Welcome to the
DRM Webinar for ABU & ASBU

30 April 2020

DRM Benefits in Times of Crisis

Asia-Pacific Broadcasting Union

ASBU
Arab States Broadcasting Union
جامعة الدول العربية

drm

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

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

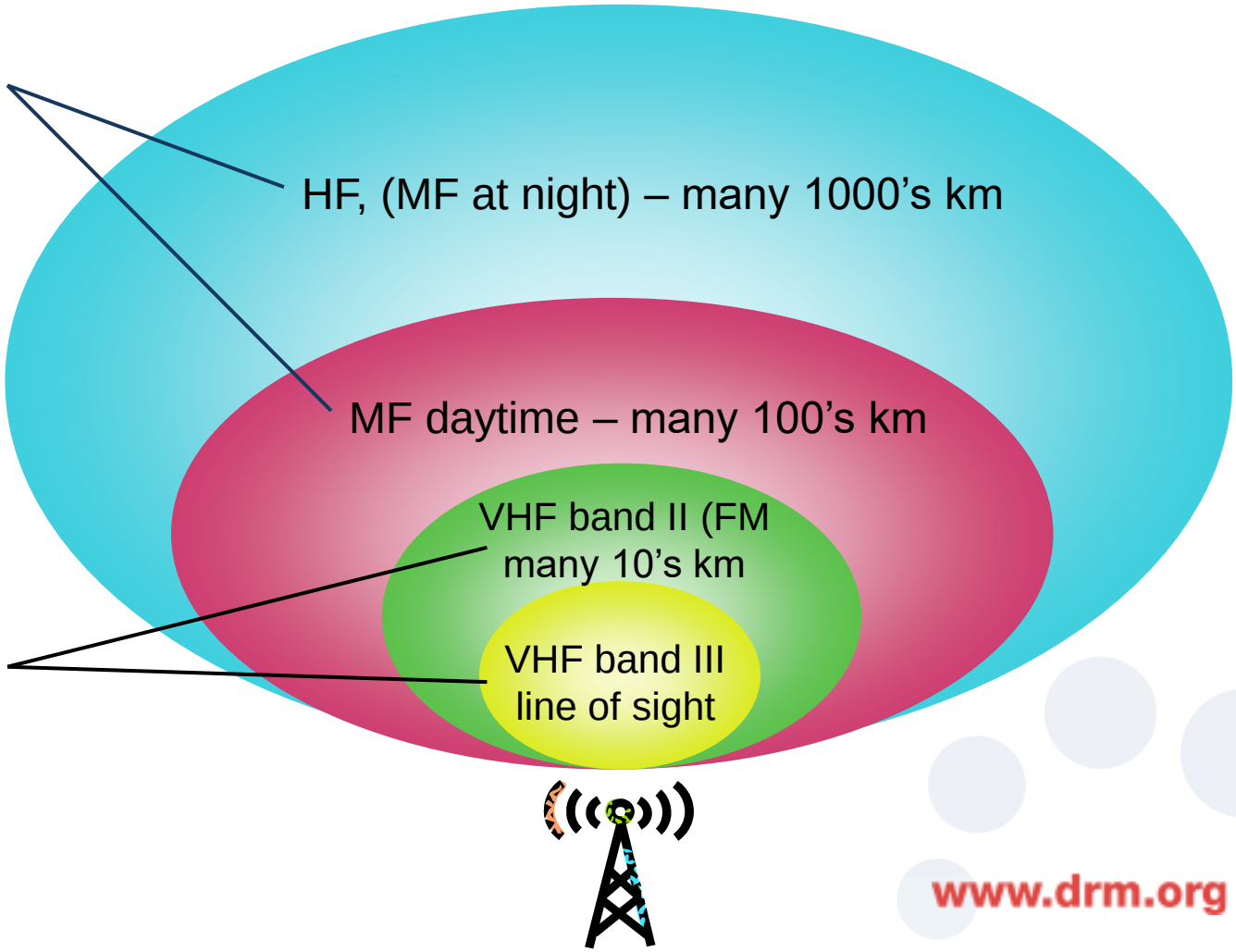
  → **No licenses** required

- 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

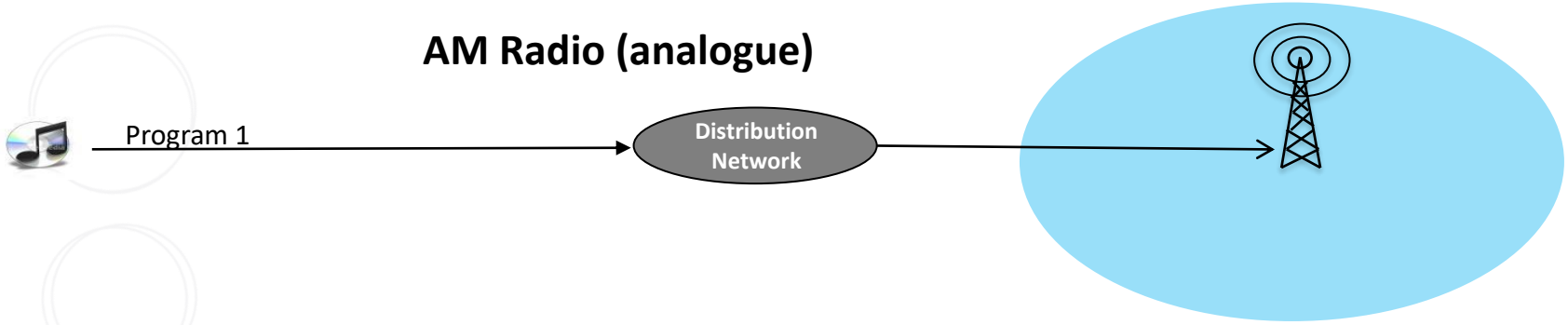


AM/FM Analogue – 1 Program per Transmitter

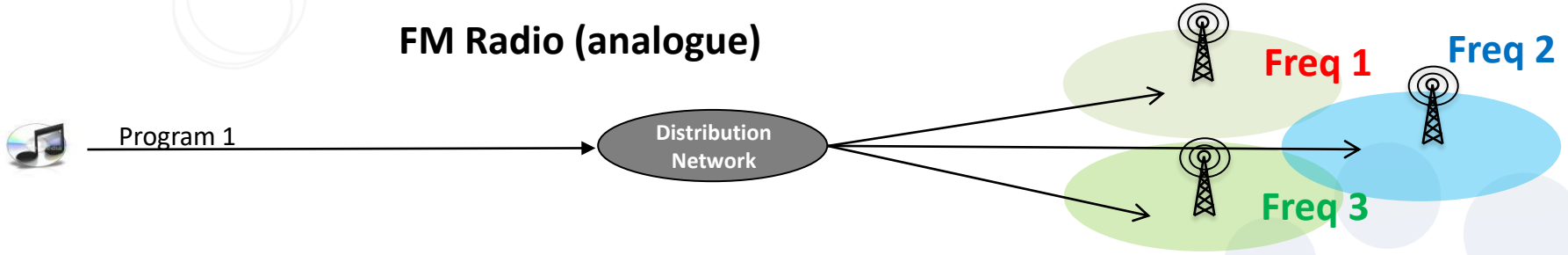
Programme Provider

Network Provider

AM Radio (analogue)



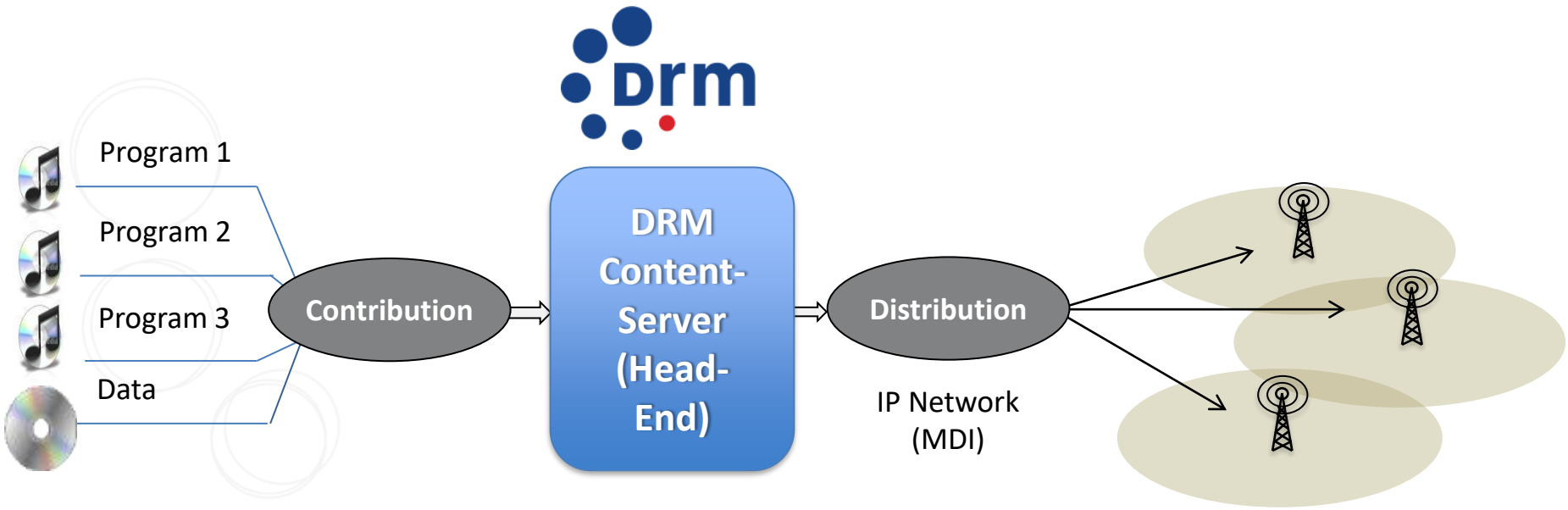
FM Radio (analogue)



DRM – Transmission System

Programme Provider

Network Provider



SFN **All TX on same Frequency**

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

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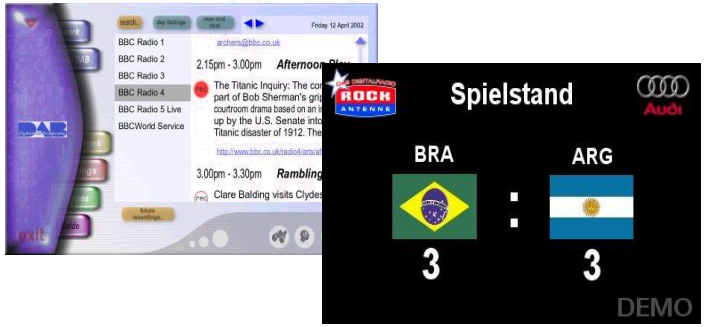

DRM TextMessages
programme accompanying labels (Unicode), max. 128 characters, max. every 20 sec.

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!**

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www.drm.org

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

Detection of pending disaster

Disaster hits

Preparatory General Education → **Instant Warning Dissemination** → Crisis / Rescue Support → Post-Disaster Services

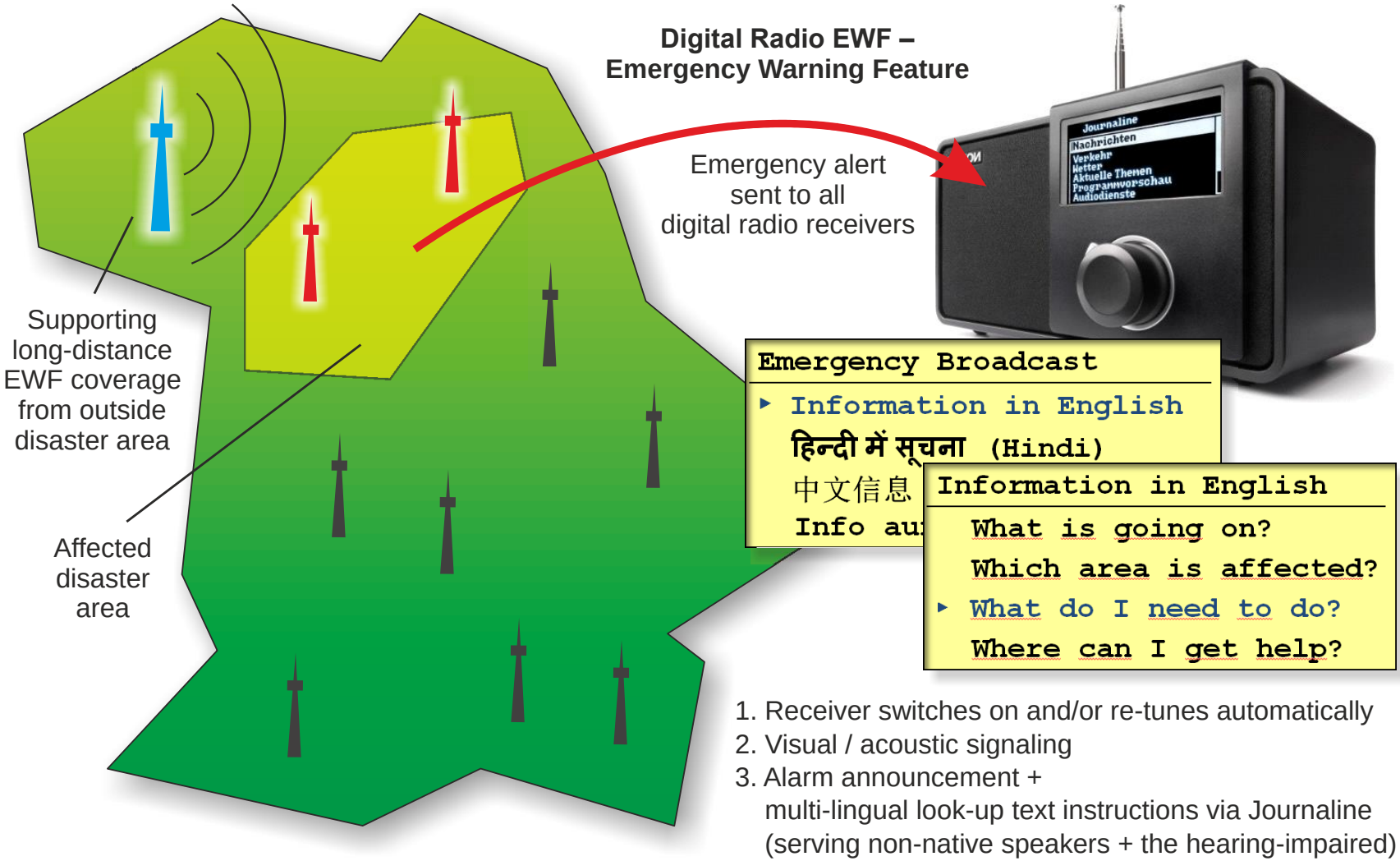
Digital Radio provides essential services in all these stages, as it:

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 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

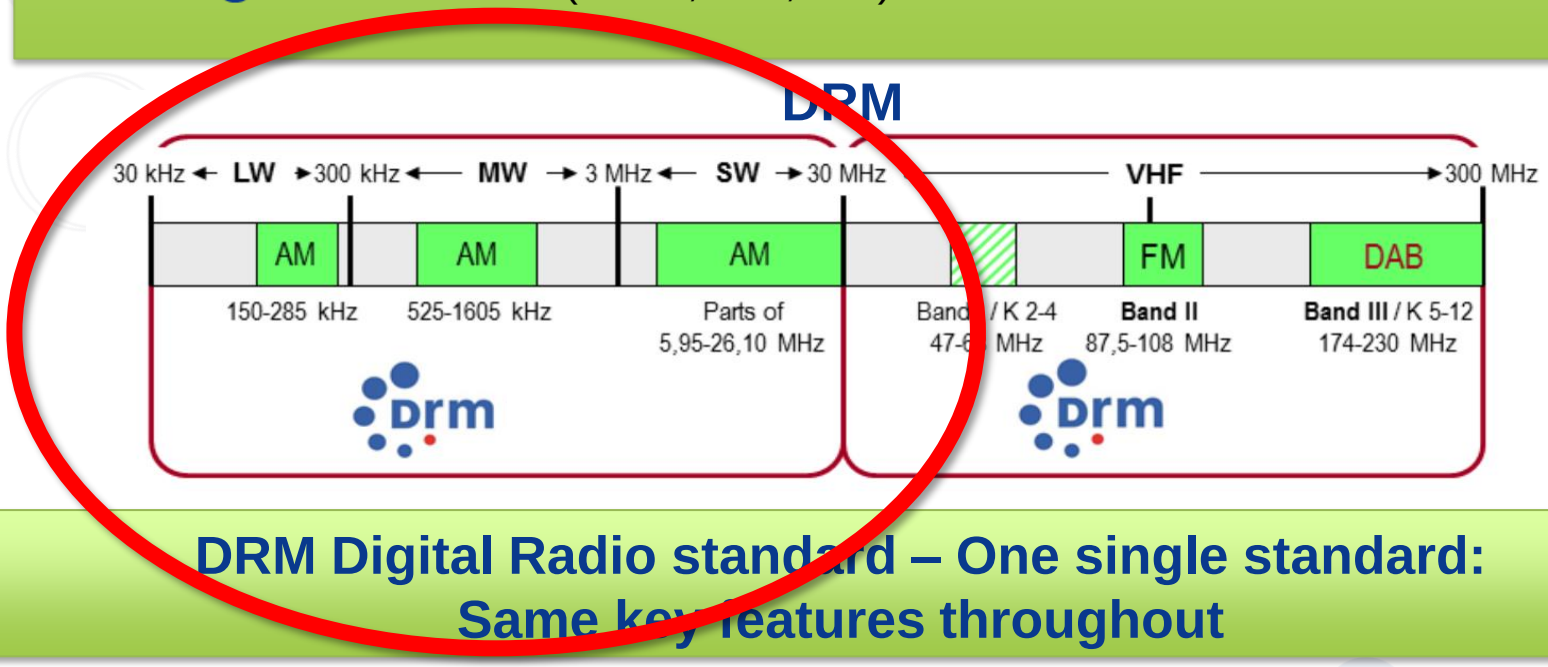
Sales and Business Development Manager, Ampegon

