedia, programme guides, slideshows, traffic information, etc.	
Data rate	1,1 kbit/s for RDS	37-186 kbit/s	~ 1125 kbit/s (PL=3A)
Audio encoding	None (analogue)	MPEG-4 HE-AAC v2	
Frequency range	VHF band II (FM band 87,5-108 MHz)		
		VHF band III (174-230 MHz)	
Available transmitter network configurations	Single transmitter or Multi Frequency Network (MFN)	Single transmitter, Multi Frequency Network (MFN) or Single Frequency Network (SFN)	
Modulation	Analogue FM	Digital COFDM	
Bandwidth	390 kHz (Carson)	96 kHz	1536 kHz

Table 1: System properties of FM, DRM and DAB

4 Suitability of the VHF Frequency Range for Digital Radio Broadcast Distribution

4.1 Digitalisation of radio broadcasting in VHF band II (FM band 87.5-108 MHz)

The FM band is completely occupied with FM transmitters and will continue to be used intensively for analogue FM radio in much of Europe - even if individual states envisage the end to their analogue FM radio broadcasting. In Germany, an amendment to the Telecommunications Act (TKG) in 2012 extended a cap on analogue frequency assignments until 31 December 2015. This may be further extended to ten years after the expiry of the present frequency assignments.

Despite the fact that no additional economically viable FM radio stations can currently be coordinated due to the completely full VHF band II spectrum, the Electronic Communications Committee (ECC) of the CEPT (European Conference of Postal and Telecommunications Administrations) has been concerned with the question of whether transmitters using digital radio systems compatible with the existing FM transmitter networks can be planned, should it be possible to make capacity available (e.g. by closing down existing FM stations).

The ECC adopted a Technical Annex to ECC Report 141 on this issue in April 2012: "Future Possibilities for the digitalisation of Band II (87.5-108 MHz)"[1]. The digital radio systems are described with the technical characteristics that could be considered for future use for the digitalisation of VHF band II - DRM in mode E (DRM+), HD Radio (a US system) and RAVIS (a Russian system), and the compatibility and protection of the existing analogue FM radio and neighbouring services.

It was found that even if some FM frequencies could be freed up for digital radio systems, the interference of all digital radio systems (be they DRM, HD Radio, DAB or any other OFDM-based system) with aeronautical radio navigation services and FM reception was so strong that a parallel use of digital sound broadcasting systems in the VHF band II is not feasible.

[1] http://www.erodocdb.dk/Docs/doc98/official/pdf/ECCREP141.PDF
http://www.erodocdb.dk/Docs/doc98/official/zip/ECCREP141techn-suppl.ZIP

The European Broadcasting Union (EBU) wrote a Technical Report TECH 3357 in early 2013 called "Case Studies on the Implementation of DRM+ in band II"[2]. Annex F on the "Impairment of FM Broadcast Reception by In-band OFDM Signals" presents laboratory measurements from the German Institut für Rundfunktechnik (IRT, German Institute for Broadcasting Technology) which demonstrate that FM radio reception is interfered with by DRM+ and HD Radio intermodulation products up to a frequency separation of ± 1-2 MHz.

In Annexes C-E "Planning study for DRM+ in band II (Germany)" the intermodulation interference results established in the laboratory were applied to a computer-aided frequency planning of DRM+ transmitters. It was unequivocally found that an implementation of an economically viable DRM+ distribution in parallel with analogue FM transmitters would not be possible in VHF band II due to the intermodulation issues.

Therefore, no frequency space will be available in FM band II for the launch of digital systems in the foreseeable future because of the densely occupied spectrum and the unresolved interference problem inside the FM band, but also because of the disturbances in the aeronautical radio navigation services above the FM band. Consequently, it will not be possible to further develop FM band radio broadcasting with neither the existing analogue nor with a digital modulation scheme. Any use of VHF band II should be thus be founded on a Europe-wide coordinated digitalisation strategy and cannot be implemented until analogue FM use has ceased, at the earliest.

4.2 Digitalisation of Radio Broadcasting in VHF Band III (174-230 MHz)

At the RRC-06 frequency conference the entire VHF band III (174-230 MHz) was assigned to the digital broadcasting, and in Germany and much of the rest of Europe digital radio broadcasting is having exclusive use of this band.

