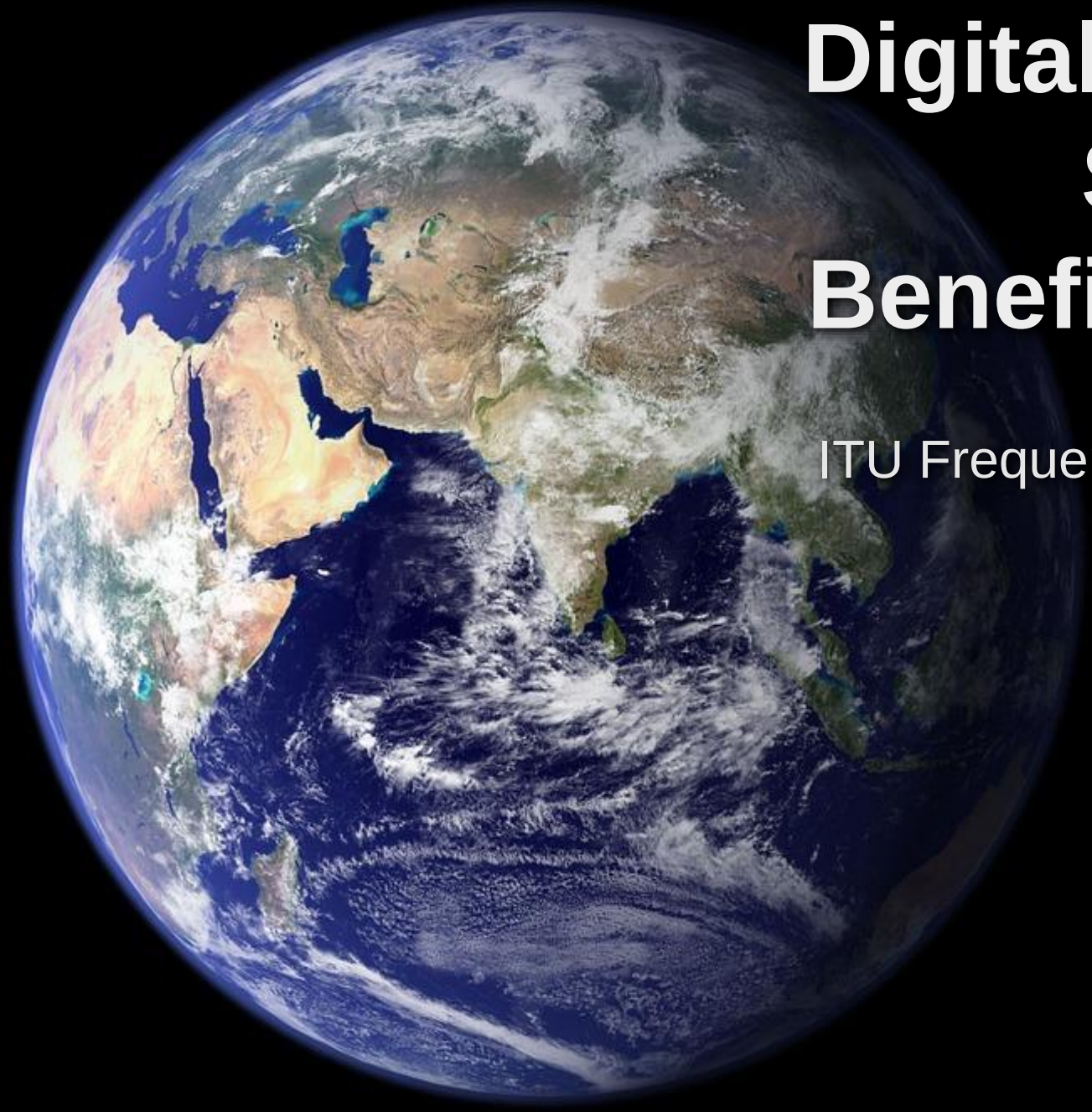


Digital Radio Mondiale – Smart Radio Benefitting All Listeners

ITU Frequency Coordination Meeting for Africa
24th January 2022

Ruxandra Obreja
DRM Chair

Alexander Zink
DRM Vice-Chair /
Fraunhofer IIS

Ruxandra Obreja

Chair of DRM Consortium

The DRM Consortium

- **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
- **Platforms** in Germany, India, Brazil, Russia
  and experts' groups in Pakistan, Indonesia
  → **And now the relaunch of the South Africa DRM Group**

For joining the DRM Consortium, write to: **projectoffice@drm.org**

Some of the DRM Consortium Members

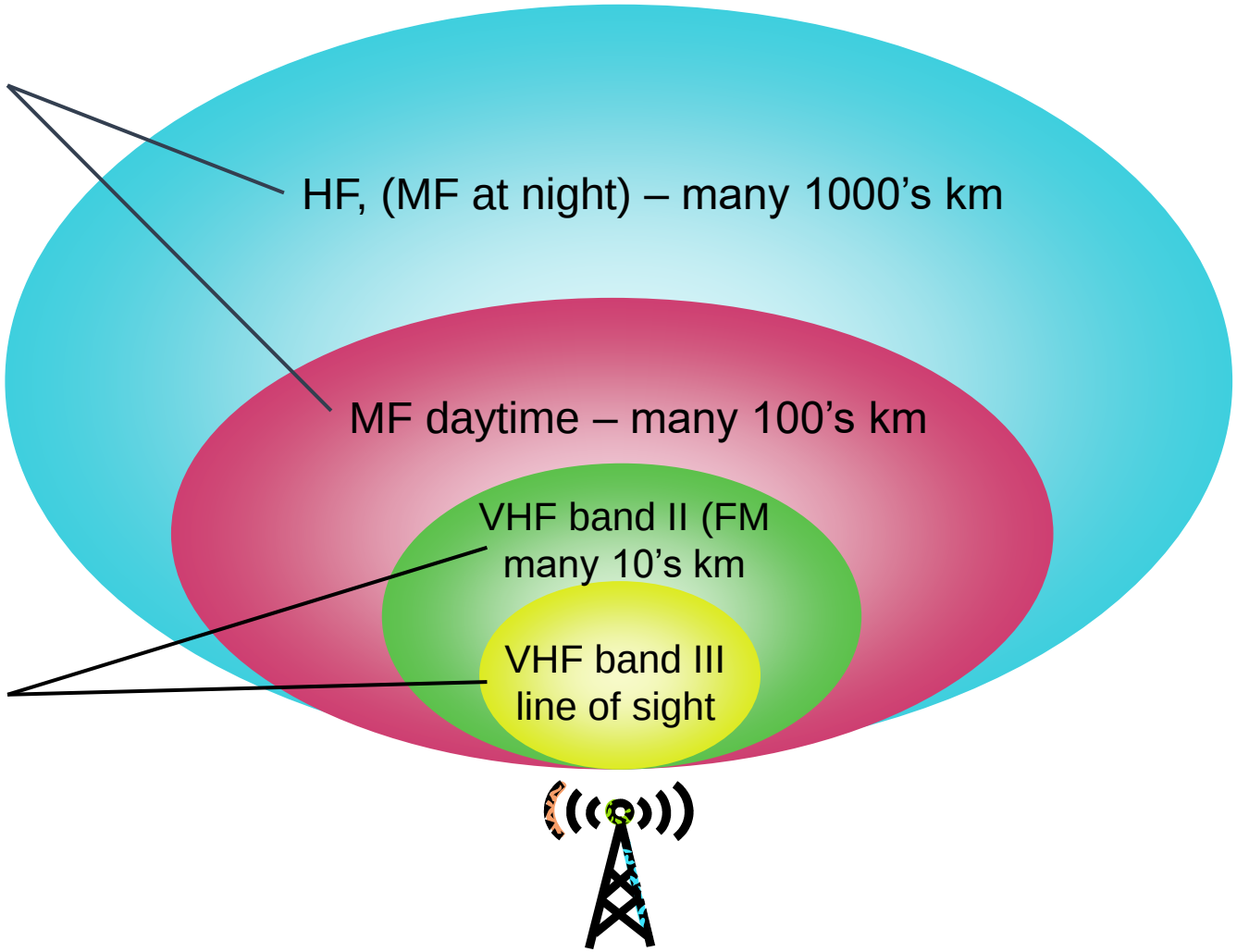
The **not-for-profit** DRM Consortium
supports and promotes the DRM Standard and its take-up globally

