BES EXPO 2024

28th International Conference & Exhibition on Broadcast & Media Technology

15-17 February | Hall 12A | Pragati Maidan | New Delhi

Evolving Media Ecosystem: Innovative, Immersive & Sustainable

BROADCAST ENGINEERING SOCIETY
BES
INDIA

EVENT PRESENTATIONS

INDEX

OVERVIEW

The 28th edition of the Broadcast Engineering Society (India) Expo (BES Expo) stood as a pinnacle in the broadcasting community, bringing together industry leaders and professionals. Endorsed by the Ministry of Information & Broadcasting, Ministry of Communications & IT , Ministry of Electronics Information & Technology in collaboration with the International Association of Broadcast Manufacturers (IABM) and DRM, the event garnered widespread support from key entities like Prasar Bharati, ABU, AIBD , UNESCO and Society of Broadcast Engineers (USA).

As a focal point for the broadcasting community, the 28th BES Expo played a pivotal role in advancing the field. With a diverse array of sessions, the edition delved into critical topics such as Innovation in Content Production, Content Marketing, and Monetization Strategy for Over-The-Top (OTT) platforms. Additionally, the expo covered emerging trends in Animation, Visual Effects (VFX), Comic and Gaming, reflecting the evolving landscape of media and entertainment.

The participation of major exhibitors, delegates, and visitors from both India and abroad underscored the global significance of the BES Expo. Recognized for its thematic approach to the current state of broadcasting, the event served as a platform for knowledge exchange, networking, and showcasing the latest advancements in the industry. The ongoing success of BES Expo highlights its integral role in fostering innovation and excellence within the broadcast community.

Introduction to Broadcast Engineering Society (BES)

Established in 1987 and registered with the Registrar of Societies in Delhi, India, the Broadcast Engineering Society (India) serves as a dedicated advocate for the interests of broadcast professionals both nationally and internationally. Originally conceived by a passionate group of broadcast engineers, the society aims to advance knowledge and practices in broadcasting and related sciences.

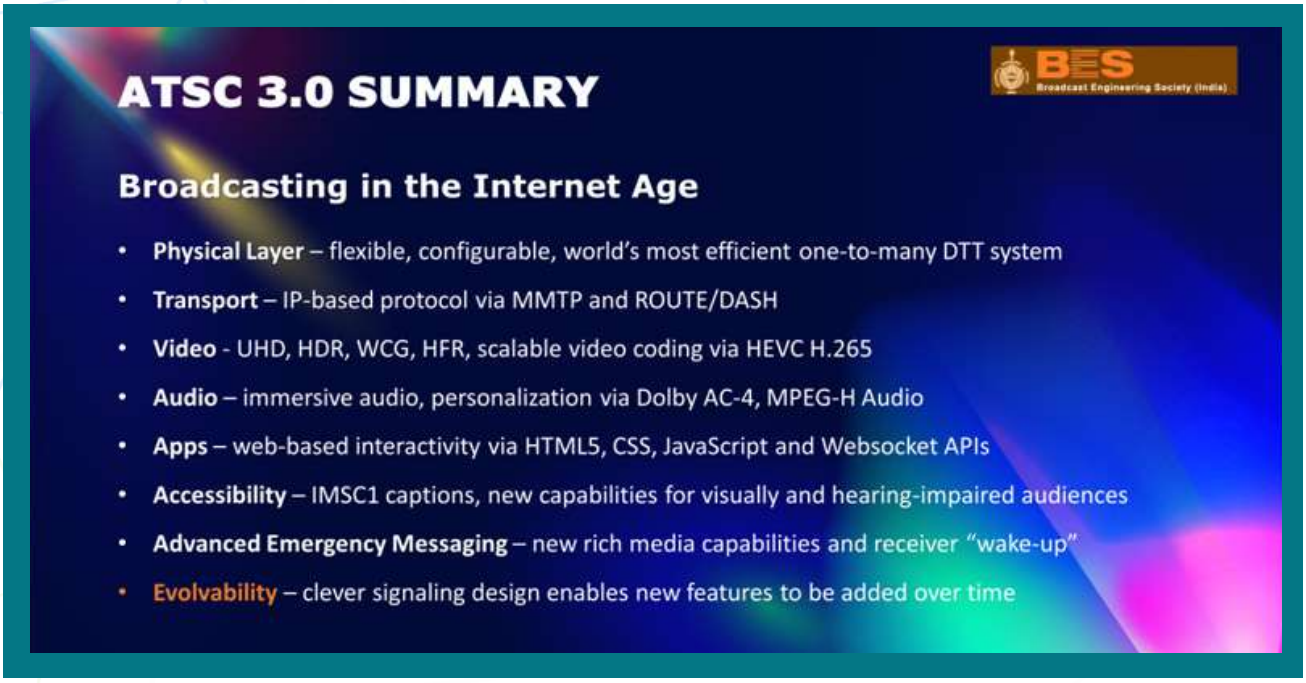
Over the years, it has expanded its influence with a headquarters in New Delhi and 12 local chapters nationwide. Through seminars, workshops, and symposiums, the society fosters education, research, and training in broadcast engineering.

Additionally, it plays a pivotal role in projecting the profession's interests globally, facilitates technology exchange through exhibitions, and provides a platform for professionals to interact and share expertise. Recognizing outstanding contributions, the society also presents awards in various broadcasting disciplines. The culmination of these efforts is the internationally acclaimed BES EXPO event.

DAY 1

SESSION 2 : ATSC3.0 BROADCASTING

Mr. Mark Corl, Sr. Vice President, Emergent Technology




ATSC 3.0
nextgenTV
Larger Capacity
Higher Efficiency
Emergency Communications Channels, Educational Services and more
DATA
rootle
(SD)
NORTHCAROLINA
(HD)
(SD)
Explorer
(HD)
(SD)
Mbs/Sec


ATSC 3.0
nextgenTV
25
Mbs/Sec
DATA
PBS NORTH CAROLINA // NC DEPARTMENT OF INFORMATION TECHNOLOGY


DATACASTING WITH ATSC 3.0
World's Most Efficient Physical Transmission System
IP-based → Supports OSI network layer directly
Everything is files:
A/V → ISO BMFF Files
CC → IMSC1 TTML Files
Signaling & ESG → XML Documents
Interactivity → HTML5, CSS, JavaScript Files
... so data delivery is native to the standard
nextgenTV
ATSC 3.0 IS Datacasting
BES
Broadcast Engineering Society (India)

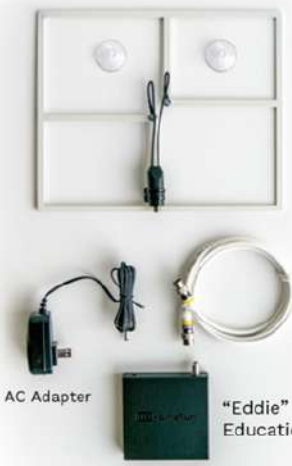
Service to a Home

To receive individualized content at the student's home, a small window-mounted antenna connects to an "Eddie," an educational device the size of a small router.*

The Eddie creates a hotspot, so any Wi-Fi-enabled device, like a computer or tablet, can connect – without the internet. These devices can accommodate eight concurrent users.

*IEI targets content to each individual device, allowing for 128GB of unique content for each home.

INFORMATION EQUITY INITIATIVE



NEXTGEN TV //

Current Kitchen Fire Dispatch

- 5 tones to 9 units – 26 seconds
- Voice announcement *only after* all pager tones
- 11 seconds to read unit numbers
- Location announced 42 seconds after alert initiated
- Full alert = ~67 seconds

PBS NORTH CAROLINA // NC DEPARTMENT OF INFORMATION TECHNOLOGY

NEXTGEN TV //

Tone Alerting and Analog Pagers

- Technology from 50+ years ago
- 70% of firefights are volunteers
- Volunteers might not be located at the fire station
- Tone & Voice Pager
- Extremely reliable & durable
- Most have no display, voice only
- Listen to on-scene radio traffic
- ISO concerns

PBS NORTH CAROLINA // NC DEPARTMENT OF INFORMATION TECHNOLOGY

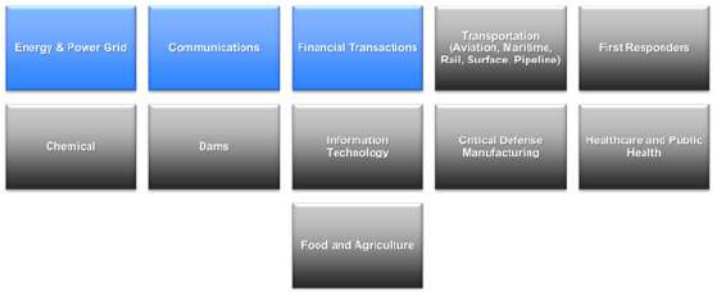
NEXTGEN TV //

ATSC 3.0 Kitchen Fire Dispatch

- Full alert ≈ 5-10 seconds
- All information delivered as text
- On-board text-to-speech

PBS NORTH CAROLINA // NC DEPARTMENT OF INFORMATION TECHNOLOGY

Timing Needs for Critical Infrastructure



HUMBER Research & Innovation | B²C Lab

NAB TECHNOLOGY

13

Technical Requirements to Satisfy Critical Infrastructure Usability Needs

Industry	Timing Requirements
Mobile Wireless Networks	**1.1 µsec** traceable to UTC
Equity Trading Systems	**1 µsec** within UTC NIST (SEC Section 613 rules, MifID II EU)
Power Grid	**1 µsec** to UTC, IEEE 37-238, (Synchro-phasors)
Other CI Industries	**200 ns** satisfies all requirements

HUMBER Research & Innovation | B²C Lab

NAB TECHNOLOGY

14

Broadcast Positioning System (BPS)

A system and method of estimating time and position at a receiver using ATSC 3.0 broadcast signals

ATSC

Compliant with ATSC 3.0 standard; uses datacasting feature

Independent and stand-alone

- GPS, Internet or cellular connectivity not required

HUMBER Research & Innovation | B²C Lab | NAB TECHNOLOGY

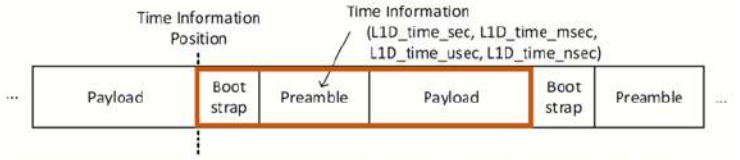
15

ATSC 3.0 Physical Layer Frame

Bootstrap – time of arrival (TOA) estimation

Preamble (L1-Basic and L1-Detail) – timing info

Data PLP - tower location and neighbor measurement info



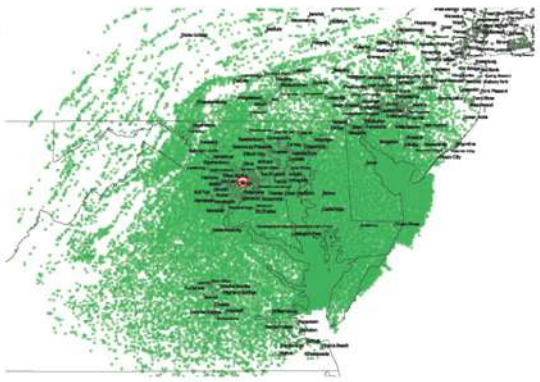
Source: ATSC Standard, Physical Layer Protocol, Doc. A/322:2020

HUMBER Research & Innovation | B²C Lab | NAB TECHNOLOGY

16

Typical Predicted BPS Coverage (50/50) of a TV Station

- WHUT-TV, Howard University
- 833 ft antenna height (HAAT)
- 416 kW ERP
- Channel 32, 587 MHz (center)



HUMBER Research & Innovation | B²C Lab | NAB TECHNOLOGY

17

Tutorial: Building OTT Platforms Key Considerations

Mr. Vikrant Khanna, CEO, Mogi I/O

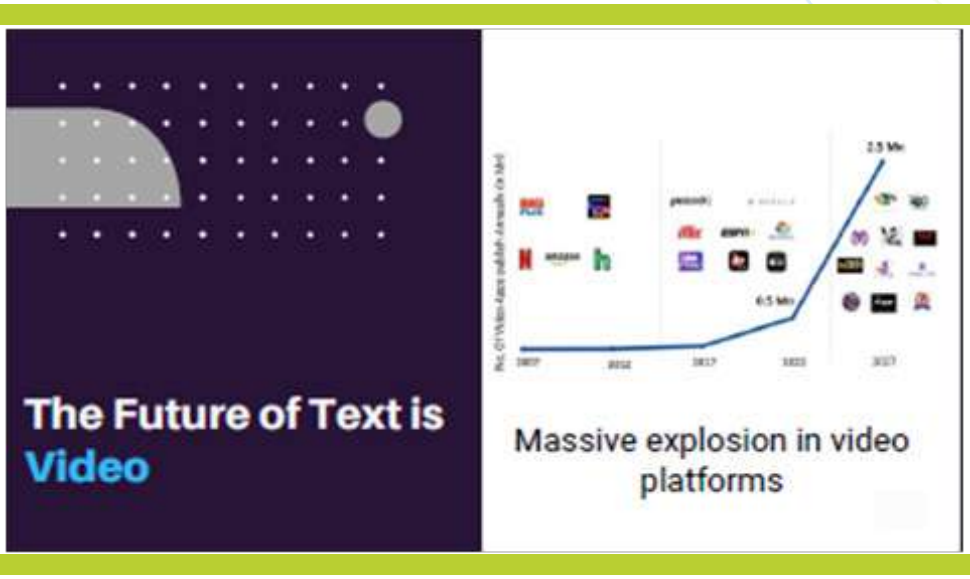
Why are OTT Platforms proliferating?

What is an OTT Platform?

OTT is a service that offers digital content through the Internet. OTT platforms provide on-demand or live video streaming services across various devices.

- Entertainment
- News & Media
- Education
- Sports
- Religious
- Fitness

Why are OTT Platforms proliferating?

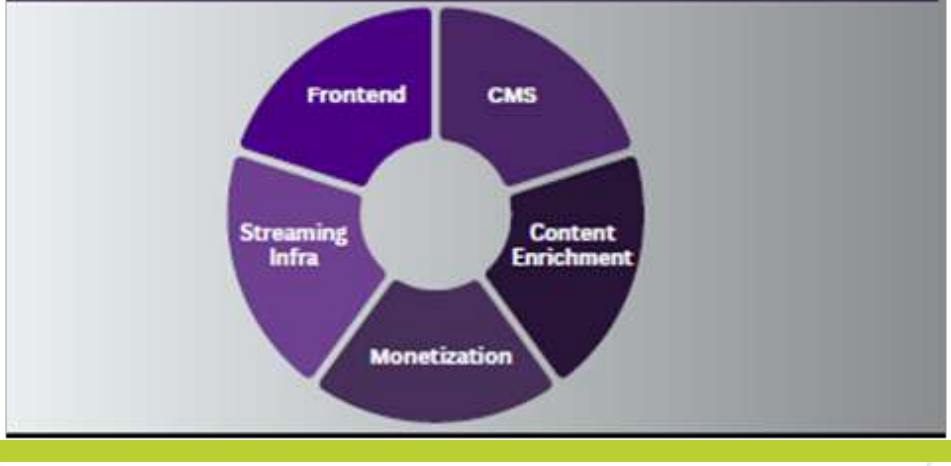


Why are content owners launching their OTT Platform?

Segment	Global Numbers Estimate	Why Shift to OTT/Digital Video Apps?
TV Channels	24k+	• Cord cutting - consumers shift away from Broadcasting • Broadcasting is capital intensive
Independent Content Producer	207 Mn+	• Only 10% are able to do business with large OTTs (India alone has 20k+ dialects alone, with top OTT's catering to only Top 6 languages, and rest are underserved) • Better monetization through Micro OTT
Print Media	1.2 Mn+ (**)	• Print is dying • Not have content/brand/viewers; Going Digital is the only way to survive
Schools/ Colleges	4 Mn+ (UNESCO Est.)	• Student/Parents/Teachers are consuming content on smart digital devices, so the school/college print magazines need to go digital or will go obsolete • Massive opportunity for student/parent/teacher engagement digitally and monetization avenues
Religious Organisation	500k+ (***)	• Do not have any digital presence for engaging pupils/followers • Massive opportunity for online monetization and audience engagement through tips/donations/Live Streams

* Some overlap may exist with Youtubers, but a far larger number is present on Instagram, TikTok and Facebook, along with Filmmakers, producers, Studios etc.
** Only India estimate is 1,18,000, and the global estimate is taken as a 10x multiple
*** Includes large/medium/small religious organizations, temples, churches, mosques, religious worship places, institutions, trusts and so on

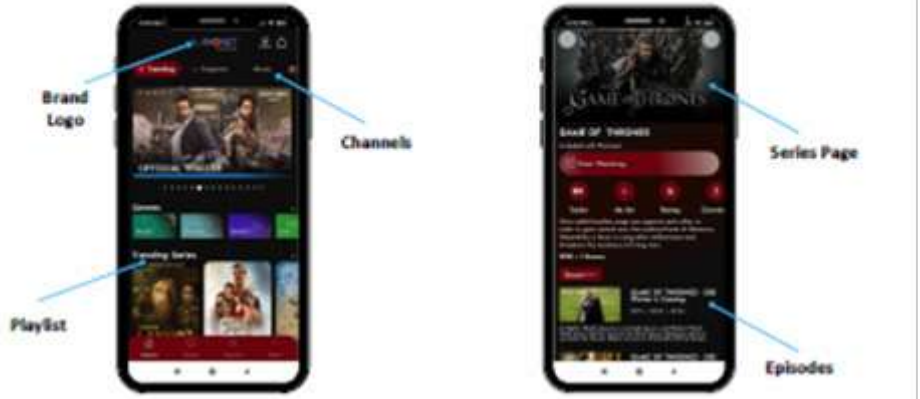
Critical components of an OTT Platform



Front End

- Multi-Device Support - Web, Android, iOS & Smart TV
- Baseline - Long form Video

Front End



Front End

Front End

Language/Region/City Selection

Language Selection | City Selection

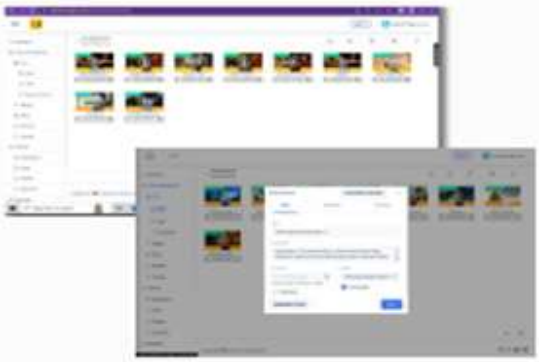
Front End - Next level

Short format Video (Reels) | Music Streaming/ Podcast | News/Articles Support | Live Streaming

Backend CMS

Create

- Channels
- Playlist
- Series
- Episode
- Meta
- Bulk uploads



Backend CMS

- Customize UI/UX
- Payment gateways
- Subscription plans
  - Country wise
  - Currency wise
- 3rd party integrations
  - AppsFlyer
  - Social logins
  - CRM

Backend CMS - Analytics

Operational Metrics
- Total Watch Time
- Active Users - MAU, DAU
- Churn Rate
- Session Duration
- Net Promoter Score

Library Analytics
- Viewership - Most Viewed etc
- Ad Performance Metrics
- Conversion Rate
- Content Performance by Device

Content Level
- Most popular by Geo, Lang, Genere
- Video Startup Time
- Buffering Rate
- Livestream Latency

Subscribers Level
- Total Subscribers
- Subscriber Growth Rate
- Lifetime Value of a Subscriber (LTV)
- Churn Rate

Backend CMS - Subscriber Management

- Intelligent Lifecycle Marketing
- Engaging Web Rules
- Attractive custom Pop-ups
- Smart exit-intent popups
- Track key growth metrics
- View funnel stages
- Co

Recommendation Engine

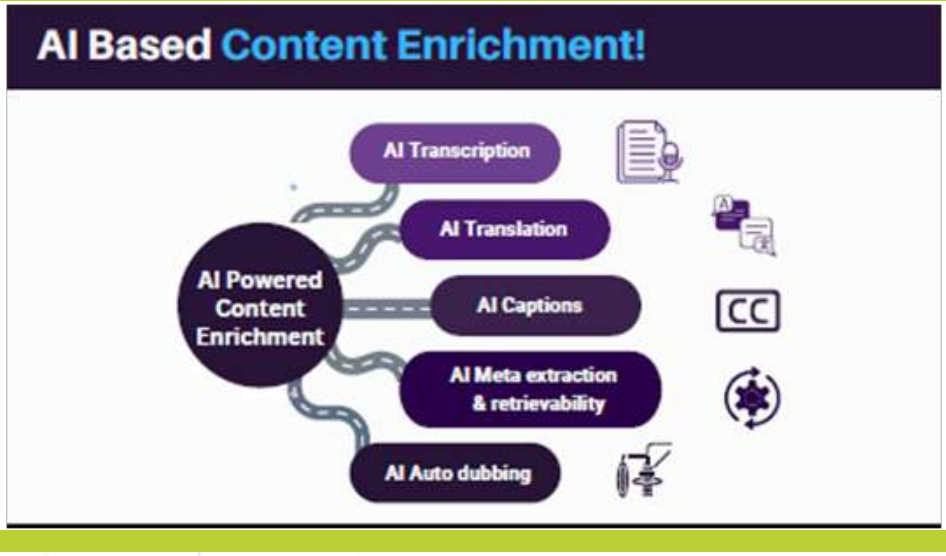
- Content-based Filtering
- Collaborative Filtering
- AI based Recommendation Systems
  - Content playing history
  - Psychographic profiling
  - Social Media habits
  - Visual Preferences

Video Streaming Infrastructure

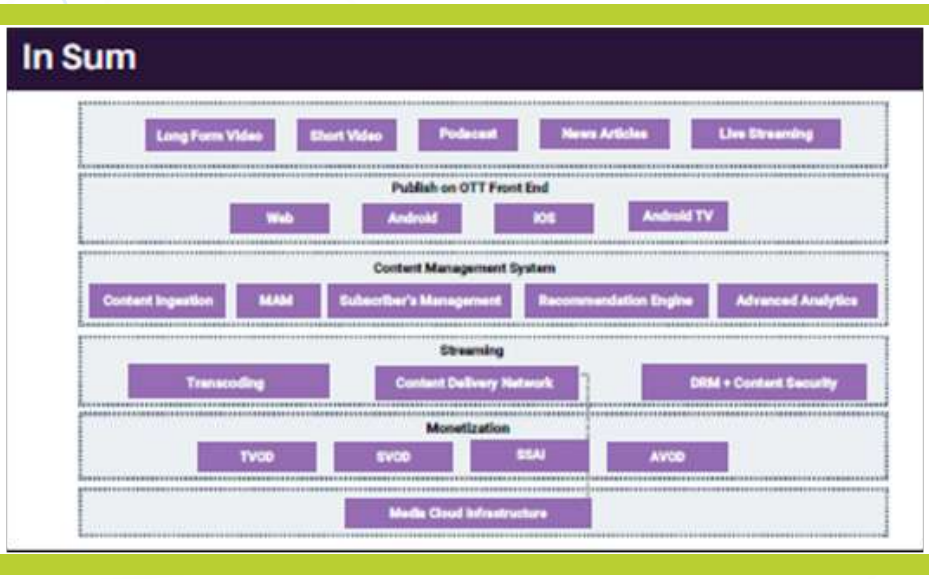
- Transcoading
- CDN
- Video Player
- DRM & piracy Prevention
- Auto Scalability
- Security