DRM in AM 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



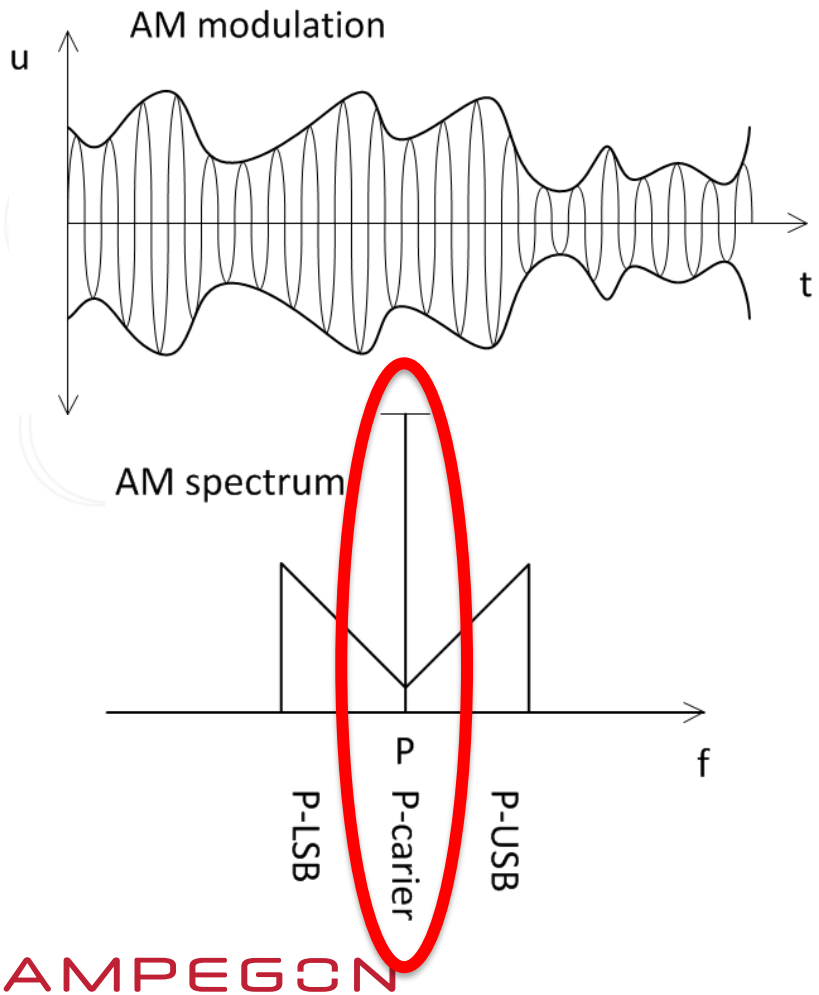
DRM Digital Radio standard – One single standard:
Same key features throughout

DRM for 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

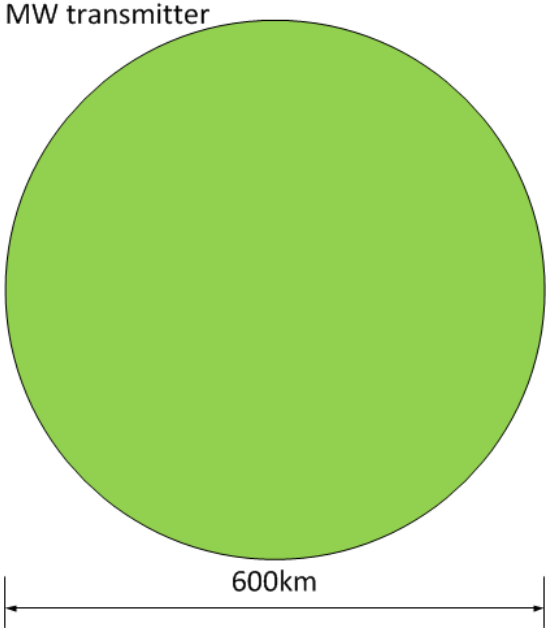


- **AM Carrier > 66% of energy (no content)**
- **P-USB and P-LSB <33% energy (content)**
- **AM reception level > 47dByV**

Coverage – AM (MW) analogue vs. DRM MW

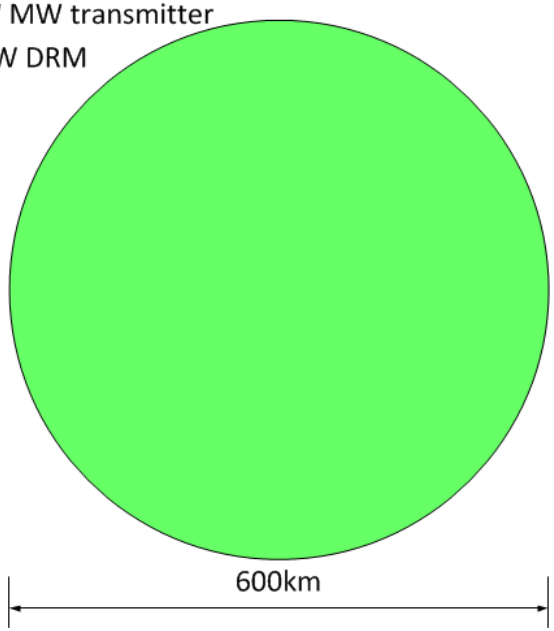
AM analogue vs. DRM – Same coverage, 1 single tx

AM Coverage
100kW MW transmitter



235 000 km^2

DRM Coverage
100kW MW transmitter
-> 40kW DRM

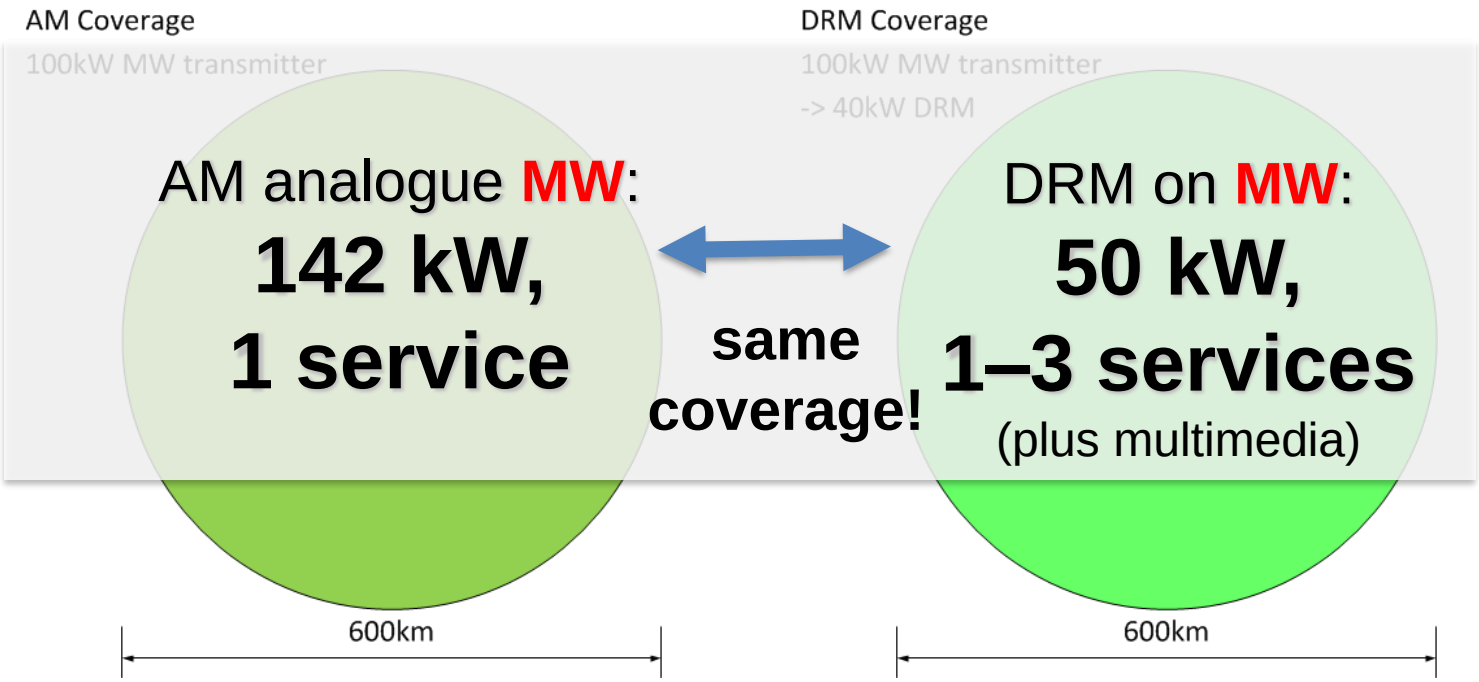


235 000 km^2

Note: Conservative calculation! ITU suggests **20 kW DRM** for same coverage.

Coverage – AM (MW) analogue vs. DRM MW

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



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

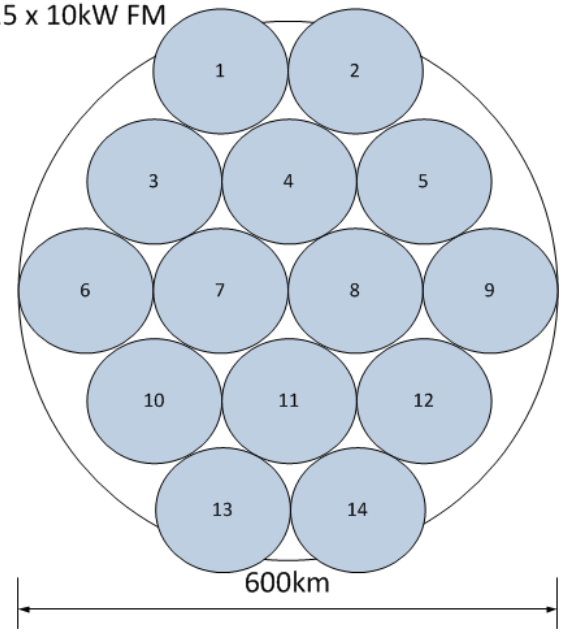
40 kW ERP @ 80% efficiency
→ 50kW power consumption

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
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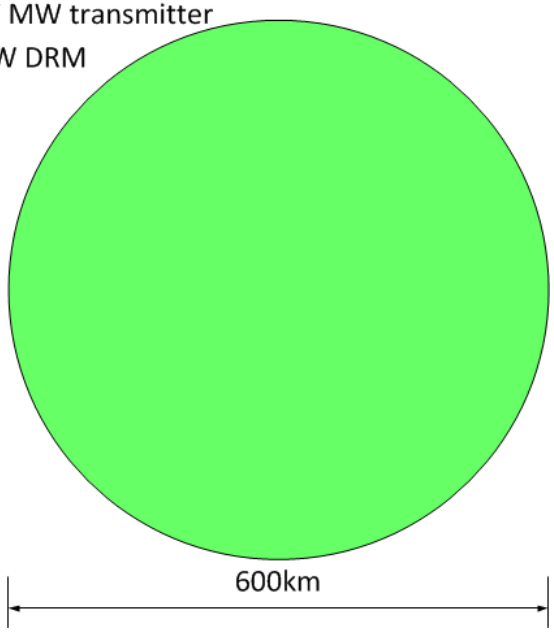
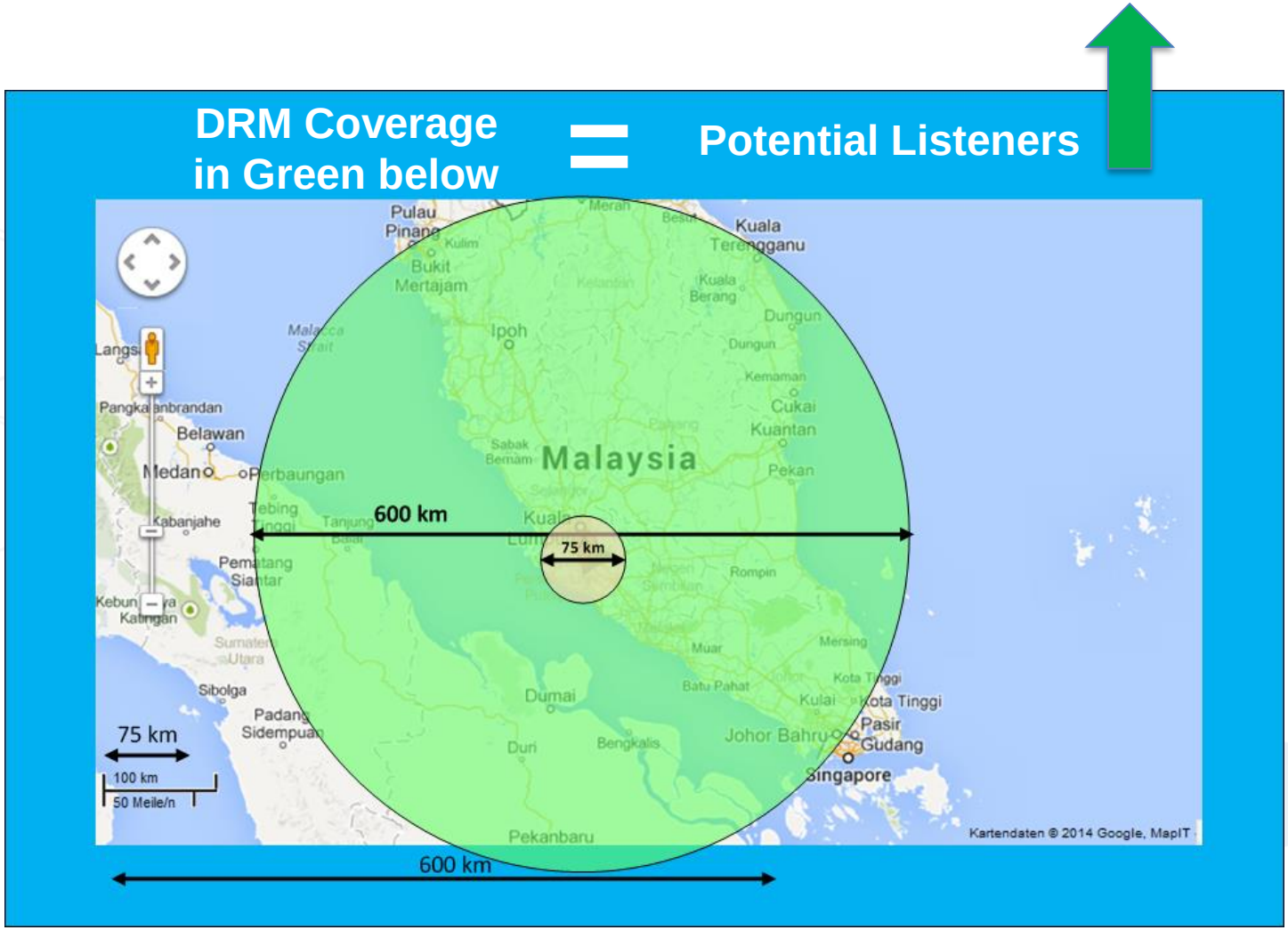
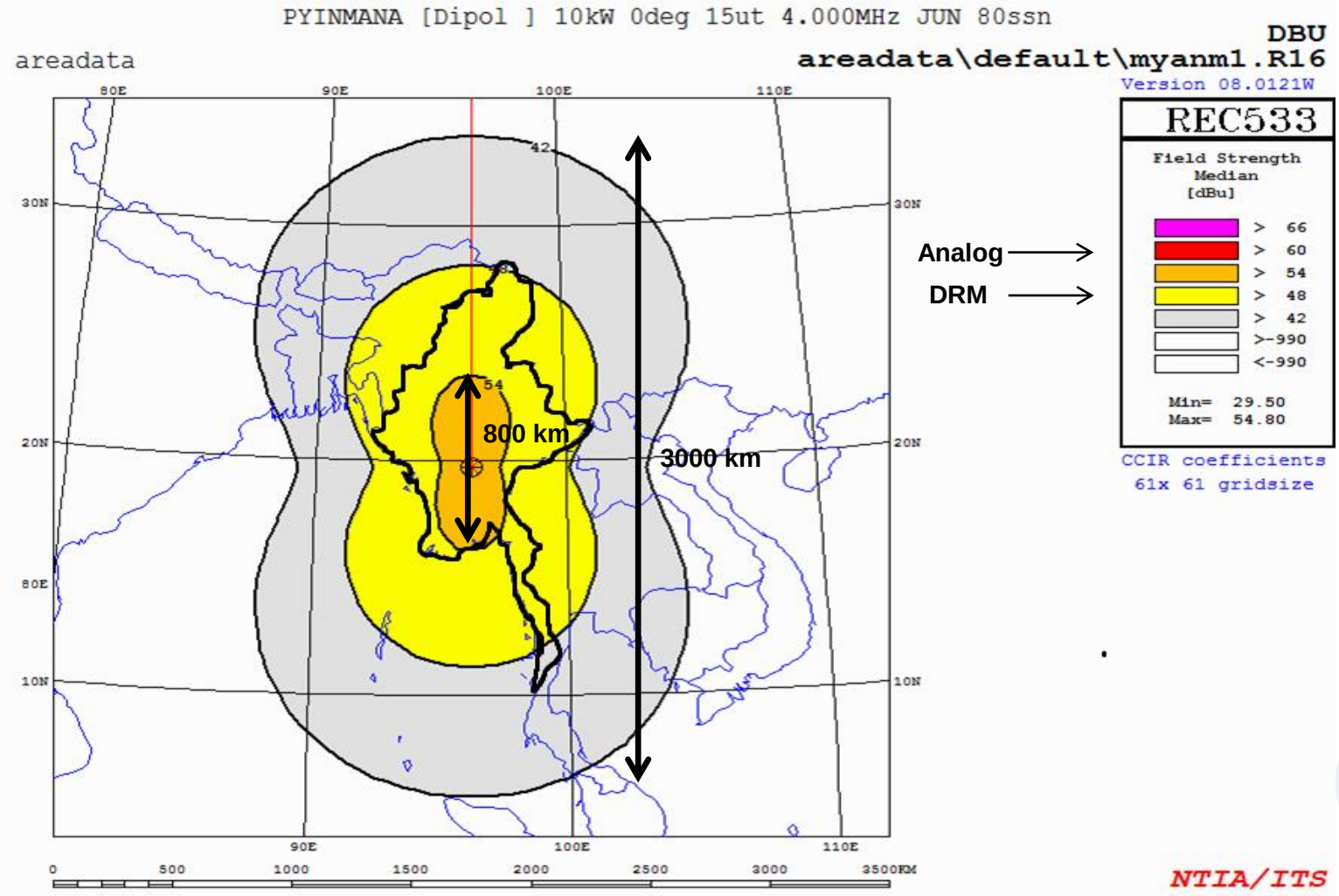


DRM Coverage using MW = 600 km!

