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## **Digital Terrestrial Broadcasting of Local Radio Services**

### **Evaluation of Digital Broadcast Technologies and Recommendation for Local Service Provision**

Digitization of terrestrial radio broadcast transmission is of prime importance in Germany. For a couple of years, a discussion has taken place aiming at the identification of the right technology supporting technical and business requirements of stakeholders. Digital Audio Broadcasting plus (DAB+) was eventually agreed among major players of the radio community being the most adequate technology going forward with the introduction of radio services at national and regional levels. A first national DAB+ multiplex compiling 12 radio channels of public and commercial broadcasters has been established in the meantime and is distributed in many geographic areas in Germany. Various regional radio services incorporating up to some 35 radio channels in some regions have been additionally introduced complementing the national service.

Local radio services constitute a third level of Germany's radio landscape next to national and regional services. This level is made up of a multifaceted service offering including local commercial radio and a variety of non-commercial radios such as citizens' radio, training radio, university radio also referred to as Community Radio. It is a matter of common knowledge that the benefits provided by DAB+ for national and regional services cannot be used for these local services to the same extent. The debate on how to convert these local services from analogue to digital has been continued and is still on the agenda mainly due to this reason.

The Technical Conference of the Media Authorities (TKLM – Technische Konferenz der Landesmedienanstalten) in Germany set up a task force for the purpose of supporting the ongoing efforts of finding an adequate solution for that issue. The given current situation with DAB+ being the existing solution for broadcasting national and regional radio services was taken as starting point of the work. Furthermore, only standardized technologies available today were agreed to be subject to investigation by the task force. In order to prevent misunderstandings, it is emphasized that the scope of

work was on digital terrestrial radio broadcasting. Hence services such as Internet radio and other non-broadcasting radio applications were out of scope of the investigations.

The findings of the work were published in a report being released under the title: “Digitale terrestrische Verbreitung des lokalen/regionalen Hörfunks - Bewertung und Empfehlung von digitalen Hörfunksystemen für die lokale/regionale Hörfunkversorgung“<sup>1</sup> by the media authorities in December 2015. Language of publication was German. The creation of an Executive Summary in English language was requested by various organizations outside of Germany. The main report needs to be consulted for information going beyond the degree of detail presented in this summary.

After an analysis of various potential candidate technologies, the following three standardized systems were eventually selected for more intensive studies: DAB+, Digital Radio Mondiale in OFDM mode E (DRM+), and Long Term Evolution Advanced (LTE-A) applied in Evolved Multimedia Broadcast Multicast Service (eMBMS) mode. Technical suitability as well as business potentials were looked at, both in relation to their capabilities supporting a market for the above mentioned case of digital local radio service delivery.

The two system approaches of DAB+ and DRM+ are very similar from a technical perspective. The technologies are suitable for implementation in multi-norm digital radio receivers using a common hardware design and IC technology. The bandwidths of their signals and thus the transport capacities of respective multiplex streams constitute the major difference between the two. DAB+ has its advantages in applications providing a high number of radio services throughout wide service areas. In contrast, DRM+ shows benefits in case of distribution of a low number of services per multiplex. DRM+ seems to be the predestined technology for a local radio service application from a technical perspective. Needed components are available at the transmitting end. However, business requirements are rarely supported today mainly because of lack of DRM+ receivers available. Important for a successful introduction of DRM+-based local radio broadcast services is the participation of these services in the entire DAB+ roll-out which can only be reached through the use of combined DAB+/DRM+ multi-norm devices at the receiving end. At time of publication of the report, none of such devices were identified in the consumer market at all. The question of availability of frequencies for DRM+ needs to be addressed in addition. DAB+ makes use of the VHF band III; frequencies are partially occupied already by DAB+ systems being on air. The same band could be used for DRM+ transmissions as well. Such a combined use of VHF band III

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<sup>1</sup> [http://www.die-medienanstalten.de/fileadmin/Download/Positionen/Gemeinsame\\_Positionen/20151020\\_Digitalradio\\_lokal\\_regional.pdf](http://www.die-medienanstalten.de/fileadmin/Download/Positionen/Gemeinsame_Positionen/20151020_Digitalradio_lokal_regional.pdf)

has been proven to be possible. It would require planning a DRM+ frequency grid in coordination with the existing DAB+ grid or even a modification of the latter. In the nutshell it should be highlighted again that a commercial launch of local radio broadcast services based on DRM+ can only be successful if multi-norm DAB+/DRM+ receivers get available at the market. This could be supported by the current international market development of DRM+. The relevance of the local radio broadcast market in Germany, however, seems to be too small generating a new radio technology besides DAB+.

LTE-A is not a system primarily designed for the application of terrestrial radio broadcasting services. Even the utilization of eMBMS allowing the technical implementation of a single frequency network in a broadcast-alike mode throughout various LTE cells keeps open various questions on how to implement such a service in real life. First of all, LTE was developed for the transport of IP traffic. The authorisation is done by means of a SIM-card integrated in a CPE. In contrast, radio broadcast services are free-to-air services in general. This simplified comparison indicates already that an application of radio broadcast services on LTE-A/eMBMS would require dedicated measures enabling free-to-air reception. CPEs supporting such a broadcast-alike service are not known at this stage. Furthermore, the entire business concept is not thought through yet and needs to be developed and established in alignment with business partners of different constituencies. Finally the media law in Germany does not reflect such a scenario; legal instruments for regulation of such markets are missing entirely.

The above findings let the TKLM task force look for a solution based on DAB+. It was recognized that the requirements for the local radio service differ heavily from case to case and from area to area. Nevertheless some technical configurations were identified which would allow the implementation of reliable businesses models. The most important recommendations applicable in general are given below:

- Aggregation of various local FM service areas to new larger DAB+ areas
- Operation of local multiplexes which transmit the intended local content and – as the case may be to fill up multiplexes – additional regional and/or national content
- Application of higher DAB+ error-protection levels to eventually reduce cost of infrastructure

Taking these and other measures into account, DAB+ provides opportunities for commercially successful implementation not only of national and

regional services but also for radio services on local scale. Realization of adequate business models seems to be possible.

Most important requirements for a successful implementation of local radio broadcast services are, on the one hand, the commercial availability of digital radio receivers in large quantities and with low prices and, on the other hand, the existence of a business/legal framework for radio broadcast service. At present, these requirements are all-encompassing fulfilled by DAB+ only. If stakeholders do not insist on copying the current FM system to digital without modifications but do accept some modifications necessary, DAB+ could be helpful paving the way for a new digital terrestrial radio broadcasting system which could provide a good and fair playing level field for the entrants in digital radio in Germany.