In the "Nationalen VHF-Frequenzplan für Deutschland“ (National VHF Frequency Plan for Germany) issued in January 2012, the technical frequency resources for DAB coverage are shown as proposed by the TKLM/PTKO (Technical Working Group of the Public Broadcasters and Media Authorities). The approach provides for an initial six DAB layers throughout Germany (two nationwide, a transnational, two national and one regional), with the potential for further regional and limited metropolitan area coverage (see Appendix 1).

Since the launch of nationwide digital radio in Germany with DAB in August 2011, further DAB transmitter networks have been put into operation with programmes of the federal state public-service broadcasters, and in some federal states even DAB transmitter networks with programmes from private providers.

DRM+ transmitters can be coordinated with DAB networks and are fully compatible without any inference issues. The compatibility criteria between DAB and DRM+ are defined in the relevant ITU -Recommendation[3].

Frequencies for local distribution with DRM+ could be made available in the VHF band III without hindering the expansion plans for DAB. For example, channel 5A is no longer planned in the first six DAB Layers for large-area coverage with powerful DAB stations in Germany. Consequently, 15 DRM+ channels could be scheduled to allow the transfer of

[2] https://tech.ebu.ch/docs/tech/tech3357.pdf

[3] Recommendation ITU-R BS.1114-7 (12/2011) “Systems for terrestrial digital sound broadcasting to vehicular, portable and fixed receivers in the frequency range 30-3-000 MHz”,
Recommendation ITU-R BS.1660-6 (08/2012) “Technical basis for planning of terrestrial digital sound broadcasting in the VHF band”

existing local or highly regionalised radio programmes on this channel. New DRM+ offerings could also be realised.

The exact regulatory conditions for the DRM+ transmitter coordination would still need to be clarified by the issuing NTAs, e.g. by the Bundesnetzagentur (BNetzA, Federal Network Agency) in Germany.

Frequency-wise, DAB and DRM+ technology can then be used together VHF band III.

5 Review of DAB for Digitalisation Specifically of Local and Regionalised Radio Broadcasting

5.1 Suitability of DAB for large-area distribution of many services

DAB is very well suited for the distribution of large number of programmes to large and identical coverage areas over (compared to FM distribution) low-cost transmitter networks using Single Frequency Networks, and provides high reception reliability for mobile and domestic reception.

Besides the quite expensive professional equipment available for establishing a DAB transmitter infrastructure, an economically attractive alternative is to implement a DAB multiplex generator with Open Source software[4] or with new entry-level DAB content servers from established providers. Such solutions may be appropriate for non-commercial operators and local broadcasters.

A complete transmission infrastructure with a multiplex generator and a DAB transmitter unit can be built for a basic investment of approx. 15000-30000 EUR (depending on the required transmitter power), although reliability will not be quite as high as with commercial equipment.

5.2 Marginal areas for DAB for local broadcasting

DAB is only suitable with certain limitations for local coverage areas or for digital distribution of individual broadcasters with different regional target coverage areas, even if a cost-effective infrastructure can be provided.

- For the distribution of only individual radio stations in small heterogeneous coverage areas with few programme offerings, the transmission capacity of DAB is far too high (typically16 different radio programmes on one transmitter). As the transmission capacity cannot be anywhere near filled, such use is not frequency efficient. 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 as compared to DAB, which also implies an economic advantage for DRM+.
- There are not enough DAB allotments available in Germany to map all the existing local FM coverage onto DAB transmissions. Therefore, when using DAB for digital distribution of local broadcasters, a new structure would have to be implemented which expands today's local coverage areas into common regional coverage areas.

[4] http://opendigitalradio.org/index.php/Main_Page

- If the existing FM coverage areas and the coverage wishes of regional and local FM broadcasters must be taken into account as part of the digitalisation of all terrestrial radio broadcasting, it is clear that this will not be easy to achieve with DAB taking the reasons above into account.

6 Review of DRM+ Specifically for Digitalisation of Local and Regional Radio Broadcasts

DRM+ in VHF band III can provide an opportunity to support the digitalisation of terrestrial radio in addition to large-area DAB coverage, in particular for existing or new local and regional offerings that cannot use DAB efficiently.