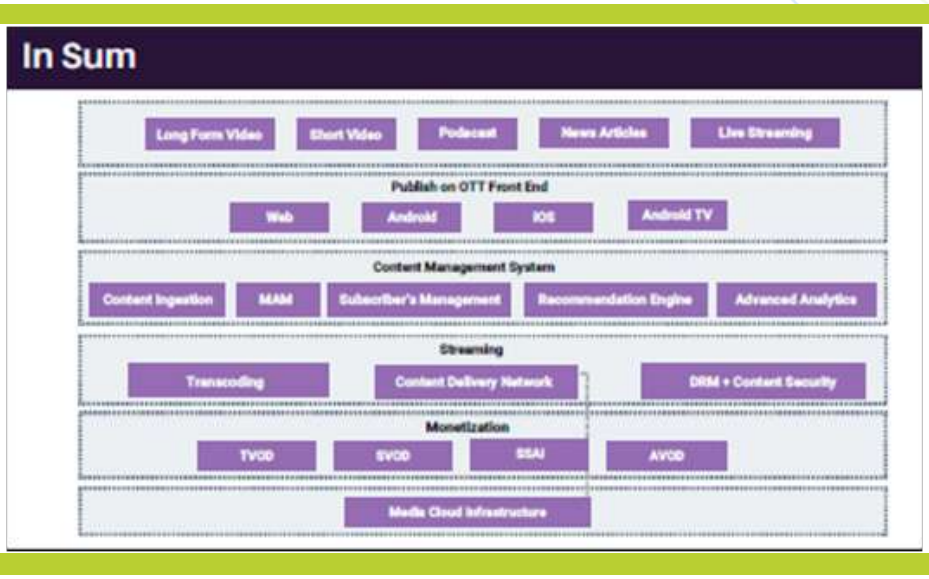
Monetization

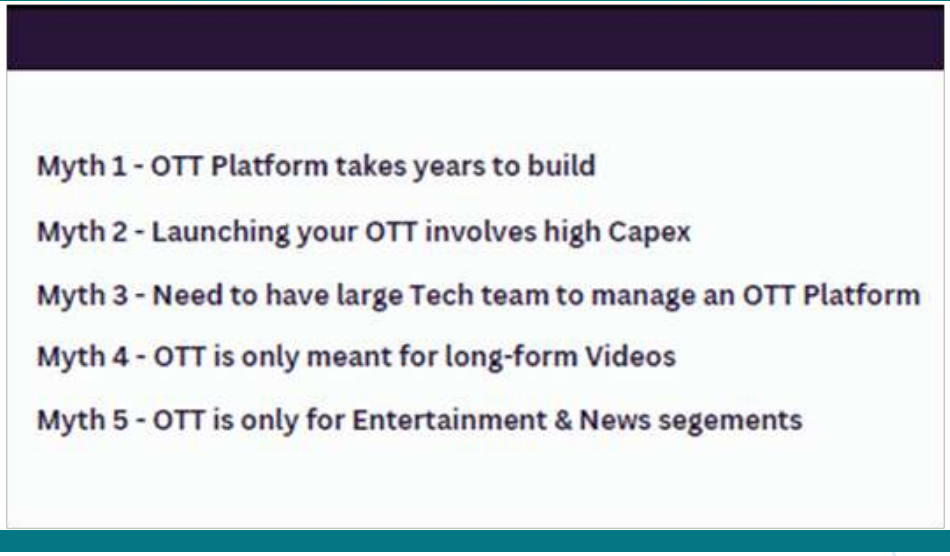
- SVOD
- TVOD
- AVOD
- Banner Ads
- Donation & Tips
- Shoppers Videos


AI Based Content Enrichment!
AI Transcription
AI Translation
AI Powered Content Enrichment
AI Captions
AI Meta extraction & retrievability
AI Auto dubbing
CC


Watch Demo Video - Click to Play
SUNDAR PICHAI
Auto Dubbing in Indian languages


In Sum
Long Form Video
Short Video
Podcast
News Articles
Live Streaming
Publish on OTT Front End
Web
Android
iOS
Android TV
Content Management System
Content Ingestion
MAM
Subscriber's Management
Recommendation Engine
Advanced Analytics
Streaming
Transcoding
Content Delivery Network
DRM + Content Security
Monetization
TVOD
SVOD
SSAI
AVOD
Media Cloud Infrastructure


In Sum
Long Form Video
Short Video
Podcast
News Articles
Live Streaming
Publish on OTT Front End
Web
Android
IOS
Android TV
Content Management System
Content Ingestion
MAM
Subscriber's Management
Recommendation Engine
Advanced Analytics
Streaming
Transcoding
Content Delivery Network
DRM + Content Security
Monetization
TVOD
SVOD
SSAI
AVOD
Media Cloud Infrastructure

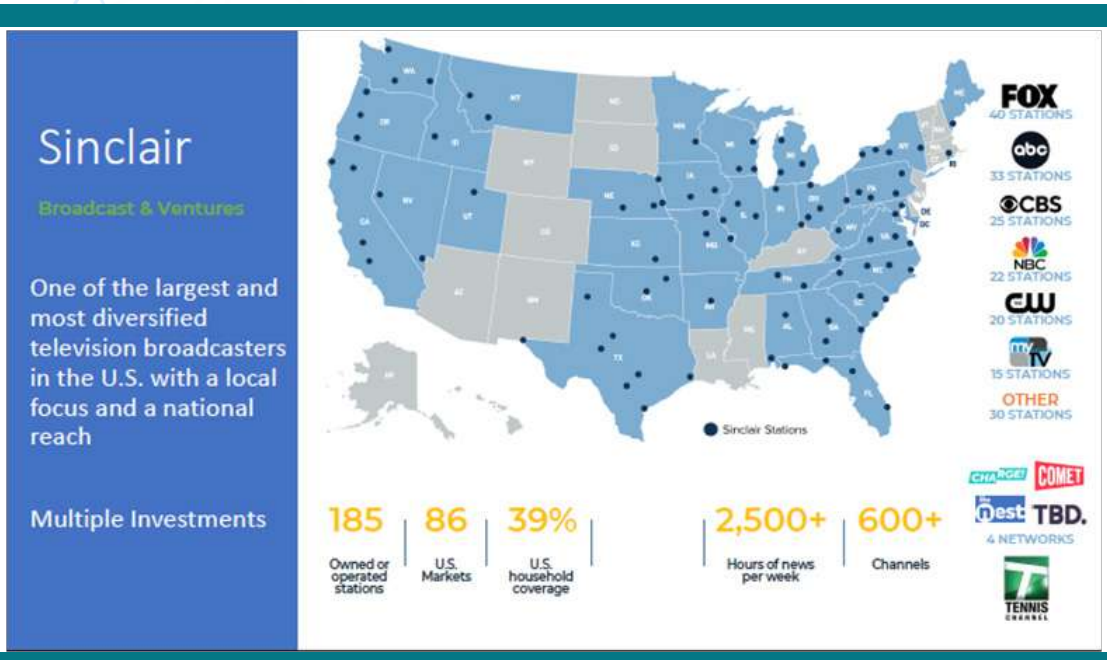

Myth 1 - OTT Platform takes years to build
Myth 2 - Launching your OTT involves high Capex
Myth 3 - Need to have large Tech team to manage an OTT Platform
Myth 4 - OTT is only meant for long-form Videos
Myth 5 - OTT is only for Entertainment & News segements


Contact Us
Vikrant Khanna - Founder & CEO
+91 98 18399142
vikrant@mogiio.com

DAY 2

SESSION 3- D2M MOBILE BROADCASTING

Mr. Delbert Parks, President, Sinclair Technology, USA



SINCLAIR

Future of Broadcast

DPP Leaders Briefing November 8-9, 2023, London

Key theme was "Business Effectiveness" and the key word was "AI"

- The media industry is in a post-transformation phase to drive revenue to retrench and contain costs and deliver business goals
- The hype around generative AI has already turned to use cases
- Maximize the value of content – of all forms, and through a range of channels and platforms
- Deploy D2M distribution channels for more efficient data distribution and better integration with compatible LTE cellular networks

SINCLAIR

Sinclair Transformation

- Provide value to the Consumer/Viewer
- Use cloud and AI/ML technology to improve operational efficiency to drive revenue and reduce costs
- Take advantage of the unique capabilities of ATSC 3.0 to serve our viewers and create new businesses and revenue opportunities
- New D2M distribution architectures for mobile devices (Cars/Phones)

nextgenTV

SINCLAIR

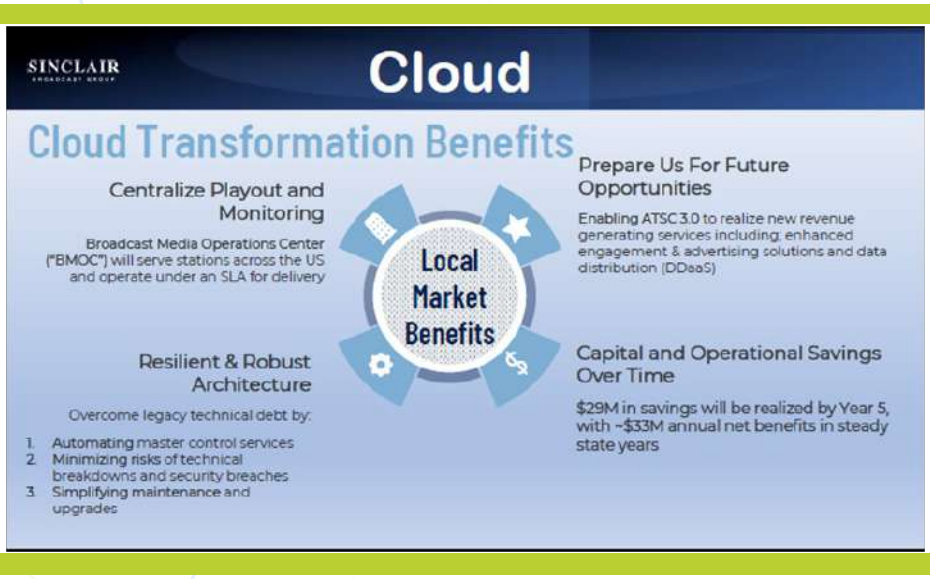
New strategy

In deciding to move to the cloud, we needed to look at our supply chain, media operations, delivery systems & our customers viewing preferences

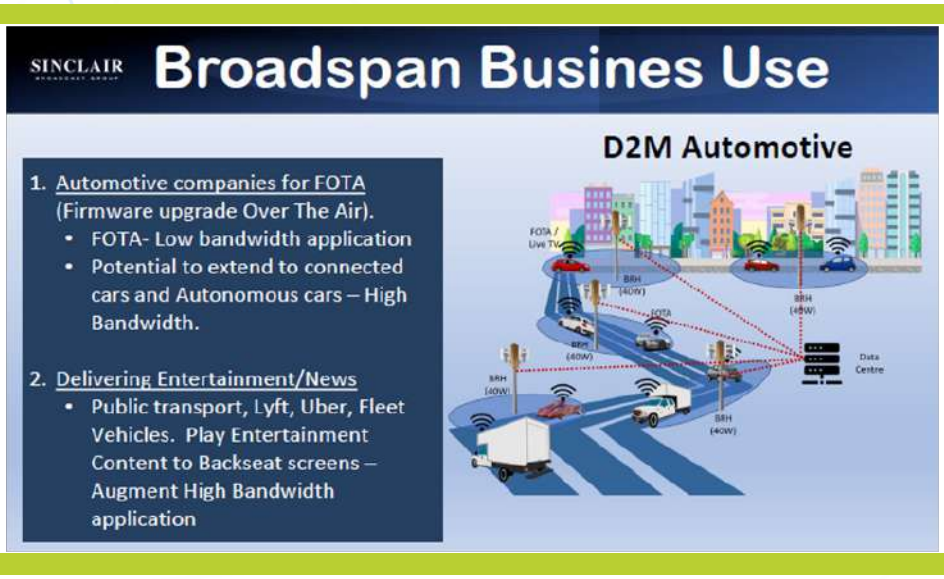
Content & Metadata
- Licensed Content: Syndication, Network Programming, Sports, News, Outside Data Sources
- Owned Content: Local Productions, Local News, Local Archives (Minus Network Content)

Orchestration, Implementation & Transactional
- Business Processes: Rights Management, Traffic, Ad Technology & Ad Optimization, Accounting
- Technical Processes: Broadcast Core & Scheduler, Transcoding, AI/ML Engines, Data I/O & optimization
- Distribution Interface Engine: Process requests, Ddaas Interface to BMX, outside vendors, etc.

Distribution Matrix
- Linear Channels: ATSC 1.0, ATSC 3.0, OTT, MVPD's, CTV Fast Channels
- Digital Distribution: Web, AVOD, SVOD, Mobile Apps, DMVPD's
- **D2M/Data Distribution as a Service or DDaaS: Distance Learning, Enhanced GPS, IOT, Vehicle Infomatics & Infotainment, CDN Offload**

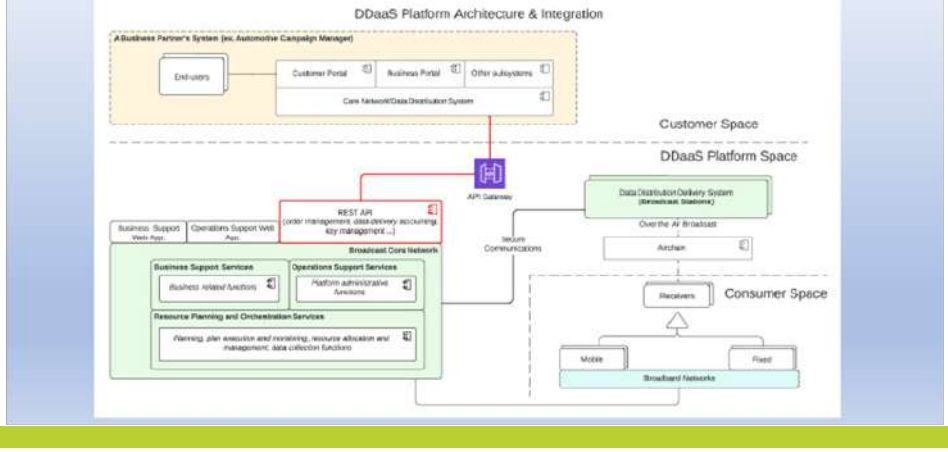

SINCLAIR
Cloud
Cloud Transformation Benefits
Centralize Playout and Monitoring
Broadcast Media Operations Center ("BMOC") will serve stations across the US and operate under an SLA for delivery
Local Market Benefits
Prepare Us For Future Opportunities
Enabling ATSC 3.0 to realize new revenue generating services including: enhanced engagement & advertising solutions and data distribution (DDaaS)
Resilient & Robust Architecture
Overcome legacy technical debt by:
1. Automating master control services
2. Minimizing risks of technical breakdowns and security breaches
3. Simplifying maintenance and upgrades
Capital and Operational Savings Over Time
$29M in savings will be realized by Year 5, with ~$33M annual net benefits in steady state years


SINCLAIR
Advertising Technology
Develop Unified Ad Sales Platform to sell across Digital and Linear
AD INVENTORY CONSOLIDATION
Provides advertisers access to larger ad inventory across news, sports, networks
ENHANCED CUSTOMER DATA
Data augmentation and analytics for insight into customer segments (Using Artificial Intelligence & Machine Learning)
BUY/SELL-SIDE INTEGRATION
Streamlined ad buying process and automated transaction flows with agency platforms
CONVERGED SALES
Monetize SBG's "House of Brands" linear and digital Ad inventory with integrations across pitch-to-pay
IMPROVE CAMPAIGN PERFORMANCE
Improve performance monitoring and reporting on overall campaign delivery


SINCLAIR
Broadspan Busines Use
1. Automotive companies for FOTA (Firmware upgrade Over The Air).
• FOTA- Low bandwidth application
• Potential to extend to connected cars and Autonomous cars – High Bandwidth.
2. Delivering Entertainment/News
• Public transport, Lyft, Uber, Fleet Vehicles. Play Entertainment Content to Backseat screens – Augment High Bandwidth application
D2M Automotive
FOTA / Live TV
BRH (40W)
FOTA
Data Centre

SINCLAIR BROADCAST GROUP

Broadspan Wireless/DDaaS



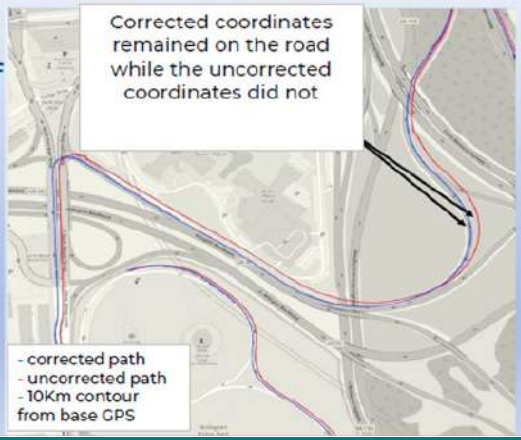
SINCLAIR BROADCAST GROUP

Enhanced GPS

NavPathTM Commercialization of Enhanced GPS

- Current GPS accuracy is +- 3 meters
- Enhanced GPS fixed precision under 10 cm
- Low latency ensures timely data packet delivery

BitPath
BROADCAST DATA NETWORK



SINCLAIR BROADCAST GROUP

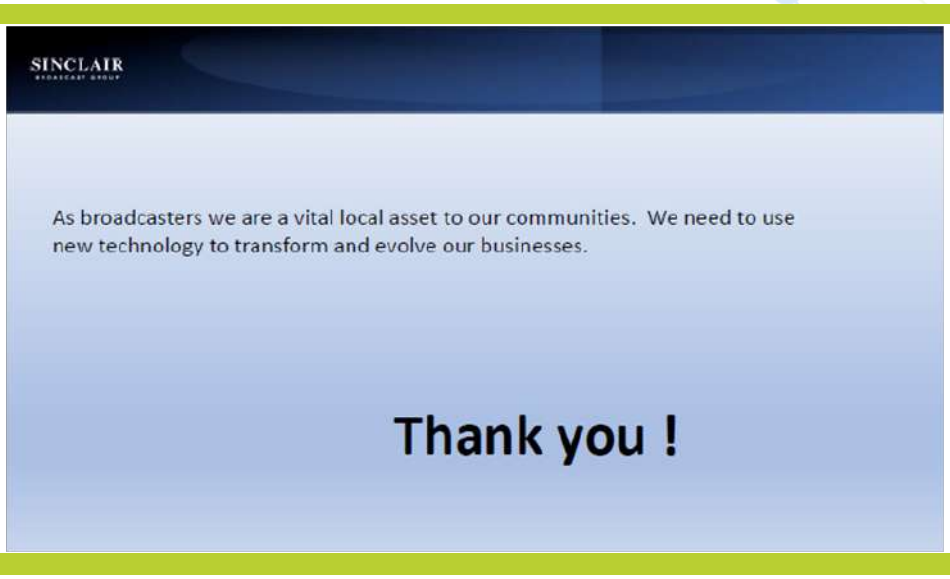
Sinclair's International Partners supporting D2M Nextgen TV and Global DDaaS Platform

- MOU with Korean Broadcasters KBS, MBC and RAPA (Korea Radio Promotion Association)
- "D2M" project in India
- Cast.era is a JV between Sinclair and South Korea Telecom. Use Telecom technology for DDaaS platform
- "Make in India" Saankhya partnership for Broadcast Radio Heads for SFN, D2M devices and ATSC 3.0 Chips


SINCLAIR
Saankhya Labs
Introducing the Direct to Mobile (D2M) Broadcast Opportunity in India
D2M broadcast enables efficient data and video content delivery capable of reaching millions of connected devices in India by broadcasting the downlink signal and delivering a reliable uplink utilizing cellular spectrum
D2M INDIA
Using advanced broadcast technology....
Telecom towers are upgraded with D2M broadcast radio heads
Single Frequency Networks are implemented to extend signal reach and create a nationwide network
D2M reception capability is integrated into budget phones and other devices
D2M enabled services are established to serve B2B and B2C subscribers
BRINGING
AFFORDABLE MOBILE VIDEO
TO THE MASSES


Mexico to Begin Experimental Transmissions
• Multimedios and one other station plan to be on the air testing NextGen TV signals this year.
• The project is supported by select ATSC members led by Thomson Broadcast.
• The sites will facilitate hands-on workshops and demonstrations of ATSC 3.0 capabilities in Mexico.
BROADCASTING THE FUTURE
ATSC


ORDEM E PROGRESSO
Brazil TV 3.0 Project
• Brazil has launched a project to implement a new next-gen television system called "TV 3.0"
• Brazil SBTVD Forum will select system elements for TV 3.0 from among the proposed systems
• ATSC 3.0, Advanced ISDB-T2, are among the proposed technologies considered
• Selections have been made for all layers except PHY, which is coming Q1 2024
• ROUTE/DASH, MPEG-H Audio, IMSC1 Captions, VVC, Ginga, and ATSC 3.0 Emergency Messaging have all been selected thus far
BROADCASTING THE FUTURE
ATSC


SINCLAIR
As broadcasters we are a vital local asset to our communities. We need to use new technology to transform and evolve our businesses.
Thank you !

Direct To Mobile Broadcasting

Prof K. Giridhar, IIT Madras

Thoughtful Utilization of sub-700MHz Spectrum –
Driven by Homegrown Technologies for India's Current & Future Needs

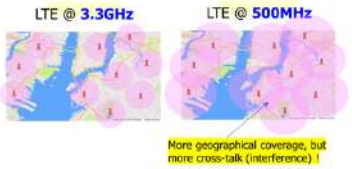
K. Giridhar

Professor, Telecom and Wireless Sensing (TelWiSe) Group
Dept. of Electrical Engineering, IIT Madras, Chennai 600036
giri@ee.iitm.ac.in; www.ee.iitm.ac.in/TelWiSe

Presentation at BES, New Delhi, Feb. 16, 2024

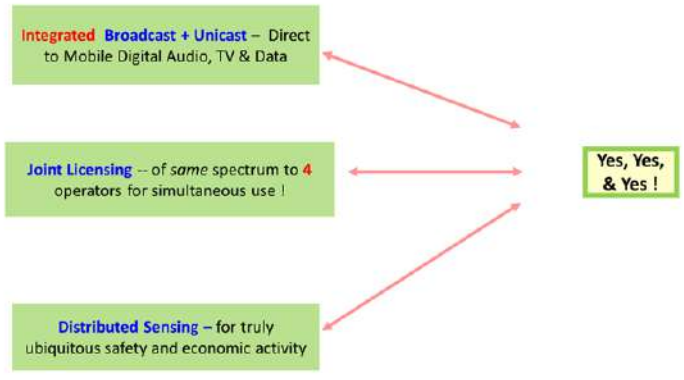
Sub-1GHz UHF Band – Pros & Cons

- **Pros**
  - Excellent geographical coverage including indoors and under foliage
  - In the sub-1GHz UHF bands, antenna design + system design knowledge abundant in India
- **Cons**
  - Available spectrum is scarce – and very expensive
  - SISO preferable; MIMO not useful
  - Cross-talk or co-channel interference would be high



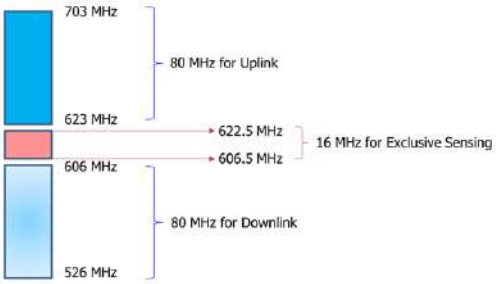
- **How then to judiciously utilize sub-1 GHz UHF bands?**

Can the *same* Spectrum be used for ....



