Welcome to the DRM Webinar for ABU & ASBU
30 April 2020

DRM Benefits in Times of Crisis
Ruxandra Obreja
Chair DRM Consortium
Agenda

➢ Introduction

➢ What is the DRM Standard and key features (short reminder)

➢ DRM for large-area coverage

➢ DRM for local / regional coverage

➢ DRM Single Frequency Networking (SFN)

➢ DRM receivers for cars, desktop and mobile phones

➢ DRM ContentServer Hands-On: Configuring Journaline and Emergency Warning Functionality
The DRM Consortium – a Quick Reminder

• **Founded in 1998**
  by international organisations
  to promote the adoption of the DRM standard worldwide

• **Not-for-profit organisation**

• **Around 100 international members**
  Broadcasters, manufacturers, network operators,
  regulators, research institutes, etc…

• **Experts and technologists**
  Ready to give expert and objective advice on the technology

• **Open to all**
  Companies, organisations, associations and individuals can join at any time

For joining the DRM Consortium, write to:  projectoffice@drm.org
Selection of Consortium Members

The not-for-profit DRM Consortium supports and promotes the DRM Standard and its take-up globally.
Why Use the DRM Standard?

- **Universal and free access** to information, education & entertainment
- Reaching **all citizens in a country** whether they live in bigger cities, in villages, on hills or in valleys
- Using a **single technical standard**, a solution for local, regional, national and international radio services
- Using spectrum more **efficiently** at much **reduced cost**
- Making radio the **digital media hub** for modern listeners, with multi-lingual and on-demand information
- Enabling a **smooth transition from analogue to digital radio**, taking listeners along, and using existing infrastructure
- Great opportunity for **local manufacturing and know-how**
Why Use the DRM Standard?

- **It offers more than audio:** access to information, education, entertainment and EWF

- Its **data** possibilities give it a new dimension

- It can offer the **same information** to people wherever they are, without the need for broadband

- It aggregates internet information **without internet**

- It preserves the **anonymity** of the users

- It can **cache information** that can be displayed at convenient times

- The **real integrator and universal provider** of education, information Emergency Warning alerts
Countries rolling out DRM or trialling and planning to launch:

- **India**, the largest digital radio roll-out in the world currently (35 MW transmitters - 600 million people covered by digital DRM signals), DRM for local coverage considered
- **China** – DRM shortwave – full country coverage (with 7 SW transmitters)
- **Pakistan** – preparing rollout DRM for FM and AM after successful demo
- **Indonesia** (successful trials in both AM as well as VHF, planning roll-out)
- **Nepal** – successful workshop Sep 2018, DRM for local coverage
- **Vietnam** – interest – successful workshop for DRM in FM in 2018
- **Bangladesh** (installed DRM transmitters)
- **South Africa** (successful DRM trials in both AM and VHF, DRM recommended for AM and FM)
Countries rolling out DRM or trialling and planning to launch:

- **Russia** (DRM mandated after successful tests in VHF in St. Petersburg and in AM in Siberia. Plans for DRM for FM as DRM for FM trial on air currently)

- **Hungary** - Installed 2 megawatts transmitters (one of the largest in the world), as well as a Shortwave demo on air in Budapest currently

- **Africa** (Algeria, Morocco, Nigeria, SADC)

- **Brazil** (successful tests in both AM and VHF, aiming to broadcast DRM SW Dec)

- **Middle East** (Kuwait, Saudi Arabia, Oman)

- **Romania** (worldwide services)

- **United Kingdom** (intl. services, BBC World Service)

- **USA** (Used by Coast Guard)

- **Germany** (Used by Navy)
What is the DRM Standard?