Local radio broadcasters are known to be more than reluctant to offer their services via a digital system in addition to existing terrestrial distribution with FM. An incentive could be created on DRM+, for example, if a technical increase in range is seen as an economic advantage. This could also satisfy e.g. the demands for new frequencies of university campus radios for terrestrial broadcasting, which can no longer be met in VHF band II.

In contrast to DAB, for which the conditions for the market (especially a regular programme offering, a business model for broadcasters with transmission services and available consumer receivers) are already given, such conditions must be still be created for DRM+.

For DRM+, the following are key points that must be observed for a market entry.

6.1 Implementation of DRM in digital radio receivers

There are currently no digital radio receivers for DRM+ available on the market, nor would it make sense to produce receivers exclusively for DRM+. Because of the strategy to digitise terrestrial radio with both DAB and DRM+, it is considered necessary to bring receivers on the market that will receive both of these systems as well as FM on VHF band II.

The technical requirements for a cost-effective implementation of DRM+ in DAB radios are simple, low cost and easy to implement due to the system similarities between DAB and DRM+, and an identical receiver design (antenna, RF frontend) and chip technology (MPEG-4 HE-AAC v2, OFDM, data services and Alternative Frequency Switching (AFS)). The regulatory framework for the implementation could be promoted through EU regulation.

To prove that DRM+ can in fact be received with the same commercially available and inexpensive components as DAB, the Media Authority of Rhineland-Palatinate (Landeszentrale für Medien und Kommunikation Rheinland-Pfalz - LMK) in 2012 commissioned the University of Kaiserslautern to build a DRM+ portable radio receiver in cooperation with the Fraunhofer-Institut for Integrated Circuits in Erlangen. It was shown that with a commercially available USB receiver stick for FM and DAB from the manufacturer NOXON (selling prince EUR 24.99), DRM+ could also be received. Thus, if the manufacturer of the DAB/FM receiver stick would make the necessary software updates available, a substantial number of receiver sticks already sold would immediately be able to receive DRM+.

Despite the simple technical implementation for enabling DRM+ reception in DAB receivers with pure software-based decoding, a certain development effort would be required by the manufacturers of hardware-based receivers for the home entertainment and in-car markets. These manufacturers would have to be persuaded with plausible scenarios and strategies to incorporate DRM+ in their DAB receivers. Otherwise there is a risk that no DRM+ capable receivers would be available for the launch of DRM+. This would be detrimental for local

radio broadcasters aiming to use digital distribution via terrestrial DRM+ to compete with the many on-air DAB offerings for which receivers already exist.

The framework for, and willingness of, the industry to adopt multi-standard DAB/DRM+/FM chipsets and receivers for the European market need to be clarified. This would also encompass the inclusion of DRM (DRM30/DRM+) in the “Euro-Chip” initiative propagated by the German public-service broadcaster Deutschlandradio, the BBC and EBU for the reception of DAB, DAB+, DMB, FM (band II) and AM (below 30 MHz).

The "Minimum Receiver Requirements" of the WordDMB (DAB) and the DRM Consortium are already aligned, and thus allow easy specification of combo receivers with both DAB and DRM+ reception.

Furthermore, established manufacturers have already designed both their current and upcoming generations of digital radio receiver chipsets as multi-standard modules with both DAB and DRM+ support.

6.2 Locations of the offerings

In a couple of German federal states (Bavaria and Baden-Württemberg) there are efforts to distribute the local offerings on large DAB multiplexes that cover several local areas. Thus, the coverage area of local FM distribution is increased considerably and a competitive situation is created with local providers from other areas in this regional DAB multiplex.

Amongst others, this raises questions as to the scope of local radio licenses as well as the continued development of local and regional advertising markets, and the distribution costs for areas that are not relevant for a specific broadcaster.

It needs to be determined if the local distribution structures of commercial operators and community media should remain unchanged with digital distribution, or if they could be translated into larger coverage areas.

6.3 Expenditure for the broadcaster

A local radio broadcaster already distributing via FM will have an additional financial burden in order to distribute its programmes in parallel on a DRM+ transmitter infrastructure. These expenses for the broadcaster must be justified with additional income opportunities (e.g. greater technical coverage or additional offerings). For example, a reduction in infrastructure costs could be achieved if the broadcaster operated the transmitters itself, as it is now permitted under the German Telecommunications Act (TKG).

