
DIGITAL RADIO DAB+

THE FUTURE OF TERRESTRIAL RADIO



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THE FUTURE OF TERRESTRIAL RADIO IS DAB+

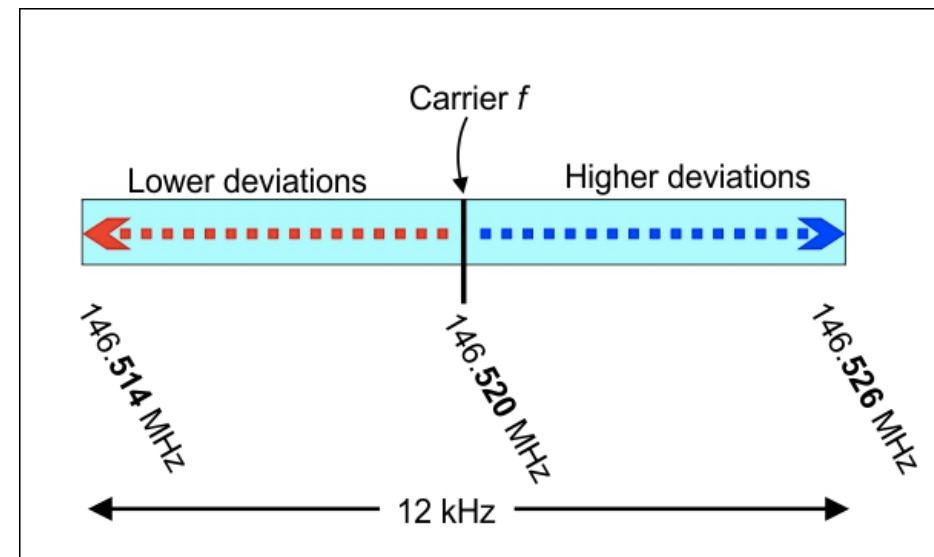
Quality and Flexibility

- Multicarrier COFDM System avoids interference problems of FM (urban and mountain areas)
- SFN (Single Frequency Networks) reduces frequency spectrum use
- Multiplex carries many services together in one Ensemble (on one frequency)
- Better frequency efficiency ("more services / Hz")
- Perfect Audio Quality, even Surround Sound is possible
- Data Services (DL/DL+, Slideshow, Journaline, TPEG, Public Information, EWF, ...)

ANALOG FM RADIO

Single Frequency Modulation

- Only **one frequency** in Band II
(modulation “describes” directly the analog audio signal)
- **Interference**
destroys the whole signal
- Interference can be caused by:
 - **multipath reception**
(urban or mountain areas)
 - **other transmitters**
- **MFN:**
requires multi frequency networks,
if a program needs more than
one transmitter to cover large areas