Alexander Zink

Vice-Chair DRM Consortium
Senior Business Development Manager,
Fraunhofer IIS

www.drm.org
DRM – Key Facts

• Global **ITU standard for terrestrial Digital Radio that**
  → **enables all coverages:** local, regional, national, international (in broadcast bands AM & FM/VHF)

• On a single AM/FM frequency, **up to 3 audio services + multimedia**

• Digital-only or **simulcast** operation (with AM or FM analogue signal)

• **DRM upgrades for existing AM/FM infrastructure** possible

• All details **openly standardized** (ETSI) and published, **Not controlled** by a single company/organization
  → **No licenses** required

• Not a multiplex solution – Each **broadcaster in full control** of their transmission and content
Where DRM fits – Serves all Coverage Needs

AM bands
Large-area coverage

VHF (FM) bands
Local/regional coverage

HF, (MF at night) – many 1000’s km

MF daytime – many 100’s km

VHF band II (FM)
many 10’s km

VHF band III
line of sight
AM/FM Analogue – 1 Program per Transmitter

Programme Provider

AM Radio (analogue)

Network Provider

FM Radio (analogue)
DRM – Transmission System

Programme Provider

- Program 1
- Program 2
- Program 3
- Data

Contribution

DRM Content-Server (Head-End)

Distribution

Network Provider

- IP Network (MDI)

SFN  All TX on same Frequency

www.drm.org
DRM Key Features

• **More choice** for listeners
  – Up to 3 programmes + multimedia on 1 frequency, thus being suitable for **programmes on education**, where other media carrier are not available
  – Simulcast analogue / digital

• **Excellent audio** quality
  – No distortion
  – Stereo and 5.1 surround sound

• **Multimedia Applications**
  – Great listener benefits
  – Extra revenue opportunities for broadcasters

• **Good coverage** area and robust signal
  – Supporting SFN (Single Frequency Networks)
  – Green and energy efficient

• **Automatic tuning**
  – by station name, no longer by frequency
  – re-tunes when leaving coverage area

• **Emergency warning & alert**
  – All stations switch, present audio and text information
**DRM Key Features**

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DRM TextMessages
programme accompanying labels (Unicode), max. 128 characters, max. every 20 sec.

Journaline
text based information service (Unicode), supporting all classes of receivers, triggers interactivity and geo-awareness

Slideshow
programme accompanying images + animation

EPG/SPI – Service Programme Information
Station logos; What’s up now & next; Search for programs and schedule recording

TPEG / TMC Traffic Information
→ Great listener benefits & revenue source!

www.drm.org
DRM Key Features

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Emergency Warnings
Why the DRM Standard?

**DRM** Digital Radio standard is an **Open System** and **has all required tools built-in** for a quick and complete mass-notification in case of disasters / catastrophes.
Digital Radio for Emergency Warnings

Disaster Stages

Preparatory General Education

Detection of pending disaster

Instant Warning Dissemination

Disaster hits

Crisis / Rescue Support

Post-Disaster Services

Digital Radio provides essential services in all these stages, as it:

a) reaches the affected people reliably
b) enables detailed multi-lingual text infos
DRM Digital Radio for Emergency Warnings

Functional Overview

1. Receiver switches on and/or re-tunes automatically
2. Visual / acoustic signaling
3. Alarm announcement + multi-lingual look-up text instructions via Journaline (serving non-native speakers + the hearing-impaired)

Emergency Broadcast

- Information in English
- हिन्दी में सूचना (Hindi)

- What is going on?
- Which area is affected?
- What do I need to do?
- Where can I get help?

Supporting long-distance EWF coverage from outside disaster area

Affected disaster area

Digital Radio EWF – Emergency Warning Feature

Emergency alert sent to all digital radio receivers

Digital Radio for Emergency Warnings

Supporting long-distance EWF coverage from outside disaster area

Affected disaster area
Emergency Warnings on DRM Digital Radio

Fraunhofer IIS and RFmondial

Demonstration during the BES Conference and Expo in Delhi 2020

Please click on the following link to access the video: https://tinyurl.com/ycjz75gg (clip stops at minute 03:10)
DRM for Large-Area Coverage

Simon Keens
Sales and Business Development Manager, Ampegon

www.drm.org
DRM Digital Radio standard – One single standard: Same key features throughout.