DRM DIGITAL RADIO STANDARD

Where DRM fits – Serves all Coverage Needs

AM bands
Large-area coverage

VHF (FM) bands
Local/regional coverage

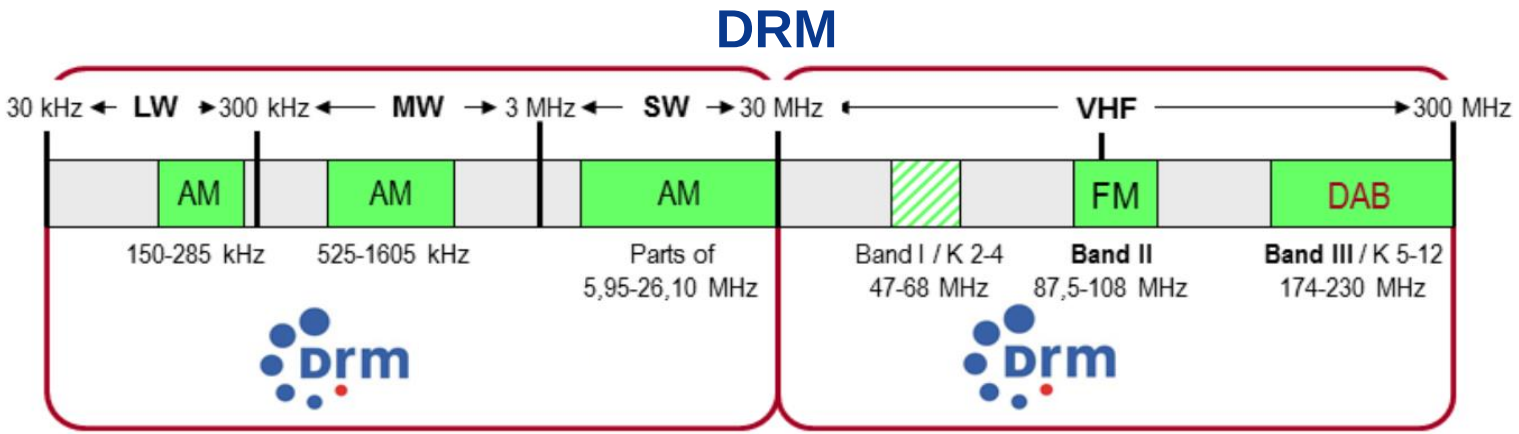


DRM Works In All Frequency Bands

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 System – Key Facts

- Global **ITU standard for terrestrial Digital Radio**

  → **enables all coverage scenarios** (in broadcast bands AM & FM/VHF)
  local, regional, national, international

- 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 possible for existing AM/FM infrastructure**
- All technical details are **openly standardized** (ETSI) and published, DRM is **not controlled** by a single company/organization
- **No licenses** required
- Not a multiplex solution – **Each broadcaster in full control** of their transmission and content

Alexander Zink

Vice-Chair of DRM Consortium

DRM in the AM bands

Most important general parameters of DRM in AM

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

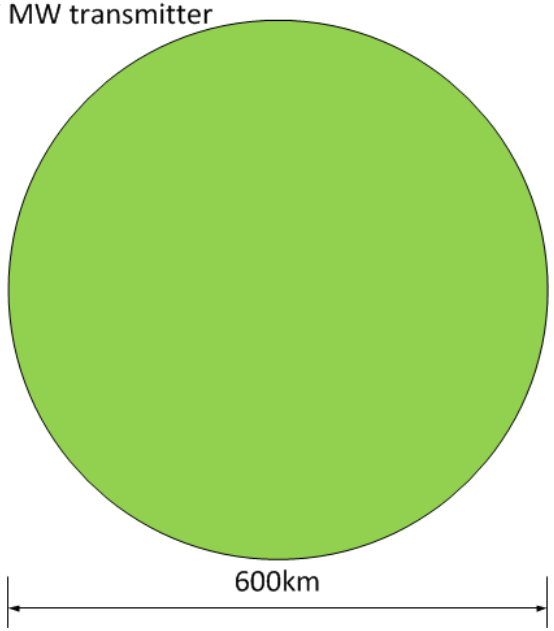
- The only standard for all the AM bands:
  - **ETSI standard ratified**
  - **Endorsed by the ITU** (full planning parameters available)
- **Worldwide spectrum compatibility:**
  9/10, 18/20 kHz bandwidth
- **Useful content bit rate:** up to 72 kbps
- **Flexible configuration**:
  robustness ←→ coverage ←→ transmission power
- **Covers large areas using a single frequency (SFN):**
  full-country coverage

DRM Digital Radio – One single standard with the same key features for all frequency bands

Coverage – AM (MW) analogue vs. DRM MW

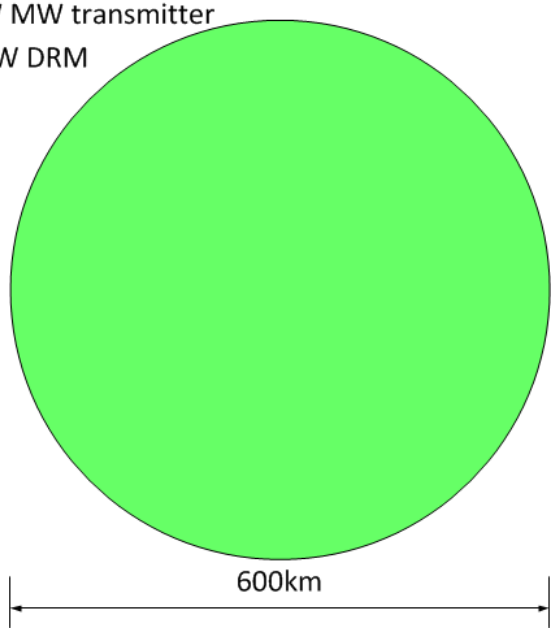
AM analogue vs. DRM – Same coverage, 1 single tx