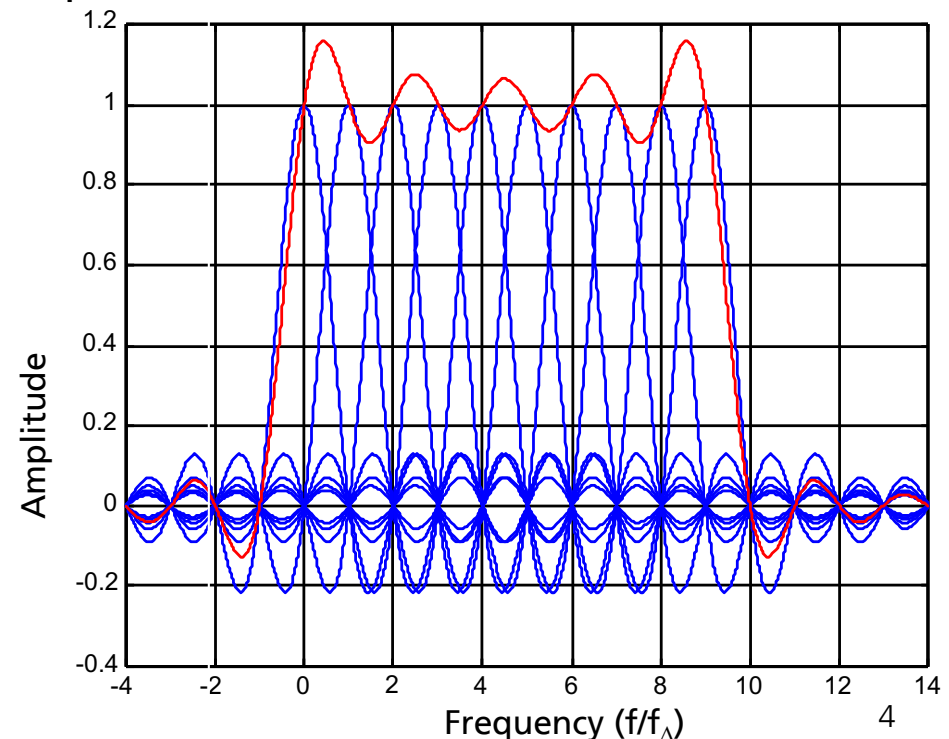
<http://www.hamradioschool.com/>

COFDM Modulation in DAB+

DAB:

Coded Orthogonal Frequency Division Multiplex

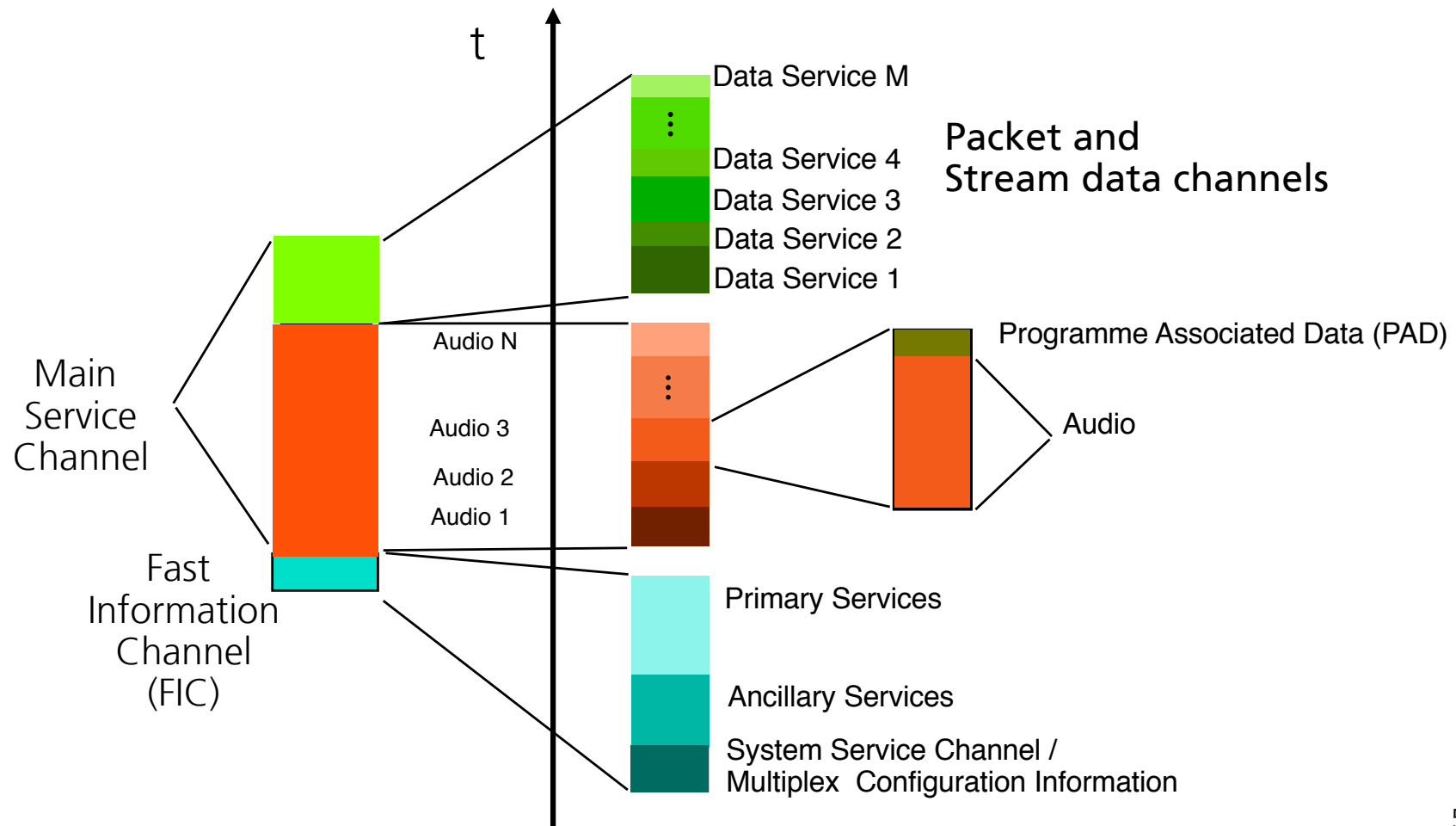
- **1536 carriers** (frequencies) in Band III
- Interferences **destroy only a part** of all carriers
- **Error correction algorithms** recover the perfect bitstream even if up to more than 1/3 of all carriers are affected by interferences
- **SFN:** Single Frequency Networks combine signals with same content from different transmitters