An initial comparison between the distribution costs of DAB and DRM+ shows that with distribution of only one or two programmes, total network costs for distribution within a given coverage area are substantially lower with DRM+ than with DAB.

The technical concept required for a DRM+ transmitter infrastructure needs to be established, especially for the local service area. This would include a cost estimate, and a willingness and framework for the broadcaster to desire DRM+ distribution (either in addition to the existing FM transmission or as a separate distribution channel).

6.4 Market potential for DRM+ in Germany

In Germany, certain federal states such as Bavaria and Baden-Württemberg and Berlin, and the nationwide public-service broadcaster ARD, as well as nationwide and large private broadcasters in individual federal states, base their digital radio broadcasting on DAB.

The remaining broadcasters (especially local providers and community media) for which DRM+ could be advantageously be chosen as the terrestrial digital audio broadcasting system, presently have these nationwide figures for their FM stations.

- A daily reach[5] of about 6.6 million listeners
- A technical coverage of approximately 39 million inhabitants

This coverage is generated in particular by the local broadcasters in North Rhine-Westphalia (about 5.6 million listeners and 17.8 million inhabitants). The other federal states where potential DRM+ distribution areas were identified gave an additional combined reach of 1.0 million listeners and 26.2 million inhabitants.

It seems possible to introduce DRM+ in the mass market as an additional terrestrial radio technology exclusively in Germany, although this would be difficult. However, the establishment of DRM+ could be advanced by the ongoing international developments and the media-political demand for the provision of multi-standard receivers.

It should be clarified under which conditions DRM+ could be promoted in the German and other European markets, respectively, how to gain an international foothold, and how a market entry could be promoted taking DAB into account.

7 Benefits of Using DRM+ in VHF Band III in Addition to DAB

7.1 Benefits for the local radio broadcasters

The benefits for local FM radio broadcasters by taking the step into the digital world with DRM+ in VHF band III are manifold.

- Radio programmes with high technical quality (MPEG-4 HE-AAC v2, even in surround) and additional information services (Journaline, TPEG, Slideshow etc., also for new forms of advertising) with high availability (mobile and home) can be disseminated.
- Gaps in the FM channel coverage in the broadcaster's assigned license area can be filled with DRM+ transmitters working in SFN mode on the same frequency.
- In Germany, broadcast programme providers can decide to either operate transmitters themselves or use an external transmitter operator, in so far as they have been assigned the necessary transmission capacity under the new Telecommunications Act (TKG). This option can also be exploited for DRM+ networks and a broadcaster can therefore focus its coverage expansion according to its own market situation, independently of other programme providers.
- A DRM+ transmitter requires lower power than for FM or DAB coverage to achieve a comparable range, and it can be put into operation independently of the large transmitter networks built by major network operators. The programming feed from the studio to the transmitter may also be realised with IP lines at low cost.

[5] The daily reach is defined according to the German Media Analysis 'MA' as the number of persons that during the day have listened to radio for at least one time slot (15 minutes). These figures are not available for community media and small local broadcasters, so this figure can only be given as an estimate of the lower limit.

- The use of DRM+ in VHF band III requires no shutdown of FM transmitters in VHF band II. Thus useful listener coverage above and beyond that available with FM receivers may be realised with the addition of one or more DRM+ transmitters.
- The announced introduction of multi-standard digital receiver chipsets (DAB and DRM+) will facilitate an expansion with DRM+ in parallel to simulcast on analogue FM.
- The decision to discontinue analogue FM transmission and realise the increased efficiency of digital transmission would be taken by the broadcasters themselves.
- The development of DRM+ networks in VHF band III is feasible without extensive scenarios for usage and analogue/digital transition, and would not impede the expansion plans proposed for DAB.

7.2 Benefits of the digitalisation of all radio broadcasting

The digitalisation of radio with DAB and DRM+ coexisting in the VHF band III will release the potential for distribution of an additional bouquet of DRM+ radio programmes from regional and local radio station in their original coverage areas.

This total offering, with a heterogeneous structure already known from the analogue FM band and with new programmes distributed only digitally, will support the digitalisation of the entire terrestrial radio landscape and offer an opportunity for a more rapid switch-off of analogue FM radio broadcasting.