AM Coverage
100kW MW transmitter



235 000 km^2

DRM Coverage
100kW MW transmitter
-> 40kW DRM

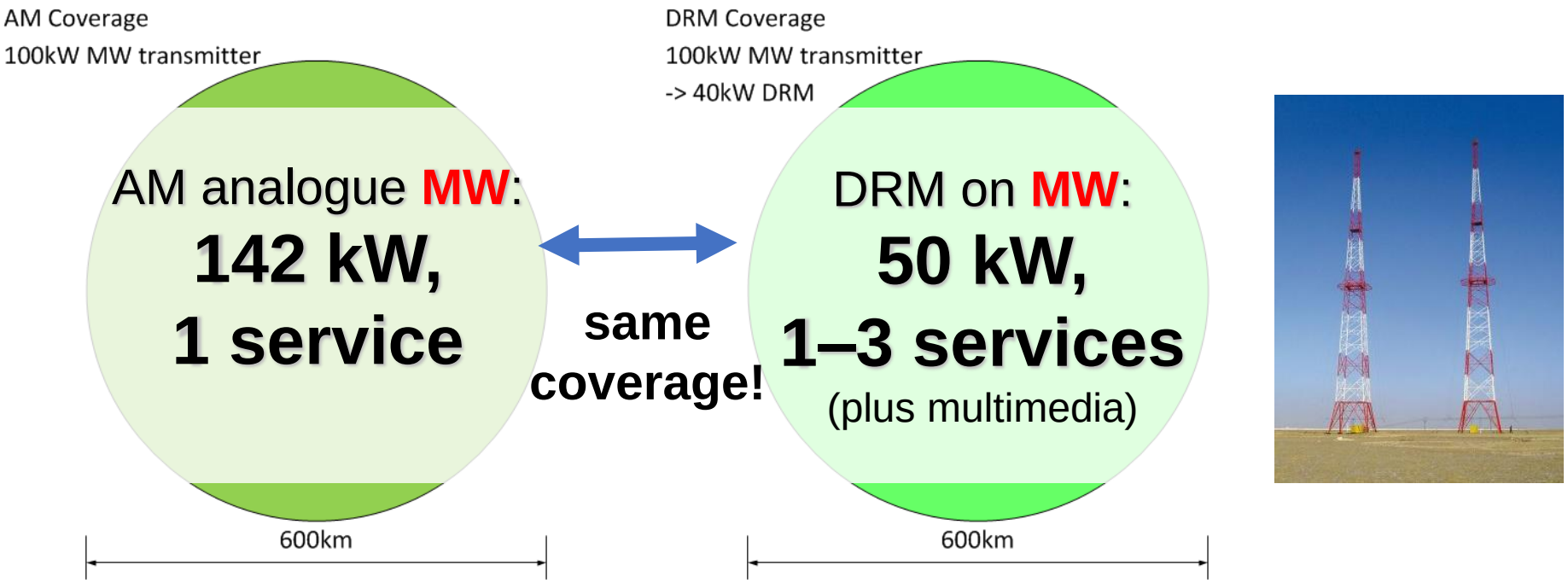


235 000 km^2

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

Coverage – AM (MW) analogue vs. DRM MW

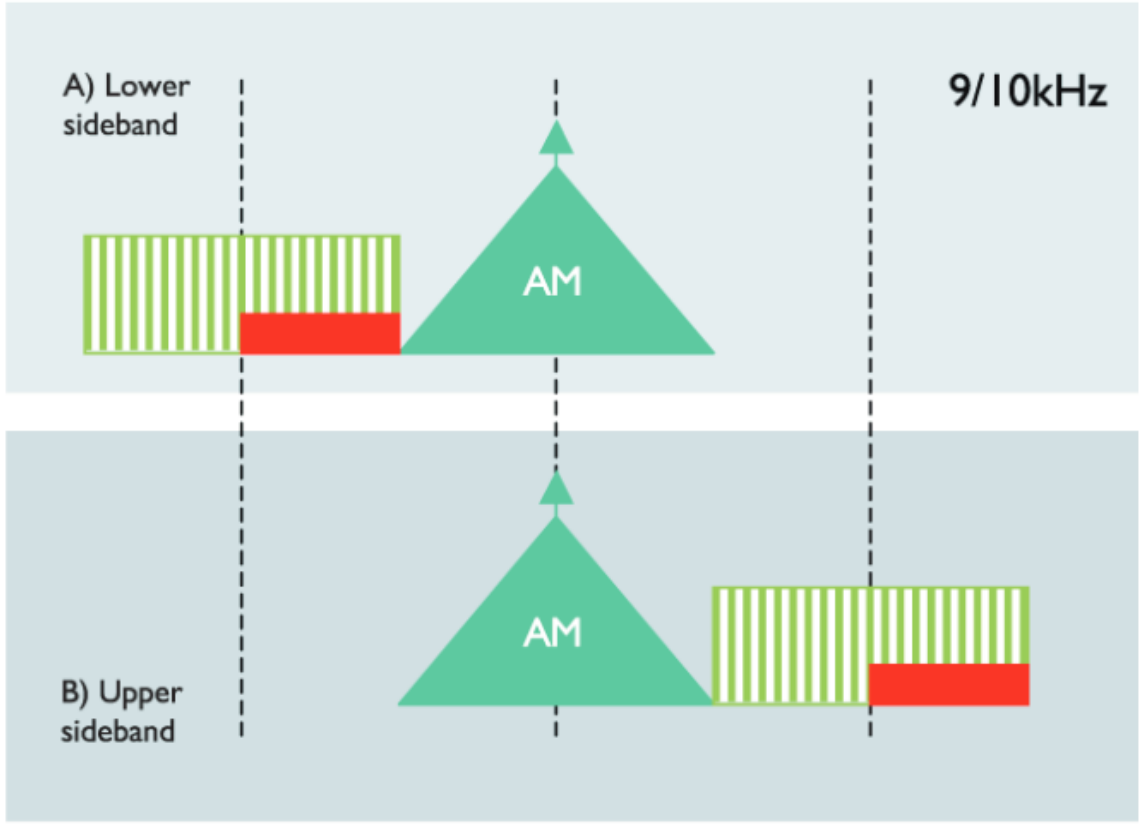
AM analogue vs. DRM – Same coverage, 1 single tx



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

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

Simulcasting – Simultaneous Broadcasting



Potential Listeners

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

DRM in the FM band

Most important general parameters of DRM in FM

General Parameters	
Frequency Range	47 MHz to 254 MHz
RF Channel Bandwidth	**96 kHz**, conform to FM raster (100kHz nominal)
Audio Coding	MPEG xHE-AAC, MPEG4 HE-AAC (5.1 surround)
Data Rate	**37 kbit/s to 186 kbit/s** (scalable)
Modulation	COFDM, 216 carrier
Sub-Carrier Modulation	4 QAM / 16 QAM
Transmission Power	-8 dB to -20 dB to coordinated FM Power
Services	- **Up to 3 audio services** plus one data channel - **There is no need for a third-party large multiplex! Transmissions are fully broadcaster controlled** - DRM in FM can work very well in both **pure digital as well as simulcast** without interferences.

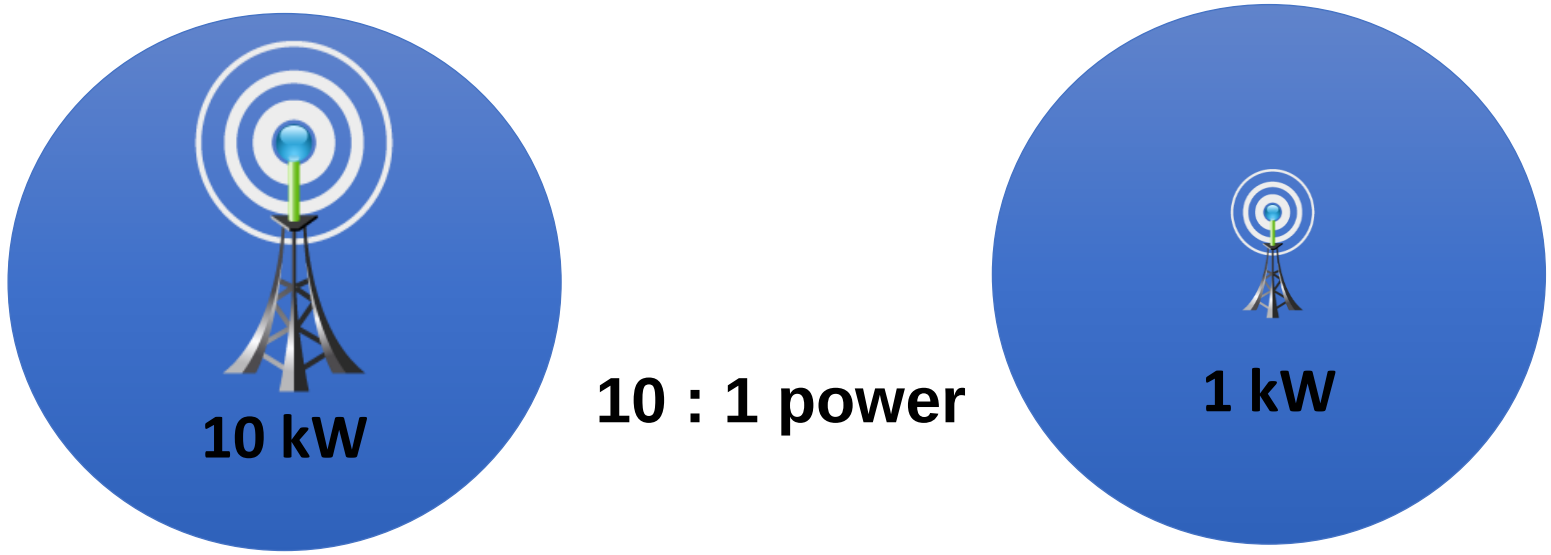
Coverage of DRM in FM Band

Assumption:

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

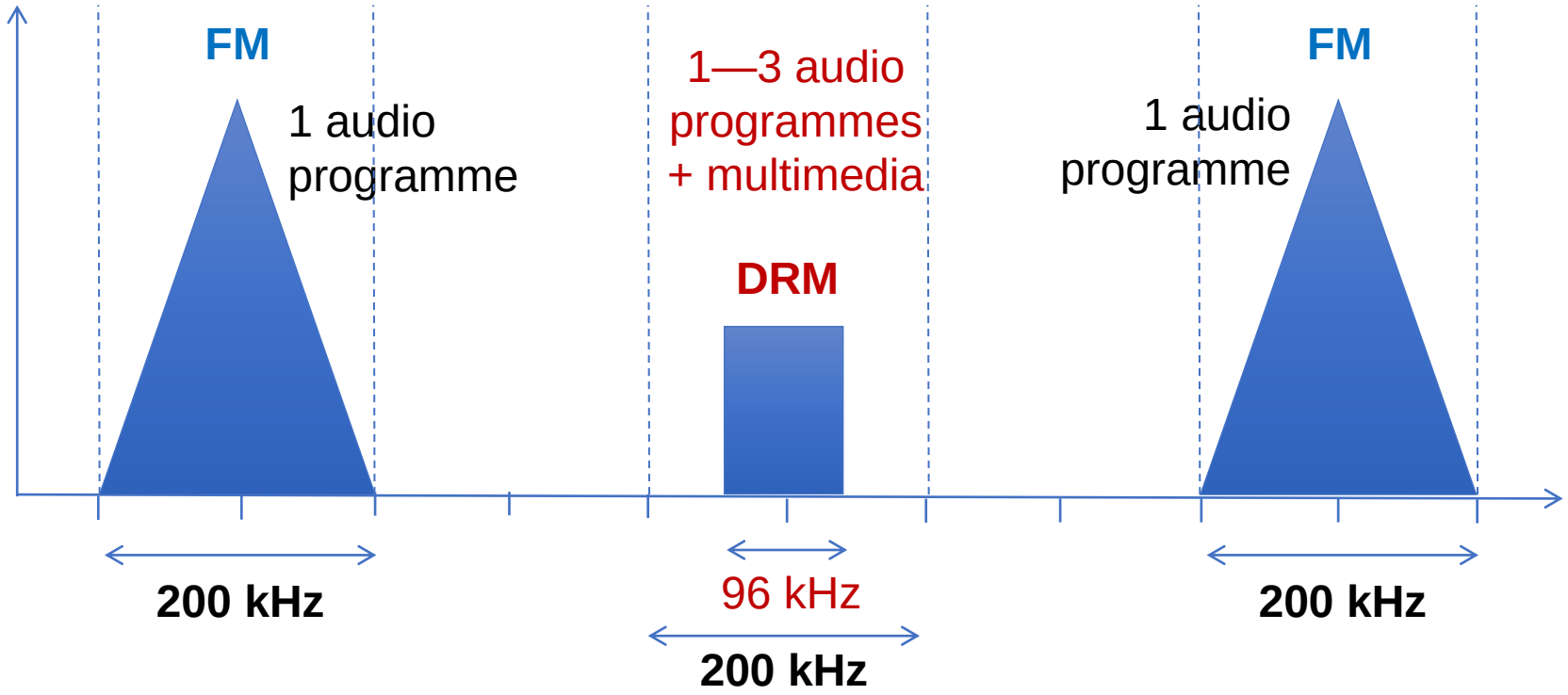
FM 1x
at 200 kHz bandwidth

DRM 3x
at 96 kHz bandwidth



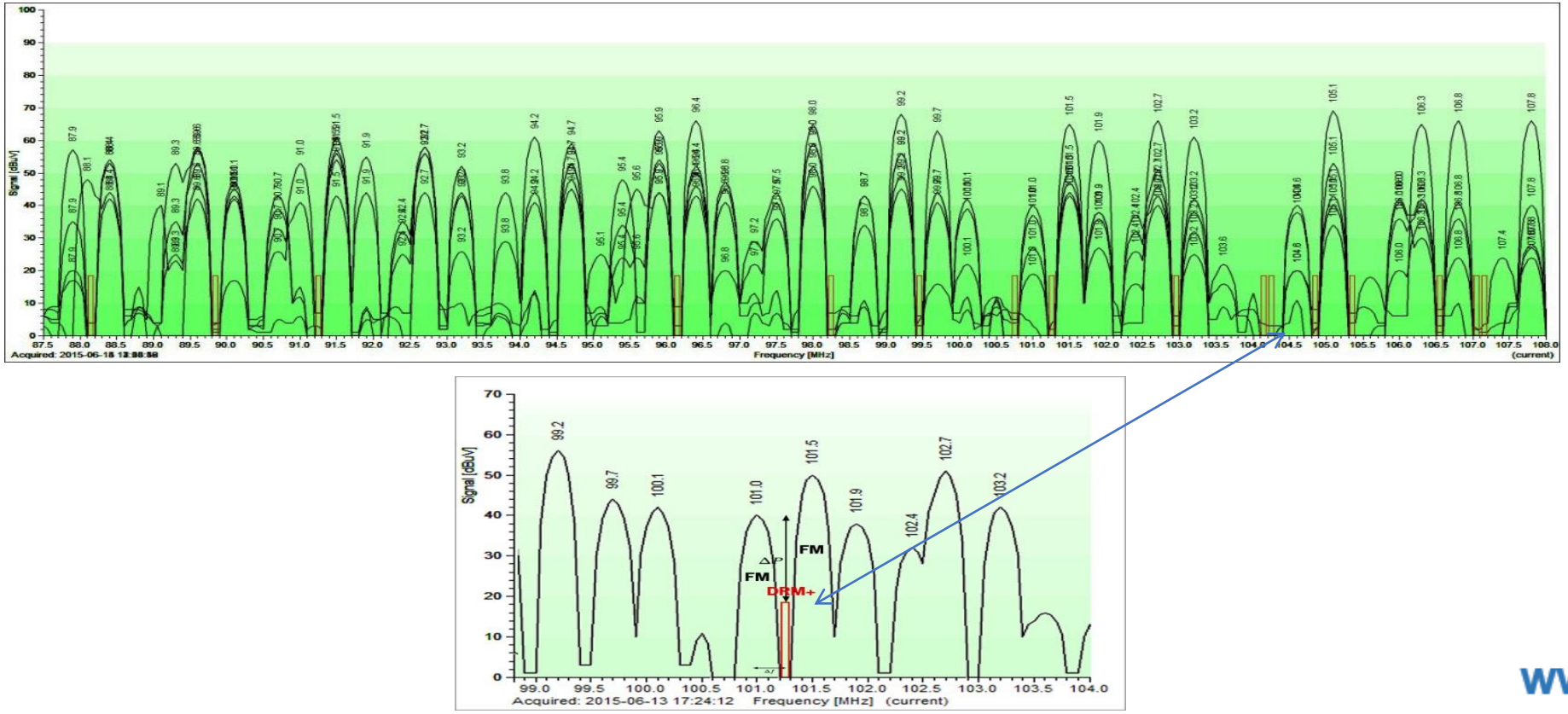
DRM fits in Existing FM Plan

- Placing DRM transmissions in-between existing FM stations
- **No interference** with existing FM stations!



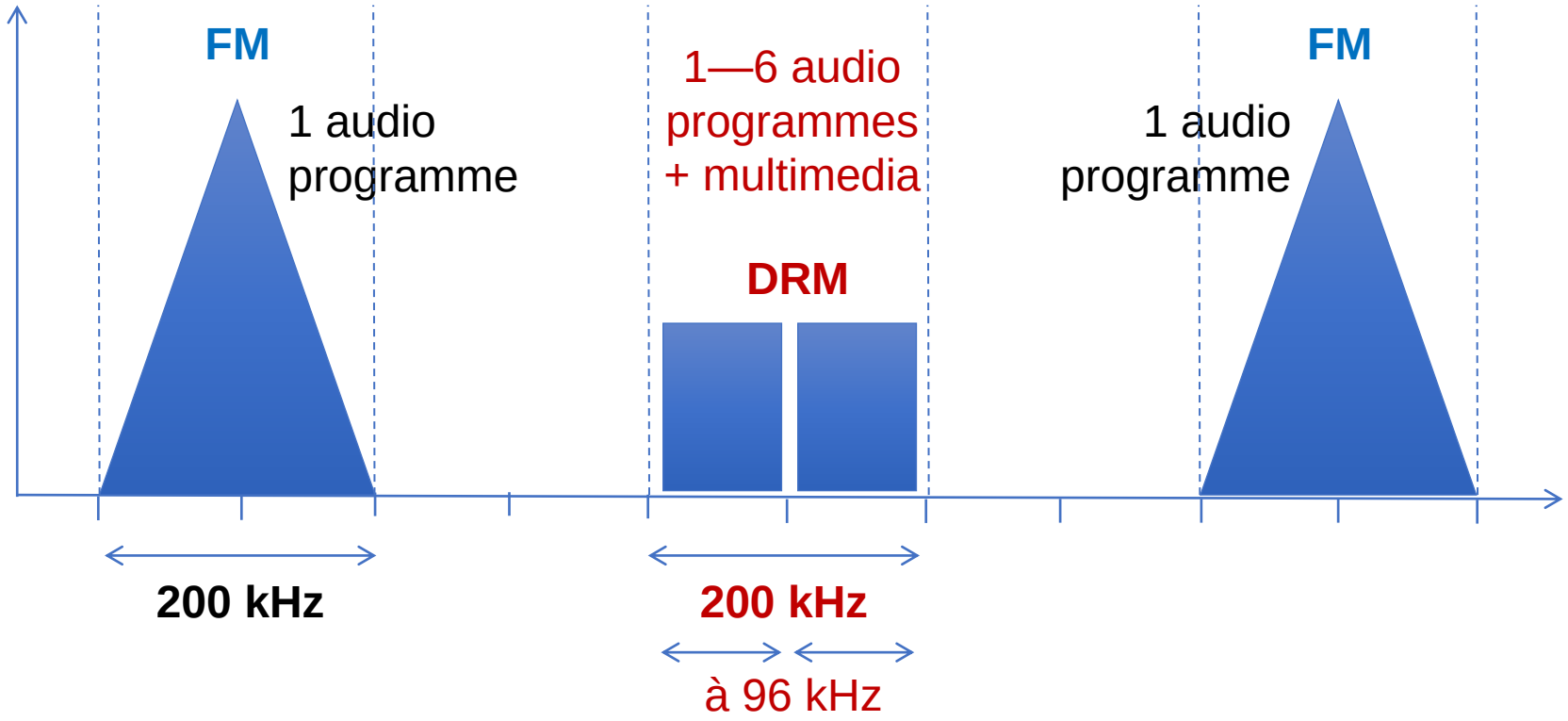
Full FM Spectrum – Plenty of Space for DRM

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).