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MULTIPLEX – MANY SERVICES TOGETHER



DATA SERVICES - Dynamic Label, Slideshow

■ Dynamic Label

- Up to 128 characters per message

You are listening to
,Papa Mia` by BAAB

■ Dynamic Label plus

- tagging for parts of the dynamic label message, like "title", "artist", ...

■ Slideshow

- sequence of pictures
(requires higher datarates)
- Not useful for text
(receiver specific screen resolutions/sizes)



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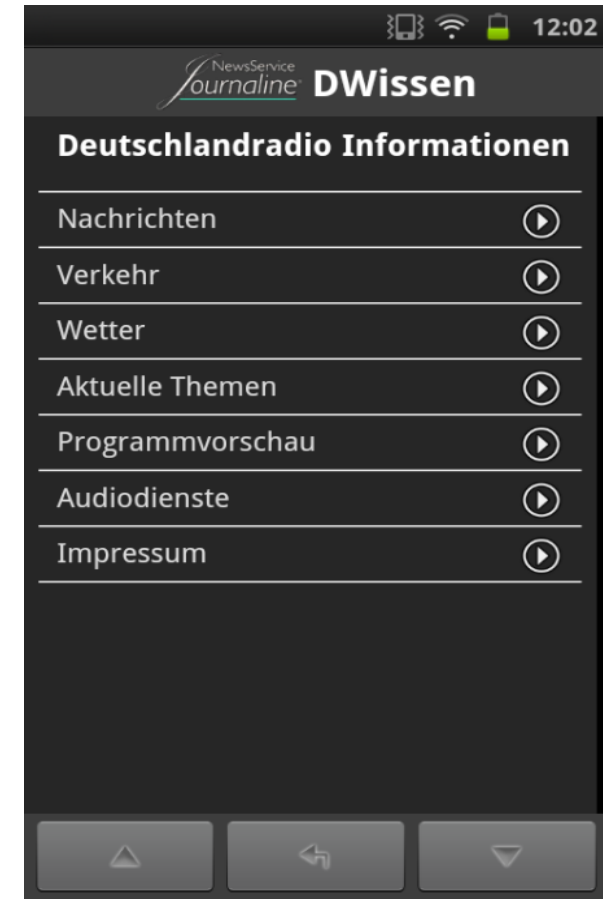


DATA SERVICES - Journaline



■ Journaline

- Detailed text information
- Menus
- List items
- Text pages
- Hybrid service
(links to internet, phone, adress navigation)
- Text-to-speech option