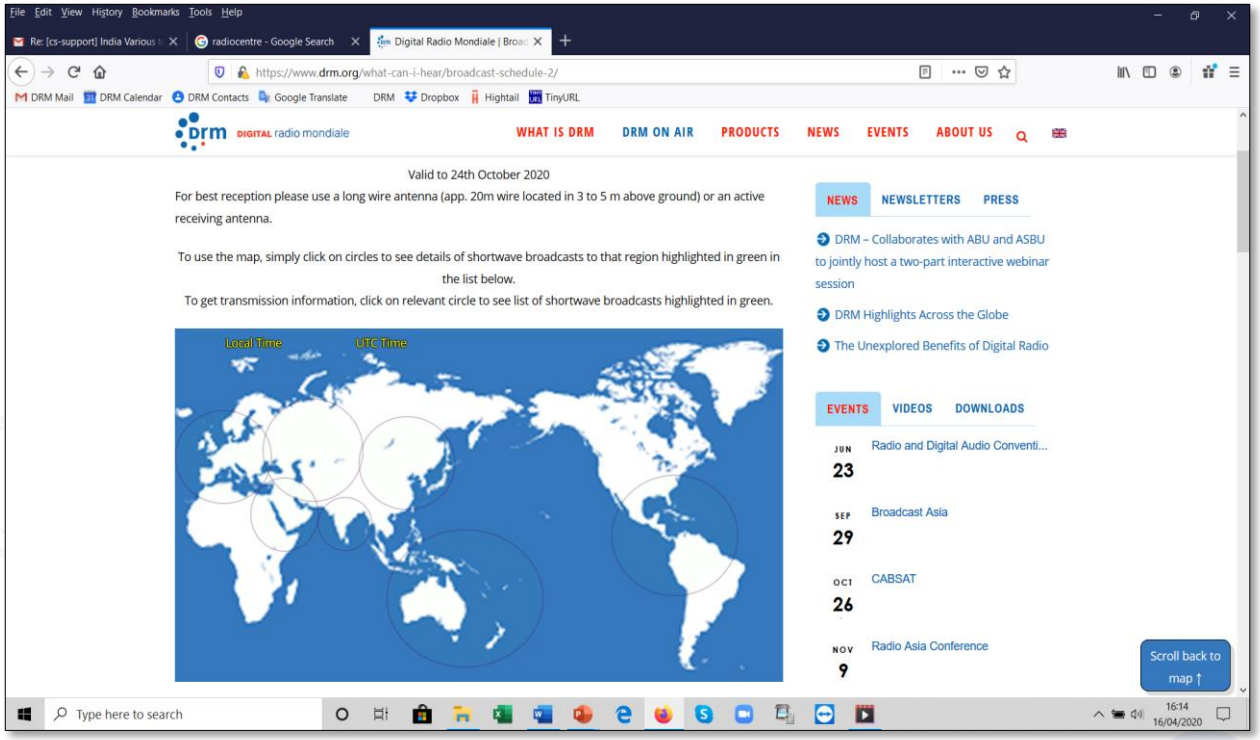


DRM Coverage with 10kW SW Transmitter



Interactive Shortwave Broadcast Schedules

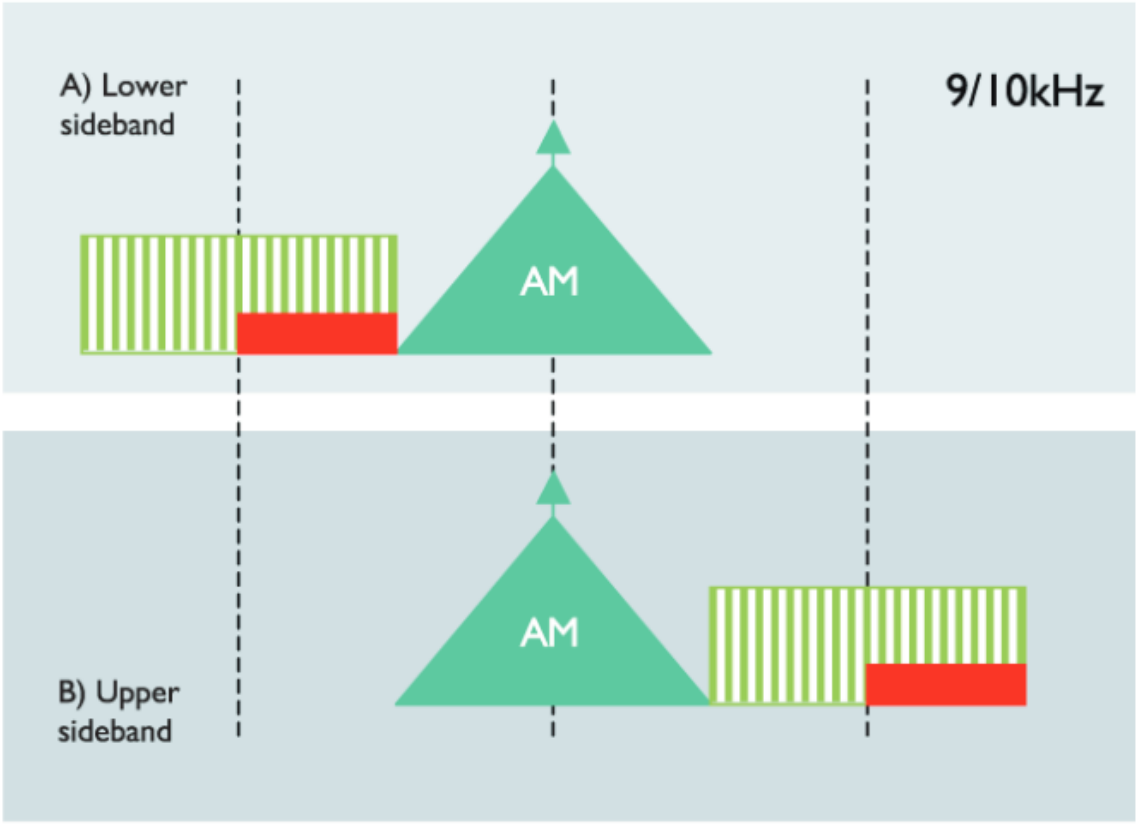
DRM Consortium has developed an online tool to quickly find DRM shortwave transmissions, broadcasters and target areas (accessible for both DRM members and non-members).



For more information, please visit the website:

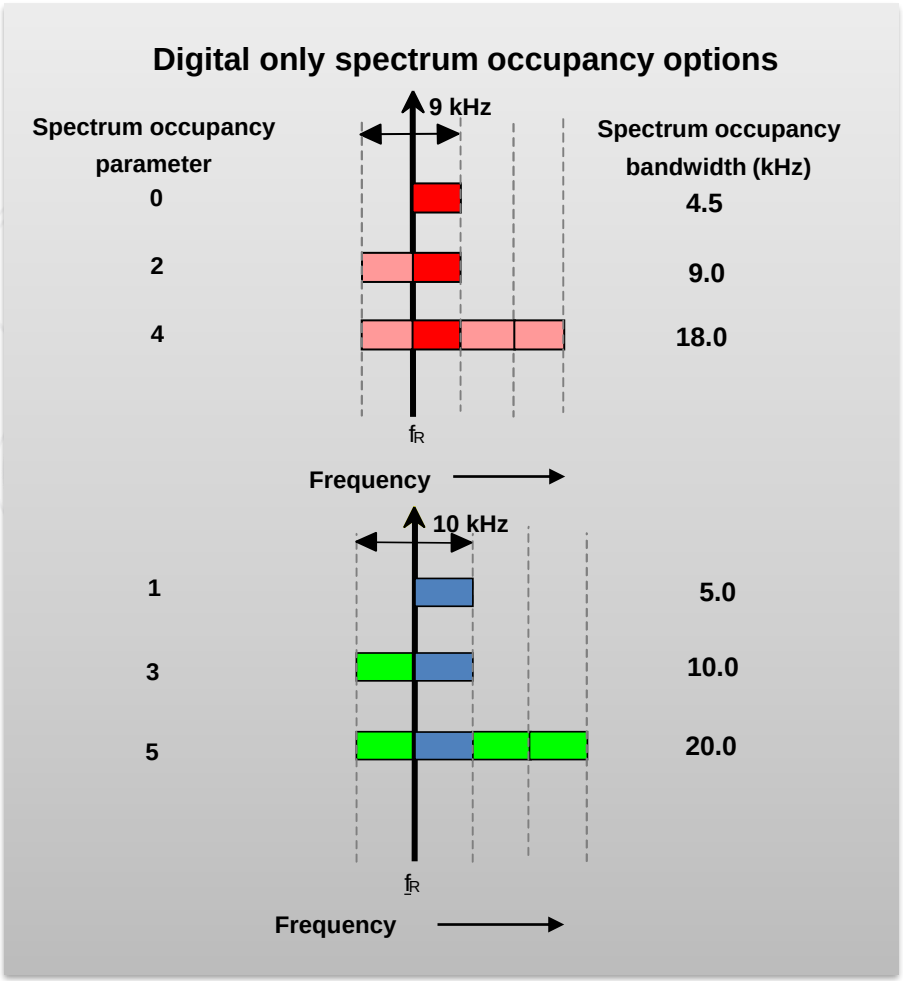
schedule.drm.radio

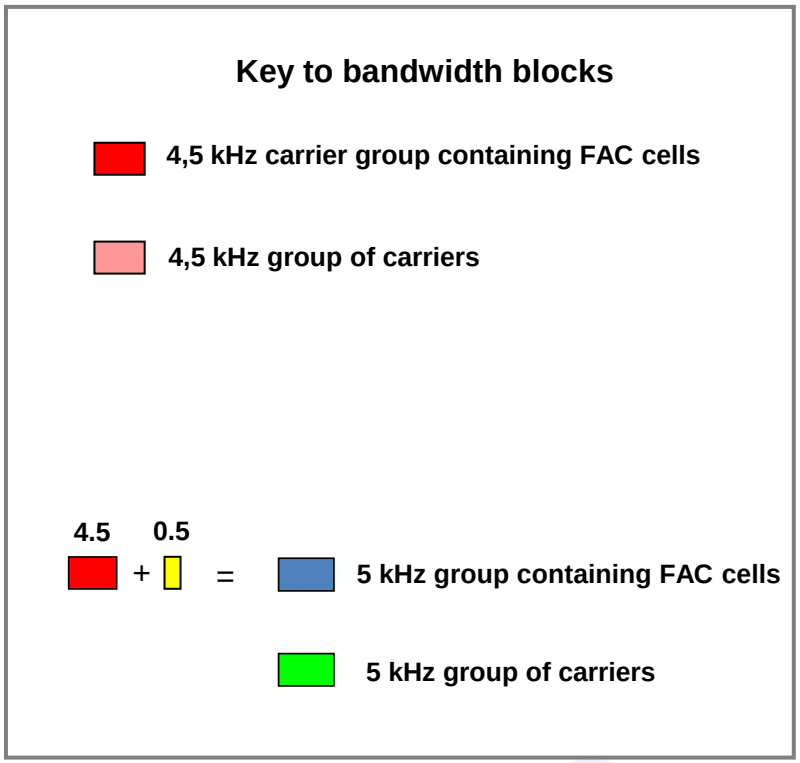
Simulcasting – Simultaneous Broadcasting



Some DRM MW-band transmitters are capable of simulcasting both DRM and analogue broadcasts within 20kHz bandwidth (i.e. 2x adjacent channels)

DRM Large-Area Coverage (MW) – Channel Configuration

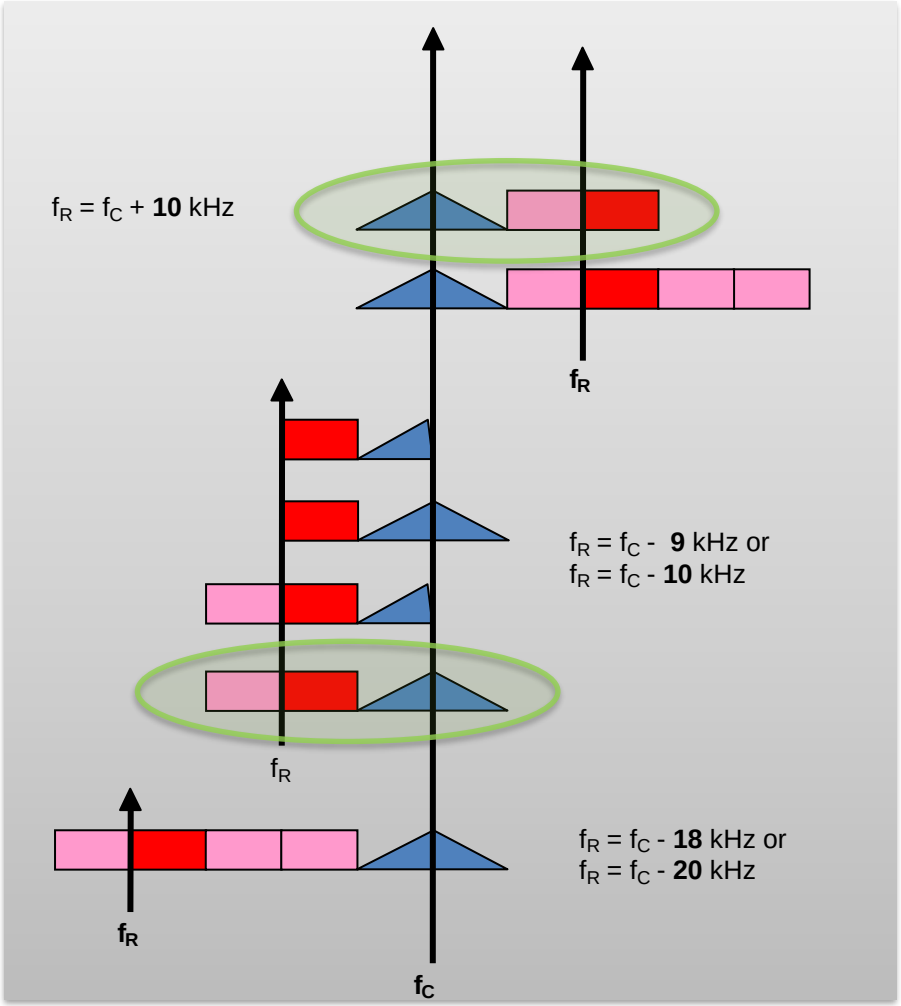




f_R is always the channel centre frequency

f_C is always the analogue signal carrier frequency

DRM Large-Area Coverage (MW) – Simulcast Option



Neighbour-Channel simulcast option (MCS) (full channels)