DRM in AM Bands

- DRM for local / regional coverage (VHF bands)
  (Band I, II – FM band, III)

- DRM for medium/large area coverage (AM bands)
  (or LW, MW, SW) – the AM bands

DRM Digital Radio standard – One single standard:
Same key features throughout
DRM for Large-Area Coverage (AM Bands)

- Offering **FM like sound quality** with large-area coverage (no more fading, crackling, distortions)

- The only standard for all the AM bands:
  - **ETSI standard ratified**
  - **Endorsed by the ITU** (full planning parameters available)

- **Worldwide spectrum compatibility:**
  9/10, 18/20 kHz bandwidth

- **Useful content bit rate:** up to 72 kbps

- **Flexible configuration:**
  robustness ↔ coverage ↔ transmission power

- **Covers large areas using a single frequency (SFN):**
  full-country coverage
Analogue AM Energy Consumption

- AM Carrier > 66% of energy (no content)
- P-USB and P-LSB <33% energy (content)
- AM reception level > 47dByV
Coverage – AM (MW) analogue vs. DRM MW

AM analogue vs. DRM – Same coverage, 1 single tx

AM Coverage
100kW MW transmitter

235 000 km²

600km

DRM Coverage
100kW MW transmitter
-> 40kW DRM

235 000 km²

600km

Note: Conservative calculation! ITU suggests 20 kW DRM for same coverage.
AM analogue vs. DRM – Same coverage, 1 single tx

AM analogue MW: 142 kW, 1 service

DRM on MW: 50 kW, 1–3 services (plus multimedia)

100 kW ERP @ 72% efficiency → 142 kW power consumption

40 kW ERP @ 80% efficiency → 50 kW power consumption
Same Coverage – FM ↔ DRM MW

Min. 15 FM transmitters

1 DRM transmitter (MW)
3 audio programmes + 1 data channel

FM Coverage
Min. 15 x 10kW FM

DRM Coverage
100kW MW transmitter
-> 40kW DRM

600km
DRM Coverage using MW = 600 km!
DRM Coverage with 10kW SW Transmitter

DRM Coverage in Green below Potential Listeners
Interactive Shortwave Broadcast Schedules

DRM Consortium has developed an online tool to quickly find DRM shortwave transmissions, broadcasters and target areas (accessible for both DRM members and non-members).

For more information, please visit the website: schedule.drm.radio
Some DRM MW-band transmitters are capable of simulcasting both DRM and analogue broadcasts within 20kHz bandwidth (i.e. 2x adjacent channels)
Digital only spectrum occupancy options

<table>
<thead>
<tr>
<th>Spectrum occupancy parameter</th>
<th>Spectrum occupancy bandwidth (kHz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>4.5</td>
</tr>
<tr>
<td>2</td>
<td>9.0</td>
</tr>
<tr>
<td>4</td>
<td>18.0</td>
</tr>
</tbody>
</table>

Key to bandwidth blocks

- 4.5 kHz carrier group containing FAC cells
- 4.5 kHz group of carriers

- 4.5 + 0.5 = 5 kHz group containing FAC cells
- 5 kHz group of carriers

\( f_R \) is always the channel centre frequency
\( f_C \) is always the analogue signal carrier frequency
Neighbour-Channel simulcast option (MCS) (full channels)

Key to analogue and digital parts of signal

- AM DSB signal
- AM SSB/VSB signal
- Red: Group of carriers containing FAC cells
- Pink: Group of carriers

\[ f_R = f_C + 10 \text{ kHz} \]

\[ f_R = f_C - 9 \text{ kHz} \text{ or } f_R = f_C - 10 \text{ kHz} \]

\[ f_R = f_C - 18 \text{ kHz} \text{ or } f_R = f_C - 20 \text{ kHz} \]

\[ f_R \text{ is always the channel centre frequency} \]

\[ f_C \text{ is always the analogue signal carrier frequency} \]
DRM for Large Area Coverage (AM Bands) – Conclusions