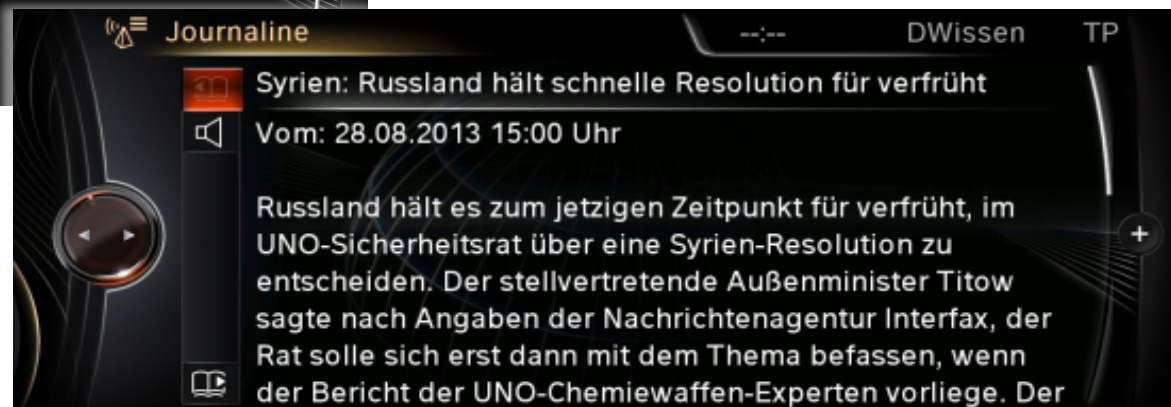
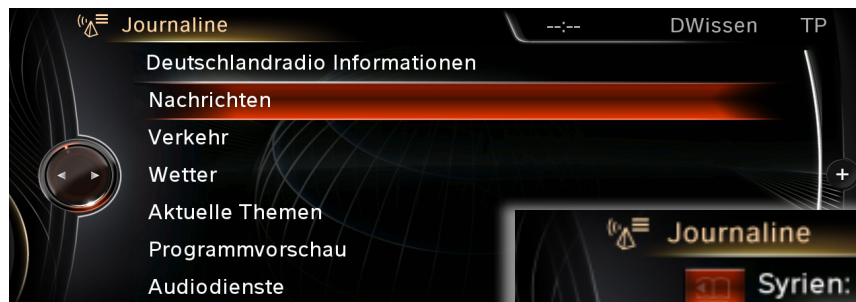


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DATA SERVICES - Journaline



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DATA SERVICES - TPEG

Characteristics

- Multimodal travel information
- Language independent
- Machine readable
- CEN/ISO Spec
- Bearer independ.

Adaptation Layer Specs

- DAB
- HD Radio
- HTTP (TCP-IP)

Applications

- Traffic Event Compact
- Traffic Flow & Prediction
- Parking Information
- Speed Information
- Fuel Price Information
- Weather Information
- Road Pricing Information
- Public Transport Info
- Conditional Access Info
- ...

Location Referencing

- Dynamic LR
- TMC LR
- TPEG LOC
- Geo LR
- Open LR
- Korean LR

Profiles

- Automotive Profile
- Public Media Profile

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DATA SERVICES – EWF



■ EWF – Emergency Warning Functionality

- Efficient and immediate emergency warning via digital radio
- Audio
- Multilingual detailed text for
 - Foreigners
 - Audibly disabled persons



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DATA SERVICES – Public Information