This means that the proliferation of technical disadvantages with analogue FM broadcasting for private radio broadcasters versus public service broadcasters, which in particular affects the local and regional providers, could be defused in Germany.

The prerequisite for such a common scenario would be the opening of the market for digital radio with DAB as the preferred platform for large coverage areas and many national programmes, which in turn would facilitate the digital distribution via DRM+ for regionalised and local providers and should be planned well in advance.

8 The Future

Before the initiation of regular DRM+ offerings in VHF band III, it is still necessary to create the conditions for market entry. These relate in particular to the availability of a commercially acceptable broadcasting infrastructure and the availability of radio receivers in the consumer market capable of receiving DRM+ in addition to DAB, as well as the creation of an implementation strategy.

8.1 First step

To answer these questions, certain steps have already been taken.

- The Technical Conference of the Federal State Media Authorities (TKLM) has developed a Technical Report under the auspices of the LMK, which accurately deals with the subject matter described in this document and which was approved at the executive “Direktorenkonferenz der Landesmedienanstalten“ (DLM, Conference of Directors of the Media Authorities) meeting on 16 April 2013.

- There are multiple signals from the European region concerning the implementation of DRM+ for local radio. The Community Media Forum Europe (CMFE) and the "World Association of Community Radio Broadcasters" (AMARC-Europe) have approached the EU Commission with a recommendation to use DRM for local digital terrestrial radio.
- In its Recommendation 138 of February 2013, the European Broadcasting Union has recommended e.g. the rollout of digital terrestrial broadcasting in Europe (R138 "Digital Radio Distribution in Europe") and that DRM should be used where DAB coverage is not feasible, and that a deadline for the switch-off of analogue terrestrial radio should be set.

8.2 Further steps

The following questions in particular should be clarified (a suggestion as to who should deal with each issue has been included).

8.2.1 Regulatory conditions for the coordination of DRM transmitters

In Germany, the *Deutsches DRM Forum* will procure the precise regulatory conditions for DRM transmitter coordination from the Federal Network Agency (BNetzA).

The *DRM Consortium* should initiate a Technical Report to clarify this issue.

8.2.2 Preparedness and framework for production of multi-standard chipsets and radio receivers

The *DRM Consortium* should clarify the industry interests and framework to bring multi-standard chipsets and receivers onto the European market that can demodulate both DRM+, DAB and analogue FM transmissions.

The *DRM consortium* should require the inclusion of DRM (DRM30/DRM+) in the ”Euro-Chip” initiative propagated by Deutschlandradio, the BBC and the European Broadcasting Union for reception of DAB, DMB, analogue FM in band II and AM below 30 MHz.

The industry needs a statement from the regulators and broadcasters about the future introduction of DRM to complement the DAB offerings in Germany and the rest of Europe in order that future digital receivers based on multi-standard receiver chips can be designed and commercialised accordingly.

8.2.3 Preparedness and framework for the providers of DRM broadcasts

The *DRM Consortium* compiles information concerning DRM-related activities in Europe and makes it available on a continuing basis. The *Deutsches DRM Forum* in Germany and other organisations (e.g. the CMFE and AMARC) can contribute to this effort.

8.2.4 Market conditions for DRM

The *DRM Consortium* should determine through a market survey under which conditions DRM+ can gain acceptance in the European marketplace, and how a market introduction can be promoted considering the DAB rollout. This should be done in cooperation with other organisations such as the *Deutsches DRM Forum*.

Ludwigshafen, Hannover and Erlangen 3 September 2013
Joachim Lehnert, *Detlef Pagel* and *Alexander Zink*

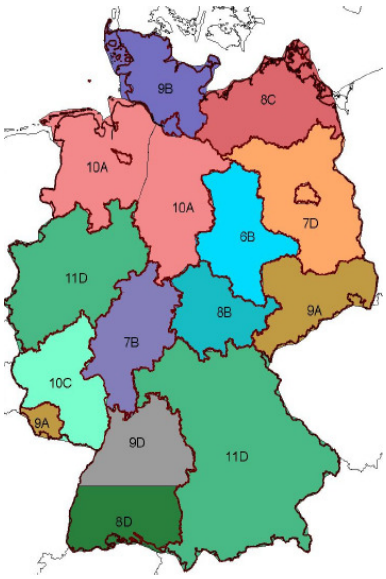
Translated from German by Niels Dreijer

Appendix 1: DAB coverage in VHF band III in Germany

Nationwide DAB coverage (Layer 1)