• DRM standard applied in the AM bands: optimised system for **wide area coverage**

• Simple AM to DRM upgrade path
  → no need for complete new infrastructure
  → secures long-term invest and existing transmitter networks

• Transmission **energy saving** (MW and SW example) more than **60%** compared to analog AM coverage (enabling **1–3 programmes** and **extra benefits**)

• **Lower cost** for maintenance and spare inventory

  → All new AM transmitters today are analogue & DRM broadcast ready
DRM for Local / Regional Coverage

Alexander Zink
Vice-Chair DRM Consortium
Senior Business Development Manager,
Fraunhofer IIS
DRM in VHF Bands

**DRM for local / regional coverage** (VHF bands)
(Band I, II – FM band, III)

**30 MHz**

**DRM for medium/large area coverage** (AM bands)
(or LW, MW, SW) – the AM bands

**DRM Digital Radio standard** – One single standard:
Same key features throughout
**DRM for Local Coverage (VHF Bands)**

- **Most recent** global digital radio standard in **all the VHF bands**: Band I, Band II (FM-Band), Band III

- **Endorsed by the ITU** in 2011
  - ITU-R Rec. BS.1114 (system),
  - ITU-R Rec. BS.1660 (planning parameters)

- **ETSI standard ratified** in 2011

- **Worldwide spectrum compatibility**: 96 kHz bandwidth (half of FM)

- **Useful content bit rate**: 37—186 kbps

- **Flexible configuration**: capacity ↔ coverage ↔ transmission power

- **Significant Cost Savings**: Green and energy efficient

- Compatible with & transition path for **established FM networks**

- **Compatible with DAB/DAB+**
Flexibility of DRM Configuration

- DRM in VHF supports 2 modulation modes and 4 code rates
- Wide range of data rates (content capacity) from 37—186 kbit/s
  - Flexibility in number of services and content
  - Corresponding with varying levels of transmission signal robustness
- **Individual trade-off**: Coverage – Transmitter Power – Content Capacity
Coverage of DRM in FM Band

Assumption:
- Same coverage in FM and DRM
- **Stationary** reception profile in acc. to ITU-R
- Same Antenna Gain

**FM**: 1x 🎵
- at 200 kHz bandwidth

**DRM**: 3x 🎵🎵🎵🎵
- at 96 kHz bandwidth

10 kW

10 : 1 power

1 kW
Coverage of Tx Mannheim, Germany, on 93.2 MHz with equal transmitting power of 1 kW e.r.p. for DRM and FM.

The coverage for FM (green) and DRM (green and white), respectively, gives an area $F$ (km$^2$) that matches with the area of a circle with the radius $d=\sqrt{F/\pi}$ (km).

Ratio of the coverage within the circles: $d_{\text{Ratio}} = \frac{d_{\text{DRM}} \text{ (in red)}}{d_{\text{FM}} \text{ (in blue)}}$
Migration Scenario for DRM (in VHF) in Band II

DRM (in VHF) – flexible for different spectrum situations

→ DRM fits anywhere in the FM gaps!
DRM Fits in Existing FM Band

- DRM fits into the FM channel raster
- DRM RF signal needs less Spectrum bandwidth compared to FM
- More RF channel possible in VHF Band II as for FM (spectrum efficient!)