One Solution → Conceived and Designed in India

4 Mobile Broadband Operators + Ultra Reliable TV/Audio Broadcasting
in FDD 80MHz +80MHz + Ubiquitous Distributed Radar based Sensing



TelWiSe Group, IITM

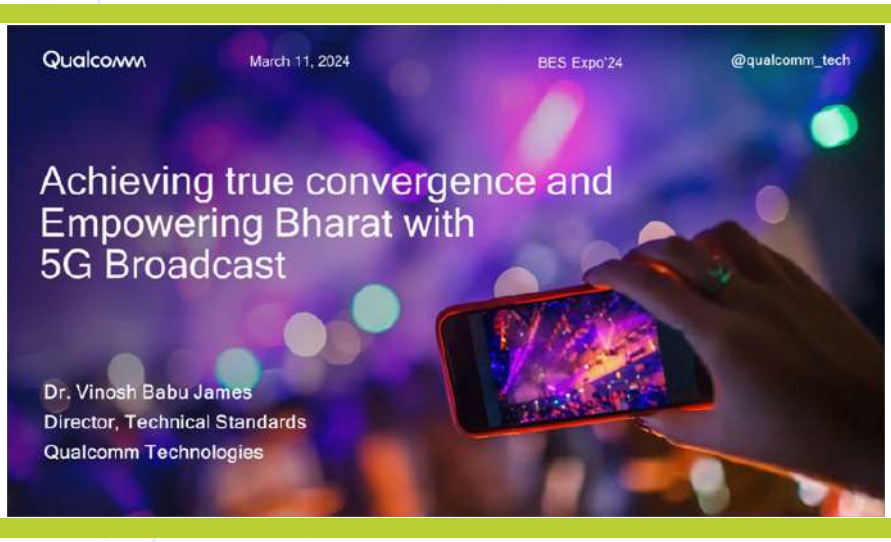
Looking Ahead

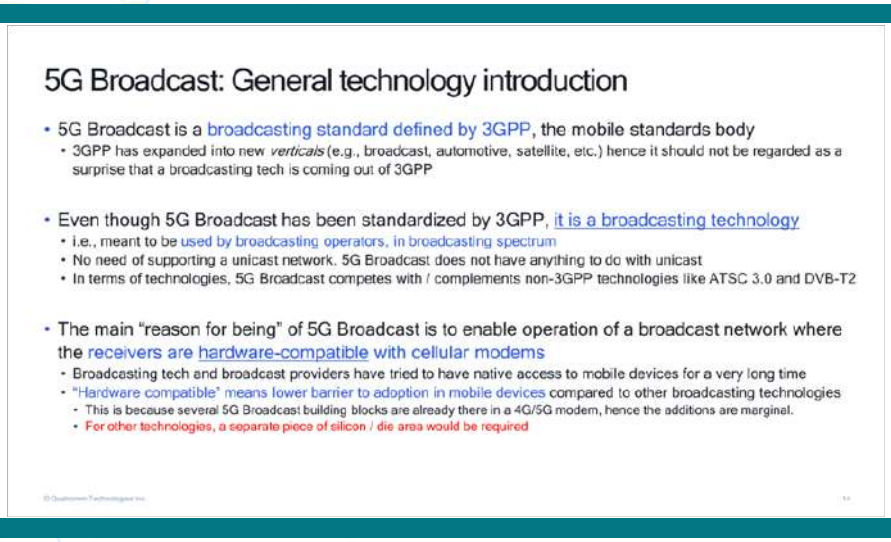
- Indigenous solution must/can seamlessly leverage
  - Bharat-Net
  - NAViC
  - BSNL Towers
  - Prasar Bharati's TV and Radio Towers
  - LEO/MEO Satellites
- Indigenous D2M Solution using ATSC 3.0 is an excellent first-step!

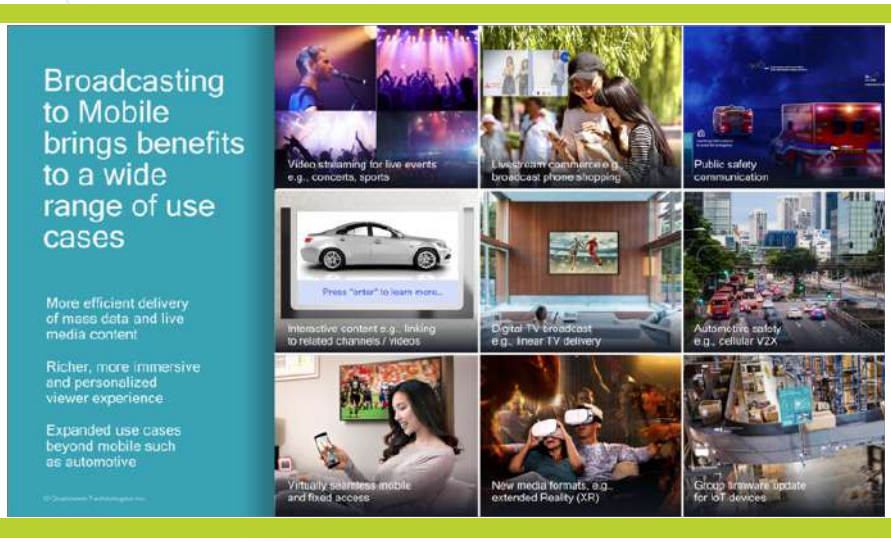
Thank You!

Feb. 2024 TelWiSe Group, IITM 5

Mr. Vinosh James, Director, Technical Standards, Qualcomm

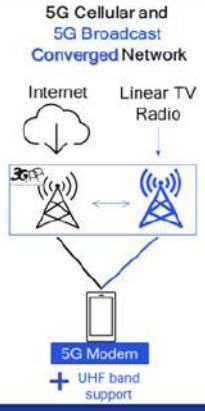






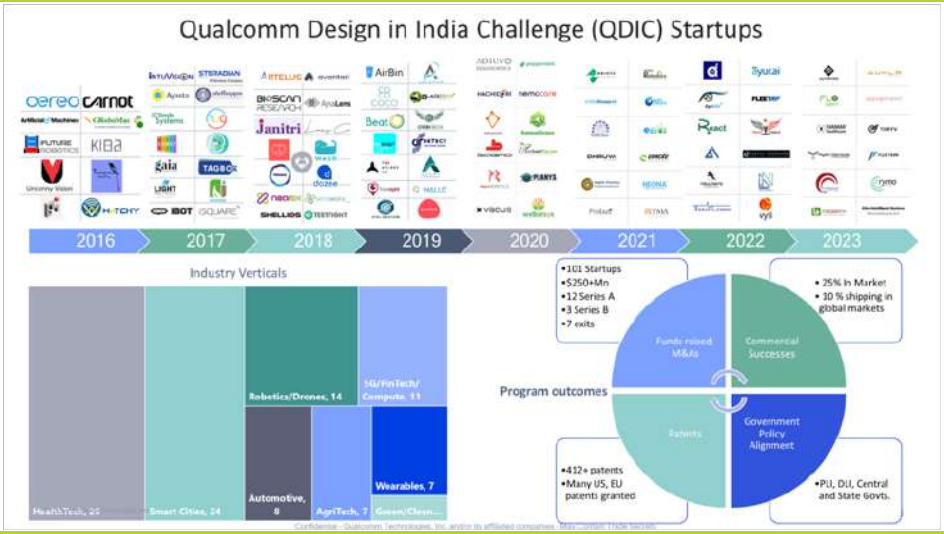
5G Broadcast Value Proposition

- Offering Broadcast / multicast content delivery to fixed and mobile devices using 5G technology (aka, cellular broadcast services)
- Allow broadcasters to reach broader audience and enhance their advertising revenue
- Enable MNOs to deliver value-added services in partnership with Broadcasters and Content Providers
- Create new partnership opportunities for MNO, broadcasters and content developers
- Maximize the utilization of the broadcast spectrum through revenue-sharing PPP models



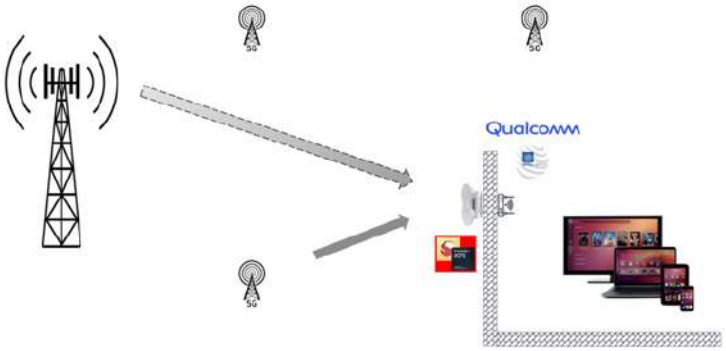
Increase Broadcaster's viewership by enabling the most efficient delivery of mass data and live media content

Qualcomm Design in India Challenge (QDIC) Startups



Note: Figure not to scale

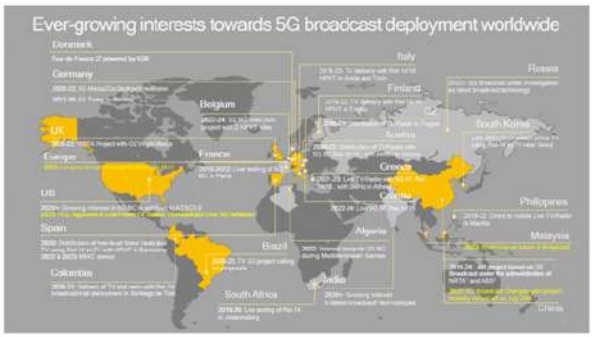
DTT2M via AirFiber



Please visit booth C4 for a demo

Now engaging Indian ecosystem partners in making this service available to Indian citizens in a meaningful timeframe

Ever-growing interests towards 5G broadcast deployment worldwide



Please visit booth C4 for a demo

Reference designs

Commercial grade devices

470 - 612 MHz

612 - 692 MHz

5G Broadcast technology was developed indigenously by our engineering teams from Hyderabad and elsewhere

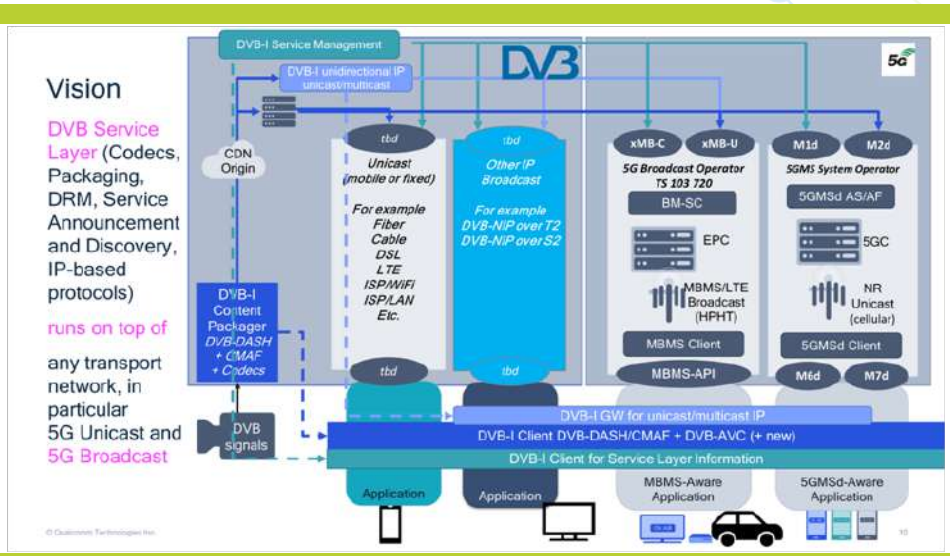
Qualcomm's proposal to MIB/PB[1]

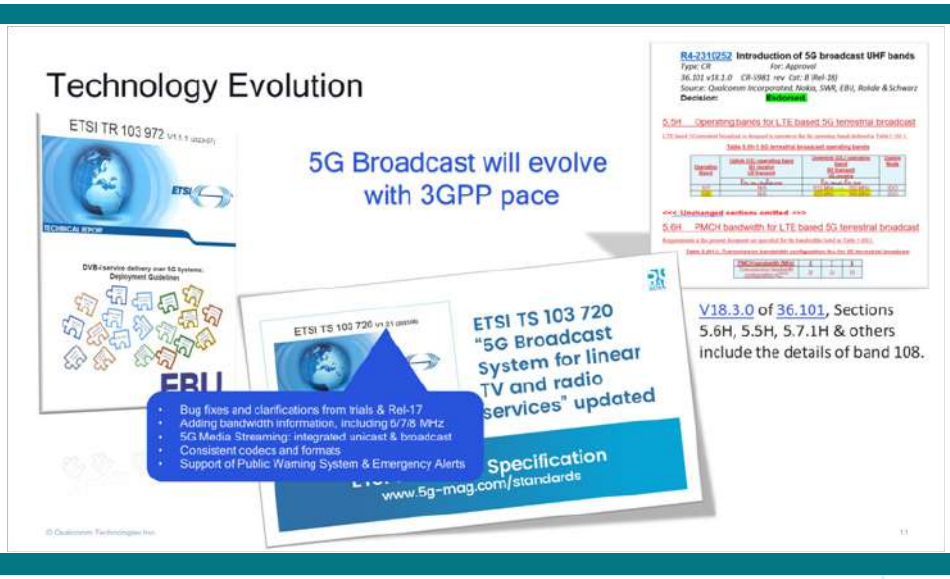
- The requests
  - Access to PB HPHT Infra in Delhi and Mumbai for 3 months each
  - Access to 566 - 582 MHz band (in coordination with WPC)
  - NOC to mobilize the necessary equipment for the trial
  - MIB support and participation for the trial
- Use cases planned for demonstration
  - DTT to Mobile (DTT2M)
  - DTT2M transition phase (enabled using CPE)
  - Emergency Warning alerts to mobile devices
  - Application to interactive education services
  - Broadcast - Unicast concurrent transmission
  - DVB-I delivery over 5GB
- Expected outcome
  - Trial summary report
  - Network planning and Business case proposal for DTT2M in India.

Delhi

Mumbai

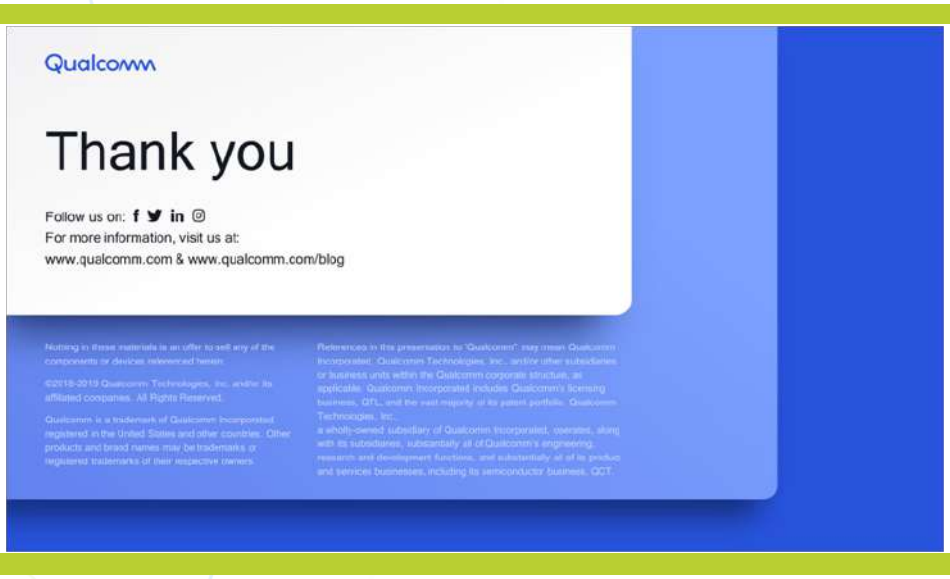
[1] Proposal to MIB submitted Dec 06, 2023
Proposal to PB submitted Jan 26, 2024



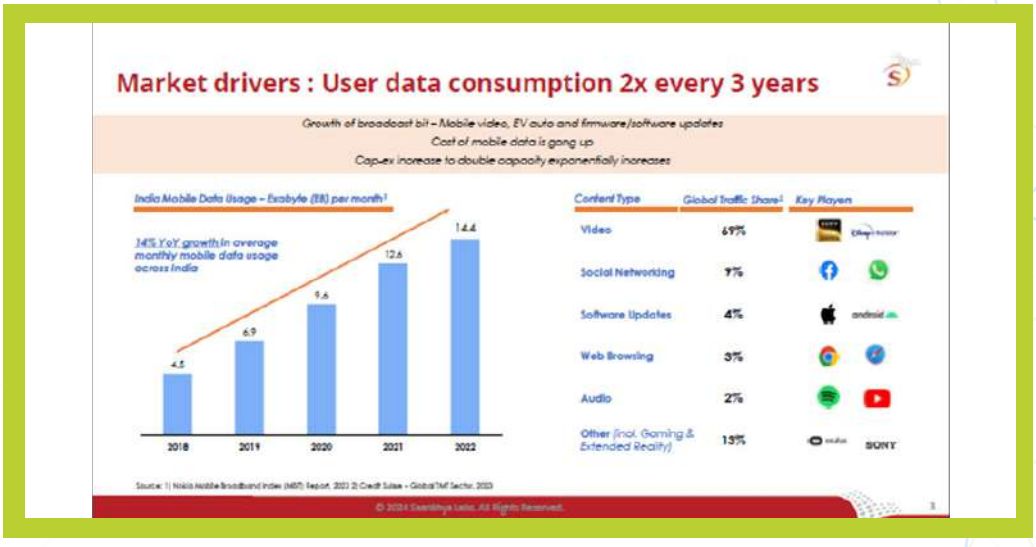


Key takeaways

- 5G Broadcast is based on the hardware reuse of cellular modems in mind.
- 5G Broadcast supports features needed for broadcasters (HPHT deployments, operation without SIM card, support of UHF spectrum, support of fixed reception).
- The 5G Broadcast system, apart from its ease of integration in handsets, inherits features of cellular systems such as support of multiple antennas, carrier aggregation, etc.
- Continuous innovation in 3GPP, including new band definitions for Introducing 6/7/8MHz channel bandwidth, and may be further enhanced if new use cases / requirements arise.
- Qualcomm is Innovating on this in India and working with ecosystem players in enabling true D2M offering by leveraging the strength and scale of Qualcomm's innovations and technology assets
  - Look forward to largescale trials - in association with Prasar Bharati / MIB, by Indian partners!

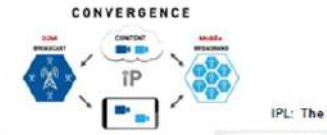

Qualcomm
Thank you
Follow us on:
For more information, visit us at:
www.qualcomm.com & www.qualcomm.com/blog

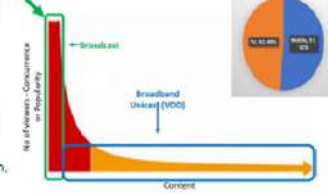
Mr. Prashant Maru, Vice President, Saankhya Labs



What is a Direct-to-Mobile (D2M) Broadcasting Service?

- D2M complements unicast broadband by offloading popular content to an independent broadcast distribution
- Point-to-multipoint (One-to-many) service that distributes content simultaneously to large number of users
- Live multimedia (e.g., TV, video, sports, music), static content, software, data and information
- Open-standard technology will be enabled in smartphones, TVs, hotspots and other devices
- ONE WAY, uses UHF spectrum in 470-582 MHz band
- Does not consume the data plan
- Spectrum congestion relief (unicast consumption is 20 GB/month, growing soon to 40 GB/Month)
- Significant end-to-end sustainability with smallest resources used (Spectrum, power, backhaul, transmission, etc.)





India Market Size

1.15B Mobile Handsets

PERSONALIZED. ANYTIME, ANYWHERE

210M TV Households

FAMILY. AT HOME

Large Opportunity in India : Unlimited video consumption

Content Access for 1.129B mobile phone users through ad backed FTA

- Convert **300M feature phones** to broadcast phone
- Access to unlimited curated Mobile Video Access
- User access to maps to these users through Broadcast and SMS

Opportunistic Video Offload on the lines of Wi-fi offload

- **Offload 25%** (5 GB in 2023) out of the average monthly usage of 19.5 GB (2023) data per subscriber
- High Viewership event offload
- OTT offload

Atmanirbhar Digital Public Infrastructure deep tech platform

- Open OTT Broadcast stack
- Remote Education
- Deliver **Public Interest Content of National Importance** directly on their devices (emergency alerts/disaster response/public service messaging

Local Semiconductor Industry in India

- New App processor
- Target to have low end smart phone with indigenous app processor

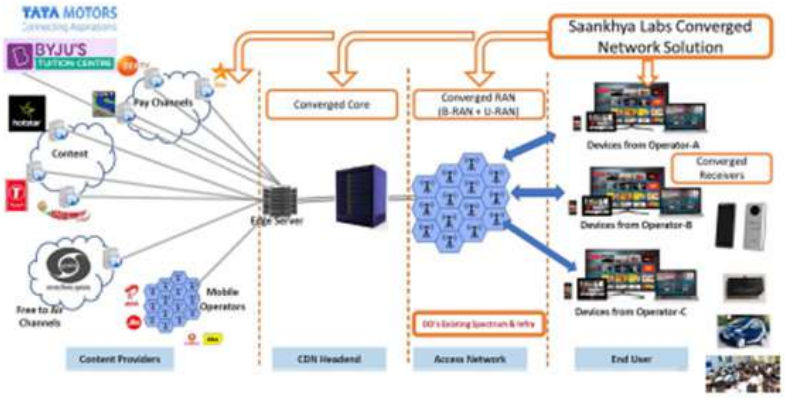
D2M Vision & Mission Statement

D2M as a Public-Private Service can enable direct broadcasting of video/data to mobile devices and other smart devices at affordable costs bridging the digital divide as envisioned by the honourable Prime Minister

- D2M can play the role of a Digital Public Good Infrastructure leveraging broadcast spectrum
- D2M as a DPGI can serve public and national interest
- D2M as a DPGI can be harnessed by both Broadcasters and Operators for new innovative services and applications independent of Big-Tech Platforms

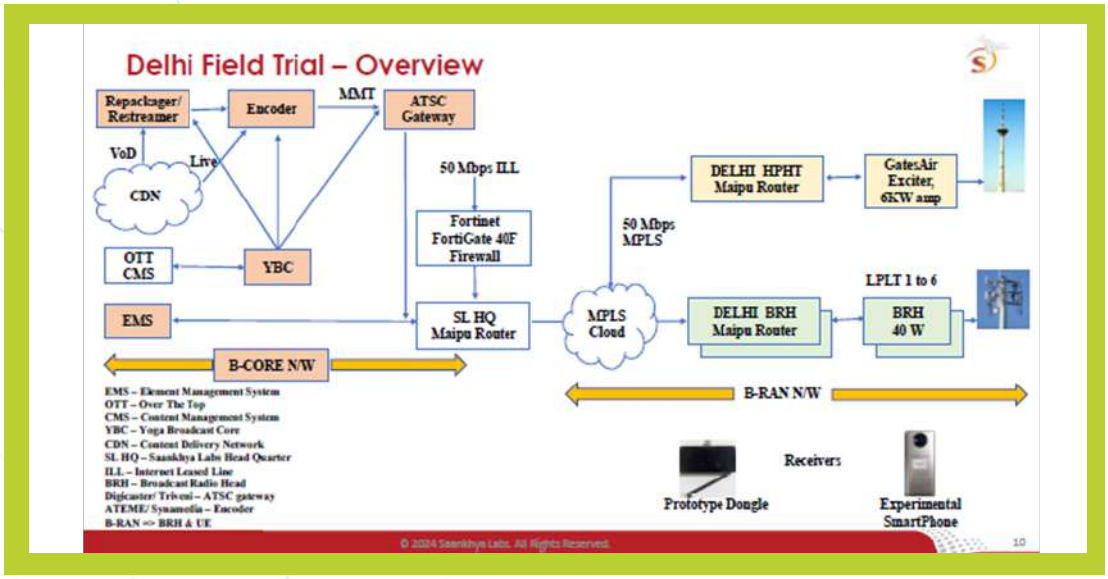
Technology Aspects

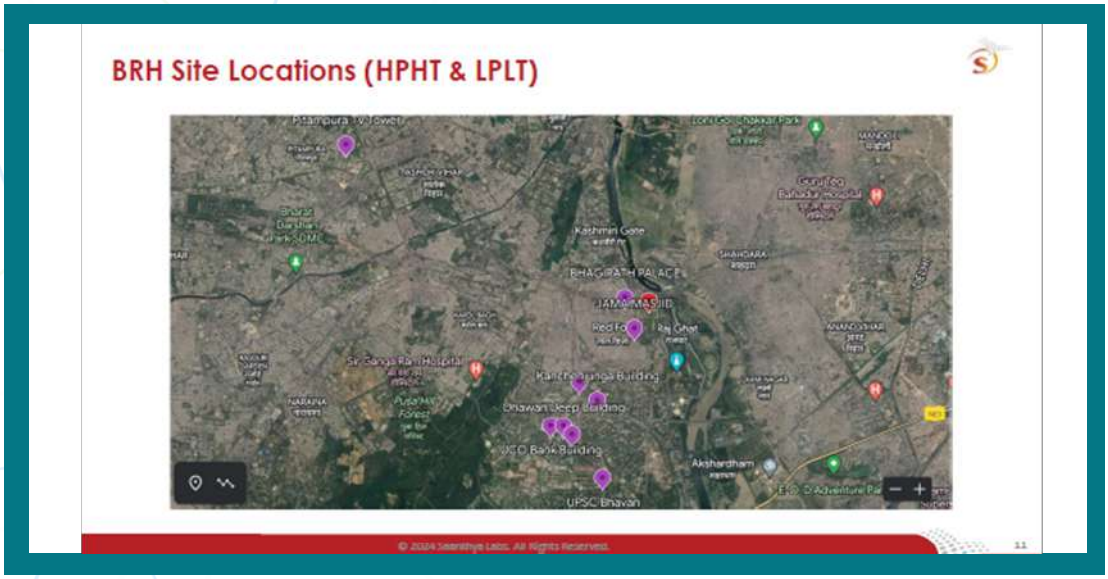
D2M Cloud based distribution platform : Target 100M users



PPP initiative with a B2B2C biz model

Vendor neutral Shared infrastructure


Delhi Field Trial – Overview
Repackager/ Restreamer
Encoder
MMT
ATSC Gateway
VoD
Live
CDN
50 Mbps ILL
Fortinet FortiGate 40F Firewall
DELHI HPHT Maipu Router
GatesAir Exciter, 6KW amp
50 Mbps MPLS
OTT CMS
YBC
LPLT 1 to 6
EMS
SL HQ Maipu Router
MPLS Cloud
DELHI BRH Maipu Router
BRH 40 W
B-CORE N/W
B-RAN N/W
EMS – Element Management System
OTT – Over The Top
CMS – Content Management System
YBC – Yoga Broadcast Core
CDN – Content Delivery Network
SL HQ – Saankhya Labs Head Quarter
ILL – Internet Leased Line
BRH – Broadcast Radio Head
Digicaster/ Triveni – ATSC gateway
ATEME/ Synamedia – Encoder
B-RAN => BRH & UE
Receivers
Prototype Dongle
Experimental SmartPhone
© 2024 Saankhya Labs. All Rights Reserved.
10


BRH Site Locations (HPHT & LPLT)
Kashmiri Gate
BHAGIRATH PALACE
JAMA MASJID
Red Fort
Raj Ghat
Sir Ganga Ram Hospital
Bhawan Deep Building
UCO Bank Building
Akshardham
UPSC Bhavan
© 2024 Saankhya Labs. All Rights Reserved.
11

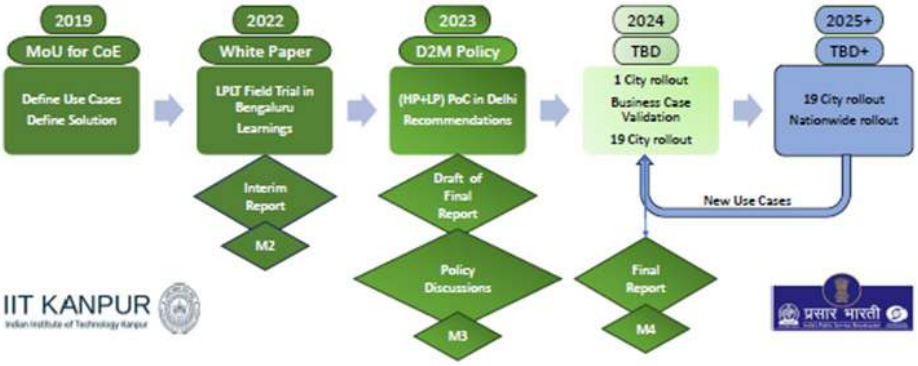

BRH Site Locations (only LPLT)
BHAGIRATH PALACE
JAMA MASJID
Raj Ghat
Shri Laxmi Narayan Temple (Birla Mandir)
Bhawan Deep Building
UCO Bank Building
South Central Ridge Forest
New Delhi
नई दिल्ली
Akshardham
UPSC Bhavan
© 2024 Saankhya Labs. All Rights Reserved.
12

D2M Smartphone Reception inside Delhi Metro

- https://www.youtube.com/watch?v=azZ7sJgWcxI

... skip to the scene from 0:30 seconds.