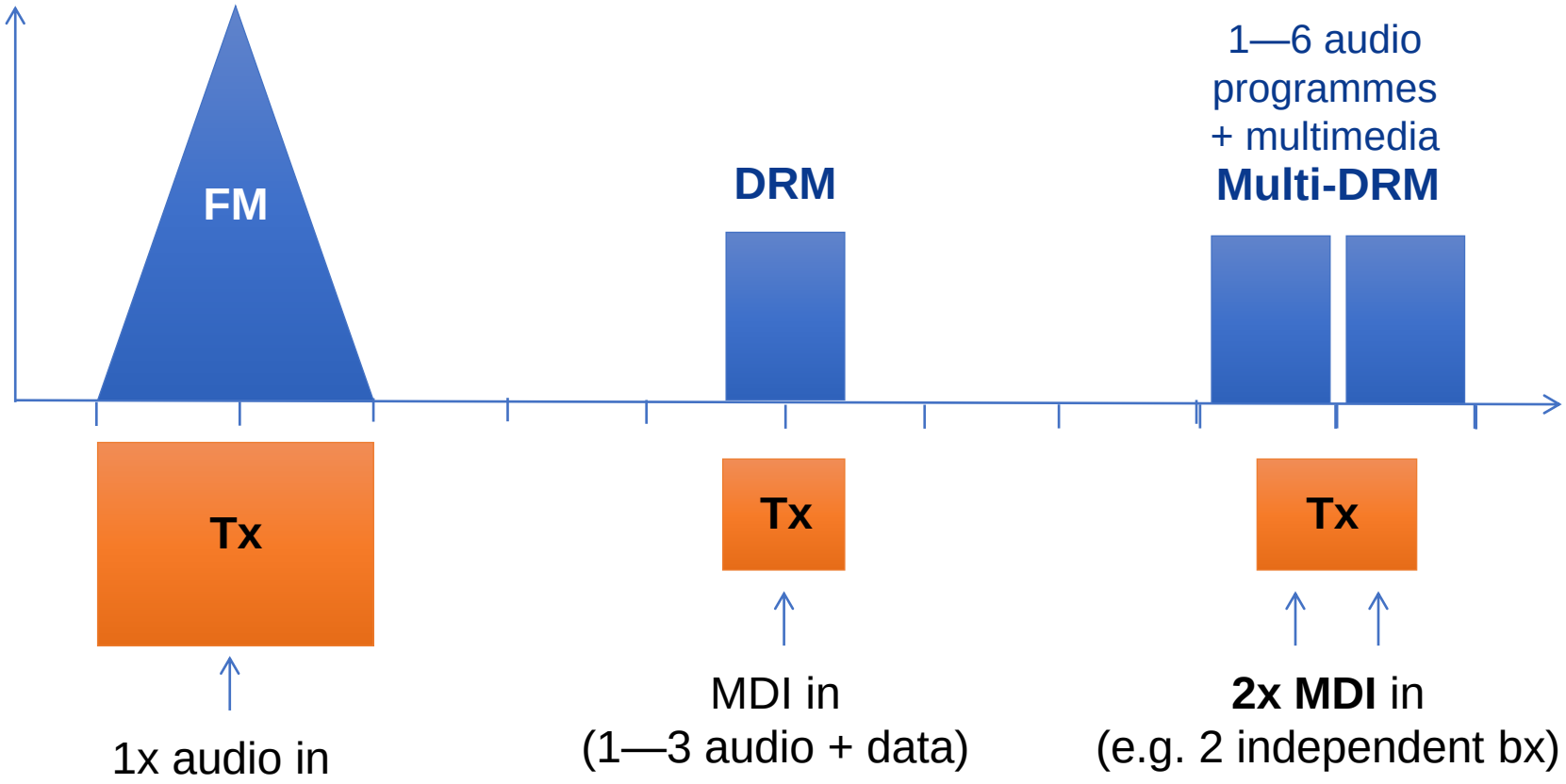
DRM fits in Existing FM Plan – Example India

- **Up to 2 DRM blocks** per license allotment
  → Space for up to 6 audio programmes + multimedia
  → 2 DRM blocks (MDI) from **single or different broadcasters**

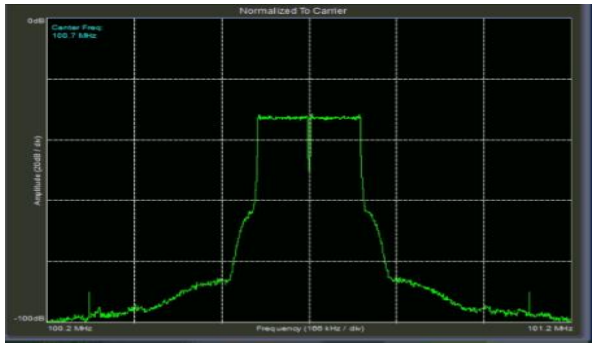
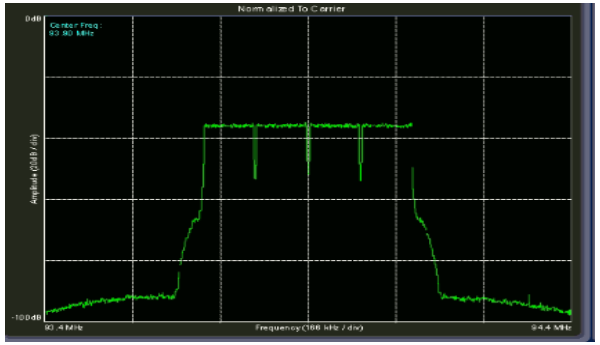
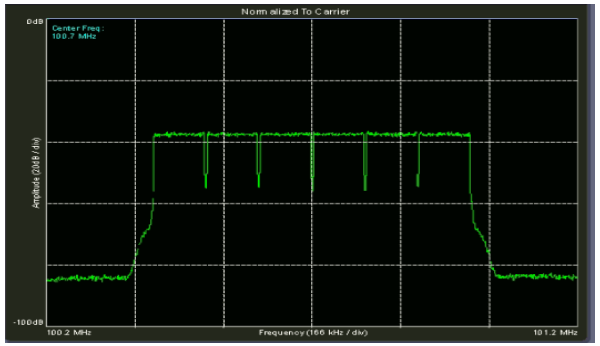
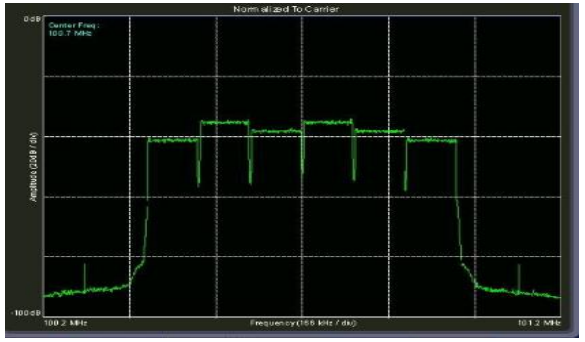


DRM in the FM Band – Infrastructure Efficiency

- FM analogue: each programme requires an individual transmitter
- DRM: **shared transmitter** for all side-by-side DRM blocks
  (per DRM block: one MDI signal from studio over IP network)



Pure Digital – Multi-DRM configuration in India

Test case	Transmitter		Signal Configuration and Receiver Tuning Frequency (MHz)												
	Center (MHz)	Power (W)	100,35	100,4	100,45	100,5	100,55	100,6	100,65	100,7	100,75	100,8	100,85	100,9	100,95
Test case 1: “Multi-DRM Showcase A”	100,65	200						100%		100%					
Test case 2: “Multi-DRM Showcase B”	100,65	600		100%		100%		100%		100%		100%		100%	
Test case 3: “Multi-DRM Showcase C”	100,65	100		25%		100%		50%		100%		50%		25%	
Test case 4: “Multi-DRM Showcase D”	100,65	100		100%		100%				100%				100%	

Colour code: DRM analogue FM

Up to 6 DRM signals (18 Audio + 6 Multimedia Journaline services) side-by-side from the same transmitter

Digital FM Radio: Financial Benefits

A) Additional Revenue opportunities:

- **Journaline** media service enables **new revenue sources**
  → **targeted** ad placement & interactivity (on connected devices)
- **Pop-Up stations** link with temporary events/festivals
  → ads for temporary channel create buzz for FM radio services

B) Cost Savings potential for distribution infrastructure:

- Annual **cost savings** for FM network (80-90%!) – power & maintenance
- A single digital transmission covers **up to 3 audio services**
  → **1 nation-wide digital FM network** replaces up to 3 analog FM networks

Digital FM Radio: Financial Benefits

- Annual **cost savings** for FM network (80-90%!) – power & maintenance

Example:

3 nation-wide FM programs, 29 sites, 10 kW analog FM power each

→ annual transmission power cost @ 0.11 USD/kWh

* Analog: 1200 thousand USD/a (!)
* Digital FM: 112 thousand USD/a

→ Digital FM saves over 1 million USD/a!

DRM LISTENER FEATURES

DRM Key Features

- **More choice** for listeners
  - Up to 3 programmes + multimedia on 1 frequency
  - 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 SERVICES: Journaline