![Diagram showing DRM fits into the FM channel raster](https://www.drm.org)
DRM in FM-band (new developments)

- DRM fits into the established FM channel raster
- DRM in the FM band is very spectrum efficient
  - Each 100 kHz bandwidth
    → up to 3 sound-services plus various multimedia components
- Radiated power is adaptable to the desired coverage
  - Independent of the FM power of the equivalent audio-service
- More than one DRM block can be transmitted from a single DRM transmitter
  - Very cost-efficient
  - **Major benefit:** each broadcaster is the owner of the content within 100 kHz
„Extended DRM Multiplex“ by Nautel & RFmondial

- Easy and cost-effective implementation of combined signals from 1 transmitter:
  - One analogue FM and up to four DRM signals (each 100 kHz wide), or
  - Up to six pure digital DRM signals

- Implementation (demonstrated at IBC 2019)
  - Single digital Nautel FM transmitter such as the GV, VS, and NVIt series
  - Each DRM signal is independently modulated connected to its DRM Content Server
  - Advanced crest factor reduction algorithms
    - E.g. broadcasting two DRM signals, only need to double transmitter size
  - Allows multiple broadcasters to share a single transmitter while remaining in full control of their own broadcast content & configuration
The FM band provides a total available bandwidth of 20 MHz.

In South Africa, a separation of 400kHz is considered the minimal separation of 2 adjacent FM signals without causing interference.

Public broadcaster’s radio stations maintain a 500kHz separation.

This would give a total number of presumptive FM transmitters to a maximum of approximately 50 but the situation is more complicated and Johannesburg FM spectrum is full.
Results in Johannesburg

- Proved that DRM signal, inserted between 2 FM signals (250 kHz separation), will **not cause interference**.
- With field strength as much as >71dBµV, both adjacent channels are clear of interference.
Applying these results to Joburg’s congested “full” FM Band shows that DRM can immediately provide space for around 48 extra radio programs within the existing FM Band in Joburg – without restacking or changing any of the existing analogue broadcast services in that band).
DRM on **Batam Island for Radio Republik Indonesia (RRI)**

**Coverage Prediction**

Prediction for DRM signal in simulcast mode with analog FM (single transmitter: 2,5 kW FM + 200 W DRM)
FM analogue vs DRM Coverage

FM analogue 3 kW (stationary)  DRM 0.3 kW (mobile)
DRM in Batam – Verification of Prediction

Blue = Expected guaranteed DRM coverage
Green = Uninterrupted DRM audio (measured coverage)

→ DRM coverage more than fulfills prediction!
DRM in Batam – Field Trip Results / Audio

Blue = Expected guaranteed DRM coverage
Green = Uninterrupted DRM audio (measured coverage)

⇒ DRM coverage more than fulfills prediction!
DRM for VHF in Batam RRI Project – Measurement Field Trip Conclusion

- Simulcast analogue FM and DRM transmission
- No disturbance to neighbouring FM stations
- Good mobile and indoor reception
- Large coverage area in DRM mode
DRM in VHF – End-to-End System

- Studios
- Contribution
- Head-End
- Distribution
- Transmitter
- Filter
- Feeder
- Antenna

xHE Audio Enc
Data Multiplex

DRM Content Server

DRM (FM band) Transmitter

Band Filter (optional)

DRM Multiplexer, Encoder, Manager (at studio)

DRM MDI (low-bitrate UDP/IP transport)

Efficient Transmission (linear tx operation)
DRM Upgrade of FM Transmitter

Example:

- Gatesair Flexiva Digital Modulator Card
- Can be retrofit afterwards into each existing Flexiva FM Transmitter

GatesAir Dig. Modulator Card Installed in Flexiva FM Exciter
Summary Benefits for the Broadcaster of DRM in FM Band

- Use of *existing* ITU standard, transmission band, transmitter sites & equipment
- Opportunities for *advanced* network planning / structures (SFN!)
- Significantly lower Total Cost of Ownership (**TCO**):
  - Equipment, Service & Operation,
  - and especially *Transmission Energy*
- **Available now!**
  Introduced immediately through *network and transmitter upgrades*
DRM Single Frequency Networking (SFN)

Simon Keens
Sales and Business Development Manager
Ampegon
Single Frequency Networks (SFN) with DRM

SFN – 2 or more transmitter transmitting
1. the same content (same bit)
2. at the same time
3. on same frequency

