



Martin Speitel

*Dipl. Ing., Group Manager Infotainment,
Fraunhofer IIS,
Germany*

FRAUNHOFER INSTITUTE FOR INTEGRATED CIRCUITS IIS

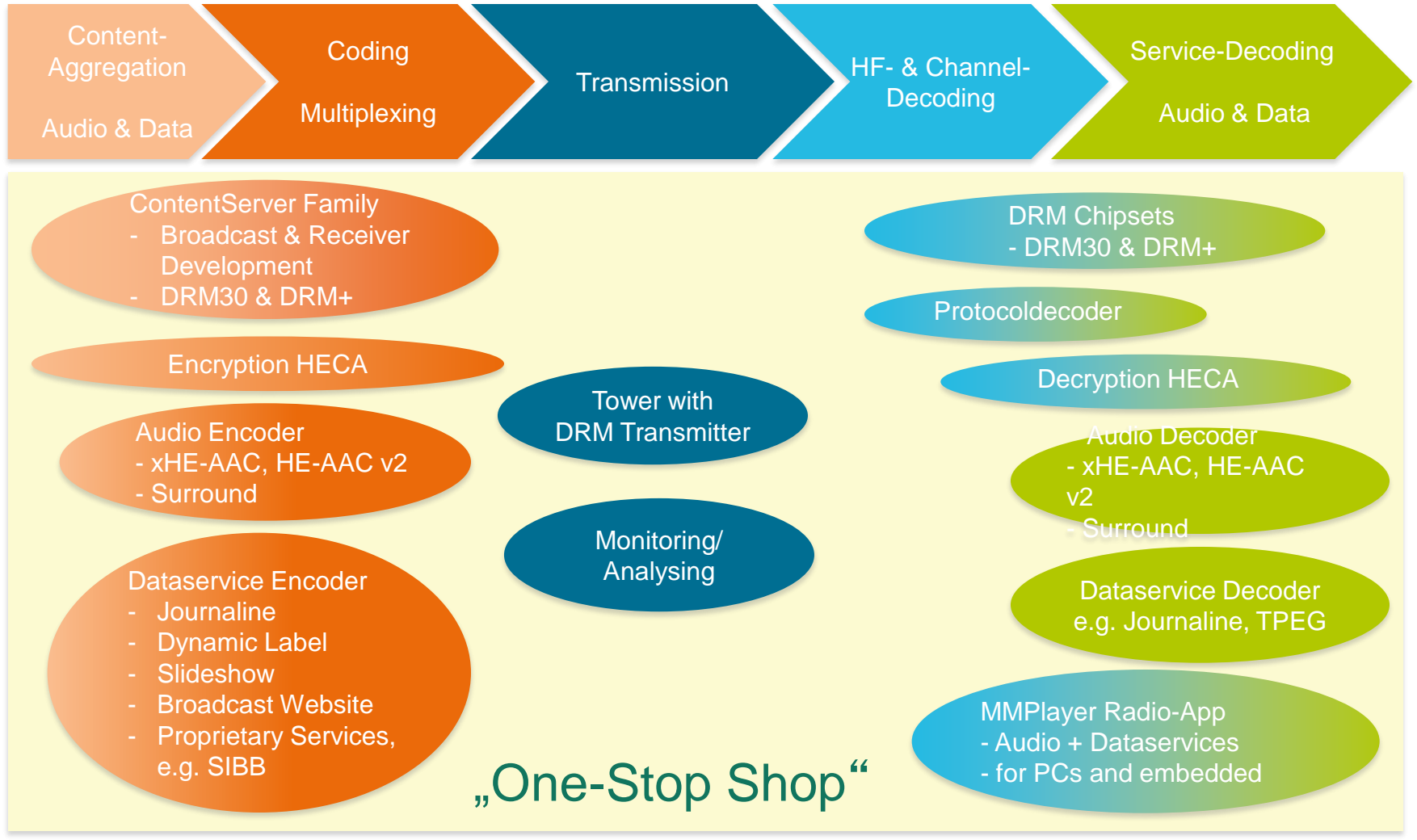
RECEIVER SOFTWARE FOR THE COMPLETE DRM STANDARD