Key to analogue and digital parts of signal

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

f_R is always the channel centre frequency

f_C 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

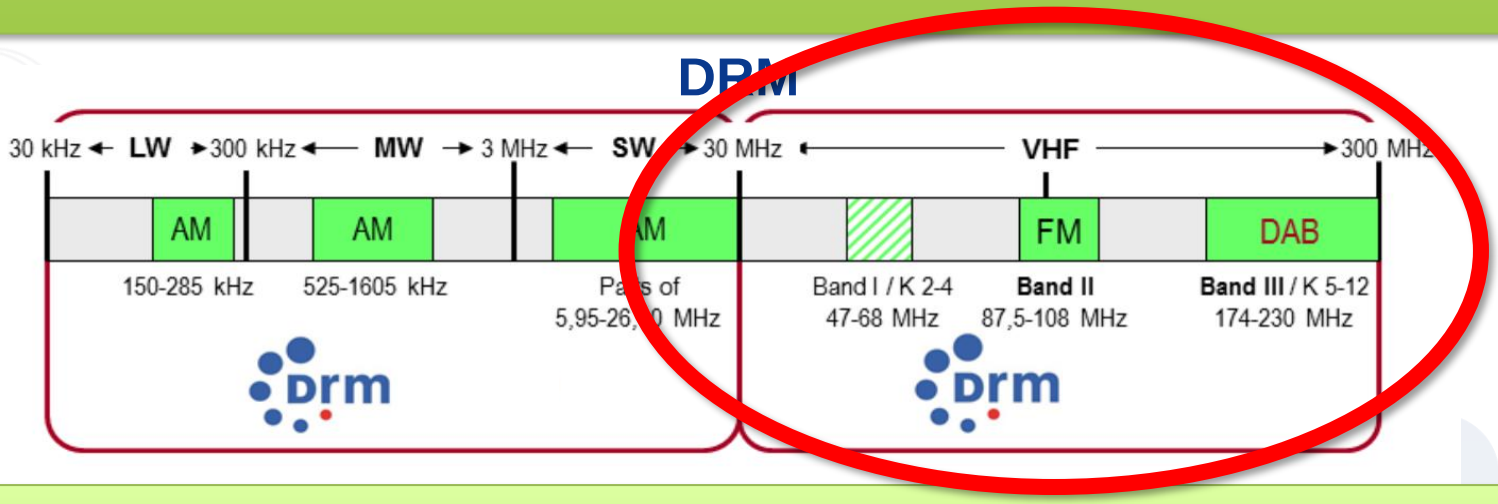
Vice-Chair DRM Consortium
Senior Business Development Manager,
Fraunhofer IIS

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**

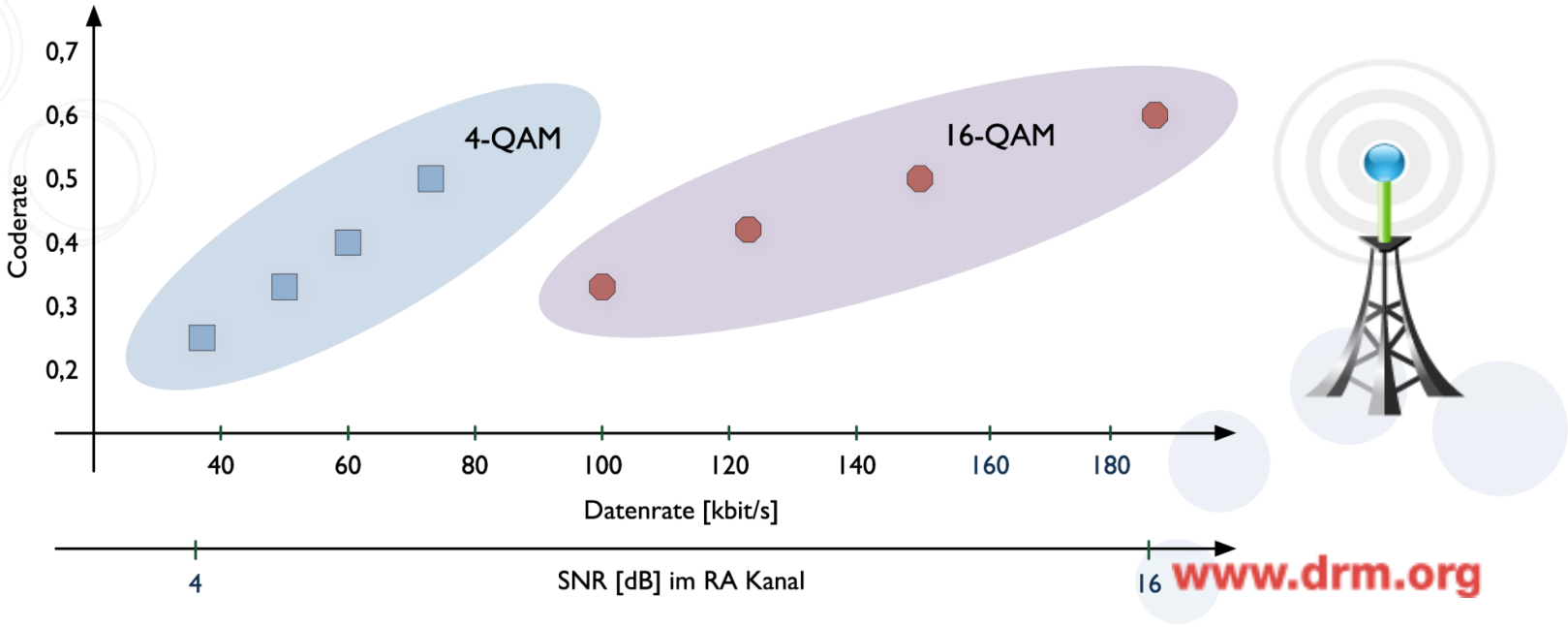
- **Endorsed by the ITU** in 2011
  ITU-R Rec. BS.1114 (system),
  ITU-R Rec. BS.1660 (planning parameters)
- **ETSI standard ratified** in 2011
- **Worldwide spectrum compatibility:** 96 kHz bandwidth (half of FM)
- **Useful content bit rate:** 37—186 kbps
- **Flexible configuration**: capacity ←→ coverage ←→ 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

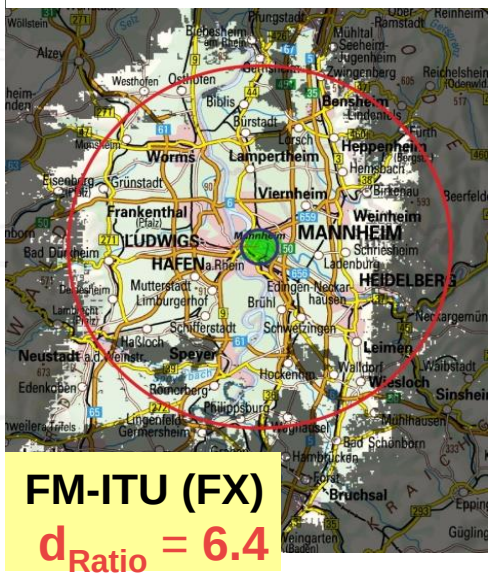
10 : 1 power

DRM 3x
at 96 kHz bandwidth

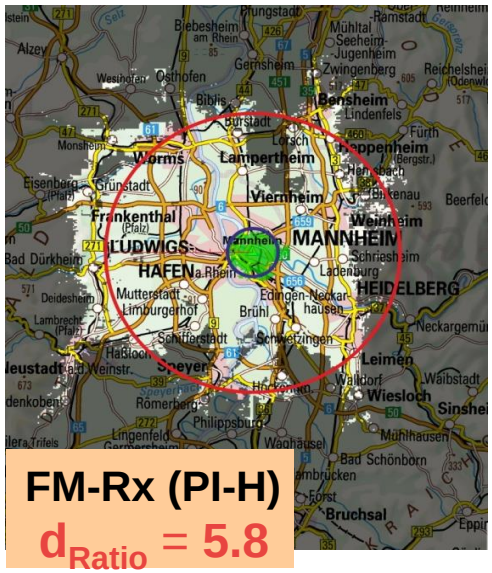
Transmitter 93.2 MHz: Calculated Coverage Comparison

Study on the Comparison of the Coverage and Transmitting Power between FM and DRM in VHF Band II

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



FM-ITU (FX)
d_{Ratio} = 6.4



FM-Rx (PI-H)
d_{Ratio} = 5.8

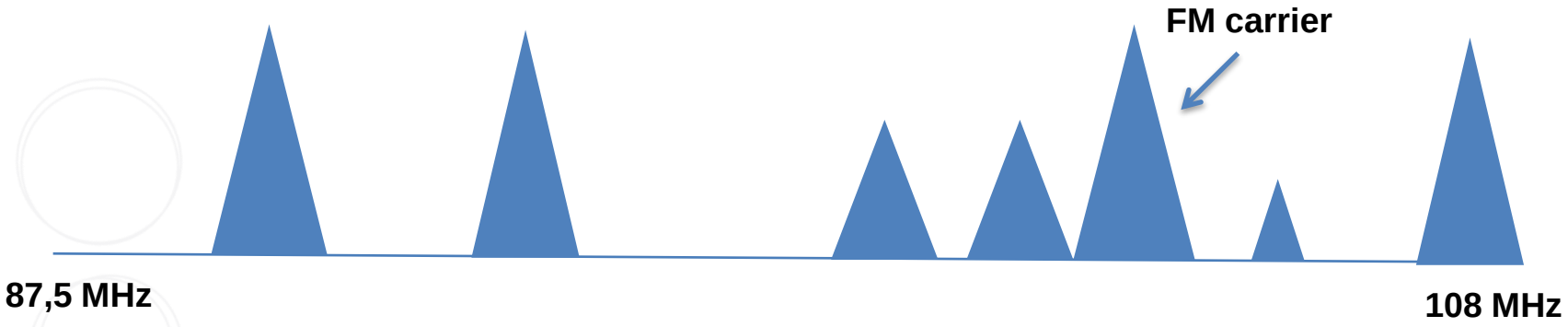
FM-Rx (MO)
d_{Ratio} = 10.2

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)

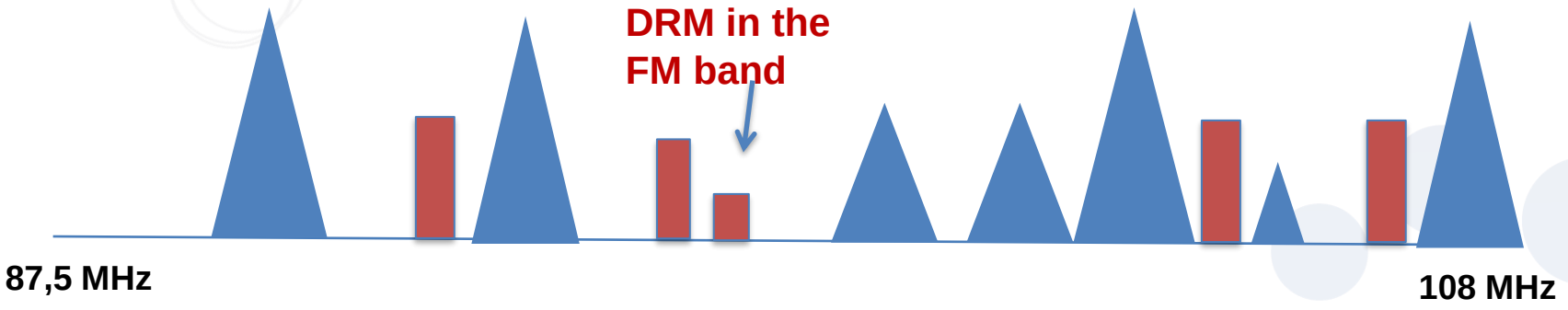
Ratio of the coverage within the circles: d_{Ratio} = d_{DRM+} *(in red)* / d_{FM} *(in blue)*

Migration Scenario for DRM (in VHF) in Band II

DRM (in VHF) – flexible for different spectrum situations

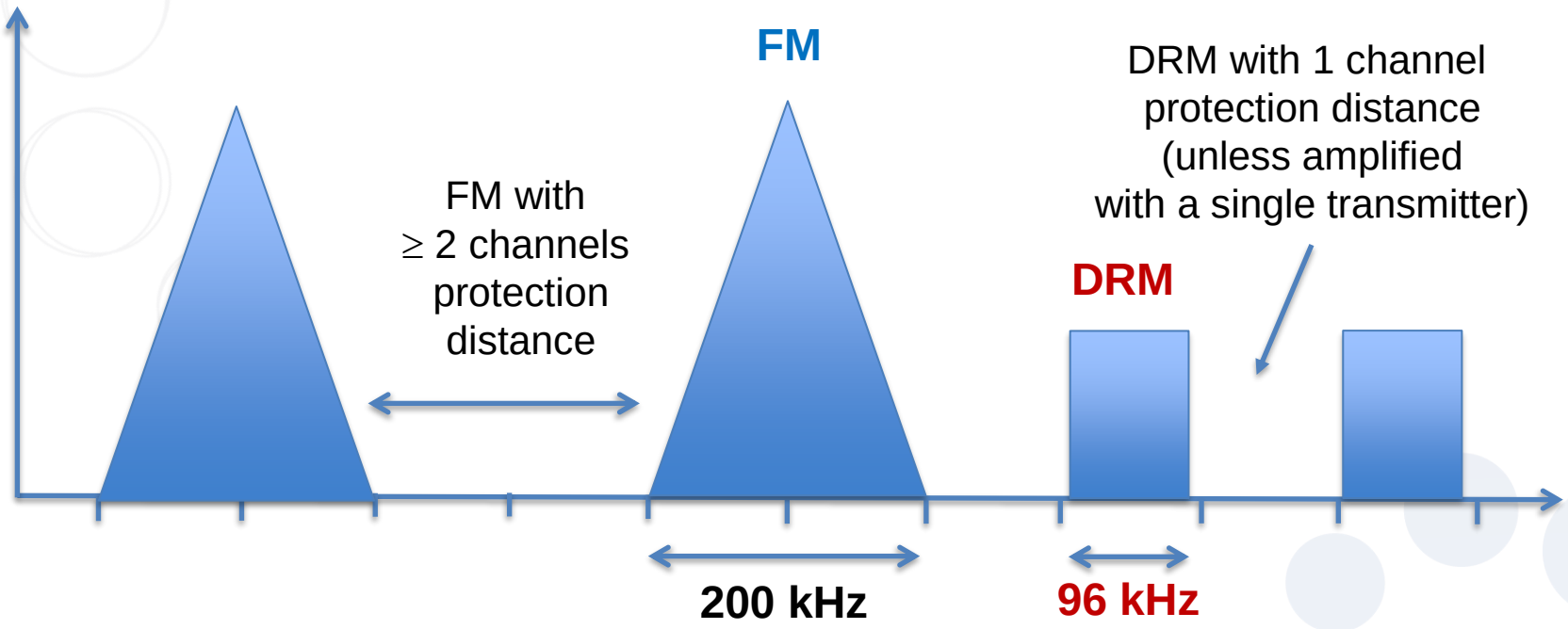


→ DRM fits anywhere in the FM gaps!



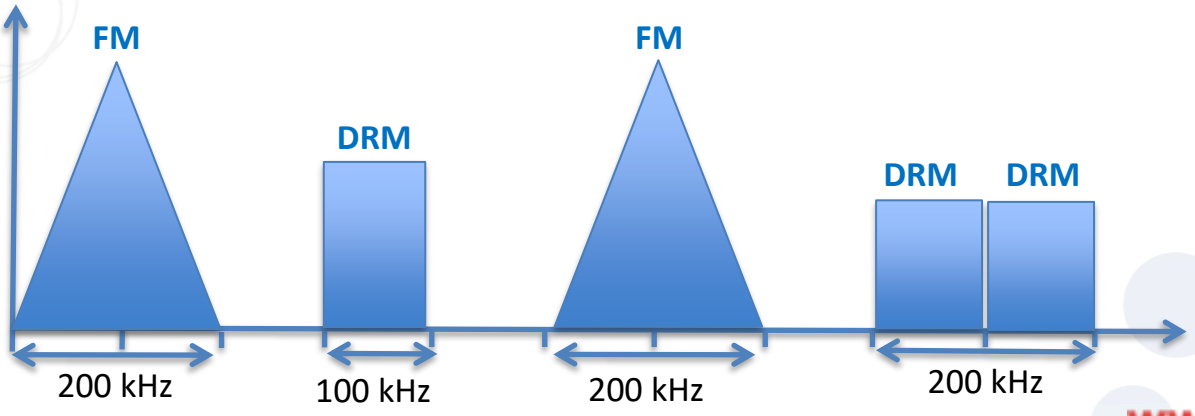
DRM Fits in Existing FM Band

- 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!)