D2M Evolution in India



Use Cases

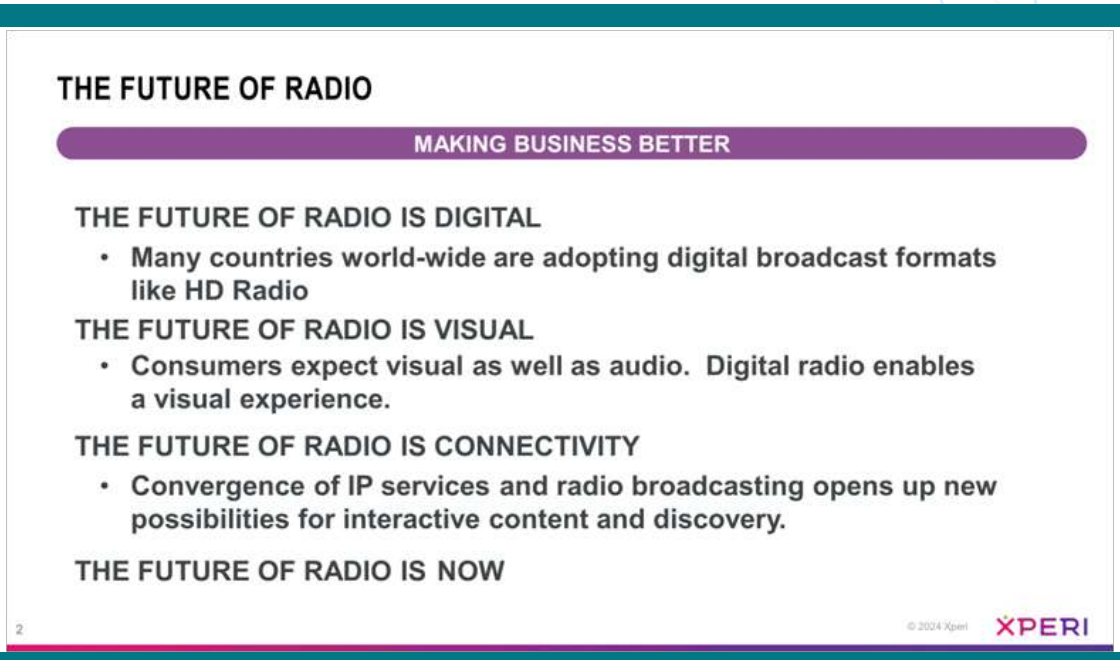
- Remote Education
- Public Content Broadcast
- Live & OTT Content Broadcast
- Mobile Network Operator Offload
- Emergency Alerts & Notifications
- Firmware / Software over the Air


Thank You
Saankhya Labs Pvt. Ltd.
Embassy Icon Floor 3, No. 3, Infantry Road
Bengaluru – 560001 Karnataka, India
Phone +91-80-6117 1000 Email info@saankhyalabs.com
www.saankhyalabs.com
@SaankhyaLabs
@SaankhyaLabs
@SaankhyaLabsUS
@SaankhyaLabs

DAY 2

SESSION 4 DIGITAL RADIO BROADCASTING- THE CHALLENGES AHEAD

Mr. Ashruf El-Dinary, Senior Vice President, Radio Technology Solutions



HD RADIO FEATURES

HD Radio

HD RADIO AUDIO PROGRAMMING IS 100% SUBSCRIPTION-FREE!

OFFERING UNIQUE FEATURES TO ENCHANCE THE LISTENING EXPERIENCE

Program Info	HD2/HD3/HD4	Digital Sound	Artist Experience	Emergency Alerts
Program Info displays information like station information, artist, song title and album name or advertiser slogan.	FM channels can offer up to 3 additional digital-only audio programs on multicast channels. Over 2,500 AM and FM stations broadcast with HD Radio technology across the U.S., and over 2,200 new, extra multicast channels are also now available.	Digital technology offers crystal clear, static-free sound with none of the clicks, hisses or pops associated with traditional analog radio. FM radio sounds like near-CD quality, and AM radio sounds like FM stereo.	Images related to the broadcast can be displayed on the radio display, including items such as album cover art and radio station or advertiser logos.	Public safety is enhanced with digital emergency alerting features including text alerts, wakeup feature, geo-coding, and images and maps.

 XPERI

COMPELLING & AFFORDABLE PRODUCT OFFERINGS

HD Radio

RADIO WILL THRIVE WITH ACCESSIBLE RECEIVER DESIGNS

 XPERI

VISUAL ADVERTISEMENTS

CREATING VALUE FOR RADIO STATIONS

 XPERI

HD RADIO MONETIZATION STRATEGIES

HD Radio

HD Radio – Creating value and opportunity for our Radio Partners.

14

XPERI

Core HD Radio Audio Services

VISUALLY ENHANCED ADVERTISING

Text Only Upsell: Radio stations are realizing a 10-15% premium for the inclusion of synchronized text with audio ads.

Text + Images: Radio stations are realizing a 25-30% premium for the inclusion of both synchronized text and images with audio ads.

XPERI

MONETIZING RADIO : VISUAL INCREASES LISTENING

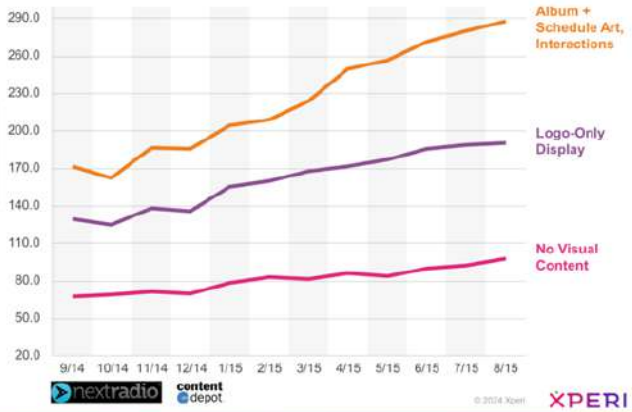
HD Radio

VISUALLY APPEALING STATIONS MEAN MORE LISTENING

Enhanced Content Means More Listening Per Listener

Minutes Listened Per Month

Stations garnered ***60%*** more listening vs. those with logo-only display and four times more listening than those without visual content!



16 August 2015

XPERI

TEXT ADVERTISING

- Special Alerts
- Station Branding
- Announcements
- Program Sponsors
- Advertising

XPERI

VISUAL ADVERTISING

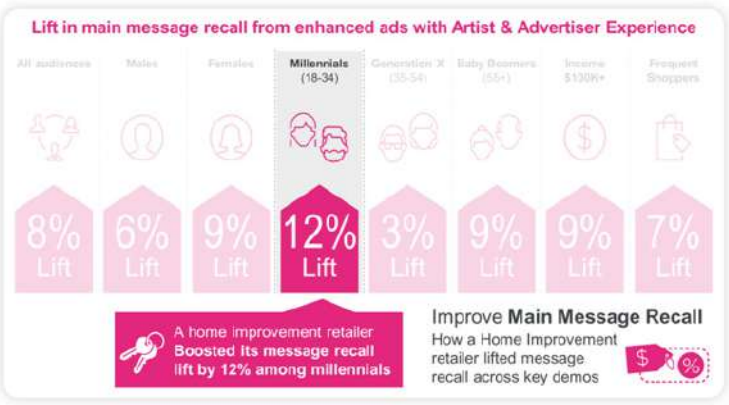
In Canada, United States and Mexico, Radio stations are already using visual image-based advertising

XPERI

VISUAL AD EXPERIENCE

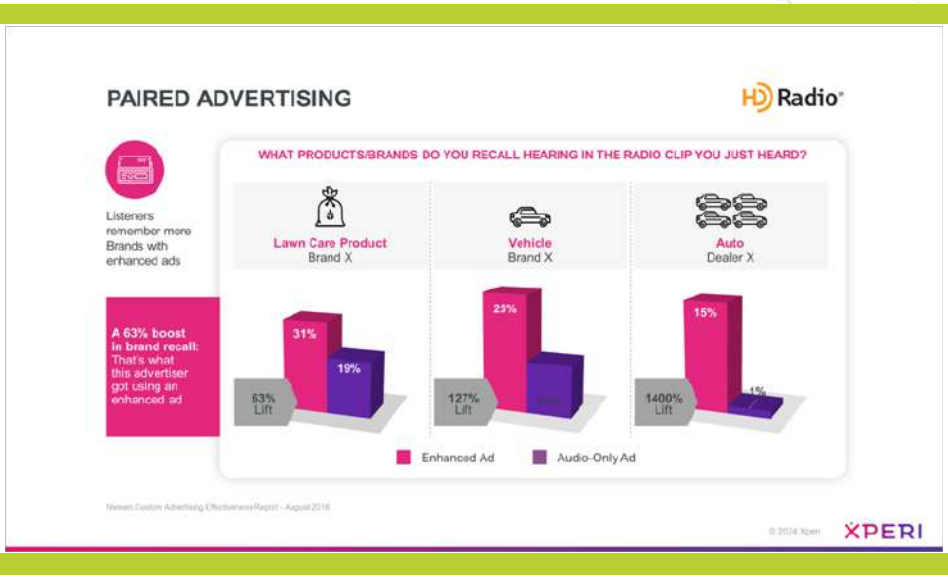
HD Radio

IN-VEHICLE DISPLAYS LIFT MESSAGE RECALL FOR ADS



19 Nielsen Custom Advertising Effectiveness Report - August 2016

XPERI


PAIRED ADVERTISING
HD Radio
WHAT PRODUCTS/BRANDS DO YOU RECALL HEARING IN THE RADIO CLIP YOU JUST HEARD?
Listeners remember more Brands with enhanced ads
A 63% boost in brand recall: That's what this advertiser got using an enhanced ad
Lawn Care Product
Brand X
Vehicle
Brand X
Auto
Dealer X
31%
19%
63% Lift
23%
127% Lift
15%
1400% Lift
Enhanced Ad
Audio-Only Ad
XPERI


Value of Visual Ads
A top 20 market Broadcaster activated Visual Ads. This station generates almost $200,000 in new annual revenue.
12:13 82°
92.5
Miercoles Ladies Night
Karaoke y Margarita Clasica $5
AM
FM
USB
Bluetooth
Settings
Browse
TUNE
Audio
XPERI


Value of Visual Ads
A top 20 market Broadcaster activated Visual Ads. This station generates almost $200,000 in new annual revenue.
12:13 82°
92.5
Miercoles Ladies Night
Karaoke y Margarita Clasica $5
AM
FM
USB
Bluetooth
Settings
Browse
TUNE
Audio
XPERI

DRIVING LISTENER ENGAGEMENT

Engagement Through the use of Scan Codes

Increases value of Visual Ad – Greater value campaigns with marketplace services

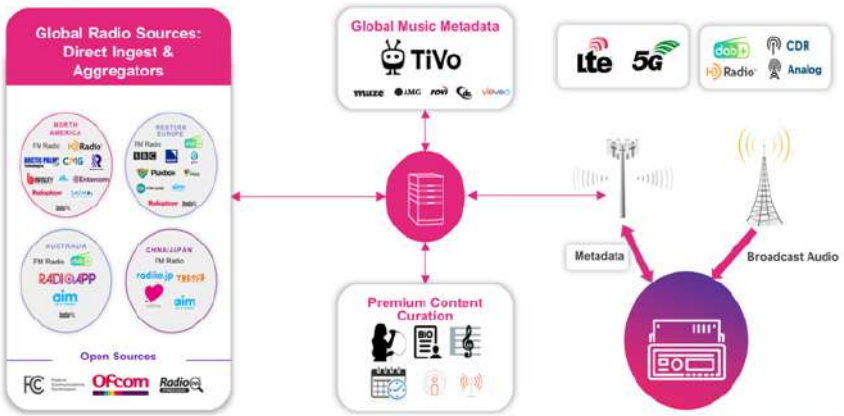
XPERI

CONNECTED RADIO

THE POWER OF BROADCAST & INTERNET

XPERI.

CONVERGENCE TECHNOLOGIES



XPERI.

DTS AUTOSTAGE: CONVERGENCE OF BROADCAST SOLUTIONS

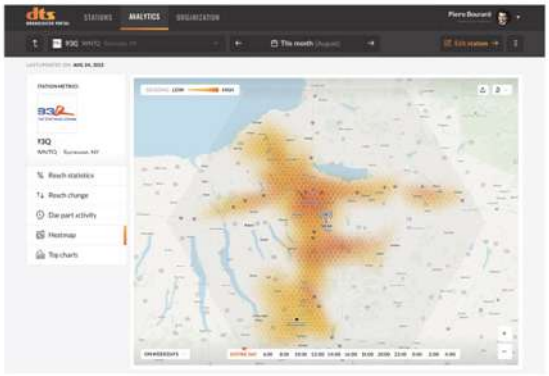
- Launched in 2020 - Coverage in 68 countries supporting over 70,000 radio stations – free to broadcasters
- Combines digital broadcasting and IP services – embedded radio solution
- Ensures rich, consistent metadata, advanced services/programming and broadcast content protection
- Delivers analytics and metrics to broadcasters at no cost
- Platform for innovation and monetization

 XPERI.

CONVERGENCE : AUDIENCE INSIGHTS

HD Radio

- Track audience patterns
- Location patterns
- Time of day patterns
- Duration patterns



LISTENER METRICS FURTHER INCREASES VALUE OF DIGITAL ADVERTISEMENTS

 XPERI.

SUMMARY

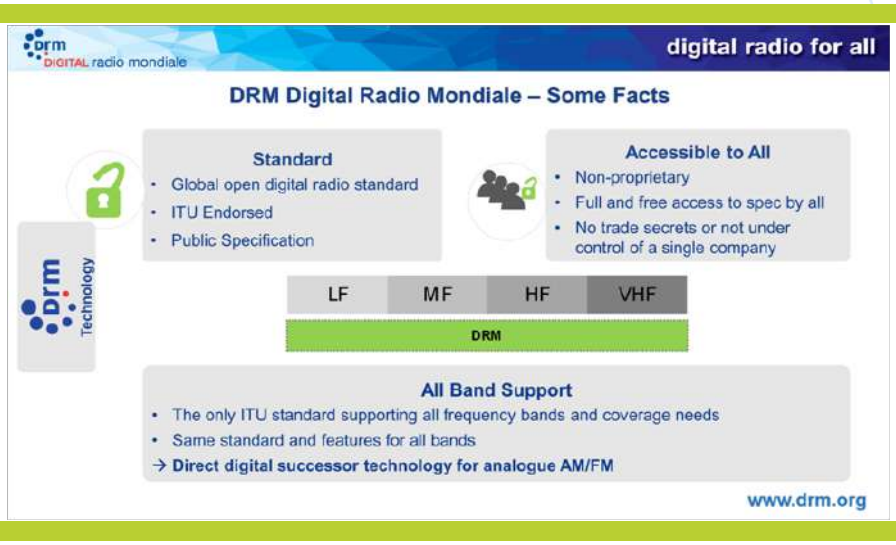
- The value of digital radio is well established across HD Radio markets
- Visual advertising has powerful impact on listener engagement
- Visual advertising increases station revenues
- Convergence of broadcast and IP creates new opportunities
- New receiver innovations

HD Radio and DTS AutoStage create innovations in radio advertising and revenue opportunities!!

 XPERI


Thank You!
Ashruf El-Dinary
ashruf.el-dinary@xperi.com
28
XPERI

Mr. Alexander Zink, Vice Chairman, DRM Consortium




drm DIGITAL radio mondiale
digital radio for all
Several of the DRM Consortium Members
BBC WORLD SERVICE GROUP
Panasonic
AMPEGON
Fraunhofer IIS
BOSCH
ENCOMPASS
RFmondial
nautel
RRI
NXP
DESAY SV
U.S. AGENCY FOR GLOBAL MEDIA
KINTRONIC LABS
OptM
Intelligence Optimized
Dolby
GOSPELL
SKYWORKS
Caribbean Broadcasting Union
CBU
cambridge consultants
CMLMicro
STARWAVES
inntot
RF2DIGITAL
The not-for-profit DRM Consortium
supports and promotes the DRM Standard and its take-up globally


drm DIGITAL radio mondiale
digital radio for all
DRM – Ingredients of Success
2. Adoption all over Asia-Pacific,
with India in the Lead
www.drm.org


drm DIGITAL radio mondiale
digital radio for all
DRM Global Update
Indonesia
India
China
Nepal
Pakistan
Australia / NZ
www.drm.org

drm DIGITAL radio mondiale

digital radio for all

New Zealand

In September 2022, Ampegon Power Electronics AG and RNZ signed a contract to supply a new TSW2100-V4 100 kW shortwave transmitter to New Zealand. The transmitter will broadcast the RNZ Pacific service to millions of people living across the Pacific with high reliability and energy efficiency.

The TSW-2100 transmitters is capable of both traditional analogue broadcasts and DRM digital broadcasting. It is designed to provide DSB and AMC analogue modes to significantly reduce power consumption and when broadcasting DRM, energy usage is reduced by up to 40% without compromising broadcast range. Additionally, DRM provides FM quality stereo

https://ampegon.com/shortwave-transmitter-contract-with-rnz/

Ampegon
1,311 followers
1d • Edited •

Great to have so many DRM Digital Radio 100kW shortwave transmitters moving through the factory - the next one is for Radio New Zealand! After some delays waiting for parts, final build is almost complete. In the image below, you can see the PSM transformers providing energy to the PSM power supply. #shortwave #digitalfuture #pacific #broadcasting

www.drm.org

drm DIGITAL radio mondiale

digital radio for all

DRM Global Update

Indonesia

India

China

Nepal

Pakistan

Australia / NZ

www.drm.org

drm DIGITAL radio mondiale

digital radio for all

DRM Global Update

Nepal

www.drm.org

drm DIGITAL radio mondiale — digital radio for all

Nepal


DRM Radio


During setting DRM in FM Engine Card


AM Antenna


DRM Engine card

By Er. Krishna Chandra Paudel, M.Sc. in ISE Radio Napal

www.drm.org

drm DIGITAL radio mondiale — digital radio for all

DRM Global Update

Indonesia
India
China
Nepal
Pakistan
Australia / NZ

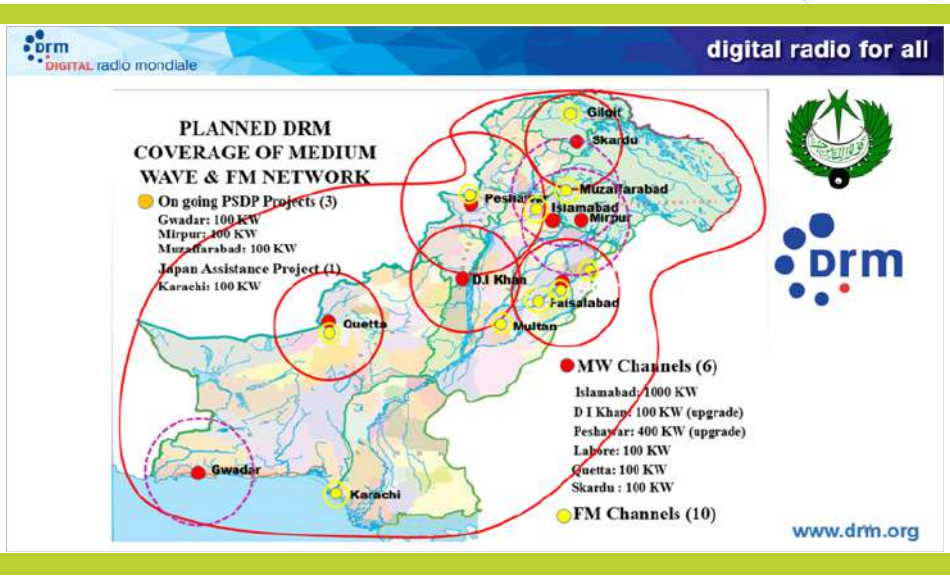
www.drm.org

drm DIGITAL radio mondiale — digital radio for all

DRM Global Update

Pakistan

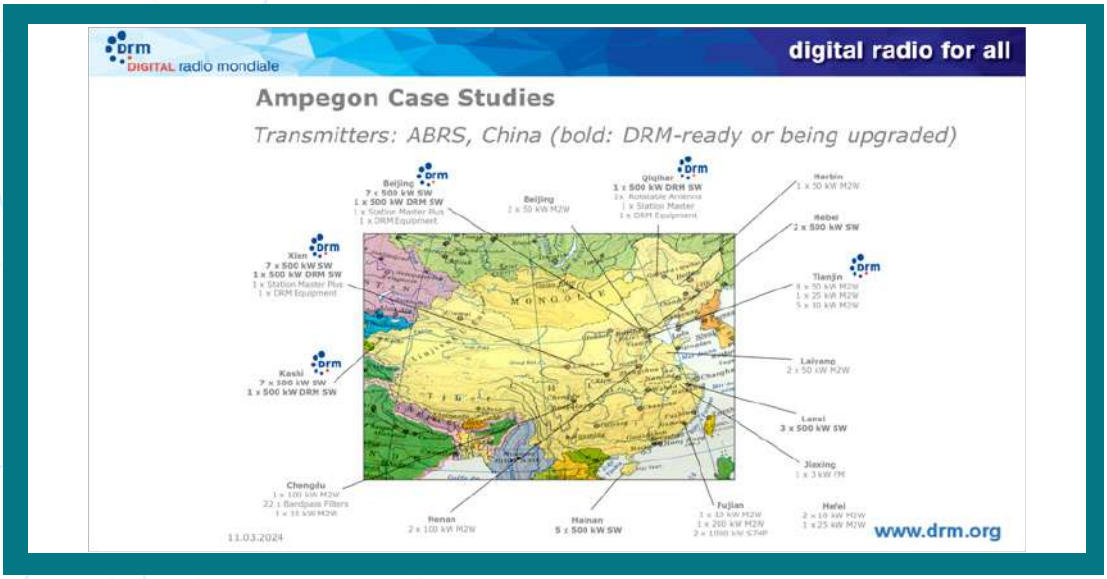
www.drm.org


drm
DIGITAL radio mondiale
digital radio for all
PLANNED DRM
COVERAGE OF MEDIUM
WAVE & FM NETWORK
On going PSDP Projects (3)
Gwadar: 100 KW
Mirpur: 100 KW
Muzaffarabad: 100 KW
Japan Assistance Project (1)
Karachi: 100 KW
Gilgit
Skardu
Muzaffarabad
Islamabad
Mirpur
D.I Khan
Faisalabad
Multan
Quetta
Gwadar
Karachi
MW Channels (6)
Islamabad: 1000 KW
D I Khan: 100 KW (upgrade)
Peshawar: 400 KW (upgrade)
Lahore: 100 KW
Quetta: 100 KW
Skardu : 100 KW
FM Channels (10)
www.drm.org


digital radio for all
Pakistan
drm
Minister of Information and Broadcasting commits to DRM Roll-out as a priority (Sep 2023)
Pakistan Broadcasting Corporation (PBC) has approved DRM as the radio standard for use in all frequency bands (AM and FM) already in January 2020.
Approval was given by the Ministry for the acquisition of a 1000 KW DRM medium wave transmitter in June 2023 and funds available to start project.
The broadcaster acquired a 5kW DRM FM transmitter to be installed in Lahore.
Another 5kW DRM FM transmitter is planned for Islamabad.
drm


drm
DIGITAL radio mondiale
digital radio for all
DRM Global Update
Indonesia
India
China
Nepal
Pakistan
Australia / NZ
www.drm.org


drm DIGITAL radio mondiale
digital radio for all
DRM Global Update
China
www.drm.org


drm DIGITAL radio mondiale
digital radio for all
Ampegon Case Studies
Transmitters: ABRS, China (bold: DRM-ready or being upgraded)
Beijing
7 x 500 kW SW
1 x 500 kW DRM SW
Beijing
2 x 50 kW M2W
Qiqihar
1 x 500 kW DRM SW
Harbin
1 x 50 kW M2W
Hebei
2 x 500 kW SW
Xian
7 x 500 kW SW
1 x 500 kW DRM SW
Tianjin
Kashi
7 x 500 kW SW
1 x 500 kW DRM SW
Lanxi
3 x 500 kW SW
Jiaxing
Chengdu
Henan
2 x 100 kW M2W
Hainan
5 x 500 kW SW
Fujian
Hefei
11.03.2024
www.drm.org