Advantage for Listener:
• Signals from multiple tx no longer destroy signal (analog FM!), but rather **improve reception**
  → SFN Gain
• **No distortions** from reflections and multi-path anymore (guard interval)

Advantages for Broadcasters:
• Option to migrate from high-power single-tx to lower-power distributed coverage → **cost savings + better coverage**
• Simple installation of **gap-fillers**
DRM SFN – Gap Filling

White spots (i.e. signal shielding) – Areas with bad or no reception
DRM SFN – Gap Filling
DRM SFN – Network Gain
DRM SFN on MW – Analogue vs Digital

Analog-AM “SFN”: Signal distortion at overlapping areas
DRM SFN on MW – Analogue vs Digital

DRM-SFN:
Overlapping areas with enhanced signal (instead of distortion) due to COFDM digital modulation
DRM Receivers
Cars, Desktops and Mobile Phones

Jan Bremer
Senior Product Marketing Manager
PL Car Infotainment
NXP – Germany

Radu Obreja
Marketing Director
DRM Consortium
DRM Receivers in Cars

Jan Bremer
Senior Product Marketing Manager
PL Car Infotainment
NXP – Germany
DRM in Cars

Over 2 million cars with DRM receivers on the road in India
➢ Over 2 million cars with line-fit DRM in India
   1.5 mio milestone in less than 2 years

➢ Car manufacturers not charging extra from consumers for DRM receivers

➢ Most of the Indian car manufacturers are either already installing DRM receivers or have plans

➢ Latest brand is Motor Garages (MG) with their model Hector

➢ More International car brands adding DRM in their cars
Hyundai – Selection of models including DRM radio

Elantra
Tucson
Grand i10
Xcent
Verna
Elite i20
Creta
Active i20
Santro
Higher end receiver versions of all Maruti/Suzuki car models are fitted with DRM receivers
Mahindra TUV 300 has line-fit DRM Receiver

**TUUV300 - DRM**
Exclusive feature in the TUV300. The TUV300 is equipped with the latest digital Radio which is DRM (Digital Radio Mondiale) compliant.
Motor Garages

SUV Model Hector
New Developments

Latest NXP innovations presented during BES 2020 in Delhi

Please click on the following link to access the video: https://tinyurl.com/yb5vbbox (clip stops at minute 06:21)
NXP has true SDR (software defined radio) solutions. By simple firmware upgrade existing DRM (in AM band) solutions can be upgraded to support DRM in AM and FM band → no hardware change needed.
NXP – Complete portfolio of automotive qualified DRM receivers (for AM and FM band) available

Entry platform (DRM in AM and FM band):
Atomic2 (TEF6659) + Saturn (SAF36xx)
• Low cost & low footprint radio tuner platform
• Basic Analog & Digital Audio Interface

Mid end platform (DRM in AM and FM band):
HERO (TEF6638) + Saturn (SAF36xx)
• Single Tuner, Scanning Antenna Diversity Radio platform
• Audio Processing & Routing
• Analog & Digital Audio Interfaces

High end platform (DRM in AM and FM band):
DiRaNa3 (SAF775x) + Saturn (SAF36xx)
• High Performance Dual Tuner platform
• Advanced Audio Processing & Routing
• Analog & Digital Audio Interfaces
DRM in Desktop Receivers & Mobile Phones

Radu Obreja
Marketing Director, DRM Consortium
Desktop and Other Car Receivers Solutions
DRM only and DRM Multi-Standard

Gospell
Star Waves
Avion
Inntot
Algor Korea
Rf2digital
Fraunhofer Iis
Communications Systems Inc. were present as usual at this year’s BES Conference and Exhibition with an updated version of their AVION desktop receiver.

Let's watch a short clip recorded during the event.