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**

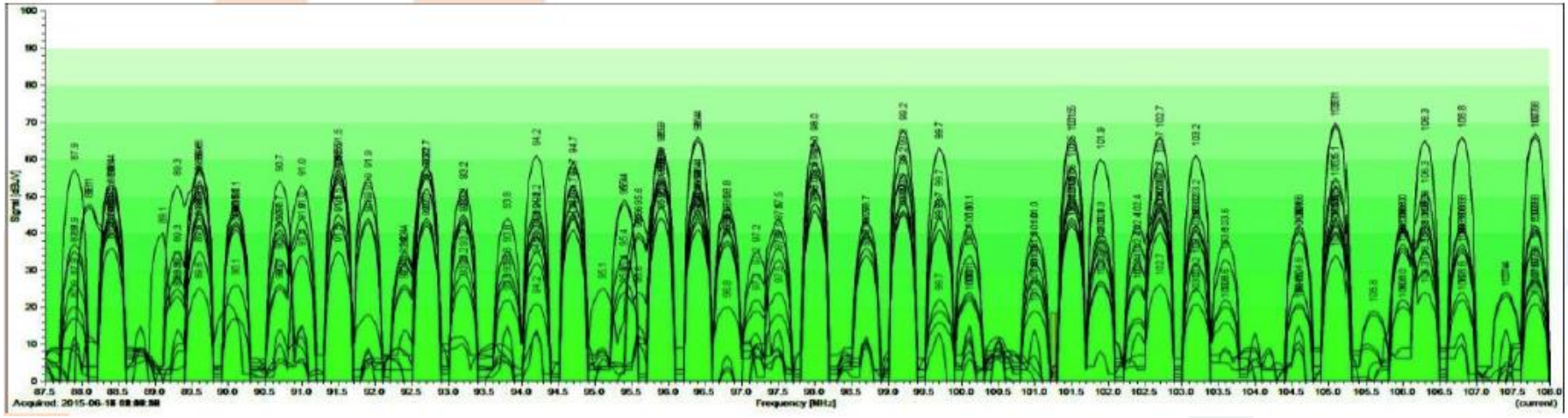
nautel RFmondial

South Africa

Radio Frequency Situation – Johannesburg, South Africa

Supporting growth and Development

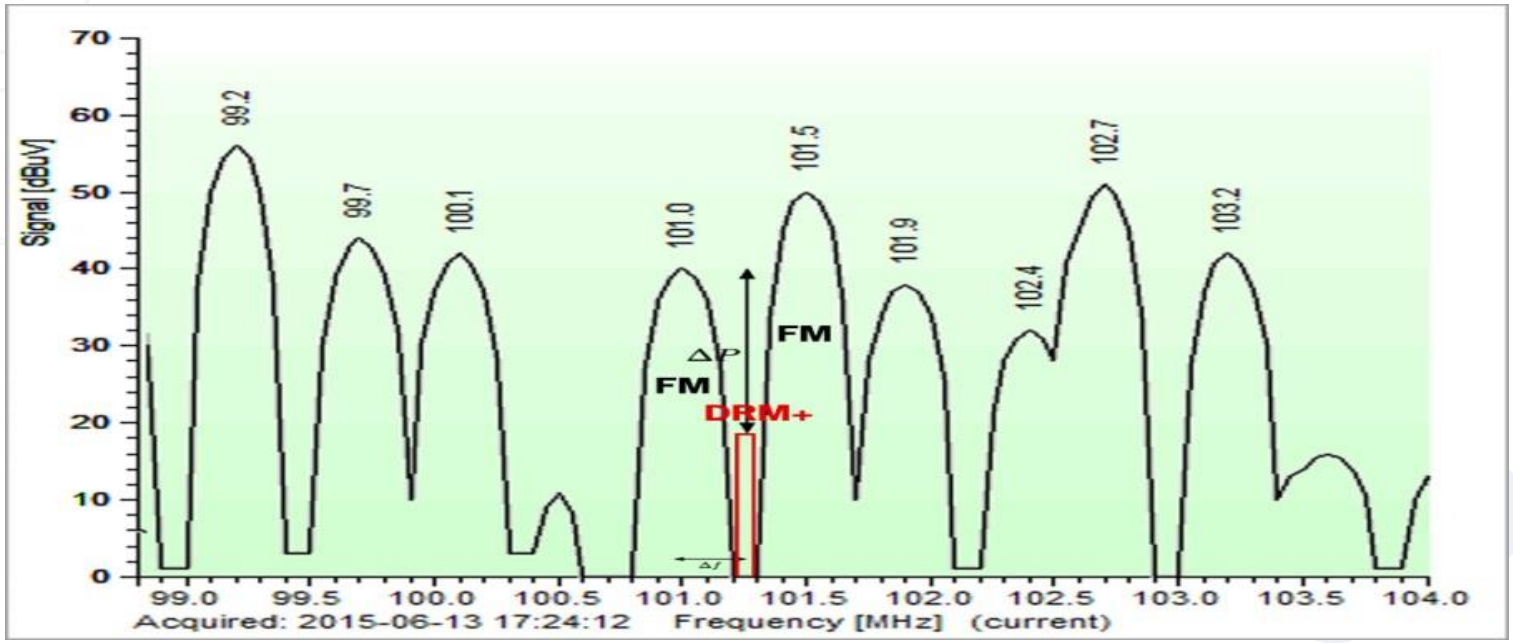
- The FM band provides a total available bandwidth of 20 MHz
- In South Africa, a separation of 400kHz is considered the minimal separation of 2 adjacent FM signals without causing interference
- Public broadcaster's radio stations maintain a 500kHz separation
- This would give a total number of presumptive FM transmitters to a maximum of approximately 50 but the situation is more complicated and Johannesburg FM



South Africa

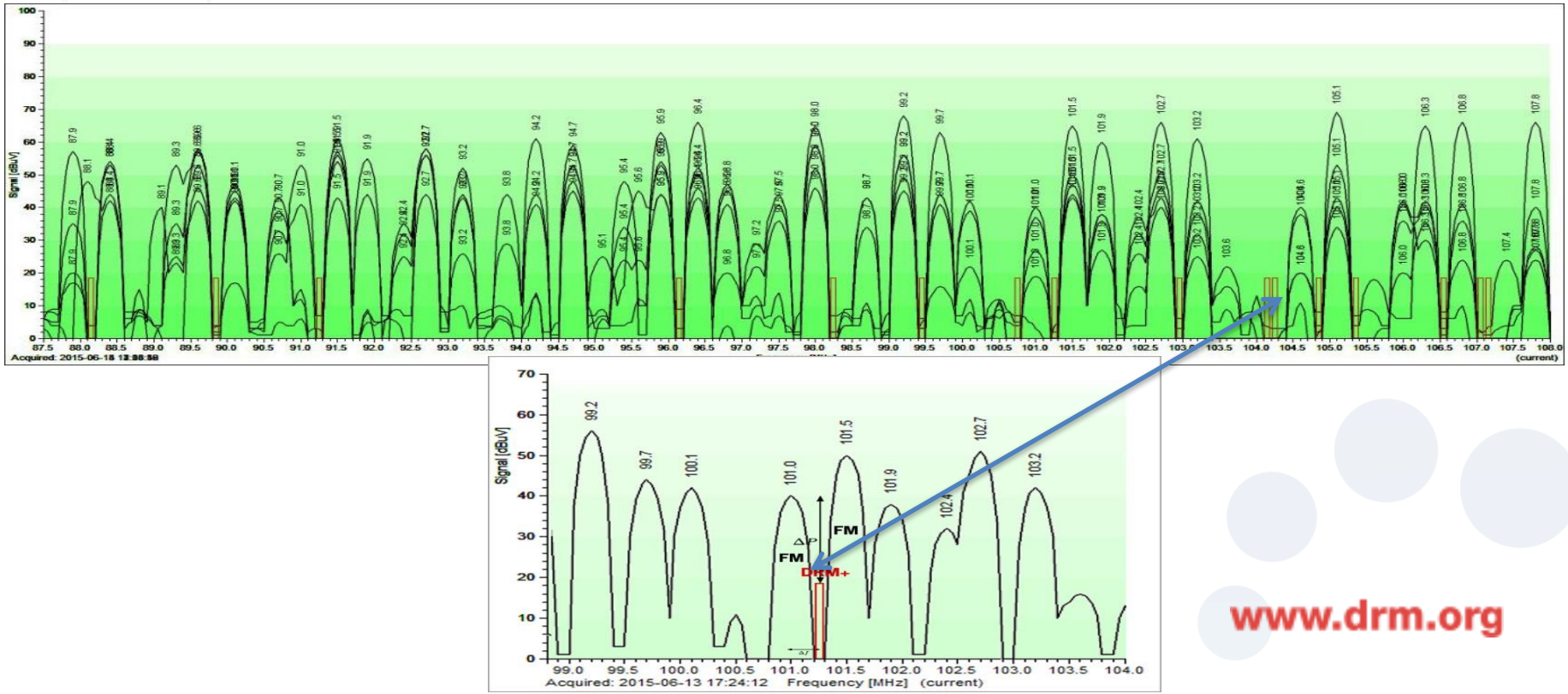
Results in Johannesburg

- 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.



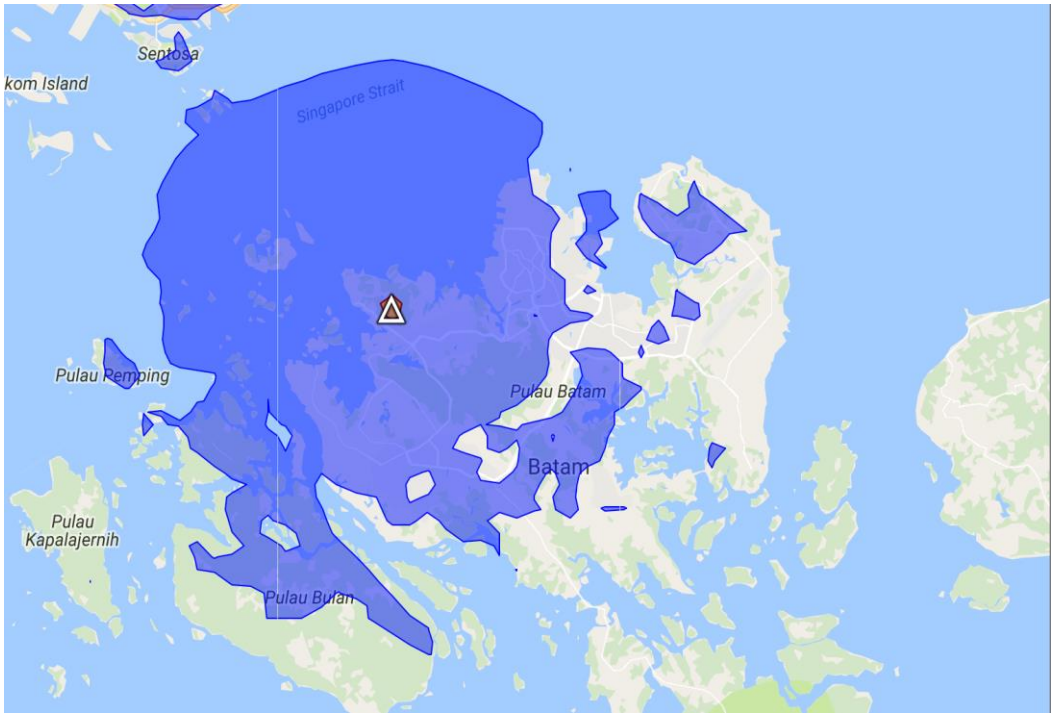
Full FM Spectrum – Plenty of Space for DRM

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).



Indonesia

DRM on Batam Island for Radio Republik Indonesia (RRI) Coverage Prediction

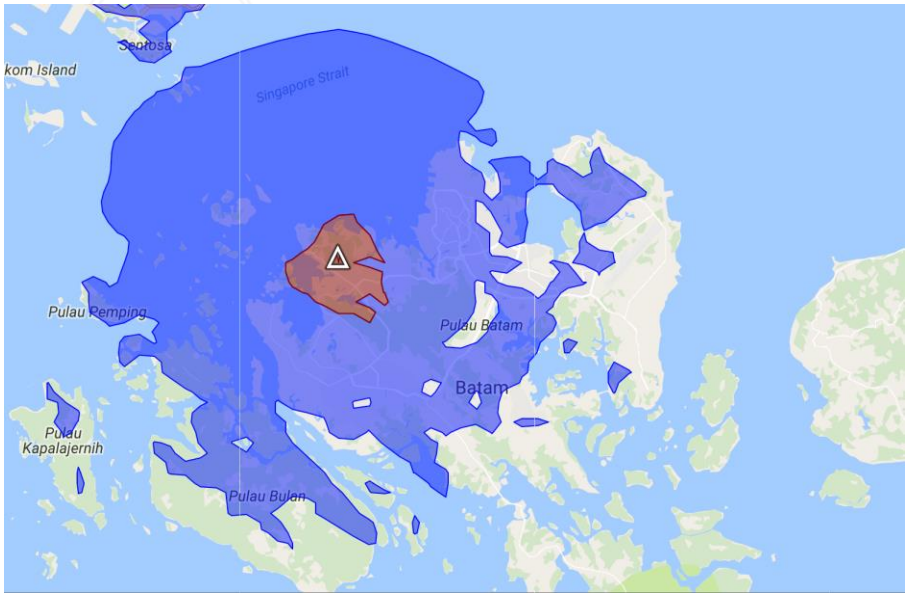


Prediction for DRM signal
in simulcast mode with analog FM
(single transmitter:
2,5 kW FM + 200 W DRM)

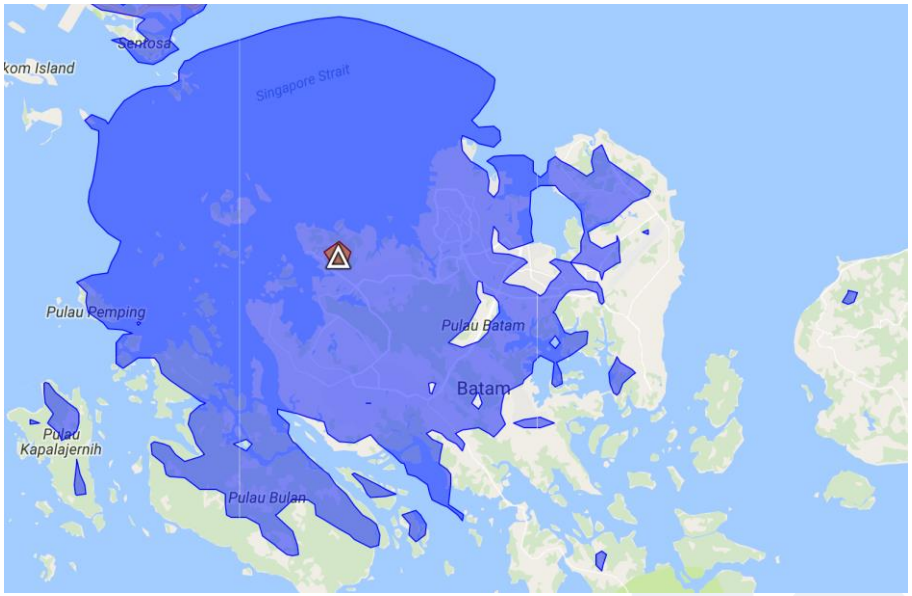
Indonesia

FM analogue vs DRM Coverage

FM analogue 3 kW (stationary)

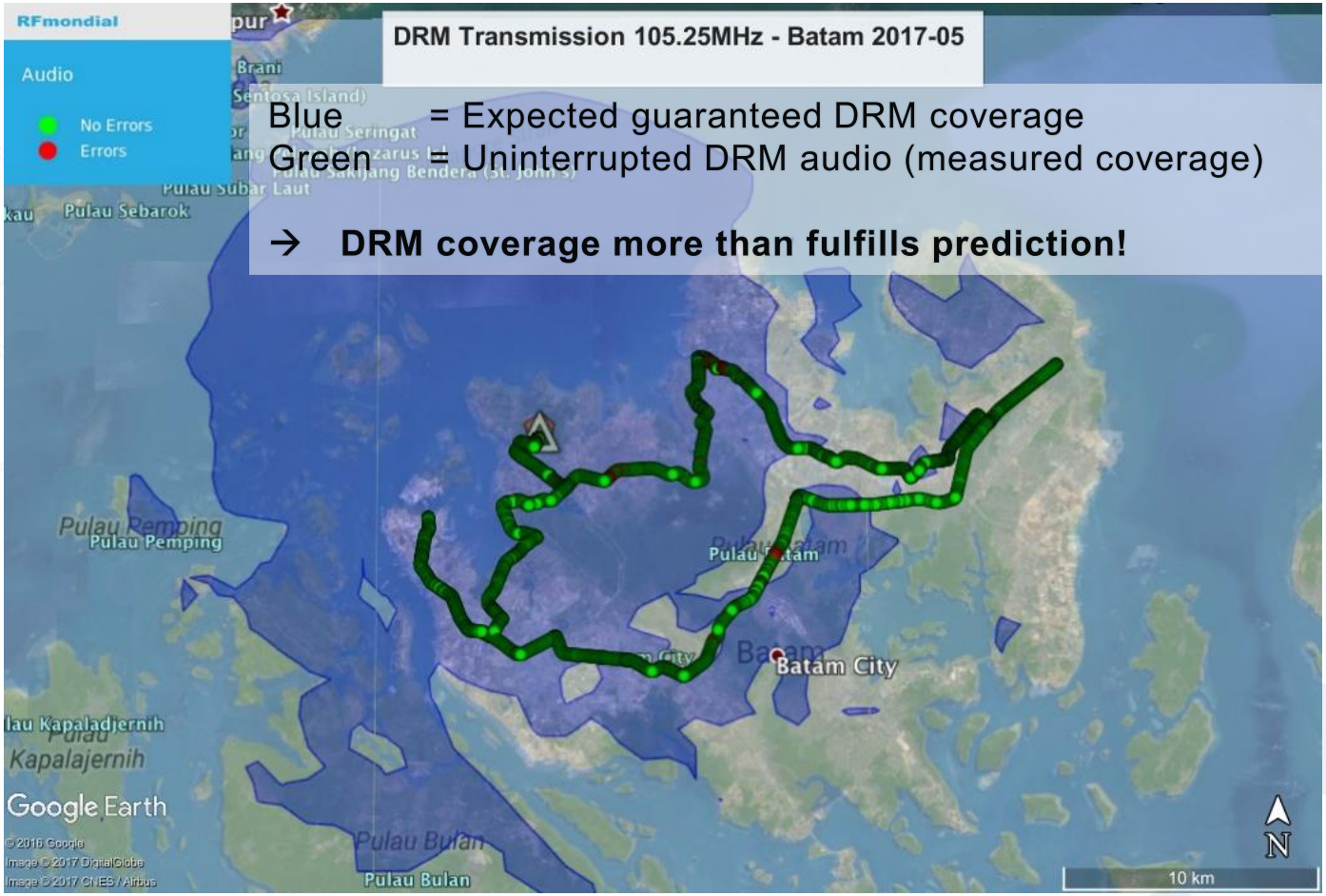


DRM 0.3 kW (mobile)