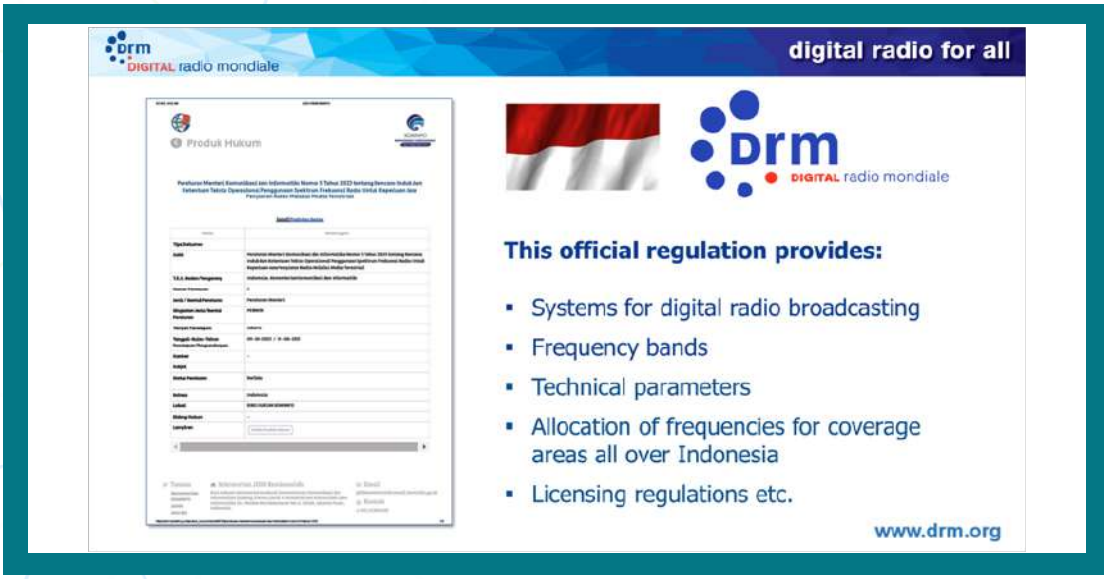

drm DIGITAL radio mondiale
digital radio for all
国家广播电视总局
国家广播电视总局 工业和信息化部 国家市场监督管理总局
关于进一步加强车载音视频管理的通知
http://www.nrta.gov.cn/art/2023/9/14/art_113_66535.html
drm DIGITAL radio mondiale
China Endorses DRM
for Domestic AM Band Transmissions
In August 2023, the government organizations
NRTA, MIIT & SAMR officially published
a joint notice, actively guiding the
Chinese automotive industry
to support DRM in AM band, and encouraging
Province transmission stations
to broadcast domestic DRM services
www.drm.org

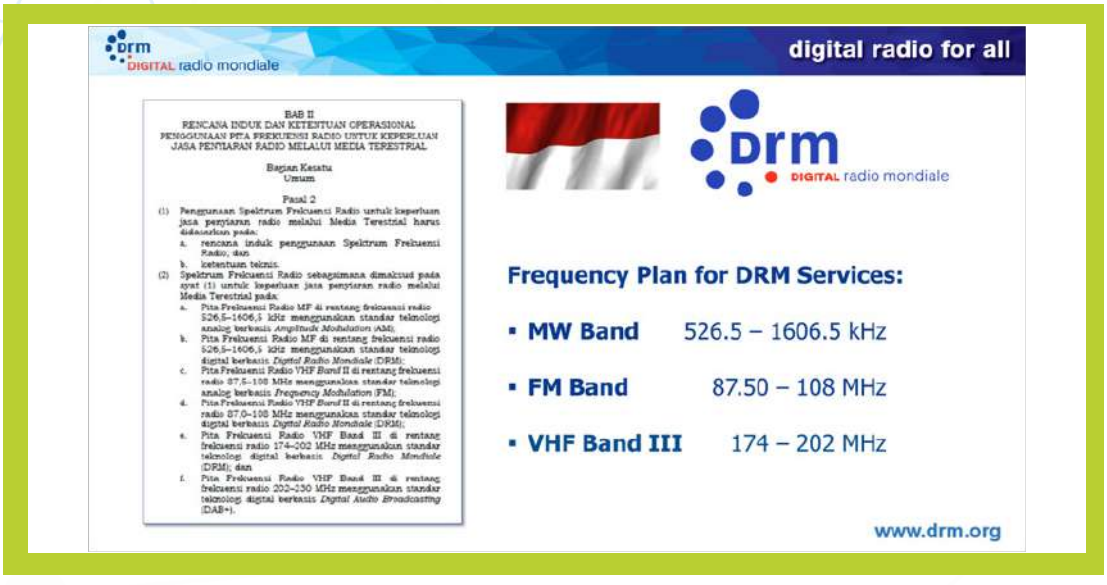

drm DIGITAL radio mondiale
digital radio for all
DRM Global Update
Indonesia
India
China
Nepal
Pakistan
Australia / NZ
www.drm.org


drm DIGITAL radio mondiale
digital radio for all
DRM Global Update
Indonesia
www.drm.org


drm DIGITAL radio mondiale
digital radio for all
drm DIGITAL radio mondiale
Indonesia Republik has promulgated
DRM as the standard
for Digital Radio Broadcasting
in MW and FM bands, and in VHF Band III
(August 2023)

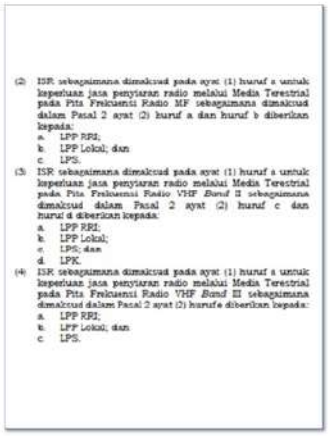

drm DIGITAL radio mondiale
digital radio for all
Produk Hukum
drm DIGITAL radio mondiale
This was pronounced vide
Menteri Komunikasi dan Informatika
Promulgation Nomor 5 Tahun 2023
Dated 9 and 24 August 2023
www.drm.org


drm DIGITAL radio mondiale
digital radio for all
Produk Hukum
drm DIGITAL radio mondiale
This official regulation provides:
Systems for digital radio broadcasting
Frequency bands
Technical parameters
Allocation of frequencies for coverage areas all over Indonesia
Licensing regulations etc.
www.drm.org


drm DIGITAL radio mondiale
digital radio for all
BAB II
RENCANA INDUK DAN KETENTUAN OPERASIONAL
PENGGUNAAN PITA FREKUENSI RADIO UNTUK KEPERLUAN
JASA PENYIARAN RADIO MELALUI MEDIA TERESTRIAL
Bagian Kesatu
Umum
Pasal 2
drm DIGITAL radio mondiale
Frequency Plan for DRM Services:
MW Band 526.5 – 1606.5 kHz
FM Band 87.50 – 108 MHz
VHF Band III 174 – 202 MHz
www.drm.org

drm DIGITAL radio mondiale

digital radio for all



(2) ISR sebagaimana dimaksud pada ayat (1) huruf a untuk kepentingan jasa penyiaran radio melalui Media Terestrial pada Pita Frekuensi Radio MF sebagaimana dimaksud dalam Pasal 2 ayat (2) huruf a dan huruf b diberikan kepada:
a. LPP RRI;
b. LPP Lokal; dan
c. LPS.

(3) ISR sebagaimana dimaksud pada ayat (1) huruf a untuk kepentingan jasa penyiaran radio melalui Media Terestrial pada Pita Frekuensi Radio VHF *Band* II sebagaimana dimaksud dalam Pasal 2 ayat (2) huruf c dan huruf d diberikan kepada:
a. LPP RRI;
b. LPP Lokal;
c. LPS; dan
d. LPK.

(4) ISR sebagaimana dimaksud pada ayat (1) huruf a untuk kepentingan jasa penyiaran radio melalui Media Terestrial pada Pita Frekuensi Radio VHF *Band* III sebagaimana dimaksud dalam Pasal 2 ayat (2) huruf e diberikan kepada:
a. LPP RRI;
b. LPP Lokal; dan
c. LPS.

drm DIGITAL radio mondiale

Applicable to types of broadcasters:

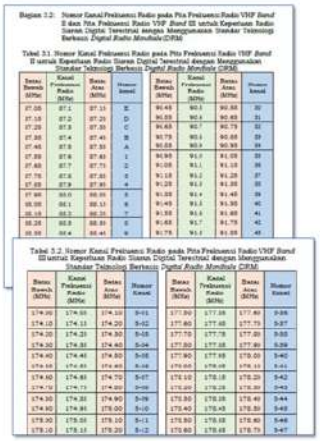
	MW Band	FM Band	VHF Band-III
RRI	✓	✓	✓
LPP	✓	✓	✓
LPS	✓	✓	✓
LPK		✓	

RRI: Local/National Public Radio – Radio Republik Indonesia
LPP: Local Public Radio
LPS: Commercial Radio
LPK: Community Radio

www.drm.org

drm DIGITAL radio mondiale

digital radio for all



drm DIGITAL radio mondiale

Frequency Channelisation:

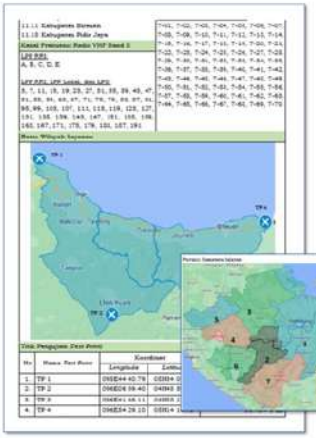
As an example

- **FM band**
  100 kHz channels earmarked
  (compatible to ongoing analogue FM channels)
- **VHF III**
  100 kHz channels earmarked

www.drm.org

drm DIGITAL radio mondiale

digital radio for all



drm DIGITAL radio mondiale

DRM Transmission Coverage:

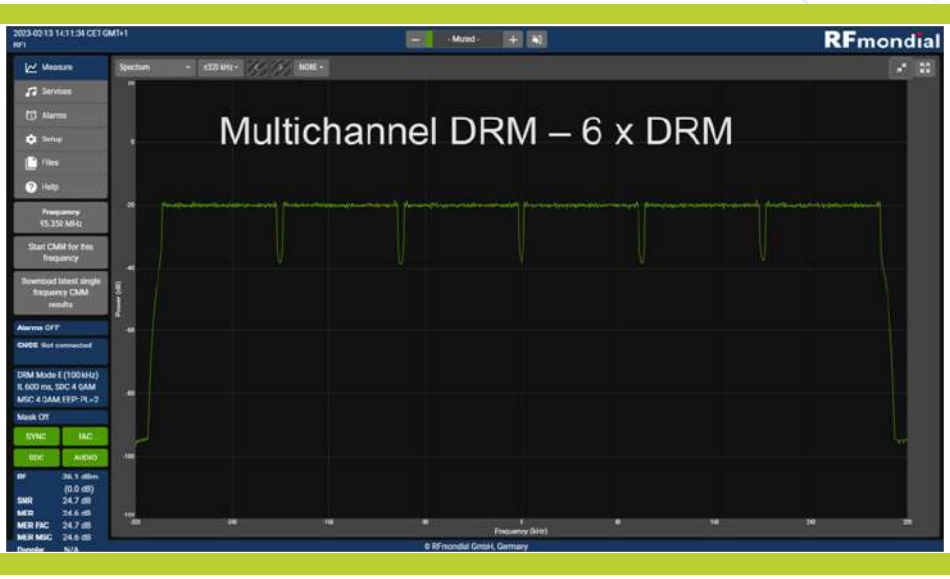
Detailed coverage maps provided using technical parameters and protection ratios

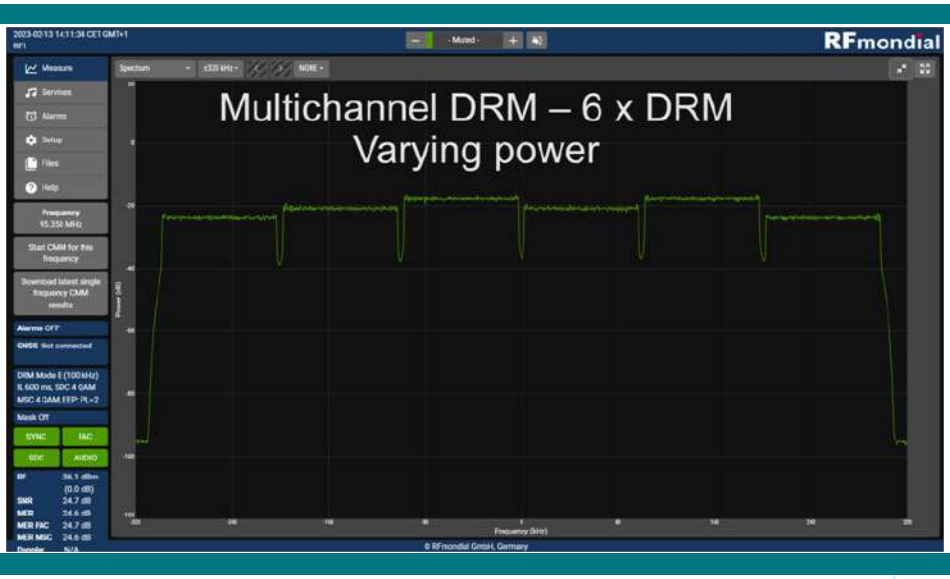
www.drm.org


drm DIGITAL radio mondiale
digital radio for all
DRM in Indonesia – On-Air Today
drm DIGITAL radio mondiale
Brunei Darussalam
Malaysia
Singapura
Indonesia
Jakarta
Bandung
Surabaya
Timor Leste
TX Painan DRM 98,05 FM
TX Labuan Banten DRM 88,95 FM
TX Pelabuhan Ratu DRM 98,35 FM
TX Cilacap DRM 89,35 FM
TX Labuan Bajo on DRM 91,05 FM
Kepulauan Cocos


drm DIGITAL radio mondiale
digital radio for all
drm DIGITAL radio mondiale
DRM – Ingredients of Success
3. Technical Innovation
that caters to India's Needs
www.drm.org


drm DIGITAL radio mondiale
digital radio for all
DRM Technology Update:
Multichannel-DRM
Sharing a single FM-band transmitter
to broadcast multiple, independent DRM signals
www.drm.org

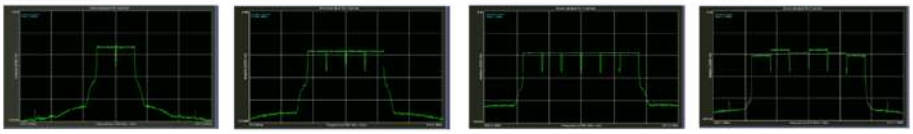




drm DIGITAL radio mondiale

digital radio for all

Pure Digital – Multichannel-DRM configuration



Test case	Transmitter Center (MHz)	Transmitter Power (W)	Signal Configuration and Receiver Tuning Frequency (MHz)
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

drm DIGITAL radio mondiale — digital radio for all

Benefits of Multichannel-DRM Transmissions

- Every **Broadcaster in full control** of their own DRM config (MDI)
- Spectrum **efficiency**
- Very easy installation and infrastructure (**no combiners** etc.)
  → **DRM Digital Combining**
- Enables **more broadcasts from one tower** without near-far problems
- 2x DRM each @100W -> 200W Tx
  - Doubling the DRM Power is adding as noise +3dB (FM would need 400W Tx)
- Power level of each DRM signal can easily be adapted to the target coverage area
- Option for **individual SFNs**
- **Compatible with all DRM receivers**

→ **Multichannel-DRM Live Modulator product available**

RFmondial

www.drm.org

drm DIGITAL radio mondiale — digital radio for all

drm DIGITAL radio mondiale

DRM – Ingredients of Success

4. New Revenue Opportunities

www.drm.org

drm DIGITAL radio mondiale — digital radio for all

DRM FM – Much more than existing analogue FM

Exemplary DRM FM application
on Car dashboard or on mobile phone

Up to 3 audio services from a single DRM FM transmission

Station logo and service description

DRM TextMessages
- Scrolling text
- Max. 128 characters; Max every 20 sec.

Journaline
- Text based information service
- Supports interactivity

SlideShow
- Images and animation

drm DIGITAL radio mondiale — digital radio for all

DRM Digital Radio – New Revenue Opportunities

- **Widening the target audiences** (additional stations, pop-up stations)
  → addressing **new markets**
- Enhanced Radio Experience
  → winning **more listeners**
- Linking audio ads with detailed Journaline content & sponsored ads
  → adding **new revenue types**
- Journaline interactivity:
  polls, phone participation, coupon codes, webpage links, etc.
  → **listener interaction + listenership monitoring**

www.drm.org

drm DIGITAL radio mondiale — digital radio for all

DRM Digital Radio – New Revenue Opportunities

- **Widening the target audiences** (additional stations, pop-up stations)
  → addressing **new markets**
- Enhanced Radio Experience
  → winning **more listeners**
- Linking audio ads with detailed Journaline content & sponsored ads
  → adding **new revenue types**
- Journaline interactivity:
  polls, phone participation, coupon codes, webpage links, etc.
  → **listener interaction + listenership monitoring**

www.drm.org

drm DIGITAL radio mondiale — digital radio for all

DRM Digital Radio – Widening the Audience

drm

Broadcasters can offer up to 3 audio services from a single DRM FM transmission (96 kHz)

Most efficient use of broadcast capacity thanks to **xHE-AAC audio codec**
→ latest generation of AAC codec family

- Wider audience reach
- Niche programs / audience
- Pop-up stations (for events/ festivals)
- Multilingual programs

Audio Service 1
- Bollywood/Contemporary
- Demographics: Adults 18-50

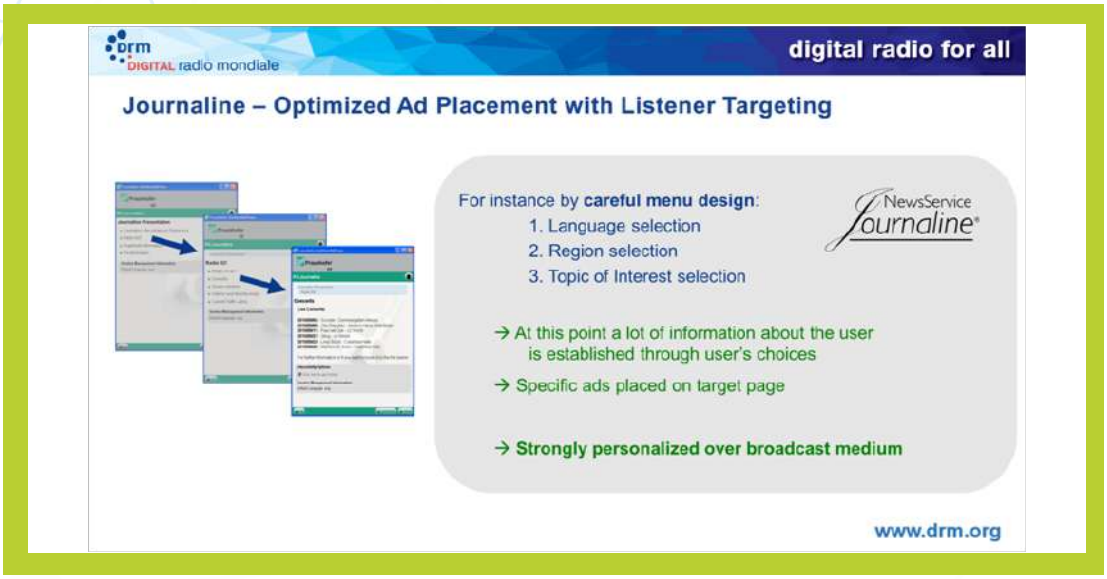
Audio Service 2
- Classic music
- Demographics: Adults 50+

Audio Service 3
- Talk & Infotainment
- Demographics: Adults 25-40

www.drm.org


drm DIGITAL radio mondiale
digital radio for all
DRM Digital Radio – Enhances the Radio Experience
Eclipse Hits
Pop Music, in Hindi, India (DRM FM)
Kesariya – Bramhastra, Music - Pritam; Singer - Arijit Singh
NewsService Journaline
Station Logo/Label: Station branding; Visual info
Service Description: Programme type, language etc.
TextMessage: Current song title & artist info; multilingual
SlideShow: Current song cover; Live RJ/Studio pic
Journaline: infos; interactivity; multilingual; ADs
www.drm.org


drm DIGITAL radio mondiale
digital radio for all
DRM Digital Radio – New Revenue Source through Journaline
Eclipse Club
Live Jazz at Sky bar & restaurant, Chanakyapura, New Delhi
FashionHub
Journaline interactive text service
NewsService Journaline
Text based information service
Can deliver local, sponsored, promotional ads etc.
Can deliver enhanced ads with images
Re-use of existing data sources for broadcasters (RSS, XML), Internationally applicable (Unicode/UTF-8)
Extensible hinting information
back channel: web, e-mail, phone,...
geo-tagging: local content, get me there
speech hinting for in-car use, etc.
Enables listener targeting & interactivity
www.drm.org


drm DIGITAL radio mondiale
digital radio for all
Journaline – Optimized Ad Placement with Listener Targeting
For instance by careful menu design:
1. Language selection
2. Region selection
3. Topic of Interest selection
NewsService Journaline
→ At this point a lot of information about the user is established through user's choices
→ Specific ads placed on target page
→ Strongly personalized over broadcast medium
www.drm.org

drm DIGITAL radio mondiale — digital radio for all

Journaline – Listener Interactivity

‚Connected Devices' – Enhanced opportunities

- Any number of "**Hot Button**" triggers per Journaline page
- Enables simple user interactivity e.g. with radio station or advertisement partners
- Default interactivity targets:
  - **Web pages (Internet URLs)** e.g. to order current or recent songs
  - **Telephone number** e.g. to participate in talk shows; place votes
  - **SMS** (target phone number + content)
  - **E-mail** (target address + content)
  - **Links to other Journaline pages** e.g. jump from ticker news to full story
  - **DRM services** (audio, EPG, etc.)