European DRM Workshop
Erlangen, April 7th, 2016



The Competence in Digital Radio Systems

Contributions to the DRM transmission chain



The Competence in Digital Radio Systems

DRM ContentServer – Head-End

One-Box Encoder Solution for Digital Radio

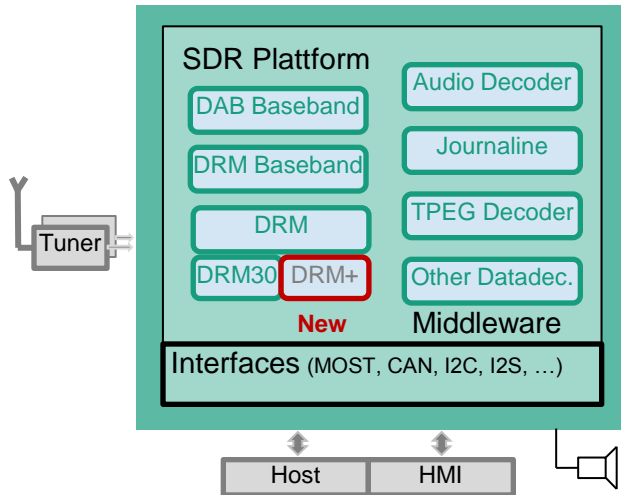
- Real-time audio encoding
DRM xHE-AAC, DRM AAC,
5.1 Surround
- Data Application Management
(TM, Journaline, SLS, EPG, TPEG, ...)
- Multiplex Generation
(incl. dynamic reconfigs)
- Monitoring / verification / logging

The screenshot displays the Fraunhofer DRM ContentServer interface. At the top, it shows the system status as 'OK' with a green checkmark. The main menu on the left includes options for System Status, Broadcast Configuration, System Management, and System Commands. The central area is titled 'DRM Multiplex Editor' and shows two multiplex configurations. The first, 'EWF - Emergency Warning Functionality', lists services: Emergency (Audio), Emergency Info (Data), Info & News (Data), and Public Radio One (Audio). The second, 'Weekdays - daytime', lists services: Public Radio One (Audio), Hit Radio (Audio), News Hindi (Audio), and Info & News (Data). Both configurations show parameters for Robustness mode A (DRM30), 9 kHz, long (2s) interleaver, MSC mode 64-QAM, SDC mode 4-QAM, and Protection level EEP: PL=0 (0.50). The interface also includes a 'Main Menu' on the left with options like System Status, Broadcast Configuration, System Management, and System Commands, as well as 'On Air' and 'Redundancy Group' sections.



Software Defined Radio (SDR)

Flexible Radio Architecture



■ Advantages of SDR:

- One platform, many configurations
- Toolkit for many models
- Possibility for upgrades and updates

■ Our Solutions:

- Hardware independent software library
- Porting on special hardware
- Compatible Interfaces

■ Prepared for Multi-Standard receivers:

- DRM (DRM30/DRM+)
- DAB/DAB+/DMB

Receiver Software for Complete DRM Standard

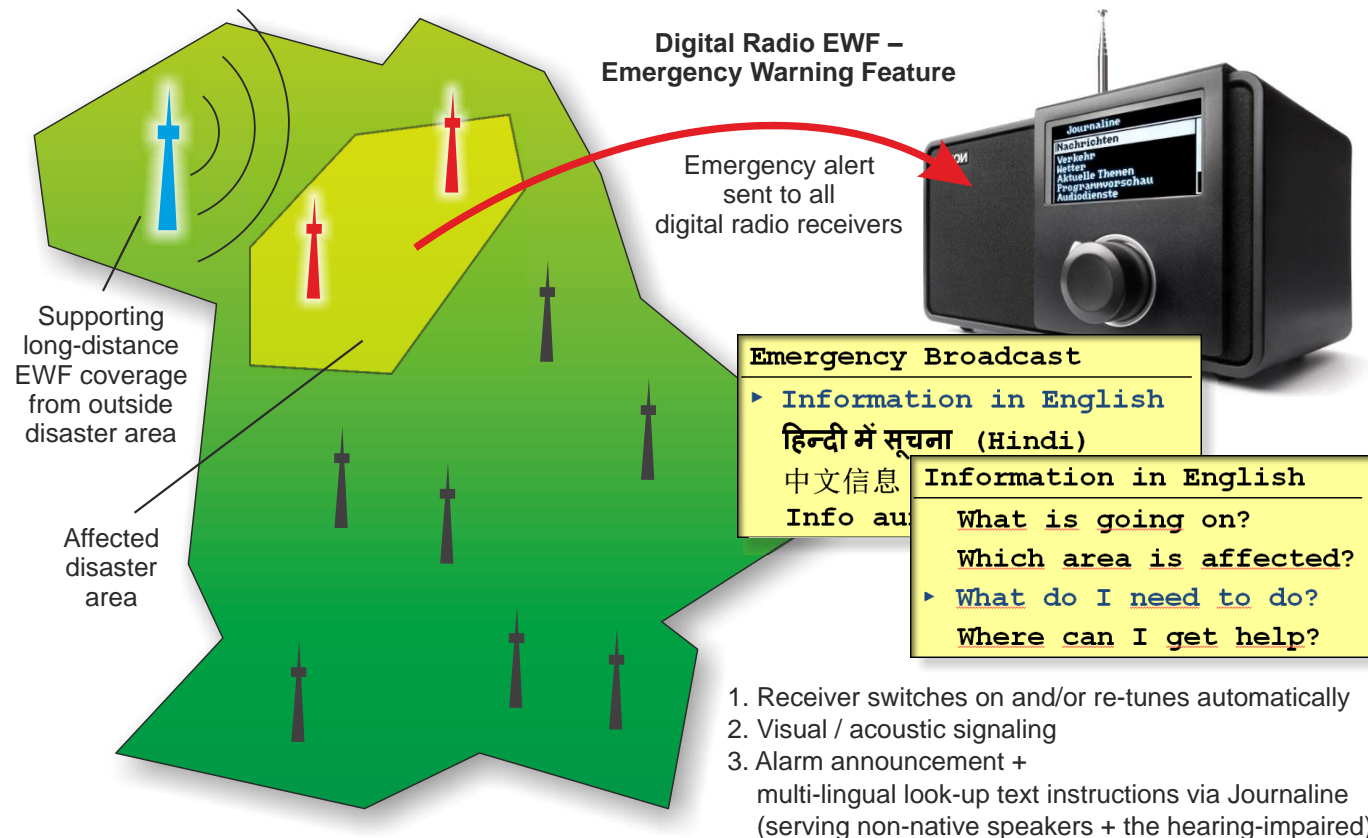
Latest Developments

- Development of a new software package for DRM+ (→ covering full DRM standard)
- Fraunhofer IIS Baseband Decoder
 - Converts the transmission signals received from the broadcaster into digital data streams
- Numerous service decoders as additional components of the modular DRM system
 - Sound quality is ensured by the new audio codec MPEG xHE-AAC
 - Representation of text, images, and other value-added information
 - Text information service Journaline



Receiver Software for Complete DRM Standard Integration of Emergency Warning Functionality (EWF)

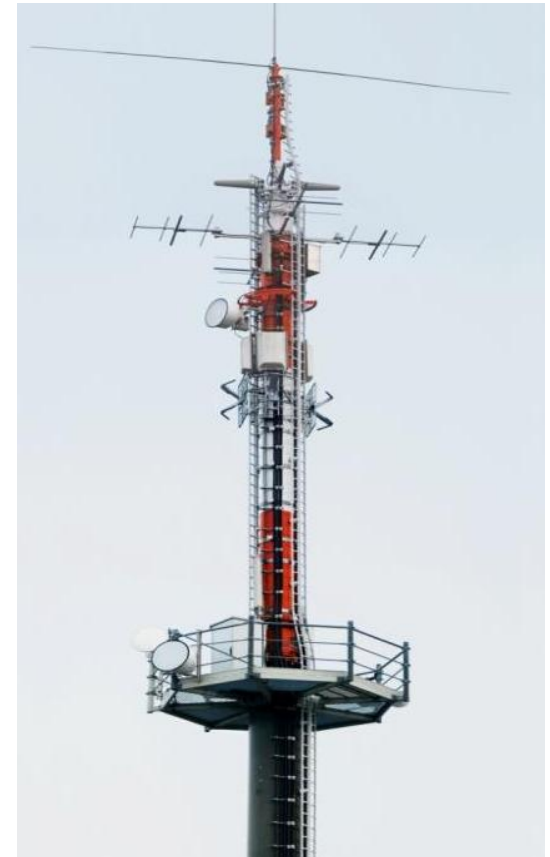
- Inform the public in case of pending or disasters via DRM digital radio



The Competence in Digital Radio Systems

DRM / DAB Transmitter Tower in Erlangen-Tennenlohe

- Experimental DAB license in Band III and DRM transmitter
 - Licensed by Bundesnetzagentur
 - DRM30: 15,785 MHz; 100W
 - DRM+: 87,9 MHz; 10W
 - DAB: Block 6A (181,936 MHz); 600W
- Testbed for Fraunhofer research activities:
 - Reconfigurations
 - New Services
 - Compliance testing
 - LTE Test bed for 5th generation mobile technology



Thank you for your attention



Martin Speitel

**Head of Group
Infotainment**

Fraunhofer Institute for Integrated Circuits IIS

Am Wolfsmantel 33
91058 Erlangen, Germany

Phone: +49 9131 776-4052
martin.speitel@iis.fraunhofer.de
www.iis.fraunhofer.de