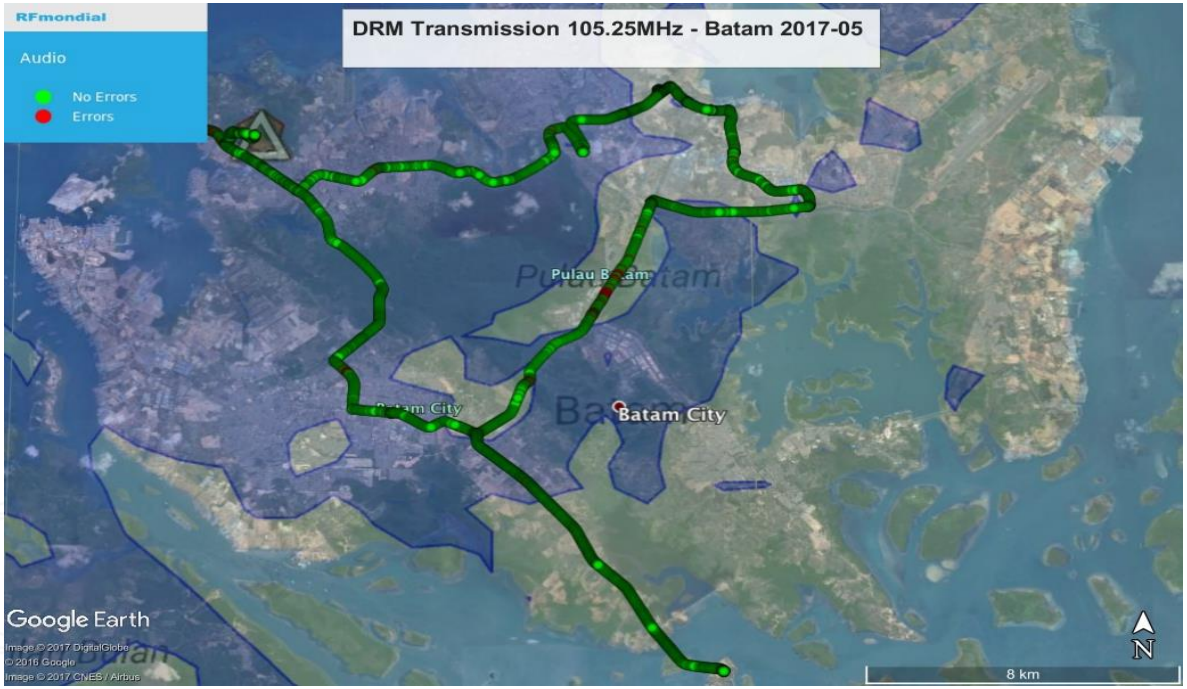
Indonesia

DRM in Batam – Verification of Prediction



Indonesia

DRM in Batam – Field Trip Results / Audio



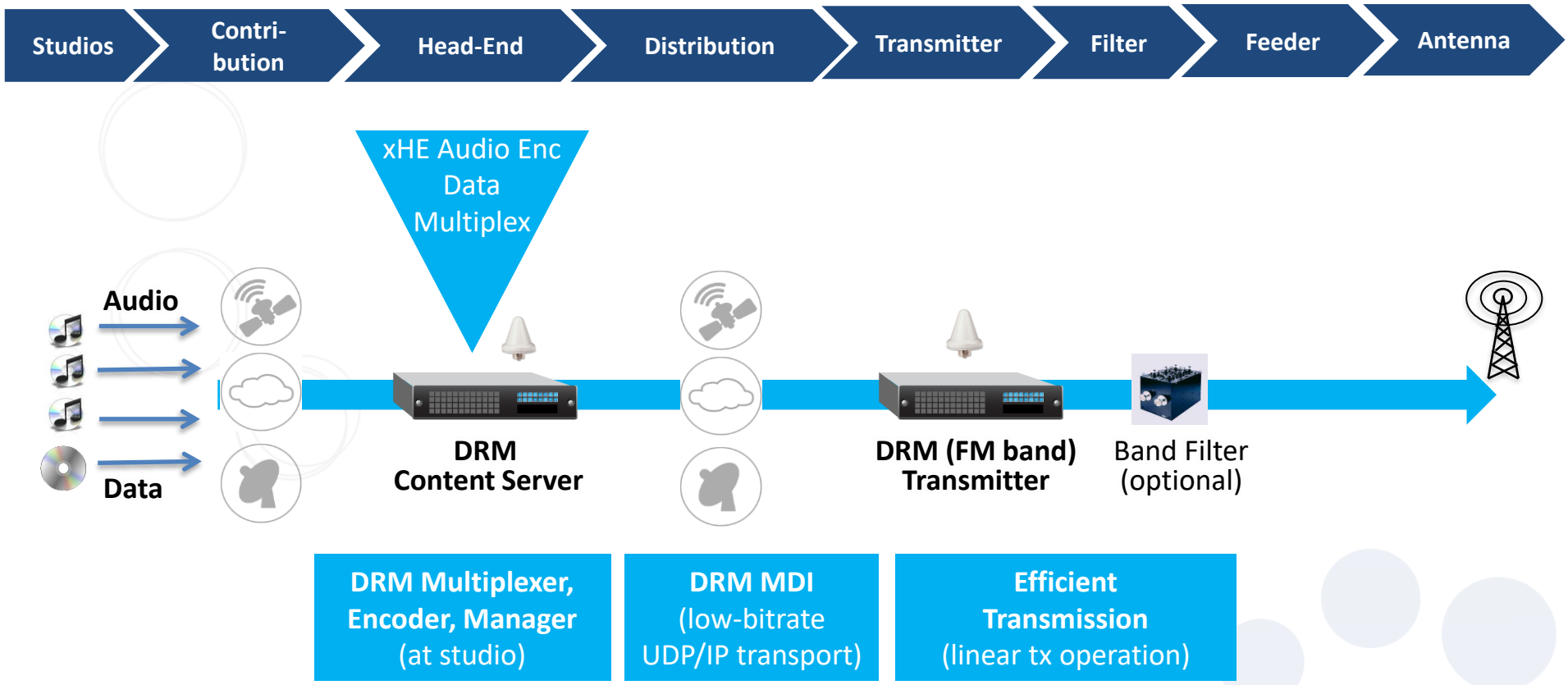
Blue = Expected guaranteed DRM coverage
Green = Uninterrupted DRM audio (measured coverage)

→ **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 

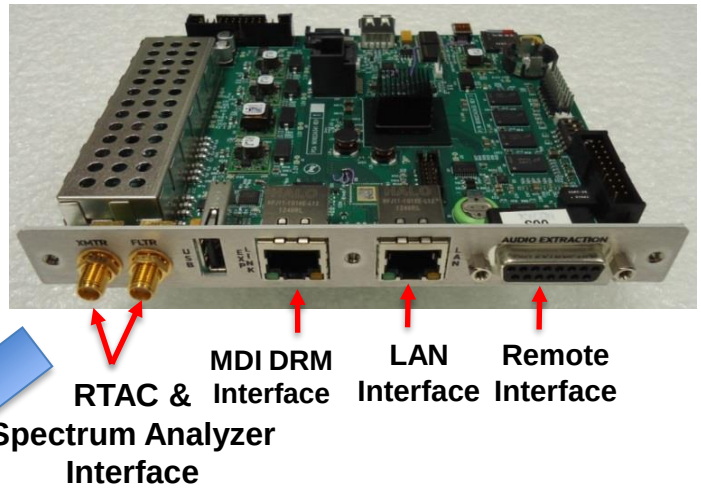
DRM in VHF – End-to-End System



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)

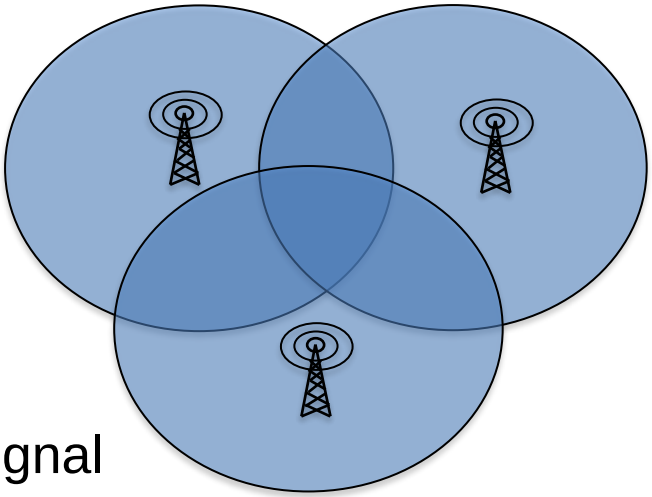
Simon Keens

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)

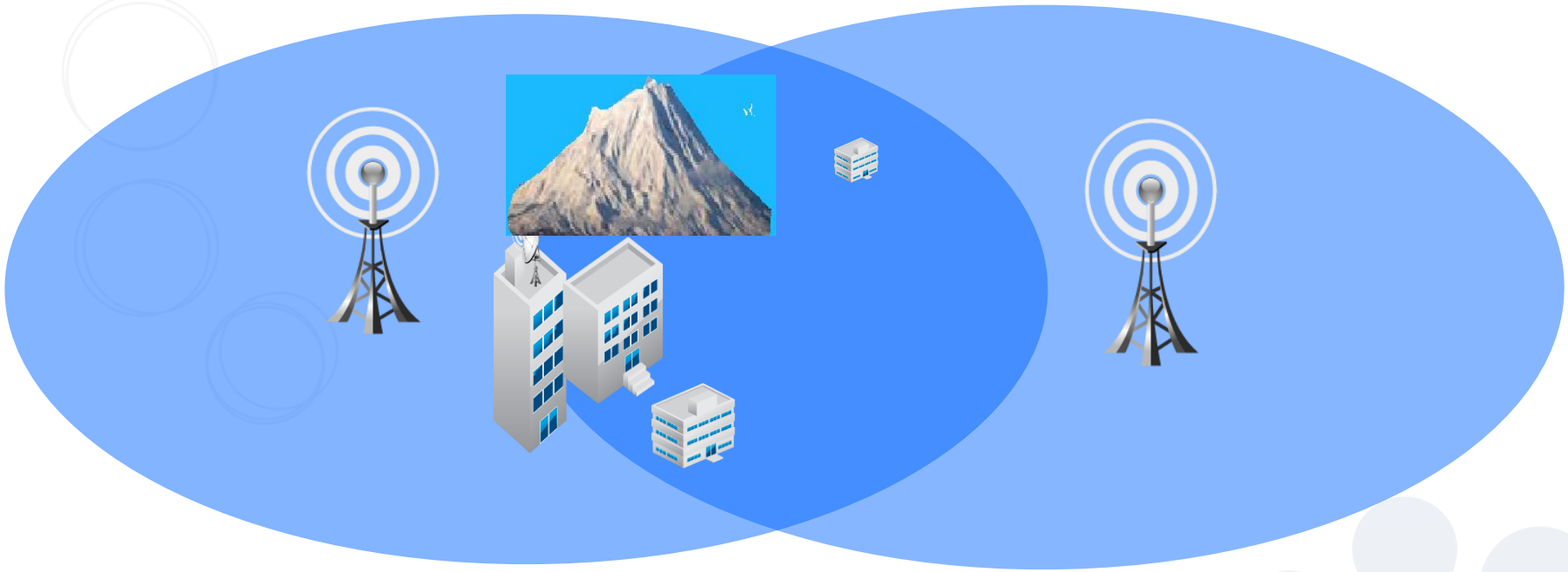
Advantages for Broadcasters:

- Option to migrate from high-power single-tx to lower-power distributed coverage → **cost savings + better coverage**
- Simple installation of **gap-fillers**