NewsService Journaline®

www.drm.org

drm DIGITAL radio mondiale — digital radio for all

drm DIGITAL radio mondiale

DRM – Ingredients of Success

**5. Broadcast Innovation –
India is Embracing DRM Digital Radio**

www.drm.org

drm DIGITAL radio mondiale — digital radio for all

drm DIGITAL radio mondiale

DRM – Ingredients of Success

**5. Broadcast Innovation –
India is Embracing DRM Digital Radio**

www.drm.org

drm DIGITAL radio mondiale — digital radio for all

DRM EWF – Emergency Warning Functionality

EWF Emergency Warning Functionality

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

"Digital Radio Mondiale (DRM) natively supports emergency alert signalling (... EWF). DRM receivers are triggered to re-tune automatically to an emergency transmission (including optional auto-switch-on) while flashing the screen and increasing the audio volume."

ITU-R Study Group 6 chair Yukihiro Nishida - Advantages of radio broadcasting in emergency and disaster situations

www.drm.org

drm DIGITAL radio mondiale — digital radio for all

DRM Exclusive Content via DRM

All India Radio is investing in **content exclusively available on Digital Radio**

- **News 24/7**
- **Cricket Commentary**
- **Journaline text news**

www.drm.org

drm DIGITAL radio mondiale — digital radio for all

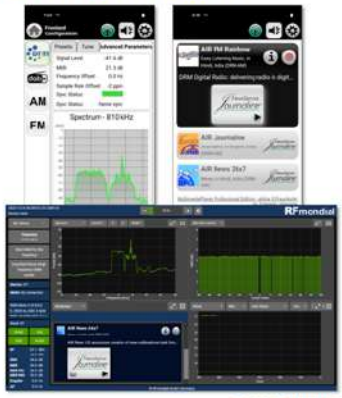
DRM MW Coverage Improvements in Delhi

In December 2023, DRM coverage from Nangli could be significantly improved with upgraded DRM Settings / Modulator

→ **Indoor-coverage** proven across offices in Delhi and Noida through increased signal strength

→ Elimination of analogue AM distortion

→ **Template for nationwide optimizations**



www.drm.org

drm DIGITAL radio mondiale — digital radio for all

Summary

drm DIGITAL radio mondiale

DRM Digital Radio Provides all the Ingredients of Success:

- **DRM Know-How Centered in India** – no closed-source components
- Countries in the **Asia-Pacific** region **embrace the DRM digital radio standard** in a big way
- **DRM Multichannel Single-Tx** for maximum cost-efficiency
- New **DRM Revenue Opportunities** with more services and Journaline

→ **India is Embracing DRM Digital Radio's Potential for Innovation**

www.drm.org

drm DIGITAL radio mondiale — digital radio for all

DRM Smart Radio Benefitting All Listeners

drm DIGITAL radio mondiale

To access information on specific DRM subjects type in your browser:
pocket.drm.org

Watch the DRM Corporate Videos:
videos.drm.org

YouTube

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

www.drm.org

drm DIGITAL radio mondiale — digital radio for all

DRM Smart Radio Benefitting All Listeners

Subscribe for free monthly updates:
newsletter.drm.org

Dedicated India page
india.drm.org

For any inquiries or comments:
projectoffice@drm.org

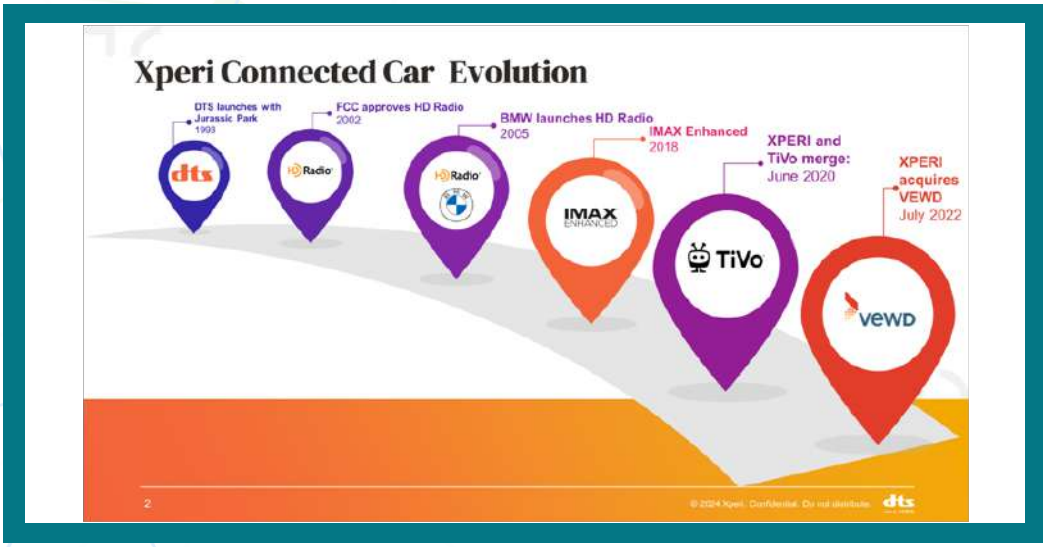
Follow: @drmdigitalradio

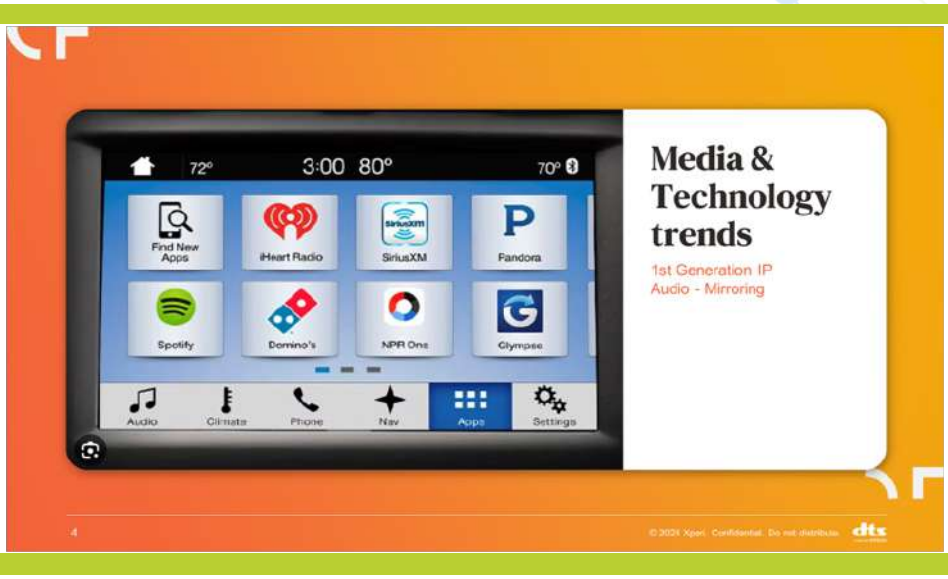
Follow: @drmdigitalradio

YouTube SUBSCRIBE youtube.drm.org

www.drm.org

Mr. Akshay Raju, Senior Staff Engineer, HD Radio: The Future of Car Broadcast Radio




72°
3:00
80°
70°
Find New Apps
iHeart Radio
SiriusXM
Fandora
Spotify
Domino's
NPR One
Glympse
Audio
Climate
Phone
Nav
Apps
Settings
Media & Technology trends
1st Generation IP Audio - Mirroring
4
dts


Media & Technology trends
2nd Generation IP Audio - Mirroring
5
DTS AutoStage
dts

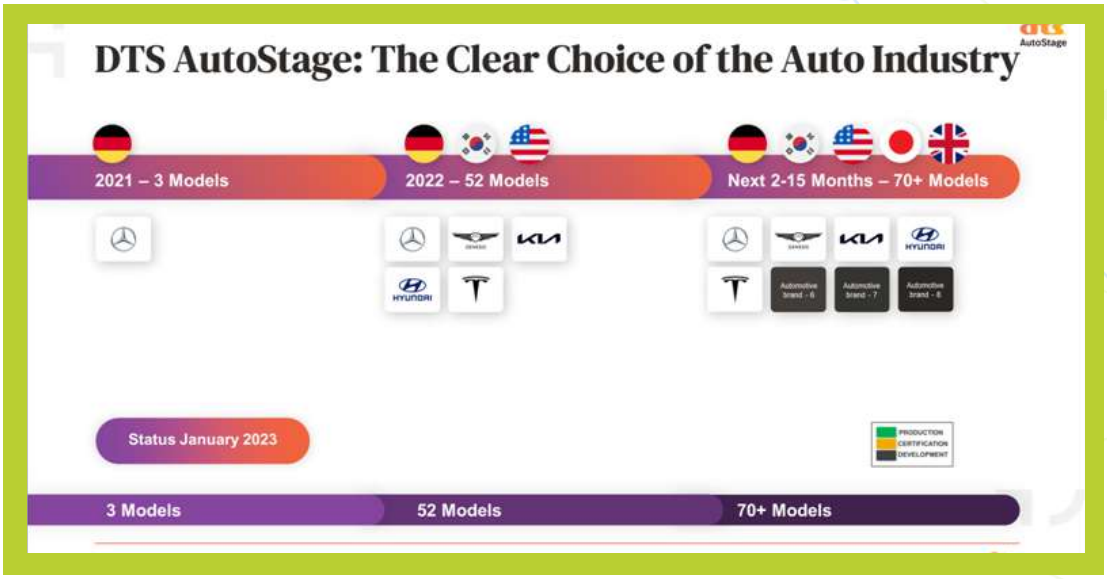

Media & Technology trends
IP Video Services - Tesla
WITCHER
6
DTS AutoStage
dts

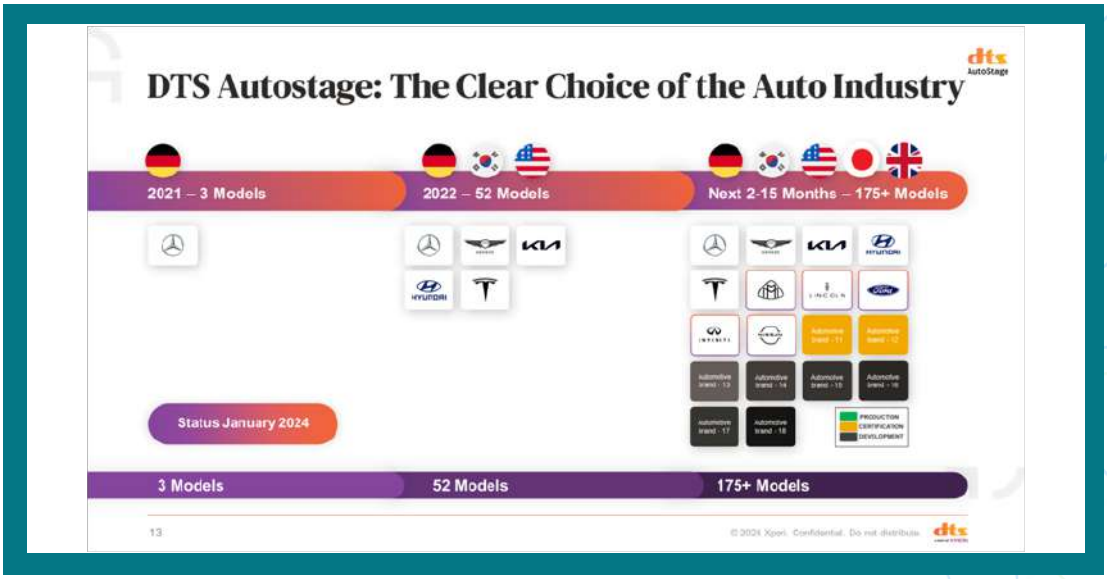
DTS AutoStage Connected Radio

DTS AutoStage Video Service Powered by TiVo™

IP Video Services - BMW

DTS AutoStage Gaming


DTS AutoStage: The Clear Choice of the Auto Industry
dts AutoStage
2021 – 3 Models
2022 – 52 Models
Next 2-15 Months – 70+ Models
Status January 2023
PRODUCTION
CERTIFICATION
DEVELOPMENT
3 Models
52 Models
70+ Models


DTS Autostage: The Clear Choice of the Auto Industry
dts AutoStage
2021 – 3 Models
2022 – 52 Models
Next 2-15 Months – 175+ Models
Status January 2024
PRODUCTION
CERTIFICATION
DEVELOPMENT
3 Models
52 Models
175+ Models
13
© 2024 Xperi. Confidential. Do not distribute.

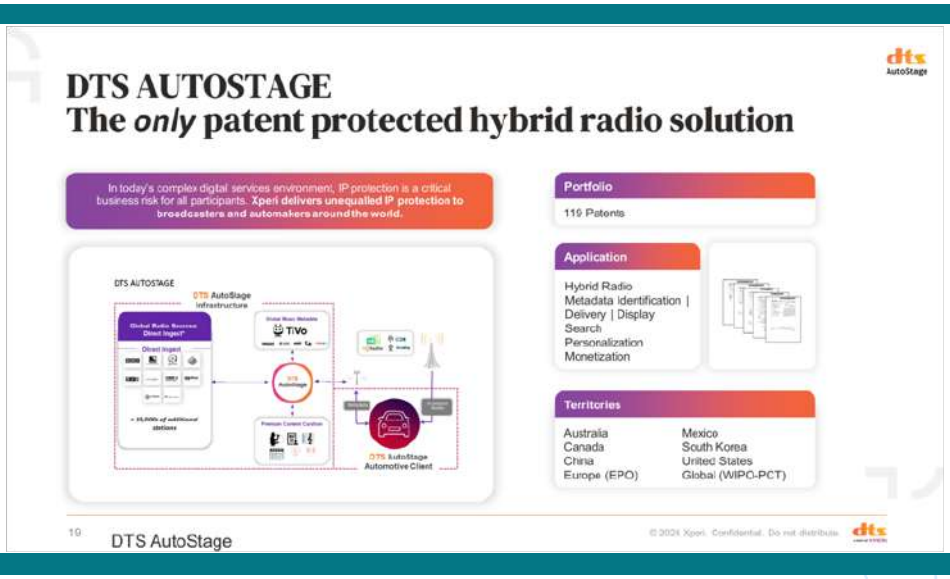

This is the Future of in car Broadcast Radio
Available Today | TESLA
dts AutoStage
heart
14
© 2024 Xperi. Confidential. Do not distribute.


This is the Future of in car Broadcast Radio
Available Today | Hyundai – Kia – Genesis
dts AutoStage
GENESIS
KIA
HYUNDAI
16
© 2024 Xperi. Confidential. Do not distribute.
dts


This is the Future of in car Broadcast Radio
Available Today | FORD MOTOR COMPANY
dts AutoStage
Ford
LINCOLN
16
© 2024 Xperi. Confidential. Do not distribute.
dts


This is the Future of in car Broadcast Radio
Available Today | NISSAN
dts AutoStage
NISSAN
17
© 2024 Xperi. Confidential. Do not distribute.
dts

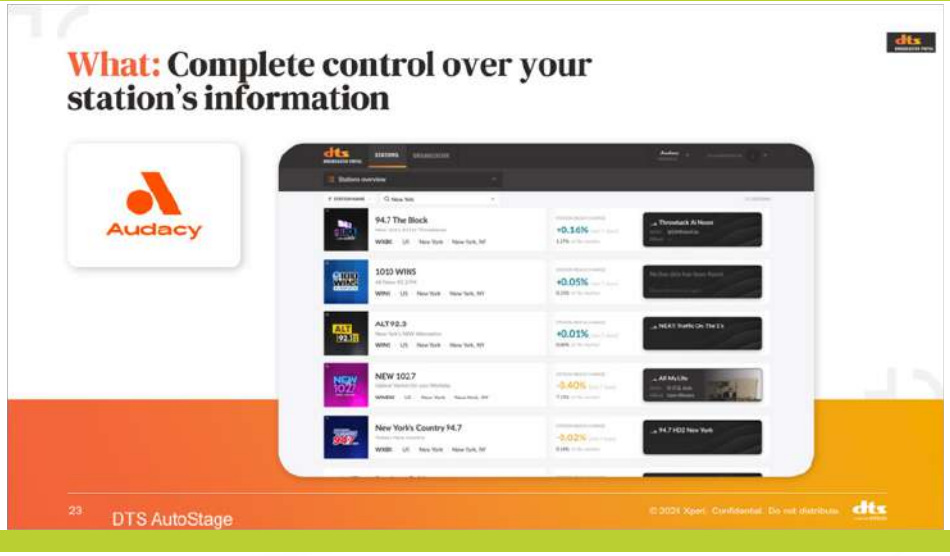

DTS Autostage
Video Powered By TiVo
DTS AutoStage Video™ Service, Powered by TiVo™
Sit back and enjoy the ultimate entertainment experience.
18


DTS AUTOSTAGE
The only patent protected hybrid radio solution
In today's complex digital services environment, IP protection is a critical business risk for all participants. Xperi delivers unequalled IP protection to broadcasters and automakers around the world.
Portfolio
119 Patents
Application
Hybrid Radio
Metadata Identification | Delivery | Display
Search
Personalization
Monetization
Territories
Australia
Canada
China
Europe (EPO)
Mexico
South Korea
United States
Global (WIPO-PCT)
19
DTS AutoStage


OPTION 2
DTS AUTOSTAGE ANALYTICS
The Story of Your Station

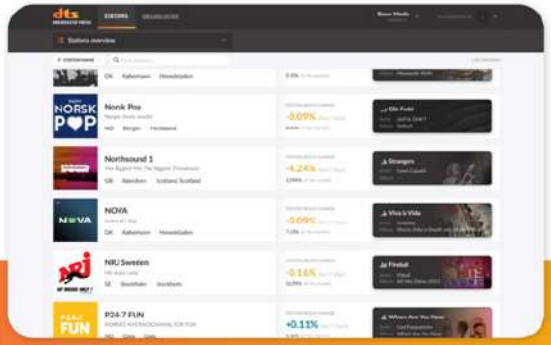

OPTION 1
Delivering Value & Insights
WORLDWIDE AUDIENCE ANALYTICS
DTS AutoStage
Content | Discovery | Experience
144 Countries
Global Car Deployment:
6.0+ million
Total Radio Stations:
94,819
Total radio listening YTD:
~3.5 billion hours
Total program events YTD:
~25 billion events
21


Telling the Story of Your Station and Audience
WHO?
Understand your audience in your markets and your performance.
WHERE?
Where is your audience concentrated and listening in your market?
WHEN?
When is your audience tuning in and tuning out throughout the day?
HOW?
How is your audience tuning into your station – analog, DAB, HD Radio, etc?
WHAT?
What programming is attracting the largest audience and how is content performing
22
DTS AutoStage


What: Complete control over your station's information
Audacy
94.7 The Block
1010 WINS
New York's Country 94.7
23
DTS AutoStage

What: Complete control over your station's information

BAUER MEDIA GROUP



24 DTS AutoStage

What: Control and awareness ensures quality & consistency

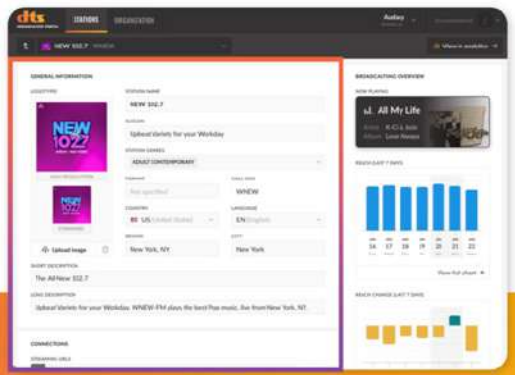
Audacy · NEW 102.7 · BAUER MEDIA GROUP · NEVA

25 DTS AutoStage

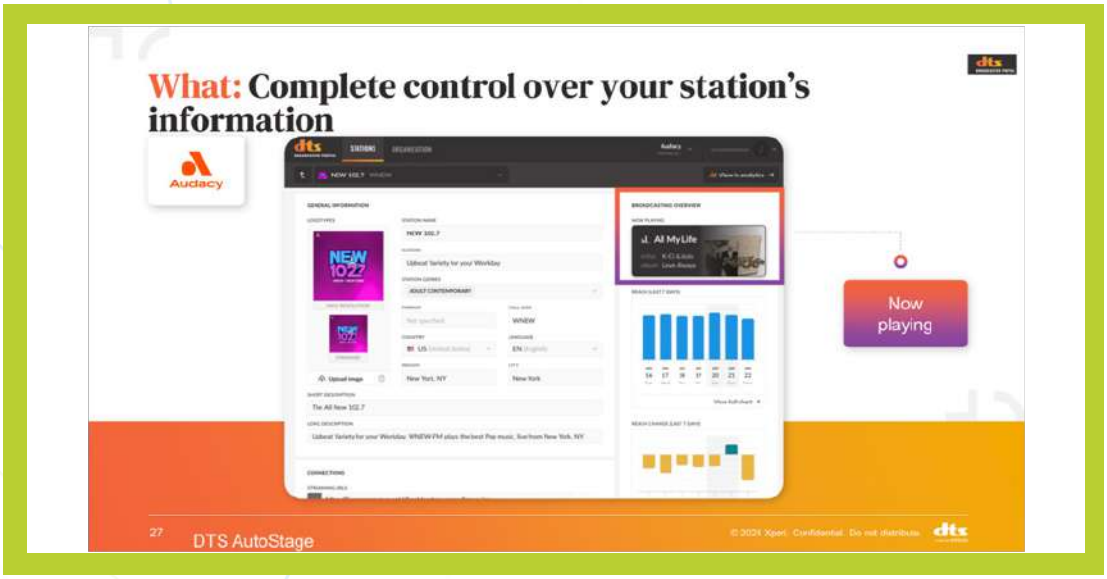
What: Complete control over your station's information