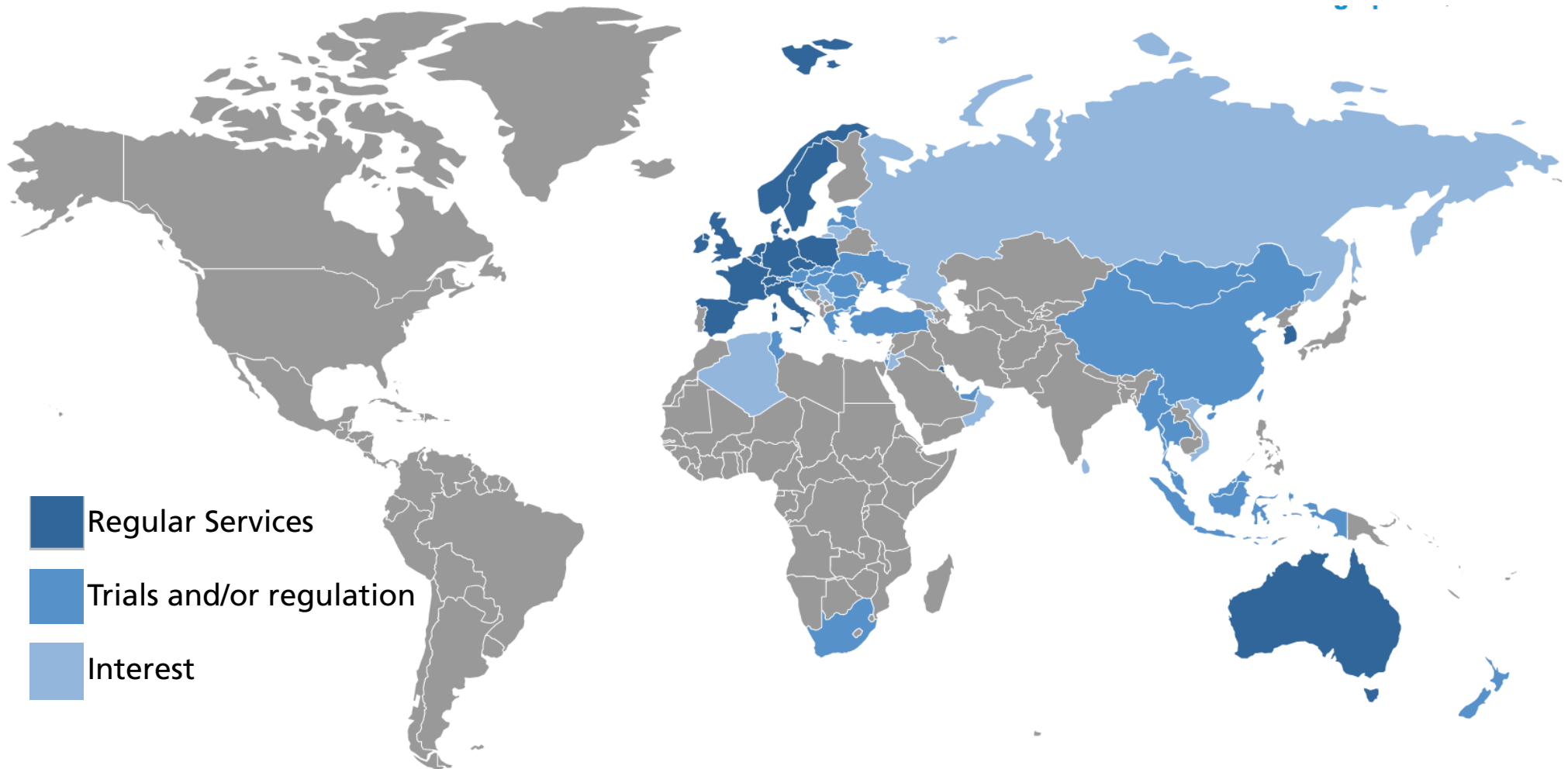
- Public information systems
 - Public transport information
 - Public screens
 - Cost efficient, 1-to-many distribution
 - Independent of internet and mobile networks



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Current Status worldwide



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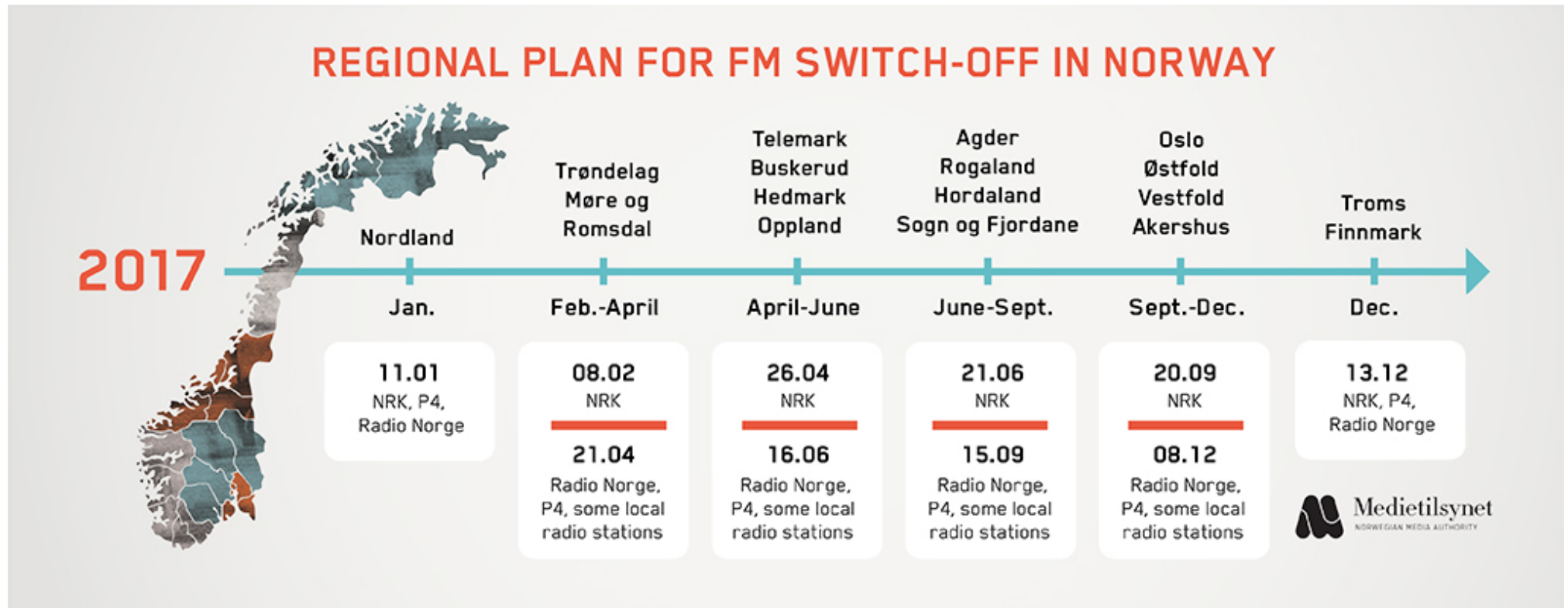
Current Status in Europe