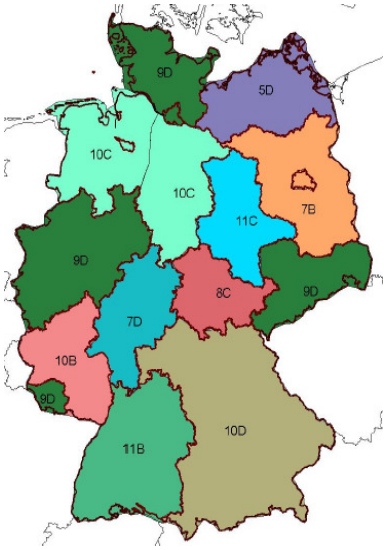
(on air since August 2011)

Statewide DAB coverage (Layer 2)



(already on air in many areas)

Statewide DAB coverage (Layer 3)

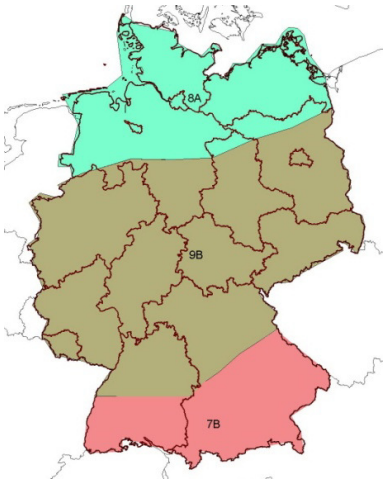


(Considerations concerning future use from 2014-2015)

Regional DAB coverage (Layer 4)

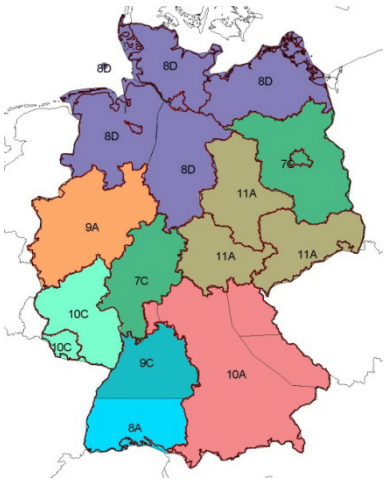
(On-air in certain federal states, considerations in others concerning future use)

Nationwide DAB coverage (Layer 5)



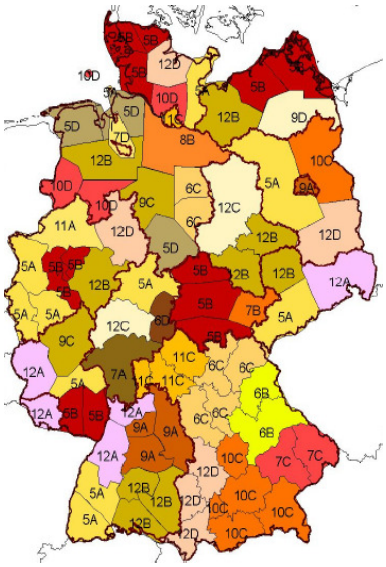
(Considerations concerning future use from 2014-2015)

Trans-statewide DAB coverage (Layer 6)



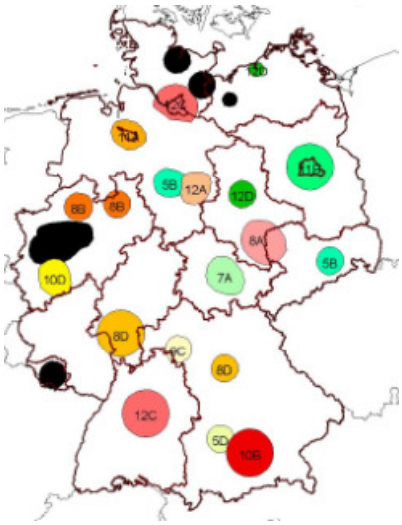
(Considerations concerning future use)

Regional DAB coverage (Layer 7)



(Considerations concerning future use)

Metropolitan area DAB-coverage (Layer 8)



(Considerations concerning future use)