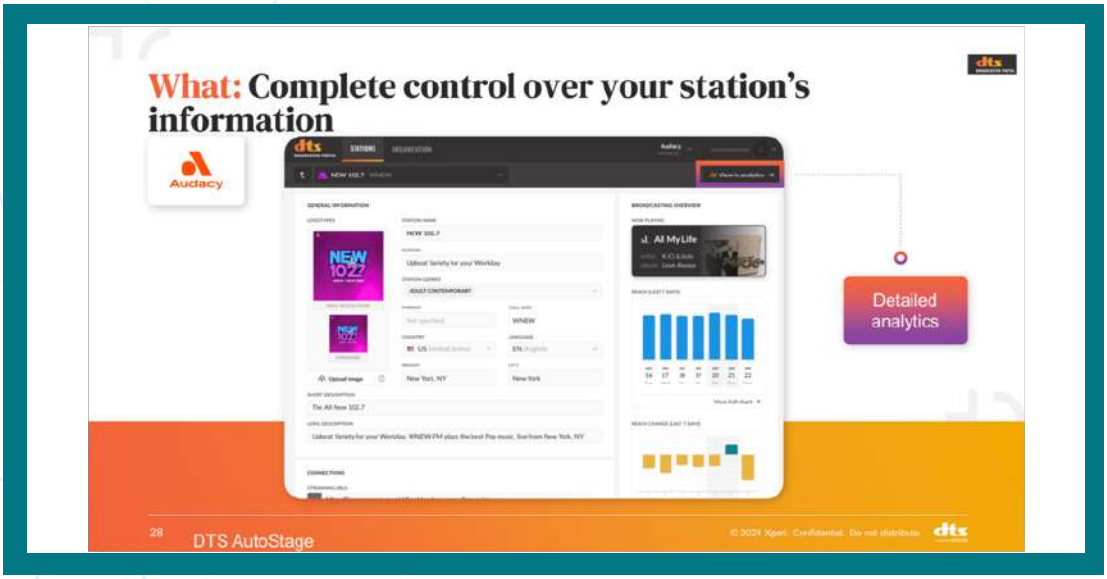
Audacy

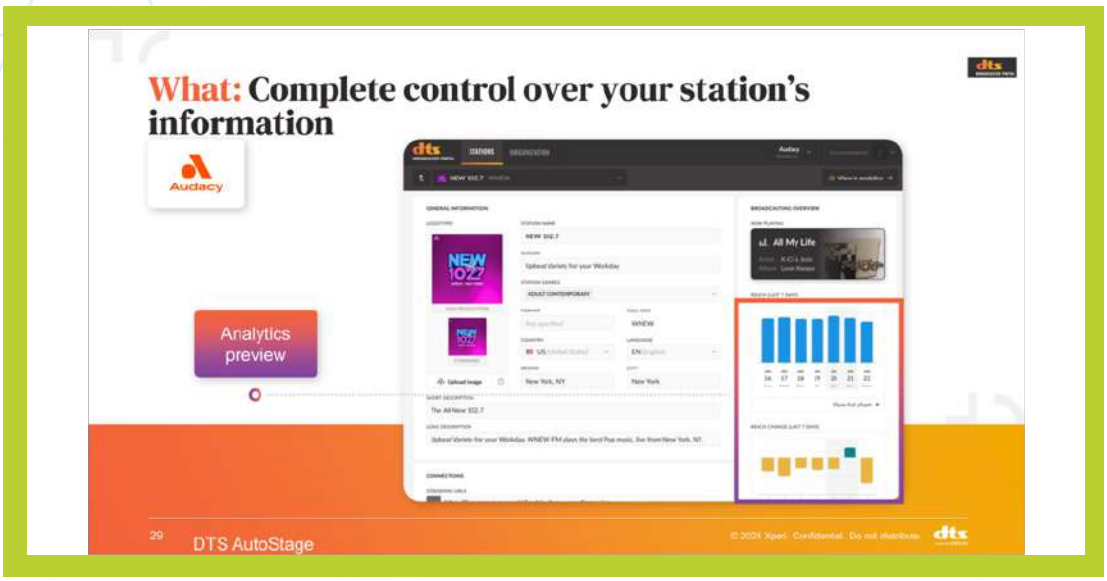
Station Information

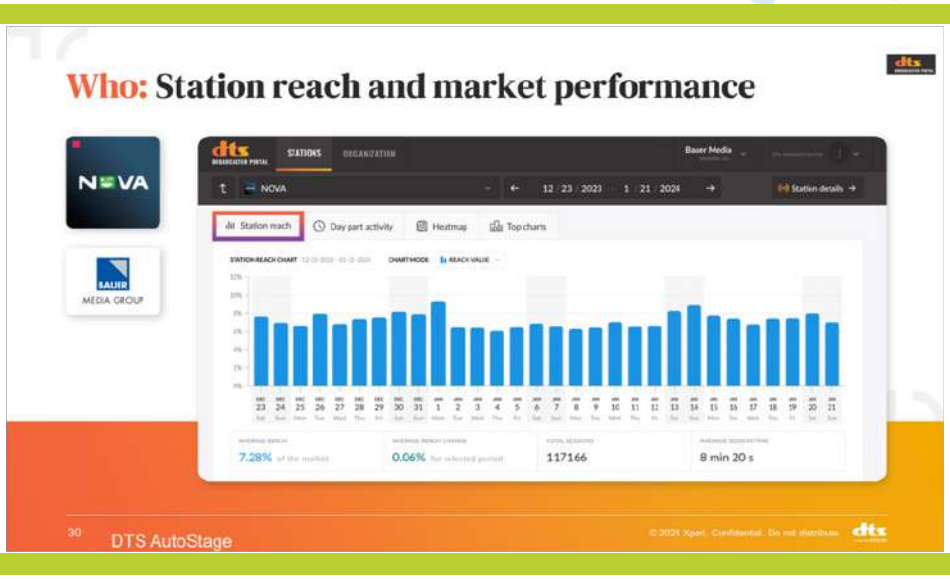


26 DTS AutoStage

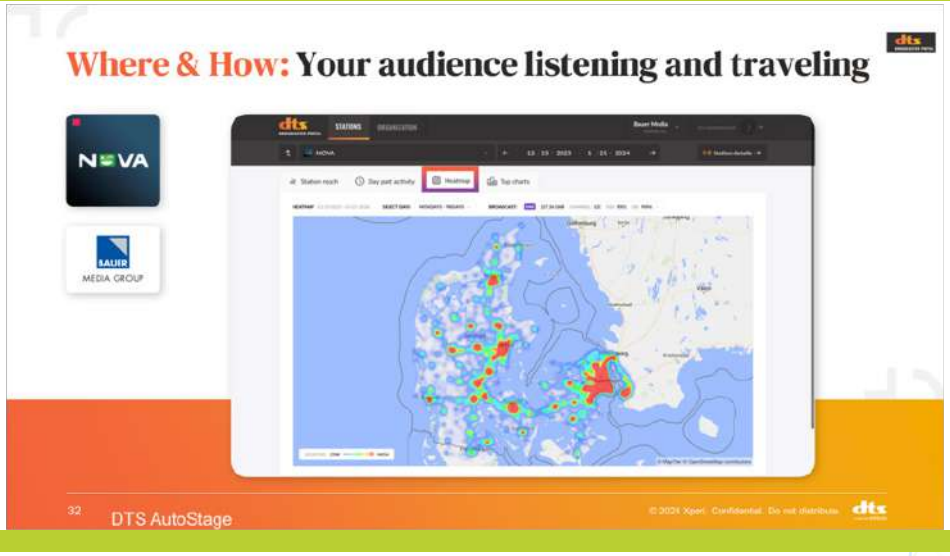

What: Complete control over your station's information
Audacy
Now playing
27
DTS AutoStage

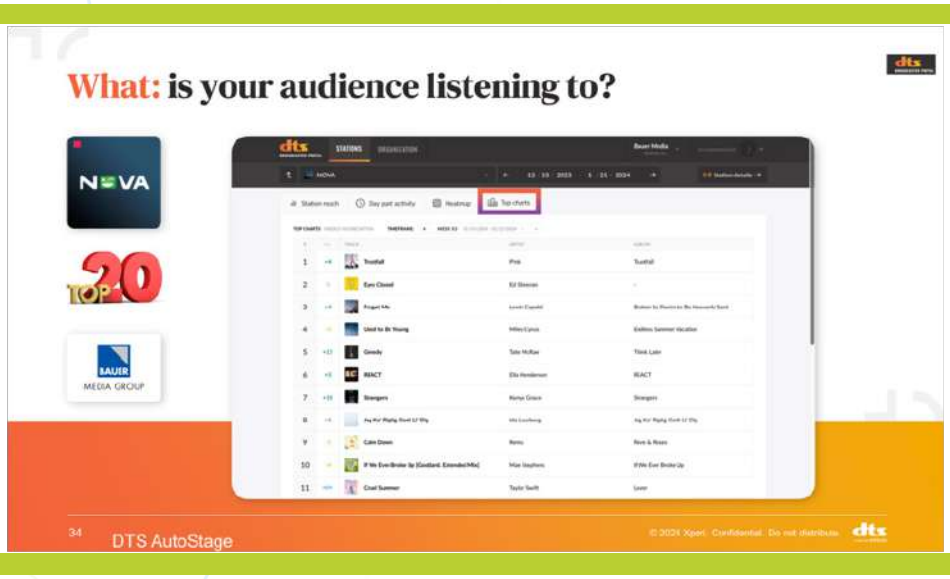

What: Complete control over your station's information
Audacy
Detailed analytics
28
DTS AutoStage


What: Complete control over your station's information
Audacy
Analytics preview
29
DTS AutoStage


Who: Station reach and market performance
NOVA
SAUER MEDIA GROUP
STATIONS
ORGANIZATION
Bauer Media
Station reach
Day part activity
Heatmap
Top charts
7.28%
0.06%
117166
8 min 20 s
30
DTS AutoStage


When: Understand your audience throughout the day - anyday
NEW 102.7
Audacy
STATIONS
Station reach
Day part activity
Heatmap
Top charts
31
DTS AutoStage


Where & How: Your audience listening and traveling
NOVA
SAUER MEDIA GROUP
STATIONS
Station reach
Day part activity
Heatmap
Top charts
32
DTS AutoStage


What: is your audience listening to?
NOVA
TOP 20
BAUER MEDIA GROUP
34
DTS AutoStage


dts
AutoStage
It's Easy and Free


dts


dts
THANK
YOU!

Mr. Thimmaiah Kuppanda

Senior Consultant- Technology and Business, IIS

drm DIGITAL radio mondiale — digital radio for all

Analogue FM – Relevance

Flat rate coverage cost
Unlike per-listener distribution cost with OTT

Ubiquitous and companion
Available in cars, at homes, on mobiles; works both indoors and outdoors

A regulated and trustworthy medium
Authentic and free to listeners

Local and limited competition
Only a handful of broadcasters/services per location

Necessary in emergencies
Radio is the most reliable communication medium in emergencies

www.drm.org

drm DIGITAL radio mondiale — digital radio for all

Analogue FM – Challenges

Limited Listener Engagement
Competition from digital media for user attention

Perceived old-style media
Audio-only service

Saturated revenue
Audio-only services with ad announcements;
All the broadcasters typically cater to a single group of audience

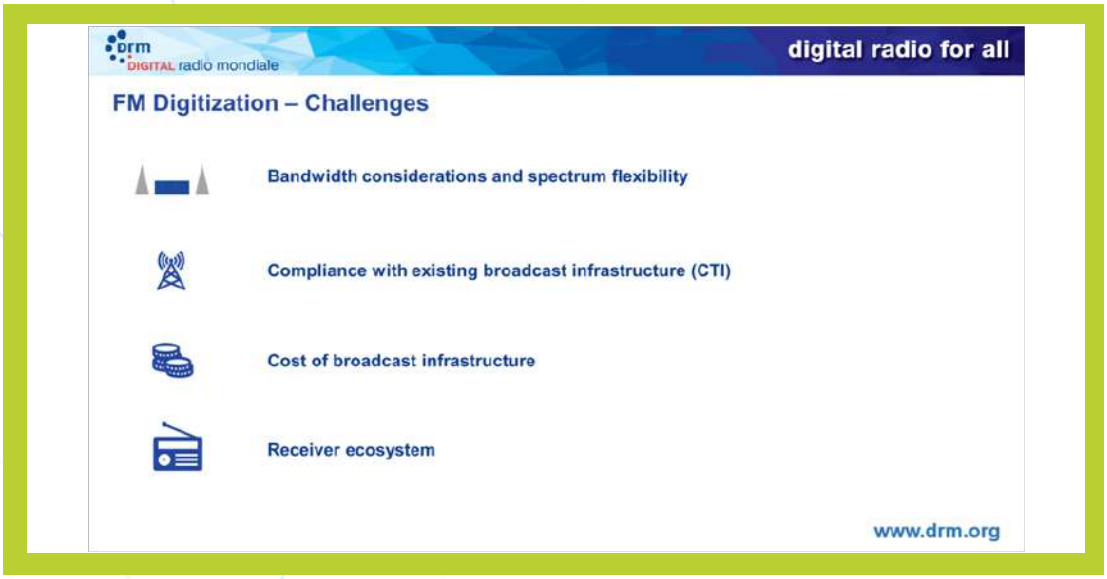
Terrain limitations and drastic urban development
Gaps in reception due to terrain, high-rise buildings, and new public infrastructure

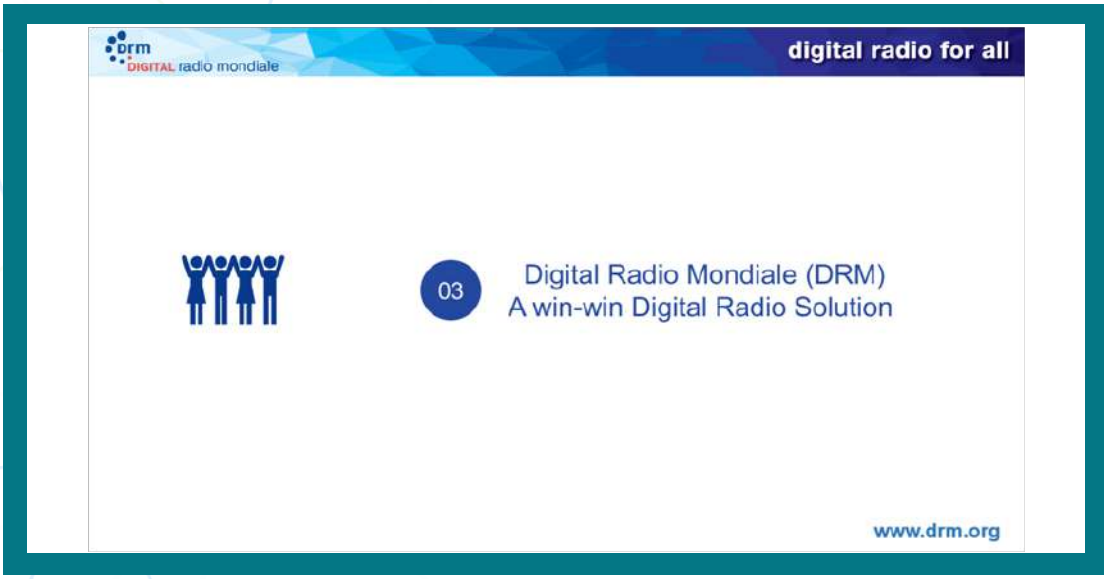
www.drm.org

drm DIGITAL radio mondiale — digital radio for all

02 FM Digitization – Challenges

www.drm.org


drm DIGITAL radio mondiale
digital radio for all
FM Digitization – Challenges
Bandwidth considerations and spectrum flexibility
Compliance with existing broadcast infrastructure (CTI)
Cost of broadcast infrastructure
Receiver ecosystem
www.drm.org


drm DIGITAL radio mondiale
digital radio for all
03
Digital Radio Mondiale (DRM)
A win-win Digital Radio Solution
www.drm.org


drm DIGITAL radio mondiale
digital radio for all
Diverse Broadcast Offerings & Enhanced listener Experience
DRM FM in car/on mobile phone
Eclipse Classic
Eclipse Club
Live Jazz at Sky bar & restaurant, Chanakyapura, New Delhi
Eclipse Hits
Journaline
Up to 3 audio services from a single DRM FM transmission (100 kHz)
Station logo and service description
DRM TextMessages
Scrolling text
Max. 128 characters; Max every 20 sec.
Journaline
Text based information service
Supports interactivity
SlideShow
Images and animation

drm DIGITAL radio mondiale — digital radio for all

Revenue opportunities - Widen and grow your listenership

Audio Service 1
- Bollywood/Contemporary
- Demographics: Adults 18-50

Audio Service 2
- Classic music
- Demographics: Adults 50+

Audio Service 3
- Talk & Infotainment
- Demographics: Adults 25-40

- Broadcasters can offer **up to 3 audio services plus Data services** from a single DRM FM-band transmission of **100 kHz bandwidth**
- Most efficient use of broadcast capacity thanks to the **xHE-AAC audio codec**
  → the latest generation of AAC codec family
  → codec of choice in Android, iOS, etc.
- Broadcasters can grow their listenership by offering - Multilingual programs, niche programs, pop-up stations (for events/festivals) etc.

www.drm.org

drm DIGITAL radio mondiale — digital radio for all

More Revenue per Listener – DRM TextMessage

TextMessage
Scrolling text; Multilingual (Unicode); Content switches automatically

Local ads:
"Live Jazz at Sky bar & restaurant, Chanakyapurua, New Delhi"

Sponsored ads:
"This song is brought to you by CoffeeGram Roastaries"

Promotion ads:
"Use the code EC25 to get 25% off on your next SwyGi order"

Multilingual/regional ads:
"ಬೆಂಗಳೂರು ಲಘು ಹಬ್ಬ, ಜುಲೈ 29-30, ಅರಮನೆ ಮೈದಾನ"

Seasonal ads:
"Kamishk Gold wishes you a Happy Independence Day; Visit us today and avail 10% off on select items"

www.drm.org

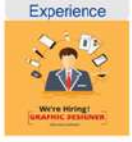
drm DIGITAL radio mondiale — digital radio for all

More revenue per Listener – SlideShow

SlideShow
- Enhanced ad via images & animation; content switches automatically
- Just like TextMessage can deliver local, sponsored, promotional ads etc. with a visual component

Enhanced Messaging

Brand Experience



Enhanced Promotions

Interactive ads

Listener Engagement

www.drm.org

drm DIGITAL radio mondiale

digital radio for all

Journaline:
Listener targeting, interactivity and audience measurement

NewsService Journaline

Journaline interactive text service

- Text-based information service
- Can deliver **local, sponsored, promotional** ads etc.
- Can deliver **enhanced ads** with images
- Re-use of **existing data sources** for broadcasters (RSS, XML), internationally applicable (Unicode/UTF-8)
- Extensible **hinting information**
  - ✓ **back channel:** web, e-mail, phone,…
  - ✓ **geo-tagging:** local content, get me there
  - ✓ **speech hinting** for in-car use, etc.
- Enables **listener targeting, interactivity, and audience measurement.**

www.drm.org

drm DIGITAL radio mondiale

digital radio for all

Journaline:
Listener targeting, interactivity and audience measurement

NewsService Journaline

Journaline interactive text service

- Text-based information service
- Can deliver **local, sponsored, promotional** ads etc.
- Can deliver **enhanced ads** with images
- Re-use of **existing data sources** for broadcasters (RSS, XML), internationally applicable (Unicode/UTF-8)
- Extensible **hinting information**
  - ✓ **back channel:** web, e-mail, phone,…
  - ✓ **geo-tagging:** local content, get me there
  - ✓ **speech hinting** for in-car use, etc.
- Enables **listener targeting, interactivity, and audience measurement.**

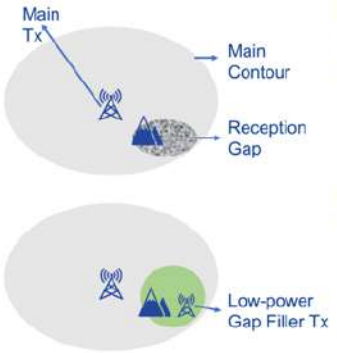
www.drm.org

drm DIGITAL radio mondiale

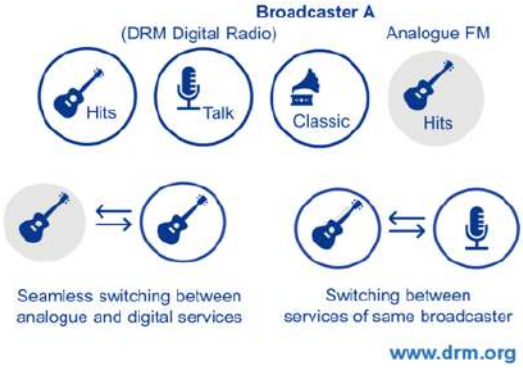
digital radio for all

DRM Digital Radio – Seamless Reception

Single Frequency Network



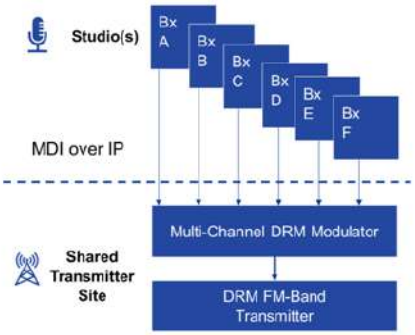
Alternate Frequency Switching



www.drm.org

drm DIGITAL radio mondiale — digital radio for all

Multi-Channel DRM & Shared Transmitter Infrastructure
A low-cost solution for FM digitization

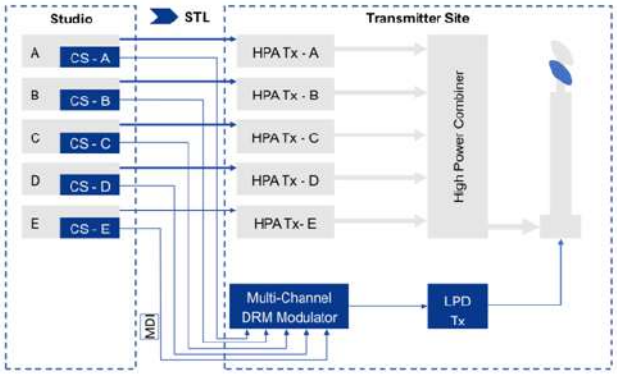


- On-Air Signal in whitespace of 600 kHz
- A to E – signal from each broadcaster with full control over the content and on-air configuration

www.drm.org

drm DIGITAL radio mondiale — digital radio for all

Multi-Channel DRM & Shared Transmitter Infrastructure
Compliant with existing CTI infrastructure



On-Air Signal; Assuming a whitespace of 600 kHz between existing analogue FM stations; tested in Jaipur CTI

Existing analogue FM infrastructure catering to current FM coverage;
→ Not changed/effected at all

Muti-Channel DRM infrastructure catering to DRM transmission;
→ Shared transmitter equipment

A to E: Represents different broadcasters
CS: DRM ContentServer
HPA Tx: High Power Analogue Transmitter
LPD Tx: Low Power DRM Transmitter
MDI: Multiplex Distribution Interface (over UDP/IP)

www.drm.org

drm DIGITAL radio mondiale — digital radio for all

Receiver Ecosystem Built on Solid Ground: Our Foundation is Set

Over 6 million (60 Lakhs) on-road cars in India have DRM support

MARUTI SUZUKI
HYUNDAI
Mahindra
MG
TOYOTA

DRM Digital FM reception is not dependent on proprietary receiver technology

Bringing the Beat Home

www.drm.org


drm DIGITAL radio mondiale
digital radio for all
04
Summary
www.drm.org


drm DIGITAL radio mondiale
digital radio for all
DRM Digital Radio: The win-win solution
Analogue FM Challenges
DRM Digital Radio
Limited Listener Engagement
Diverse broadcast offerings to engage listeners
Perceived old-style media
Enhanced listener experience
Saturated revenue
More listeners and more revenue per listener
Reception gaps
Seamless reception and service switching
www.drm.org


drm DIGITAL radio mondiale
digital radio for all
DRM Digital Radio: The win-win solution
FM Digitization Challenges
DRM Digital Radio
Bandwidth considerations; spectrum flexibility
Efficient and flexible spectrum options
Compliance with existing broadcast infrastructure (CTI)
Compliant with existing CTI infrastructure
Cost of broadcast infrastructure
Low cost with shared infrastructure
Receiver ecosystem
Built on Solid Ground: Our Foundation is Set
www.drm.org


DIGITAL radio mondiale
DRM Smart Radio Benefitting All Listeners
DIGITAL RADIO FOR ALL
WHAT IS DRM AND WHAT ARE ITS BENEFITS?
LISTEN & COMPARE
RECEIVERS
DRM HANDBOOK AND
BROADCAST
DRM INDIA PAGE
Subscribe for free monthly updates:
newsletter.drm.org
Dedicated India page
india.drm.org
For any inquiries or comments:
projectoffice@drm.org
Follow: @drmdigitalradio
Follow: @drmdigitalradio
YouTube
SUBSCRIBE
youtube.drm.org

Mr. V.J. Christopher, Wireless Advisor, WPC, Ministry of Telecommunications, Gov. of India

Two milestones in 2023

1. Indian Space Policy,2023

2. The Telecommunications Act, 2023

Commercial space based services currently operational in India

Application	Radiocommunication Service	Frequency Band (GSO)	Open Sky (Yes/No)	Licensees
GMPCS	MSS	L, S – UT, C - GWT	No	BSNL
Comm. VSAT	FSS	C, Ku, Ka	No	Hughes, Bharti, BSNL, TataNet, Reliance etc
IFMC	FSS (ESIM)	C, Ku, Ka	No	Hughes, TataNet, BSNL
NLD, ILD	FSS	C, Ku, Ka	No	Reliance, BSNL
Teleports	BSS/FSS	C	Yes	Zee, Star, Sun, ETV, etc
DTH	BSS/FSS	Ku	No	Tatasky, Airtel, DD free dish etc
DSNG	FSS	C, Ku	No	Associated with news channels
HITS	BSS	C	No	Two operators only

FSS: Fixed Satellite Service, BSS: Broadcast Satellite Service, MSS: Mobile Satellite Service, UT- User Terminals, GWT: Gateway Terminals

Spectrum Assignment Methodology – Broadcasting Services

- **Broadcasting Services**:
  - Terrestrial Based – AM, MW, SW, FM, Terrestrial TV
  - Satellite Based – Teleports, DTH, DSNG, HITS
- **Service Providers**:
  - AM, MW, SW, Terrestrial TV – Public Broadcaster
  - FM, Teleports, DTH, DSNG, HITS – Private Operators & Public Broadcaster
- **Spectrum Assignment Methodology**:
  - Administrative based with no upfront charges. Spectrum Usage Charges are levied on annual basis

New Telecommunications Act 2023 – Spectrum Assignment Methods

- Subsequent to 2G judgement, since 2013, spectrum assignment to all wireless users including broadcasters in on interim basis. This interim assignment is with the condition that if the Govt. decided to assign spectrum through the auction mechanism, the wireless user has to pay the auction determined price with retrospective effect.
- This regulatory uncertainty about spectrum assignment has been addressed in the new Telecommunications Act 2023.
- Schedule 1 of the Act clearly specified the type of usages/users for which spectrum will be assigned through administrative method

Schedule 1 entries related to Broadcasting

- S.No. 3 – Public Broadcasting Services
- S.No. 13 – Community Radio Stations
- S.No. 16 – Certain Satellite based services such as Teleports, Direct To Home, Headend In The Sky and Digital Satellite News Gathering

Ease of Doing Business

- **Community Radio Station**:
  - Spectrum assignment and licensing process has been made completely online and seamless integration with MIB portal
  - Additional frequency spots have been released to promote and accommodate more CRS in a given geographic location
- **WOL Process**:
  - Entire process of issuing WOL has been simplified.
  - After capturing the requisite information from the applicant, it is scrutinized only once and LOI is issued. After the issue of LOI, all other events like issue of Decision Letter, SACFA clearance, import permission are applicant driven and after paying the requisite amount they are auto generated.