Journaline – New Revenue Opportunities

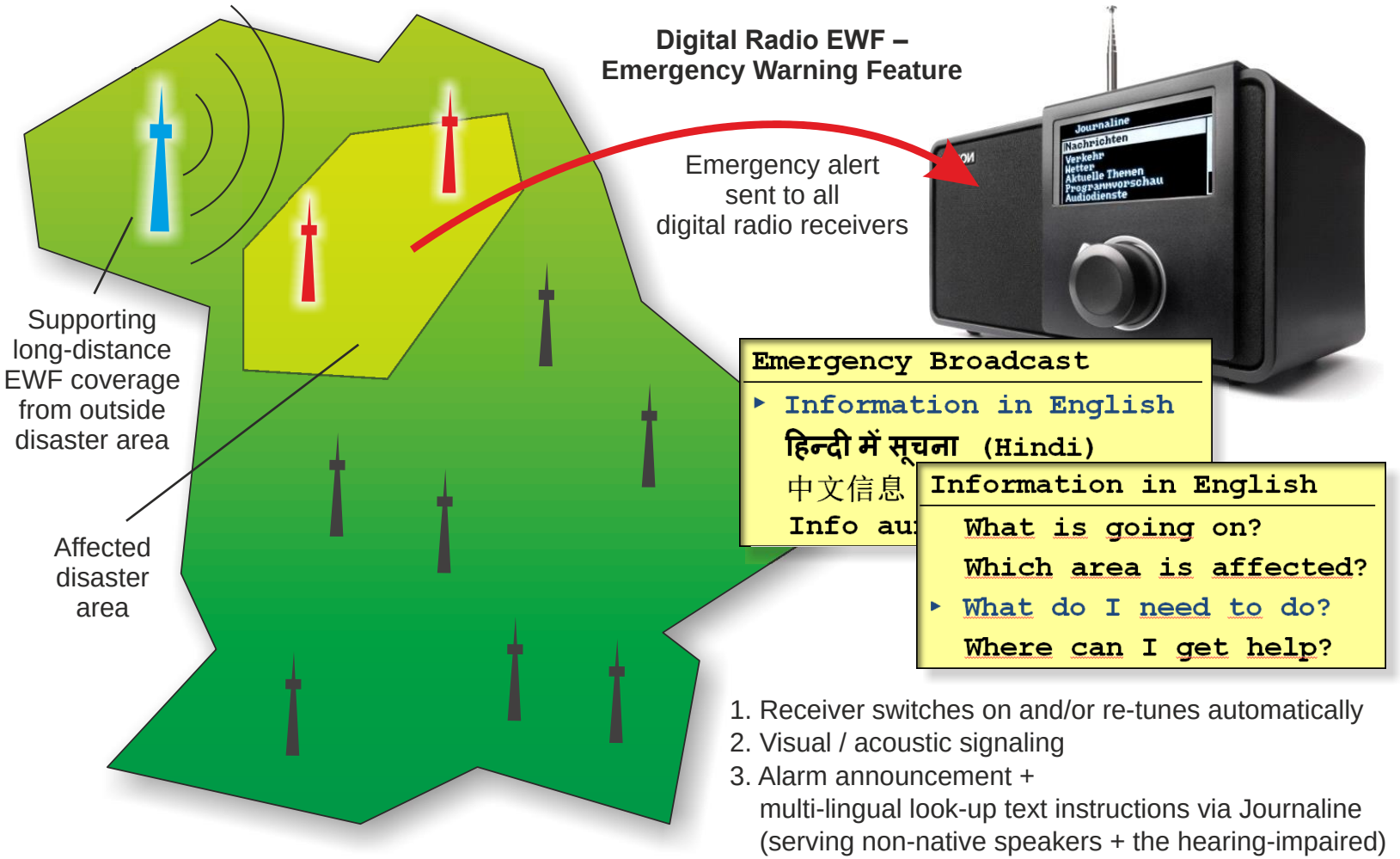
NewsService Journaline®

- **Journaline advanced text service for digital radio**
- Works on **all classes of radio sets**
- One-time setup, **no editorial effort** (brings Internet content to the radio set)
- **Efficient transport** – works even on AM
- Wide support in receivers and encoders
- **Enhances listener engagement, triggers listener interaction**
- Opens **extra revenue sources**

DRM SERVICES:

Emergency Warning EWF

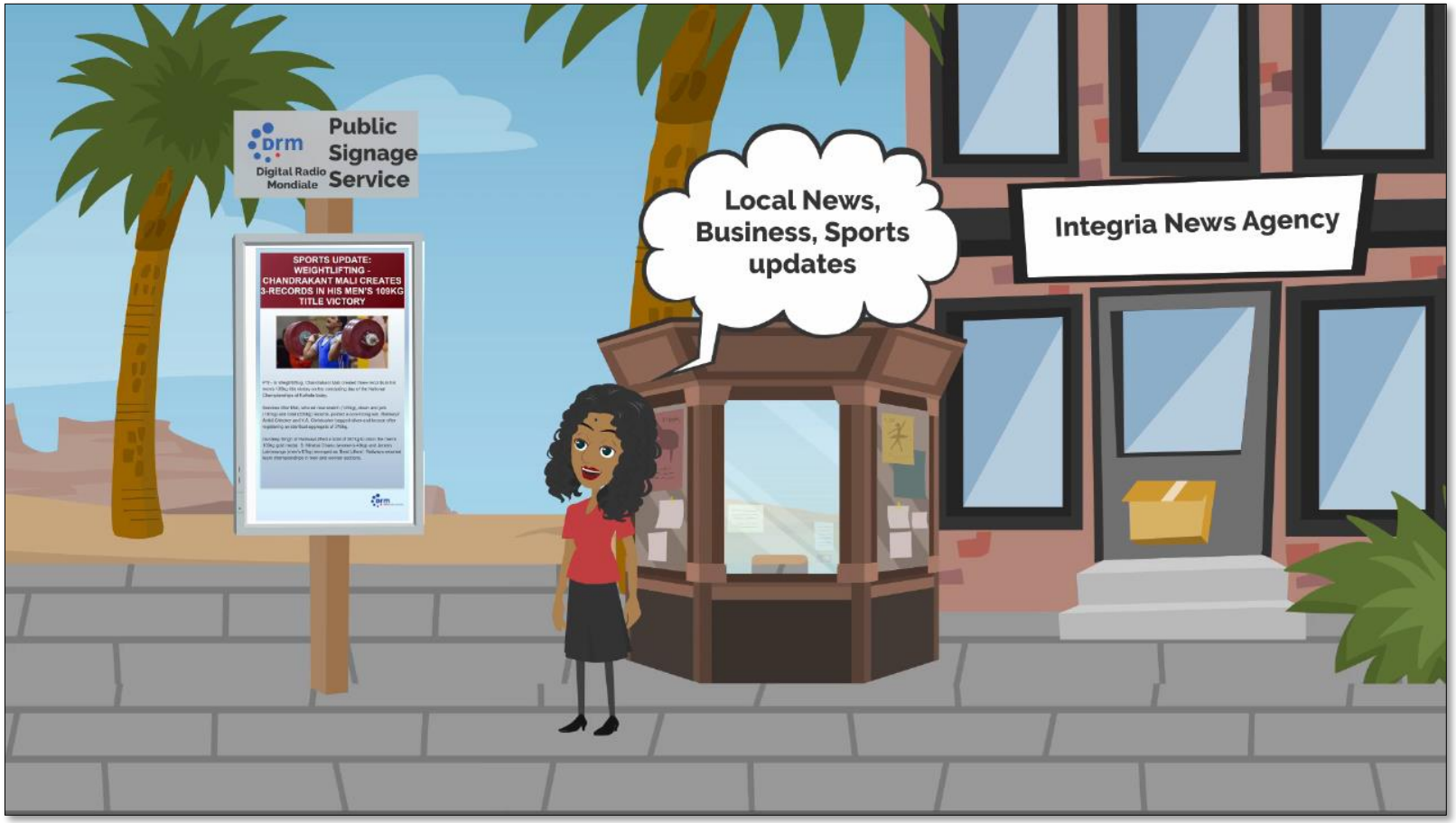
DRM Emergency Warning – Overview



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)

DRM SERVICES: Public Signage

Public Signage by DRM



DRM SERVICES: Radio Schooling

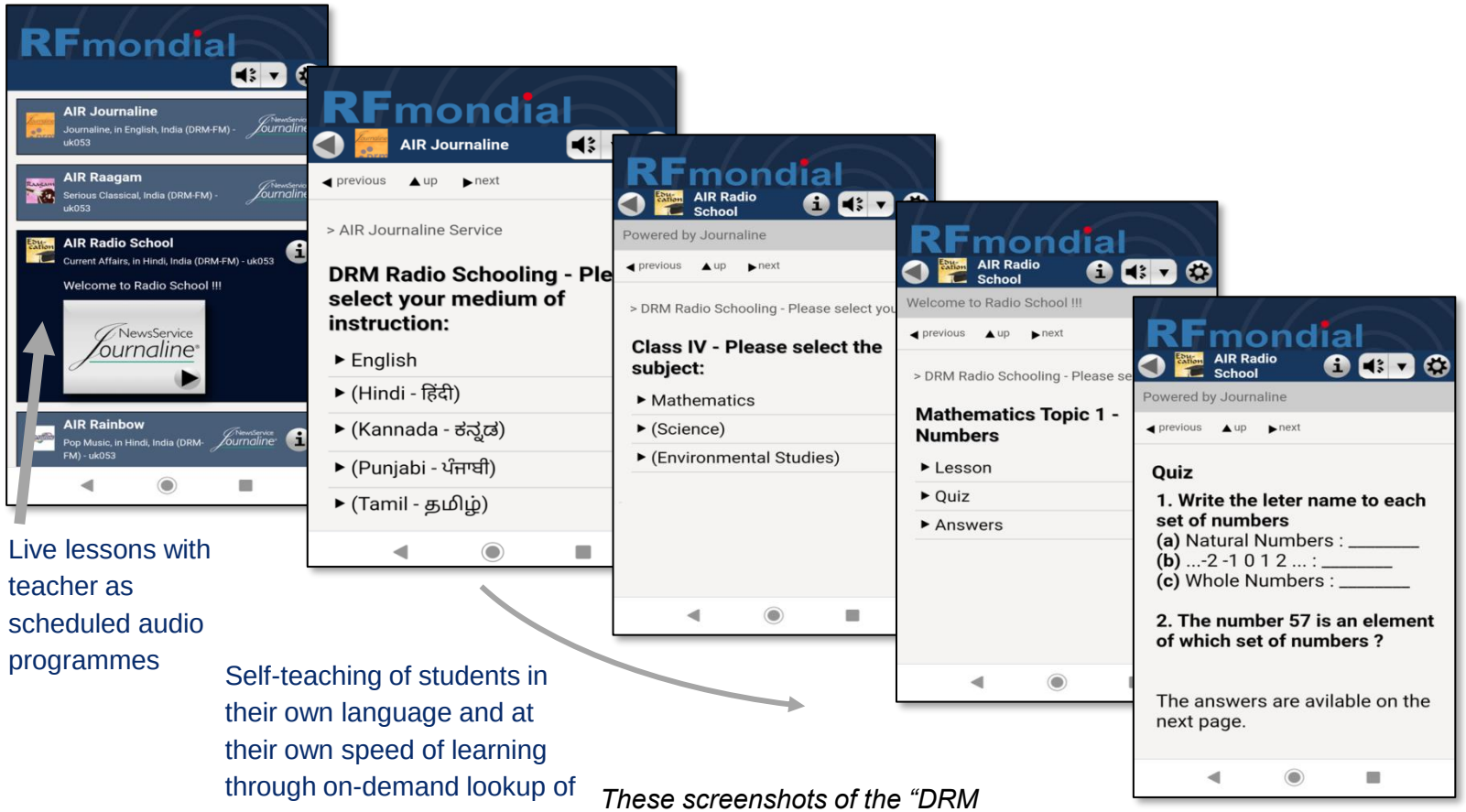
Radio Schooling

- Purpose:
  - Self- and class-based learning option via radio
  - During pandemics and reaching remote areas
  - Pure radio broadcast – **no Internet required**