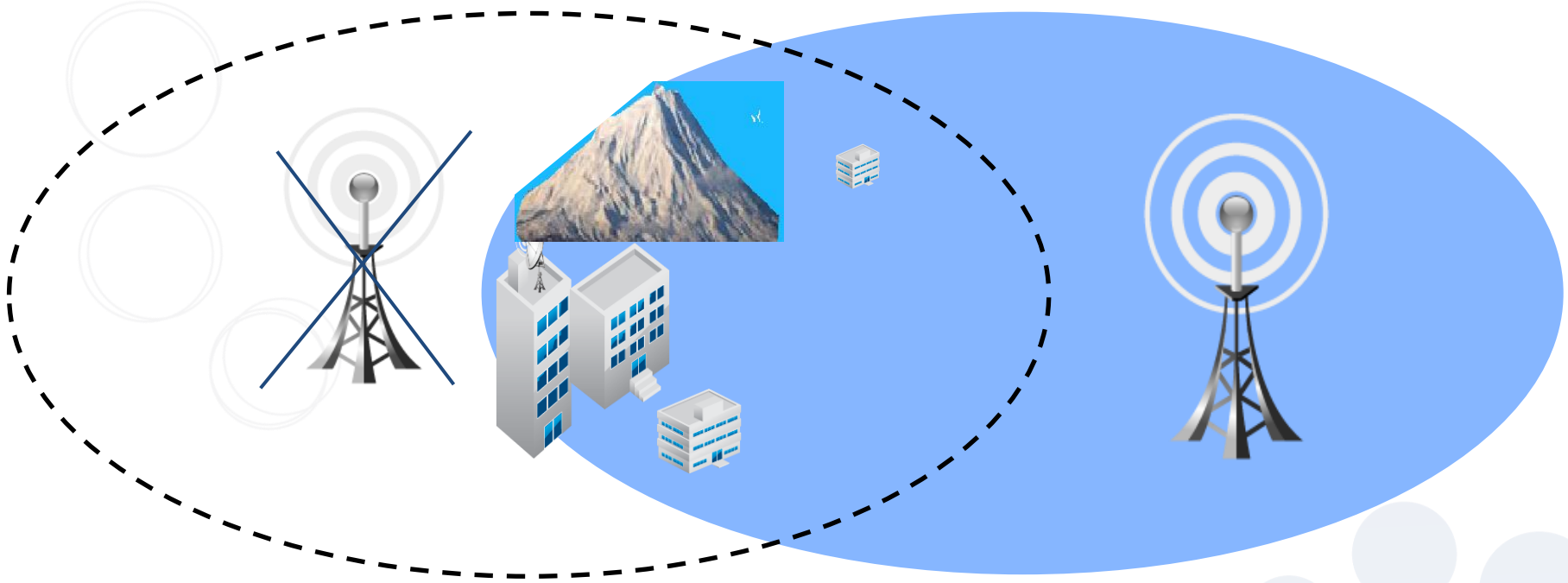
DRM SFN – Gap Filling

White spots (i.e. signal shielding) –
Areas with bad or no reception

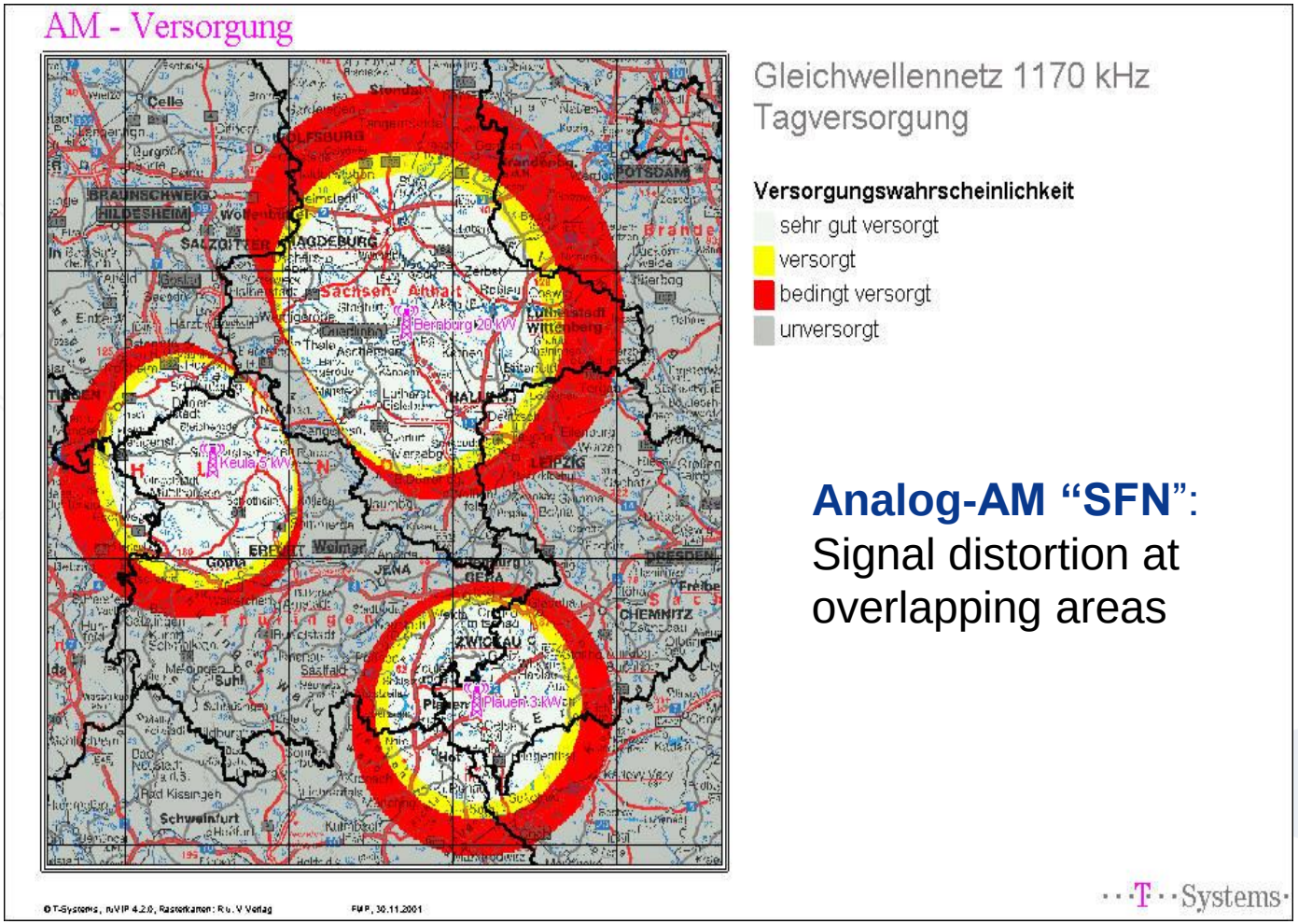
DRM SFN – Gap Filling



DRM SFN – Network Gain

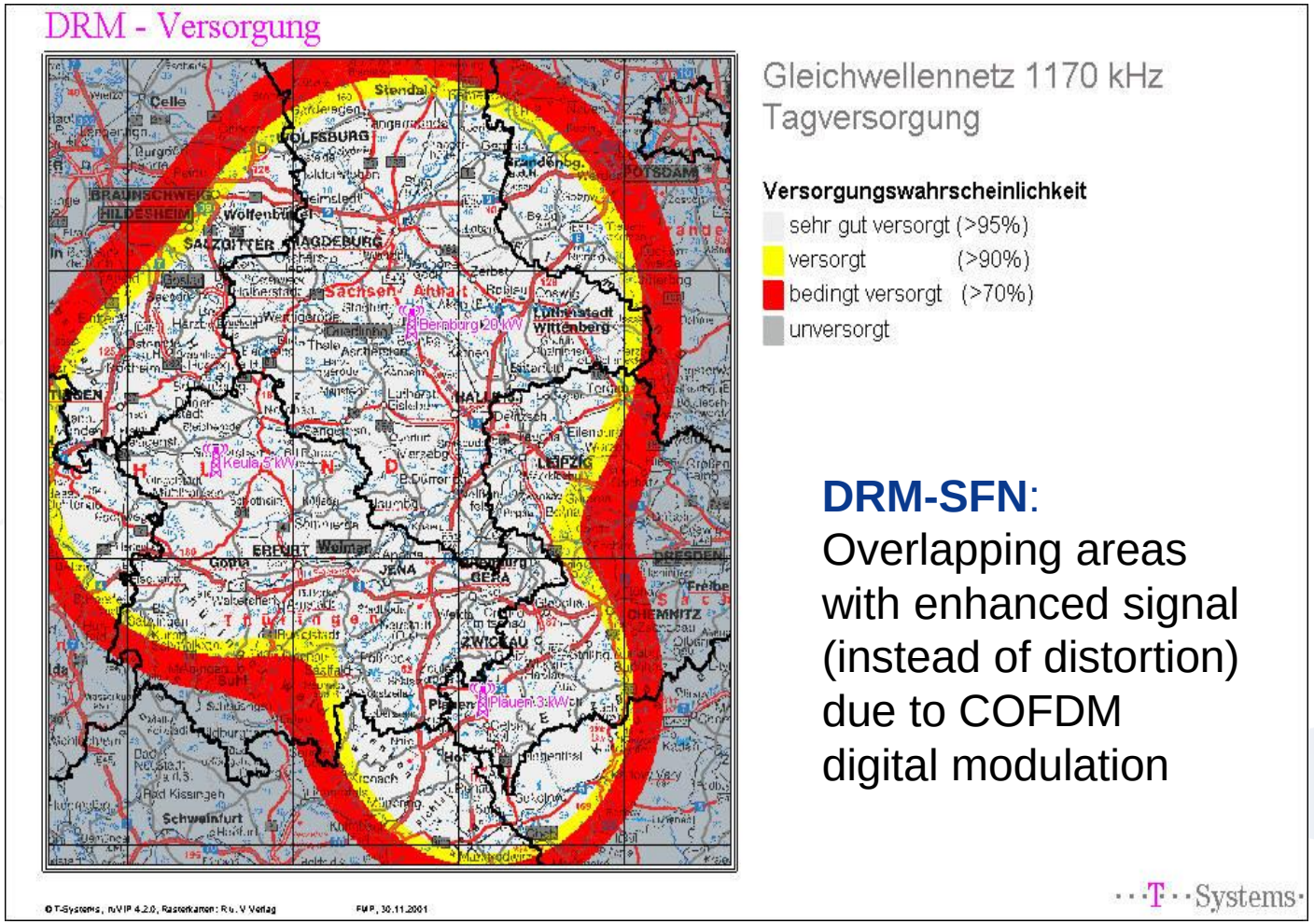


DRM SFN on MW – Analogue vs Digital



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

MARUTI SUZUKI

Mahindra

MG

Hyundai – Selection of models including DRM radio

Elantra

Tucson

Grand i10

Xcent

Verna

Elite i20

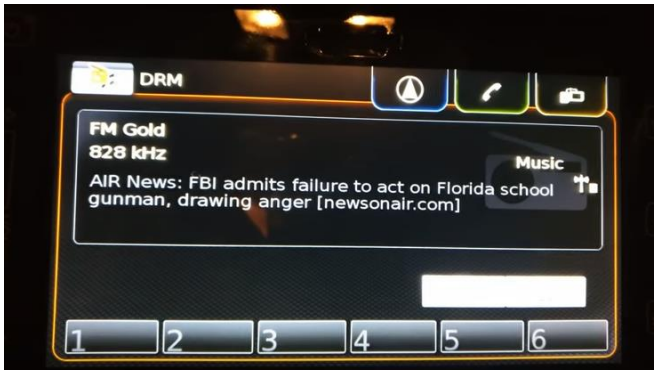
Creta

Active i20

Santro

MARUTI SUZUKI

Higher end receiver versions
of **all Maruti/Suzuki car models**
are fitted with DRM receivers



Mahindra TUV 300 has line-fit DRM Receiver

Mahindra

TUV300 - DRM

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

Motor Garages

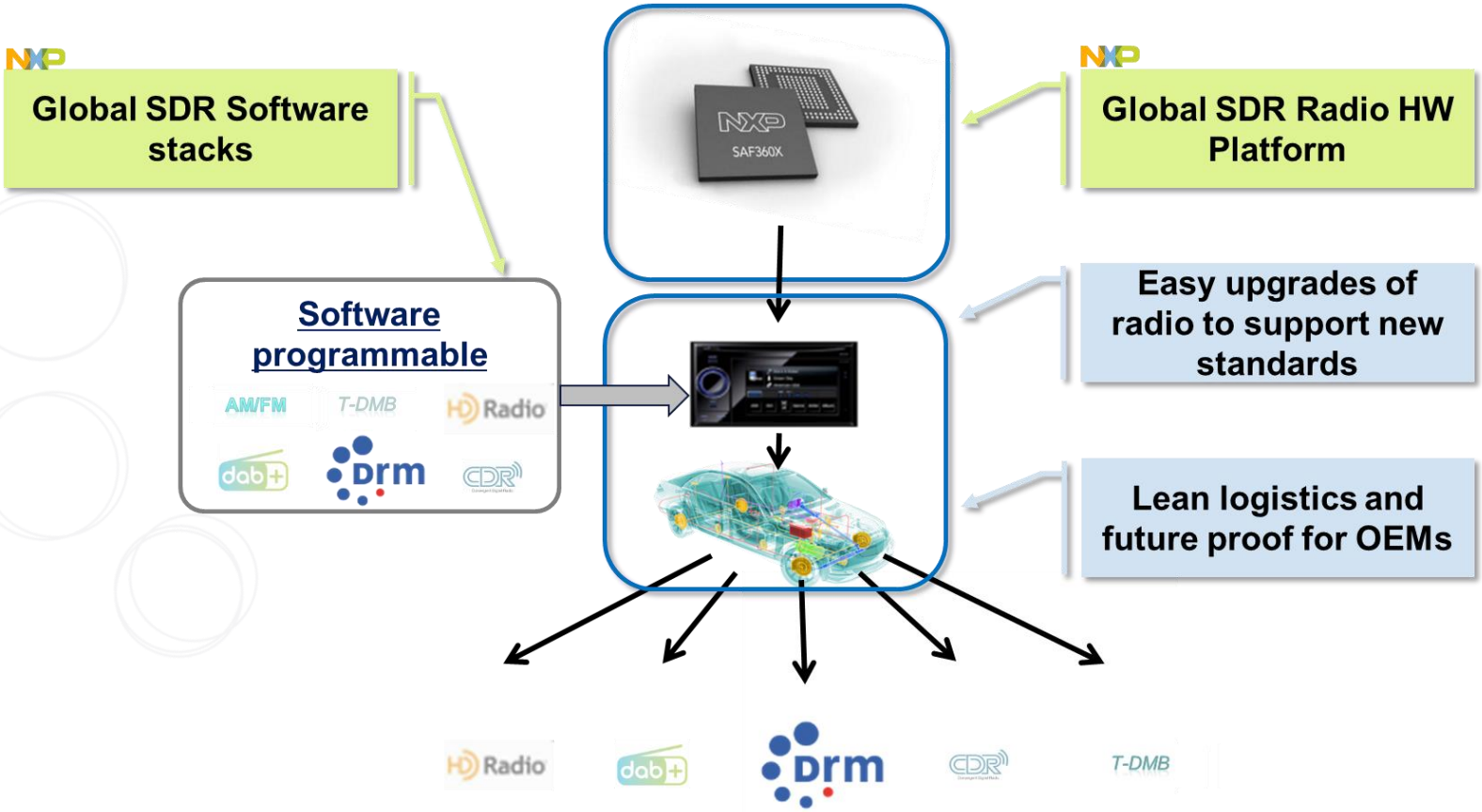
SUV Model Hector

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's Software Defined Radio (SDR) solutions



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

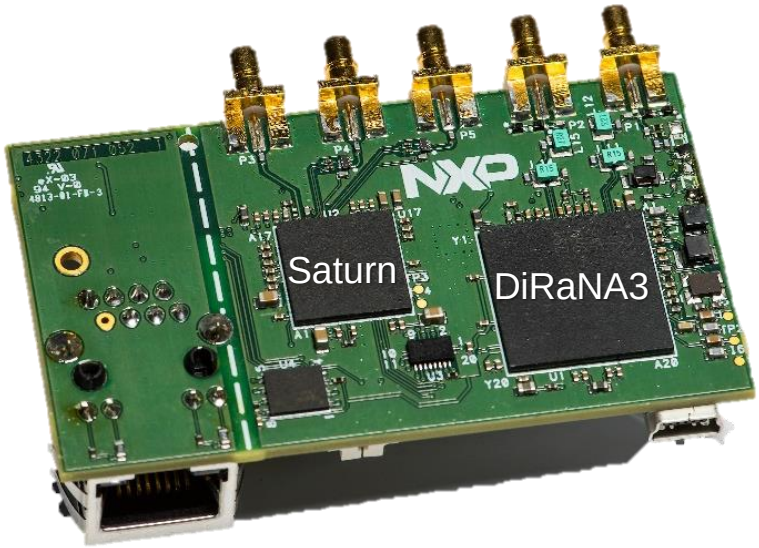
NXP – Complete portfoilio of automotive qualified DRM receivers (for AM and FM band) available

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®
Technology Serves People

STARWAVES

avion

inntot

AlgorKorea

RF2DIGITAL

Fraunhofer IIS

INDIA

avion

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.

Ready for mass market production based on substantial orders

Please click on the following link to access the video:
https://tinyurl.com/ybxx8622 (clip stops at minute 09:33)

CHINA

GOSPELL®
—Technology Serves People—

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

GOSPELL® Technology Serves People

	**GR-224BP**	Portable DRM (AM&FM bands)/AM/FM Receiver, Bluetooth, USB, AUX
	**GR-226BP**	Portable DRM (AM&FM bands)/AM/FM Receiver, Bluetooth, USB, AUX
	**GR-228BP**	Portable DRM (AM&FM bands)/AM/FM Receiver, Bluetooth, USB, AUX, Stereo
	**GR-501BCW**	**After Market Car DRM (AM&FM bands)/AM/FM Receiver, Android, Bluetooth, Wi-Fi**
	**GR-502BCW**	**OEM Car DRM (AM&FM bands)/AM/FM Receiver, WinCE, Bluetooth, Wi-Fi**

GOSPELL®
Technology Serves People

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

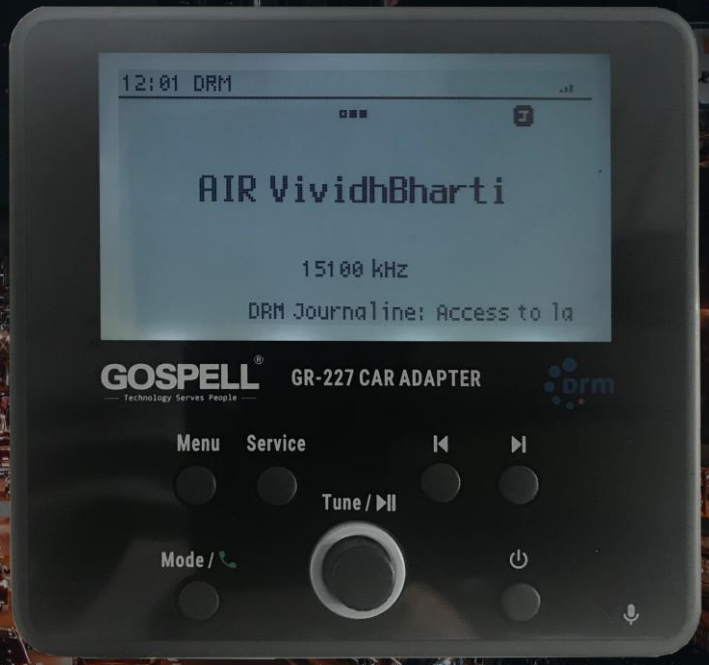
Ready for mass market production based on substantial orders

www.drm.org

GOSPELL®
Technology Serves People

GR-227 DRM Car Adaptor

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



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GERMANY

STARWAVES

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

STARWAVES

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)

INDIA 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.

INDIA

Receivers & Solutions

inntot

Please click on the following link to access the video:
https://tinyurl.com/y93r2a46 (clip stops at minute 08:55)

Cambridge Consultants

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

SDR Digital Car Radio Solutions

RF2DIGITAL

- 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

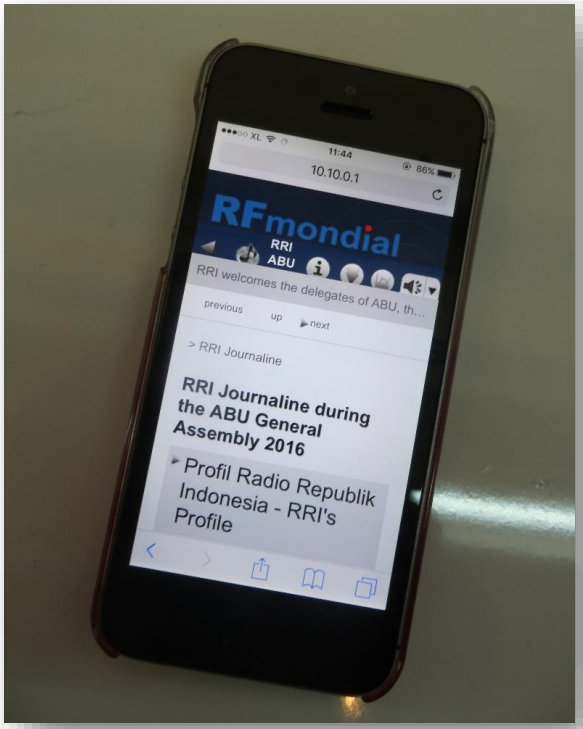
AlgorKorea

- 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

Mobile Phone Solutions

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

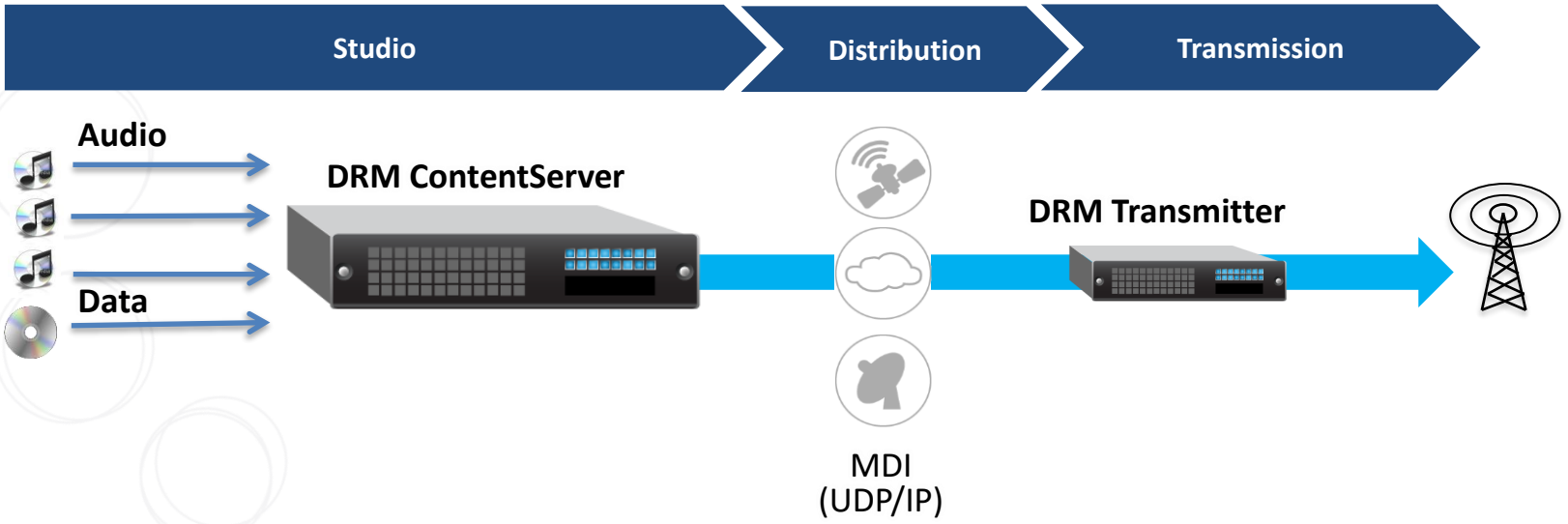
Configuring Journaline
Distance Learning and Emergency Warning Functionality