Please click on the following link to access the video: https://tinyurl.com/ybxx8622 (clip stops at minute 09:33)
A high quality and performance DRM receiver

- DRM (AM and FM bands), AM, FM
- MPEG xHE-AAC stereo
- Journaline
- EWF – DRM Emergency Warning
- Large screen, full-range speaker
- USB recording/playback

Ready for mass market production based on substantial orders
# Gospell Receivers 2020

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GR-224BP</td>
<td>Portable DRM (AM&amp;FM bands)/AM/FM Receiver, Bluetooth, USB, AUX</td>
</tr>
<tr>
<td>GR-226BP</td>
<td>Portable DRM (AM&amp;FM bands)/AM/FM Receiver, Bluetooth, USB, AUX</td>
</tr>
<tr>
<td>GR-228BP</td>
<td>Portable DRM (AM&amp;FM bands)/AM/FM Receiver, Bluetooth, USB, AUX, Stereo</td>
</tr>
<tr>
<td>GR-501BCW</td>
<td>After Market Car DRM (AM&amp;FM bands)/AM/FM Receiver, Android, Bluetooth, Wi-Fi</td>
</tr>
<tr>
<td>GR-502BCW</td>
<td>OEM Car DRM (AM&amp;FM bands)/AM/FM Receiver, WinCE, Bluetooth, Wi-Fi</td>
</tr>
</tbody>
</table>
Portable DRM/AM/FM Radio
GR-224BP, GR-226 BP, GR-228BP

- DRM in AM & FM bands
- Journaline advanced text
- Latest xHE-AAC audio codec
- Emergency Warning Functionality
- FM RDS station name display
- 60 station memory presets
- Operates on internal battery or AC adapter
- Auto scan tuning

Ready for mass market production based on substantial orders
GR-227 DRM Car Adaptor

- DRM Receiver (AM&FM bands)
- Full-band MF/HF and FM analogue
- Jurnaline advanced text
- xHE-AAC Audio
- FM re-broadcast / line out
- Mount on center console

Journaline licensed by Fraunhofer IIS, check www.journaline.info for more information.
New receivers in co-operation with **Nedis** of Netherlands

- Smart LCD Display
- AM/FM/DRM Receiver:
  - AM/FM reception with digital IF processing
  - DRM: Both AM and FM Bands
  - Including latest xHE-AAC Audio Codec
  - **Journaline advanced text**
  - **Emergency Warning Feature (EWF)**

All receivers are ready for mass market production based on substantial orders
Johannes von Weyssenhoff, CEO of Starwaves presents his receivers at the BES Conference and Exhibition in Delhi 2020

Please click on the following link to access the video:
https://tinyurl.com/y8gqnped (clip stops at minute 12:15)
Receivers & Solutions

Inntot Technologies

**Automotive Segment (DRM in AM Band)**
Inntot Receiver solution for DRM in AM Band licensed to multiple customers. These include Telechips Inc (a major automotive chip maker based in South Korea), Clarion and other Tier-1 companies.

**Desktop Radio Segment (DRM in AM Band; DRM in FM Band)**
Inntot is manufacturing reference radio (Supporting DRM in AM and FM bands and the legacy analogue radio standards FM, AM) in limited numbers.
- Controller/Host processor: from Telechips
- Tuner: from NXP Semiconductors
First lot with DRM in AM and FM bands along with AM and FM will be ready by November 2019.

**Smart Phone Segment (DRM in FM band)**
Inntot DRM Receiver solution in FM band using Android smart phones; DRM reception is achieved using external USB tuner.