- Norway FM SwitchOff
- Denmark, Switzerland, EU Commission Statement for Digitalradio)
- Germany (Bundesmux 1+2, Regional Muxes, Local Muxes, Program availability, Statement of German Government)

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Current Status in Europe



Switzerland, Denmark, UK are the expected next candidates for FM switchoff

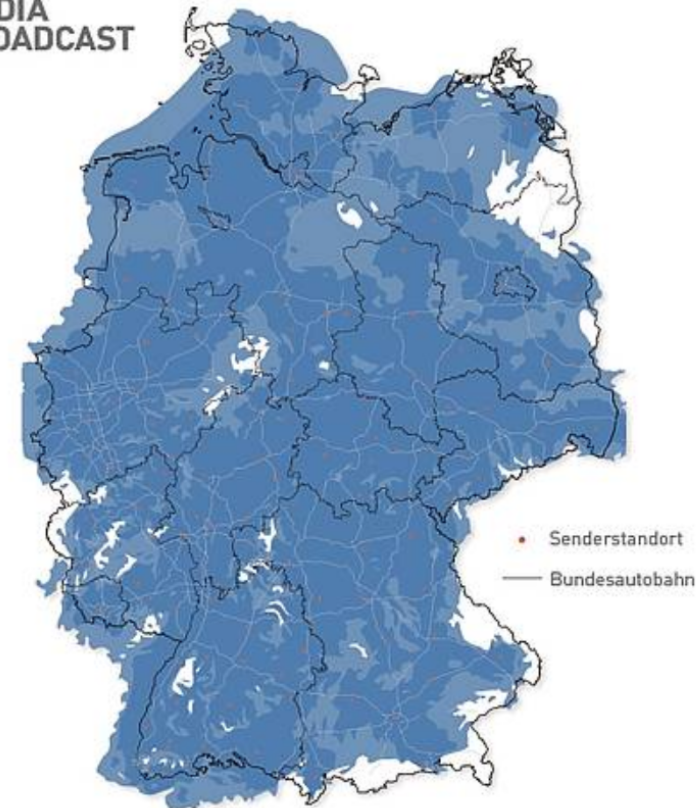
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Current Status in Germany

- First nationwide Multiplex since 2011
- Second nationwide expected in 2018
- Many new regional (Bundesländer)
- Many new local multiplexes
- Munich:
More than 70 DAB+ programs available

MEDIA
BROADCAST



BUNDESWEITES DAB+ NETZ IM KANAL 5C

110 Senderstandorte (Ende 2016)

versorgt mit	vers. Einwohner	in %	vers. Fläche (km²)	in %
Portabel Indoor	67,6 Mio	82,2	261.499	73,1
Mobil	78,9 Mio	95,8	328.174	91,7

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Receivers

- WorldDAB just reported on Oct 17th 2017:
More than 60 million receivers sold worldwide
- More than 500 different receiver models available (20€ up to more than 1.000€),
covering all kinds of use cases:
 - Car
 - Stationary
 - Mobile



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EMERGENCY WARNING ON DAB+



EWf – EMERGENCY WARNING FUNCTIONALITY

2nd June 2017



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