Alexander Zink

Vice-Chair DRM Consortium
Senior Business Development Manager
Fraunhofer IIS

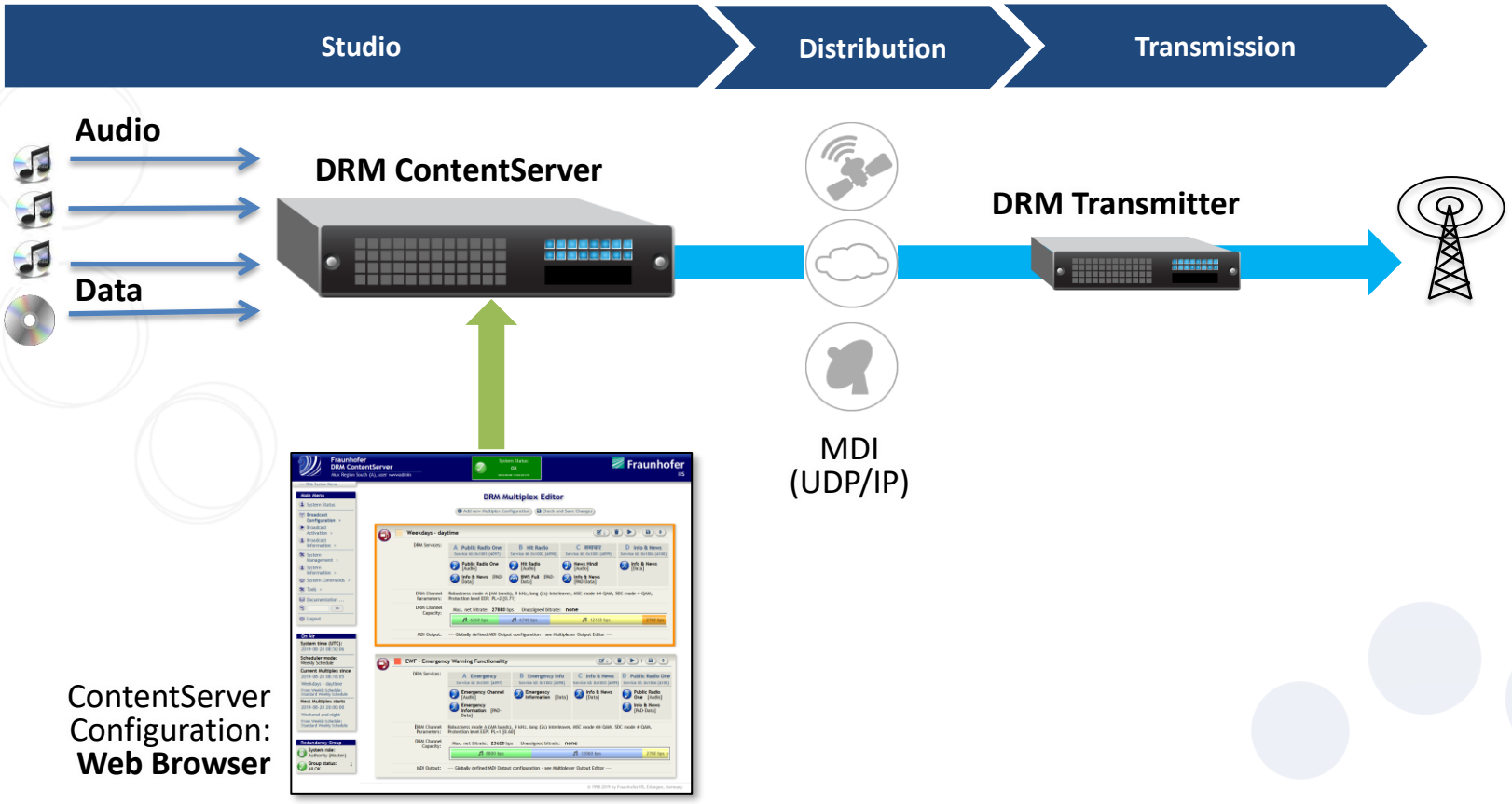
DRM Transmission Chain Overview

Hands-on Configuration Exercise and Demonstrations



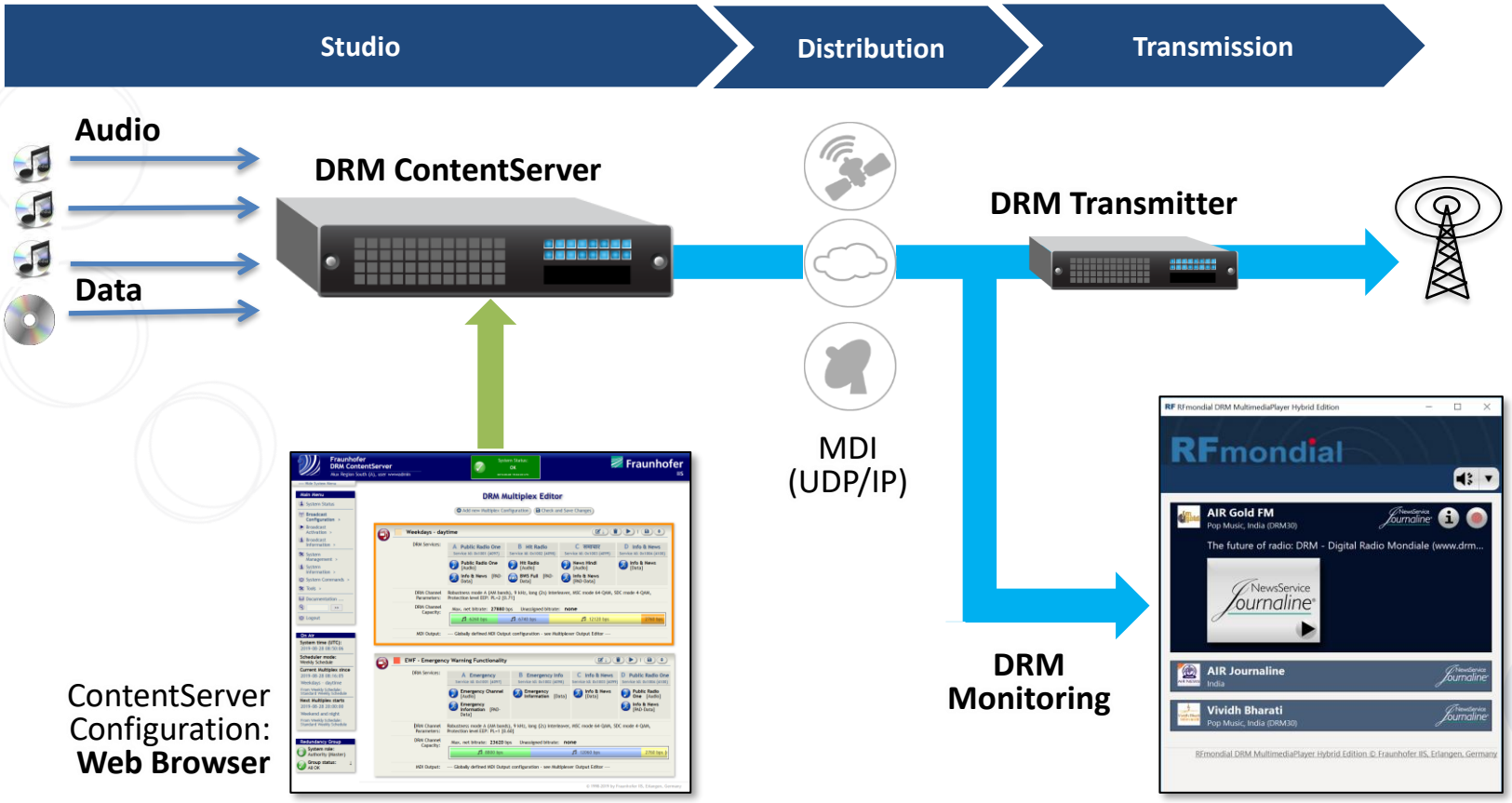
DRM Transmission Chain Overview

Hands-on Configuration Exercise and Demonstrations



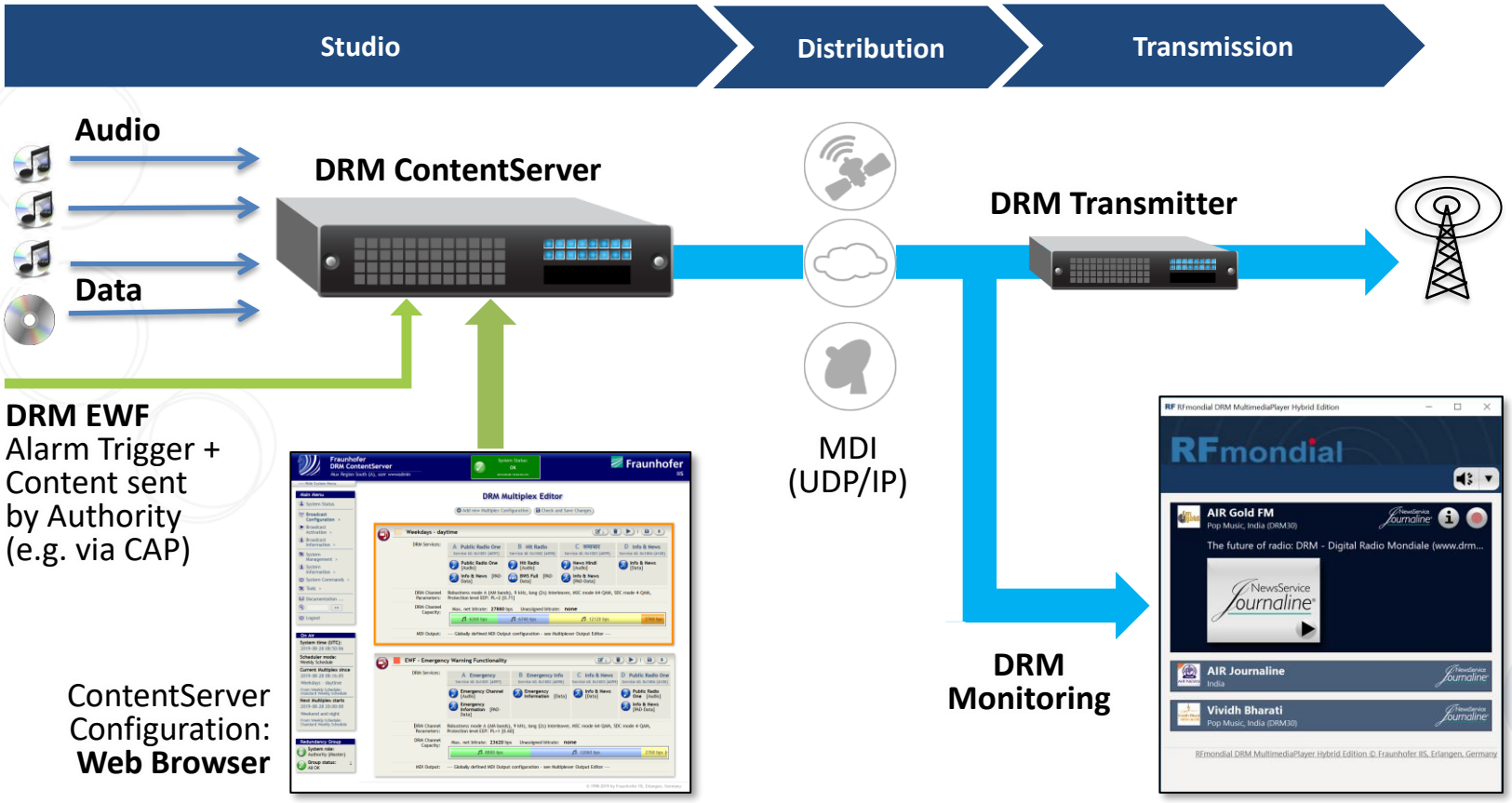
DRM Transmission Chain Overview

Hands-on Configuration Exercise and Demonstrations



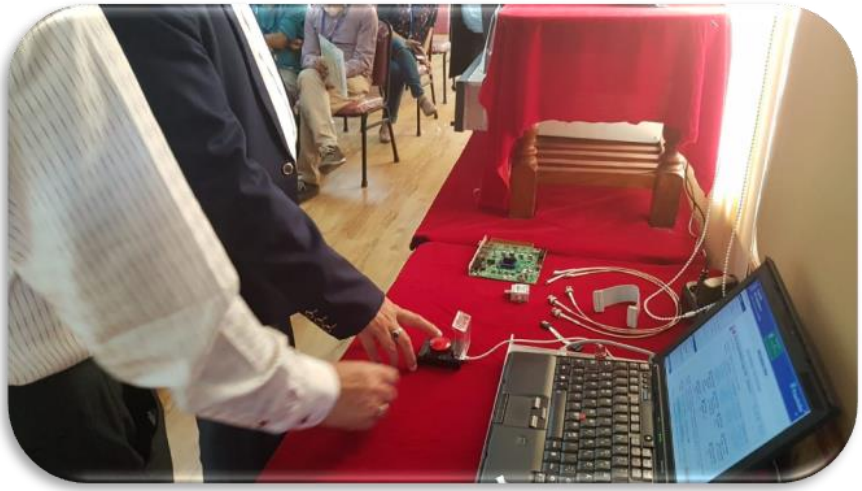
DRM Transmission Chain Overview

Hands-on Configuration Exercise and Demonstrations



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

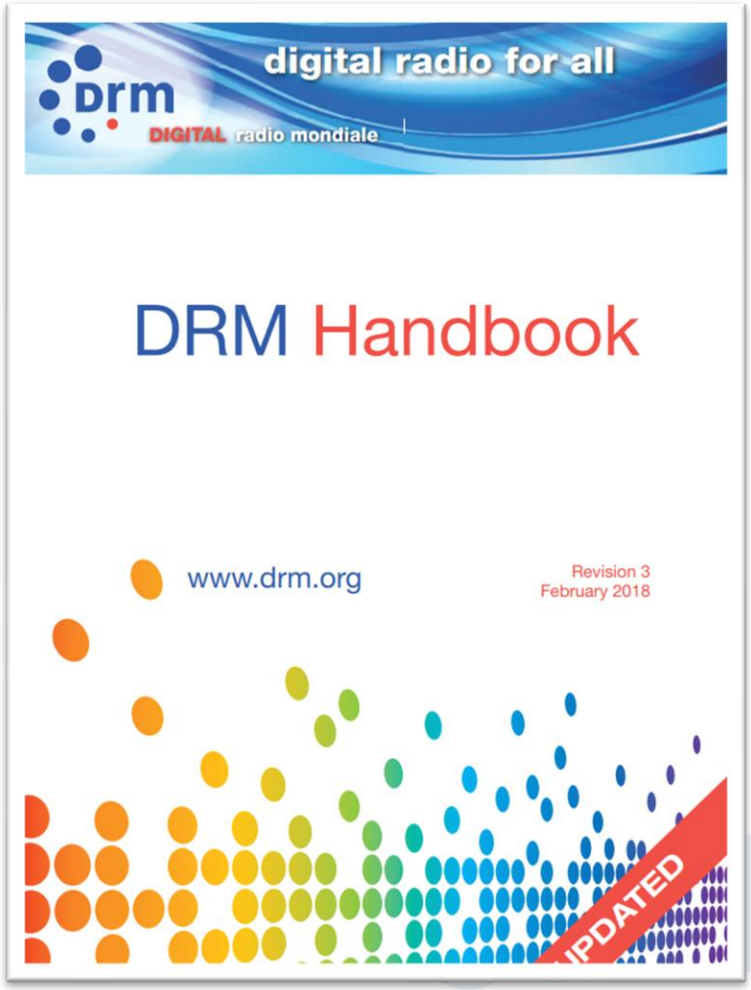
DRM Handbook

Version 4

Version 5 release next month!

Free download from:

handbook.drm.radio



More Information on DRM

Visit us: **www.drm.org**

Free monthly DRM updates:
newsletter.drm.radio

Dedicated DRM India page:
india.drm.radio

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

Your Questions


Thank You!