[Image of radio devices and Inntot logo]
Please click on the following link to access the video: https://tinyurl.com/y93r2a46 (clip stops at minute 08:55)
Cambridge Consultants working on Prototype for Integrated DRM Receiver Solution with a low price tag

At the company’s annual Innovation Day conference Cambridge Consultants, the breakthrough innovation specialist (UK) showcased a proof-of-concept prototype of a **low-cost, low-power** DRM design, addressing the vital need for information by the global population that doesn’t have internet or TV.
South Korean Company
Developed Software Defined Radio (SDR) for automotive markets
Works in all broadcast bands – SW, MW and FM
Full DRM feature support, incl.
  - Journaline advanced text
  - EWF – Emergency warning Functionality
Mobile Phone Solutions

AlgorKorea

- South Korean Company
- In the process of developing a DRM for FM app for Android
- The app couples to the SDR (receiver dongle) using audio cords or USB
- The DRM in FM app can receive DRM text messages, Journaline and MOT Slideshow
Fraunhofer IIS

Working on a DRM Receiver Solution with built-in Wi-Fi hotspot to serve tablets and mobiles, which was presented in New Delhi during the BES Expo 2019

https://youtu.be/p3ovO2A7ibE
Production of Receivers and Their Prices

1. Production of receivers

Manufacturers expect **clear announcements** from the Governments/Regulators that DRM digital radio **will be launched at a given date**.

Manufacturers need to have full confidence in such national roll-out projects before they can plan, invest and produce mass market receivers which should also sell well. Actual DRM broadcasts proving that digital radio is a reality with all its extra benefits are also needed before manufacturers can take large orders and start producing mass market radio sets.

2. Prices of receivers

a. The Consortium encourages and supports any DRM receiver manufacturer but does not produce itself any receiver, as it is a not-for-profit organisation.

b. The Consortium believes in the local receiver manufacturing industry, the best way to keep prices low.

c. **Prices depend solely on the volumes ordered**: the higher the number of receivers ordered, the lower the price per unit will be, as is the case for any commercial mass market product.
DRM ContentServer Configuration

Configuring Journaline
Distance Learning and Emergency Warning Functionality

Alexander Zink
Vice-Chair DRM Consortium
Senior Business Development Manager
Fraunhofer IIS
DRM Transmission Chain Overview

Hands-on Configuration Exercise and Demonstrations

Diagram showing the flow from Studio to Distribution to Transmission with Audio and Data inputs and an output to DRM Transmitter via MDI (UDP/IP).
DRM Transmission Chain Overview

Hands-on Configuration Exercise and Demonstrations

- **Studio**
  - DRM ContentServer
  - MDI (UDP/IP)

- **Distribution**
  - DRM Transmitter

- **Transmission**

Audio

Data

ContentServer Configuration: Web Browser

www.drm.org
DRM Transmission Chain Overview

Hands-on Configuration Exercise and Demonstrations

DRM ContentServer

MDI (UDP/IP)

ContentServer Configuration: Web Browser
DRM Transmission Chain Overview

Hands-on Configuration Exercise and Demonstrations

**Studio**
- Audio
- Data

**Distribution**
- DRM ContentServer
- MDI (UDP/IP)

**Transmission**
- DRM Transmitter

**DRM EWF**
- Alarm Trigger + Content sent by Authority (e.g. via CAP)

**ContentServer Configuration:**
- Web Browser

**DRM Monitoring**
DRM ContentServer Hands-On

Demonstration
Why is DRM good for your country?

Ruxandra Obreja
Chair DRM Consortium
Why DRM for Your Countries?

- **Audience**: More programmes on a single frequency, excellent audio quality, multi-lingual text and information services

- **Government/Regulator**: More services on air, all coverage scenarios, additional revenue from spectrum licensing authorities, Emergency Warning in case of disaster, socio-economic benefits

- **Broadcasters**: More and improved services to the audience – FM quality with AM coverage, additional audiences, new revenue opportunities, lower operating (energy) costs

- **Receiver Industry**: a whole new industry eco-system with potential for job creation and domestic expertise build-up
All you need to know about DRM Digital Radio

DRM Handbook

Version 4

Version 5 release next month!

Free download from:
handbook.drm.radio
More Information on DRM

Visit us: www.drm.org

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Dedicated DRM India page:
india.drm.radio

For any inquiries or comments, please write to:
projectoffice@drm.org
Your Questions