- How it works:
  - Lessons and textbook-content via **Journaline**
    → Always available on-demand, even for self-study
  - At specific times, accompanied by **live teacher** (audio service)
    → Referencing the current Journaline textbook location
  - Options for student **interactivity**: Journaline quiz, Q&A re-broadcast, etc.

Radio Schooling on DRM

User Interactivity

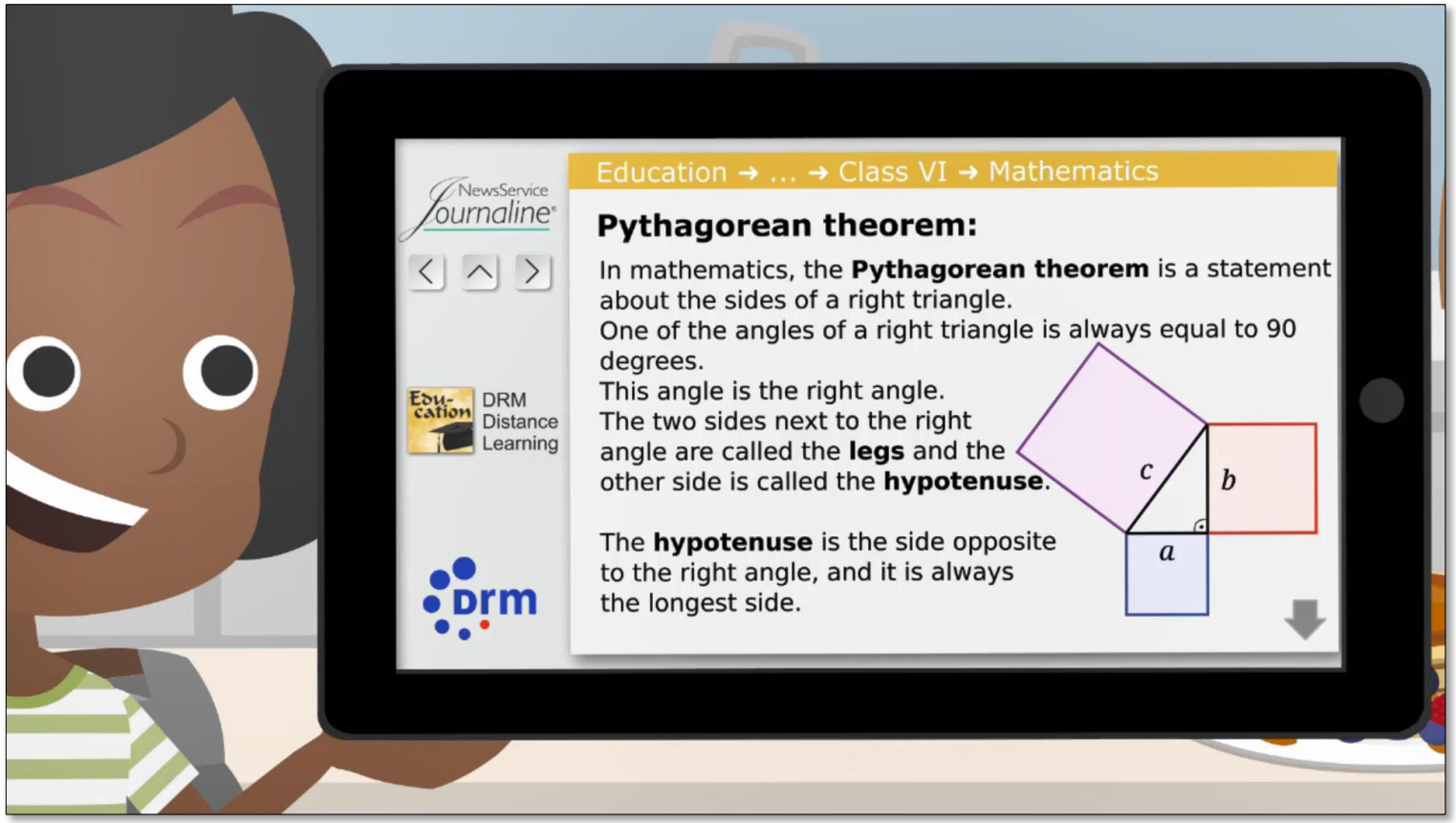


Live lessons with teacher as scheduled audio programmes

Self-teaching of students in their own language and at their own speed of learning through on-demand lookup of lessons

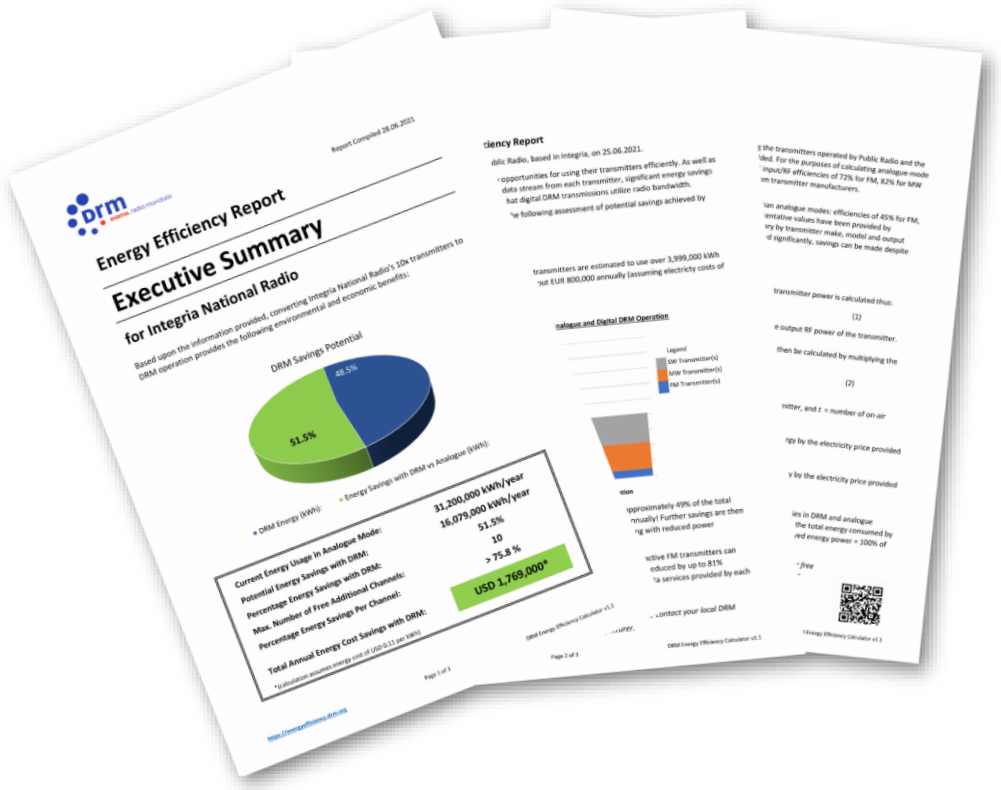
These screenshots of the "DRM MultimediaPlayer Radio App" show an example for a radio schooling service.

DRM Application in Education: Radio Schooling



DRM SERVICES:
Energy Efficiency Calculator

DRM Energy Efficiency Calculator: Ready for Use



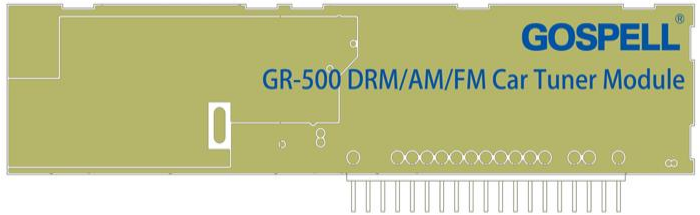
Website:
energyefficiency.drm.org

If you are interested, e-mail us:
energyefficiency@drm.org

DRM RECEIVERS

Car, Portable and Mobile DRM Receivers

Manufacturers in **China, Germany, India, South Korea, UK**

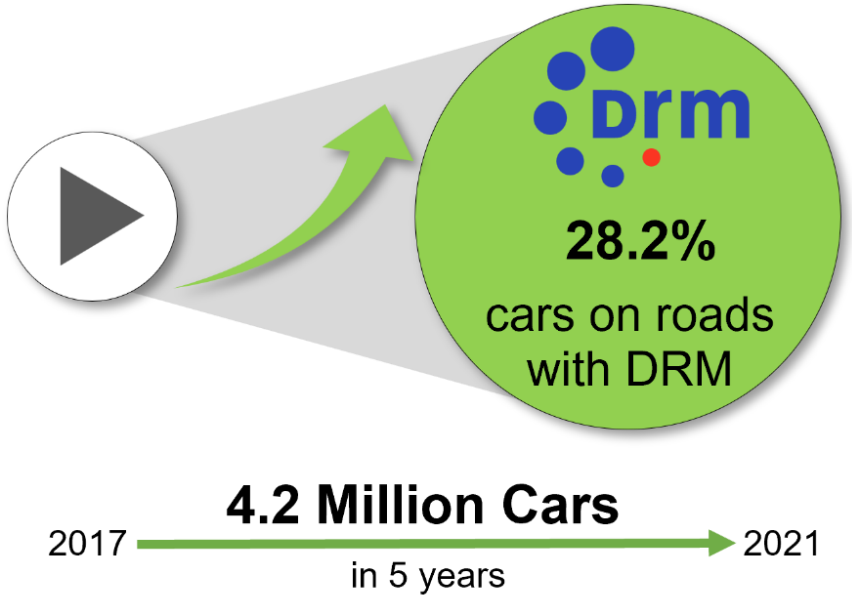


DRM in Cars

India

DRM in Indian Cars

- **More than 4.5 million cars with line-fit DRM in India** since 2015
- Chipsets exist to support all standards
- Car manufacturers **not charging extra** from consumers for DRM receivers
- **More International car brands adding DRM in their cars**



Mahindra · MARUTI SUZUKI · HYUNDAI · MG · TOYOTA · Mercedes-Benz

DRM for mobile phones & tablets

STARWAVES DRM Software Radio App

- Listen to DRM live broadcasts on your Android phone or tablet simply by connecting an external RF dongle to the USB port of your device
- Works with various SDR RF dongles out of the box, including AirSpy HF+, SDRplay, MSi. SDR Panadapter; and supports RTL-SDR through a third-party driver (experimental); requires a device with USB host capability
- Supports DRM digital radio services both in the AM and FM/VHF bands (depending on RF dongle capabilities)
- Supports all standard compliant DRM audio codecs, including xHE-AAC
- Browse through Journaline text content with latest news, sports and weather updates, programme background information and schedules, distance learning / RadioSchooling or travel information
- Supports EWF within DRM transmission

Ruxandra Obreja

Chair of DRM Consortium

DRM AROUND THE WORLD

Countries rolling out DRM or trialling and planning to launch

- **India – MANDATED DRM (AM)** the largest digital radio roll-out in the world currently (39 MW + SW transmitters – over 600 million people covered by digital DRM signals), DRM for local coverage considered –
  DRM for FM trial – finished as of March 22nd, 2021

- **China – DRM shortwave for domestic coverage** – full country coverage (with 7 SW transmitters)

- **Russia** (**DRM MANDATED and ENDORSED for AM and FM**).
  Successful demos in VHF band II in St. Petersburg (still on air since 2019) and in AM in Siberia.

- **Indonesia** (successful trials in both AM as well as VHF, planning roll-out).
  5 FM transmitters installed and operation; DRM-EWF successfully demonstrated. Plans for DRM AM in 2021

- **Pakistan – MANDATED DRM in all bands in 2021**. 3-stage plan with cost allocation.
  On Oct 5th, 2020 PBC installed signboard of future 10kW (DRM) transmitter.

- **Malaysia – interested in DRM having found DAB+ not useful at this stage**

- **Brazil** (successful tests in both AM and VHF), SW Transmitter for Amazonia installed near Brasilia – **DRM SW transmissions** to north and south until MARCH 2021

Countries rolling out DRM or trialling and planning to launch

- **In Africa Nigeria, Algeria, Botswana, Zambia, Mozambique, Morocco broadcasting or planning DRM.**
- **SADC (www.sadc.int 16 countries in Southern Africa) recommending DRM and DAB+**
- **Romania -** worldwide DRM SW service, currently received in India and Brazil)
- **United Kingdom -** intl. services, BBC World Service to Europe and India
- **Germany** (tested extensively in all bands and used by German Navy)
- **Hungary –** a. 2 megawatts MW transmitter installed in *Antenna Hungaria*
  b. One of the largest SW demo on air by the Technical University in Budapest
- **USA** (Used by Coast Guard)
- **Asia: Vietnam, Malaysia, Thailand, Bangladesh, New Zealand –** interest – test or roll
- **Middle East - ADOPTED** Kuwait broadcasting in DRM, Saudi Arabia, Oman

South Africa

drm SOUTH AFRICA GROUP

Policy Recommendation for using DRM

South Africa is **the first African country with a coherent Digital Sound Broadcasting (DSB) policy**

The Department of Communications and Digital Technologies in South Africa published a document in July 2020 outlining its **policy position on digital sound broadcasting in the country**

This paves the way for the **migration to digital radio broadcasting which includes the use of the DRM digital radio technology**

South Africa becomes the first country to recommend the **all-bands DRM standard + DAB+;** the availability of multi-standard chipsets could be the catalyst in accelerating the adoption of digital radio broadcasting

WHY IS DRM RIGHT FOR AFRICA?

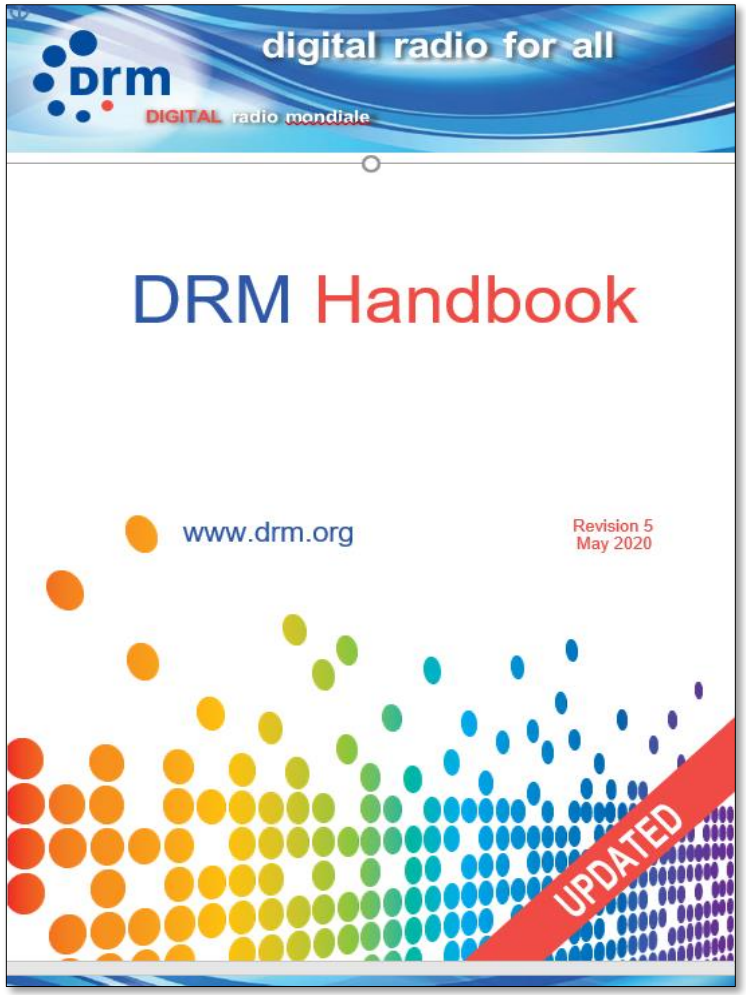
DRM Digital Radio
is the Digital Successor to analogue AM/FM

- **The SADC countries, including South Africa have mandated the complete 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 costs
- 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
- **Using existing infrastructure**, where possible
- Great opportunity for local manufacturing and know-how

All you need to know about DRM Digital Radio

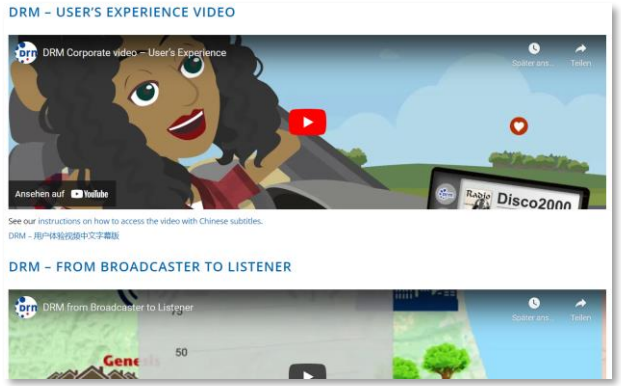
DRM Handbook
Version 5

Free download from:
handbook.drm.org



All DRM Information at your fingertips:
pocket.drm.org

DRM Smart Radio Benefitting All Listeners



Watch the DRM Corporate Videos:
videos.drm.org

Additional videos on DRM YouTube channel:
youtube.drm.org

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Thank You!