Ease of Doing Business - continued...

- **TV Channel Endorsement/de-Endorsement/Name Change**: This process has been made on self-declaration mode through Saralsanchar portal
- **SACFA Clearance**:
  - This process has been made on self-declaration mode.
  - The sites which are meeting pre-defined criteria of Airport Authority of India and/or JCES are instantaneously cleared and SACFA certificate is generated instantaneously.
  - The sites not meeting the criteria sent to AAI & JCES for their clearance or otherwise
  - If no response is received within 30 days from them, the sites are deemed to be cleared

Table for Royalty charges for Terrestrial Broadcasting Service (per channel)

Type of Broadcasting	Changes in Royalty	Power rating	Existing Royalty (Rs)	Revised Royalty (Rs)
Public Broadcasting (All India Radio and Doordarshan)	Public broadcasting, social factor of one third is applied to existing charges (as already done for CRS) considering social responsibility associated with Public Broadcaster i.e. Prasar Bharti.	Low Power FM (upto 100W)	90,000	30,000
		Medium Power FM (100W to 1KW)	1,80,000	60,000
		High Power FM (>1KW)	3,37,500	1,25,000
		AM Broadcasting	50,000	50,000
		Low Power TV (upto 1KW)	3,60,000	VHF: 1,20,000 UHF: 3,60,000
		High Power TV (>1 KW)	13,50,000	VHF: 1,20,000 UHF: 3,50,000
Commercial Broadcasting	No Change	High Power FM (>1KW)	3,37,500	3,37,500
Community Broadcasting	No Change	Low power FM (upto 100W)	22,500	22,500
Low Power indoor studio equipment	Fixed for lifetime use			5000/- per set (lifetime use)

9

Promoting R&D and Innovation

- **Simplified Experimental License procedure**:
  - The process has been simplified and one license encompasses all permissions required to carryout experiments viz, import permission etc.
  - Granted experimental license to M/s Sankhya Labs to conduct experiments for direct broadcast to mobiles in the 500-600 MHz band

Licensing process streamlining

A taskforce in DoT is established in DoT to review & simplify internal processes within DoT for facilitating space-objects in line with Indian Space Policy, 2023 and to suggest the methods to further streamline the clearances pertaining to setting up of a SatCom Network

Mr. Sanjeev Gupta, Associate Director, SATCOM, ISRO

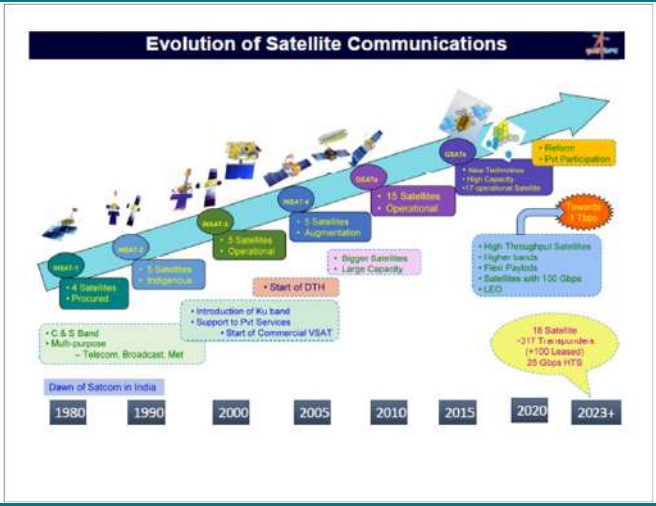
28th International Conference & Exhibition on Broadcast & Media Technology -2024

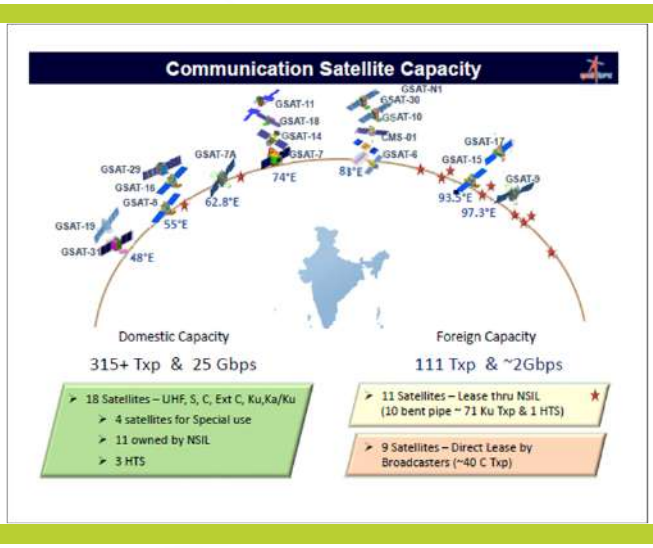
Satellite communications

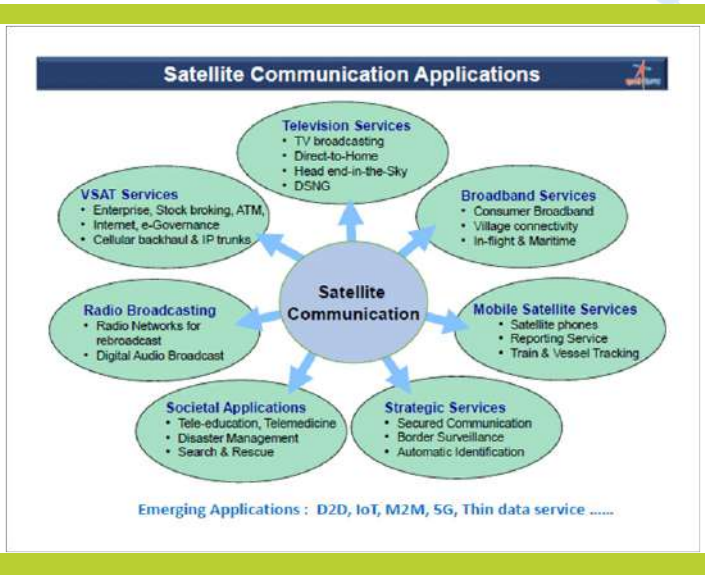
Emerging Trends, Technologies, Opportunités & Issues

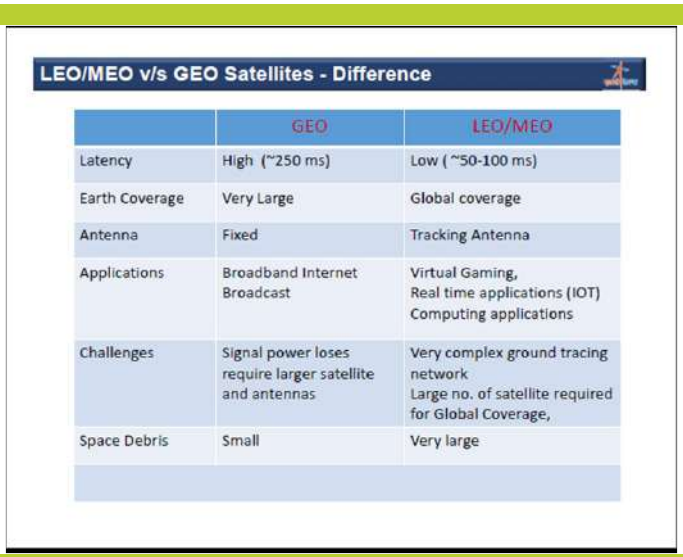
February 16, 2024

Sanjeev Kumar Gupta
Associate Director
SATCOM Programme Office
ISRO HQ, Bangalore







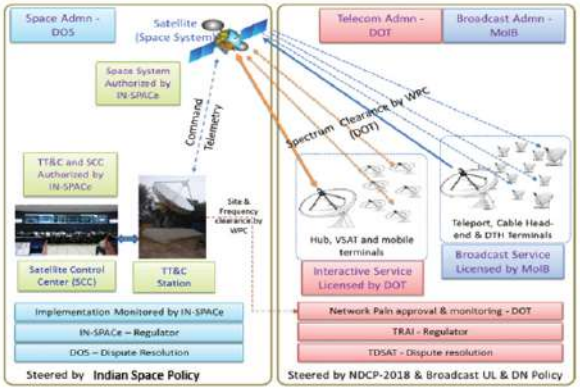


	GEO	LEO/MEO
Latency	High (~250 ms)	Low (~50-100 ms)
Earth Coverage	Very Large	Global coverage
Antenna	Fixed	Tracking Antenna
Applications	Broadband Internet Broadcast	Virtual Gaming, Real time applications (IOT) Computing applications
Challenges	Signal power loses require larger satellite and antennas	Very complex ground tracing network Large no. of satellite required for Global Coverage,
Space Debris	Small	Very large

Indian Space Policy – how it enables satcom?

1. Provides freedom to carry out all activities related to space based communications – research, design development & realisation of spacecraft & its sub-systems; establishment of assembly & integration facilities; providing capacity to various services, within and outside India.
2. Indian Entities can bring GSO/NGSO systems into operations with IN-SPACe authorisation.
3. Indian Entities can establish Satellite Control Center (SCC) and Telemetry, Tracking & Command (TT&C) stations, for controlling their own satellites or third party satellites, with the authorisation of IN-SPACe
4. Regulatory requirements – Considerations for country's liabilities towards use of outer space as UN treaties & conventions, use of orbit-spectrum resources as per National & ITU guidelines, national security aspects.
5. Regulations of communication service matters to continue under DOT & MOIB.

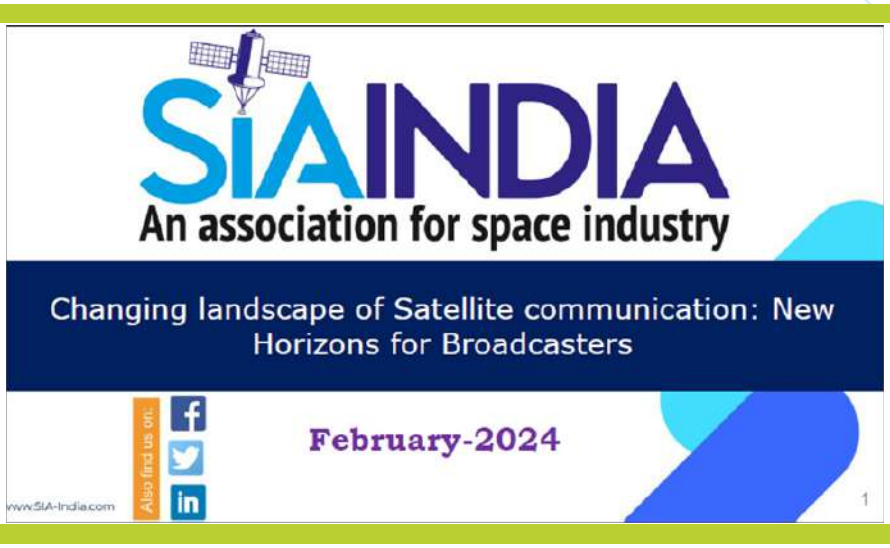
Roles of DOS, DoT, MoIB & Other Agencies

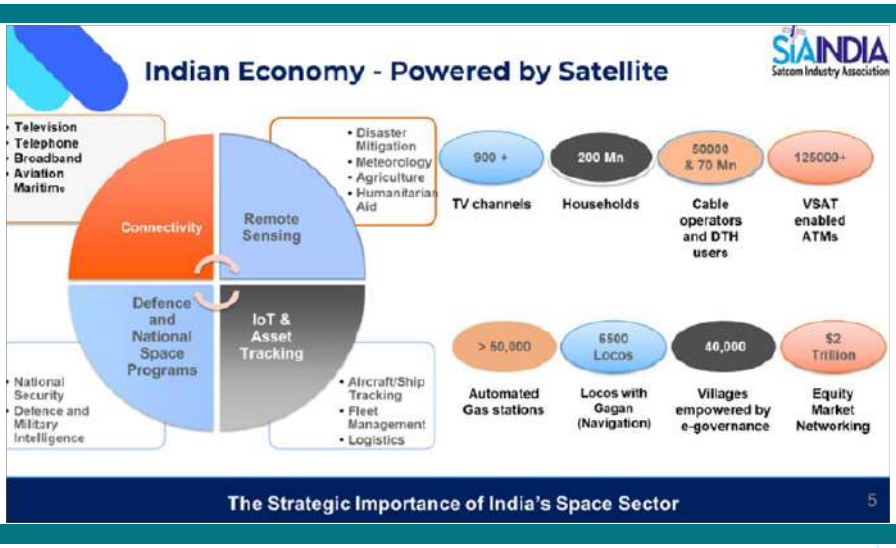


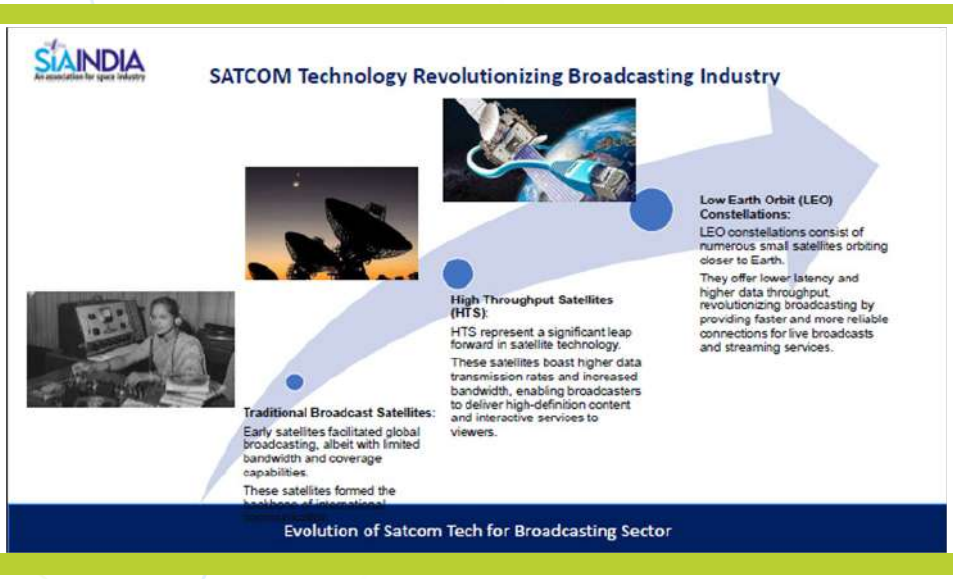
THANK YOU

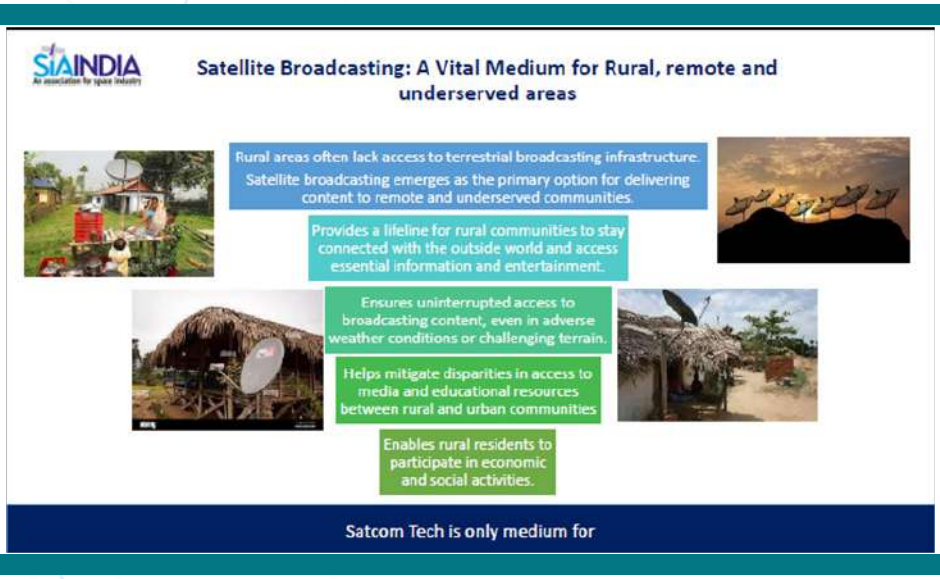
Mr. Anil Prakash

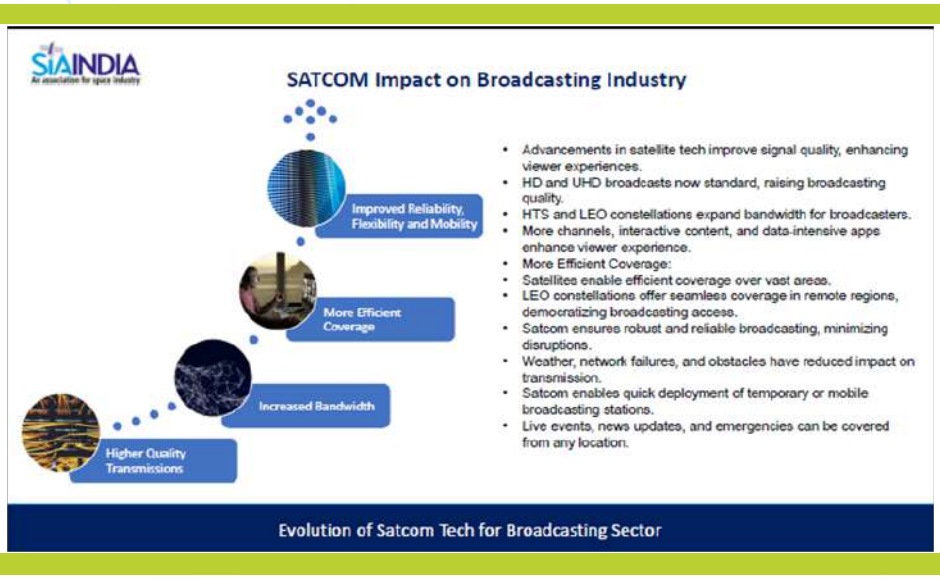
Director General, Space Industry Association India






SIAINDIA
SATCOM Technology Revolutionizing Broadcasting Industry
Low Earth Orbit (LEO) Constellations:
LEO constellations consist of numerous small satellites orbiting closer to Earth.
They offer lower latency and higher data throughput, revolutionizing broadcasting by providing faster and more reliable connections for live broadcasts and streaming services.
High Throughput Satellites (HTS):
HTS represent a significant leap forward in satellite technology.
These satellites boast higher data transmission rates and increased bandwidth, enabling broadcasters to deliver high-definition content and interactive services to viewers.
Traditional Broadcast Satellites:
Early satellites facilitated global broadcasting, albeit with limited bandwidth and coverage capabilities.
These satellites formed the
Evolution of Satcom Tech for Broadcasting Sector


SIAINDIA
Satellite Broadcasting: A Vital Medium for Rural, remote and underserved areas
Rural areas often lack access to terrestrial broadcasting infrastructure.
Satellite broadcasting emerges as the primary option for delivering content to remote and underserved communities.
Provides a lifeline for rural communities to stay connected with the outside world and access essential information and entertainment.
Ensures uninterrupted access to broadcasting content, even in adverse weather conditions or challenging terrain.
Helps mitigate disparities in access to media and educational resources between rural and urban communities
Enables rural residents to participate in economic and social activities.
Satcom Tech is only medium for


SIAINDIA
SATCOM Impact on Broadcasting Industry
Improved Reliability, Flexibility and Mobility
More Efficient Coverage
Increased Bandwidth
Higher Quality Transmissions
Advancements in satellite tech improve signal quality, enhancing viewer experiences.
HD and UHD broadcasts now standard, raising broadcasting quality.
HTS and LEO constellations expand bandwidth for broadcasters.
More channels, interactive content, and data-intensive apps enhance viewer experience.
More Efficient Coverage:
Satellites enable efficient coverage over vast areas.
LEO constellations offer seamless coverage in remote regions, democratizing broadcasting access.
Satcom ensures robust and reliable broadcasting, minimizing disruptions.
Weather, network failures, and obstacles have reduced impact on transmission.
Satcom enables quick deployment of temporary or mobile broadcasting stations.
Live events, news updates, and emergencies can be covered from any location.
Evolution of Satcom Tech for Broadcasting Sector

Major Advances in Satellite Technologies

High-Definition (HD) and Ultra High-Definition (UHD) Broadcasting:
- Enhanced picture quality with sharper images and better audio with expanded capacity for delivering more channels and content.

Direct-to-Home (DTH) Satellite Broadcasting:
- Elimination of intermediary networks, providing direct access to viewers' homes.

Direct-to-Device Satellite Broadcasting:
- Direct to Mobile which would allow direct TV content to your device without internet. The new tech is being worked upon by DoT, MIB and IIT-K.

Digital Compression Techniques (e.g., MPEG-4, HEVC)
- More efficient use of satellite bandwidth, allowing for increased channel capacity.
- Improved picture quality and reduced transmission costs.

Spot Beam Technology
- Targeted delivery of content to specific geographic areas for more efficient coverage.

Multi-Satellite Constellations
- Redundancy and resilience in satellite networks for uninterrupted service.
- Global coverage and expanded capacity for broadcasting services.

Interactive and On-Demand Services
- Access to content at the viewer's convenience, including video-on-demand and interactive features.

Hybrid Satellite-Terrestrial Networks
- Seamless coverage leveraging both satellite and terrestrial infrastructure.
- Increased reliability and flexibility in broadcasting services with hybrid network architectures.

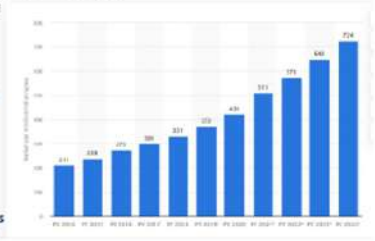
Innovative use of new technologies is drastically reducing cost

India's Broadcasting Industry: Scaling Up its potential for Growth

- India's broadcasting industry is powered by satellite, which enables the distribution of television and radio signals to a wide audience; to remote areas, and over large distances within India and other countries and continents.
- The industry carries 900+ registered channels to 21 Cr households in urban and rural India through ~1730+ digital platform operators and 50000+ cable operators
- The industry provides direct and indirect employment to 1.83 M people.
- In addition, the use of satellite technology has facilitated the transition from analog to digital broadcasting, enabling higher quality and more diverse programming options for consumers.
- The loss of C-band spectrum could derail the broadcasting sector and cripple the entire INR >700 Bn Indian broadcasting industry
- Foreign Direct Investment in Nation-Building: Over the last 10 years, the segment has brought in $5.48n worth of FDI to India propelling growth as well as stimulating the Indian economy.
- India's media content is distributed all over Asia-Pacific, Middle East and Africa Regions using C band

Broadcasting Industry in India

(In billion Indian rupees)



Stakes for Indian society and the Indian economy in the smooth operation of C-band satellite distribution of broadcast signals are high

Key SATCOM Bands for Broadcasting India

SATCOM Bands in Use

C (3.7-4.2 GHz)	Ku (12-18 GHz)
Used by Broadcast Sector (TVRO)	Used by DTH Sector
(Serves Over 210 Mn HH in India)	71 million active DTH subscribers in India

Significant SATCOM Band in Use globally

KA (27.5-29.5 GHz)

Identified by ITU for Satellite Services

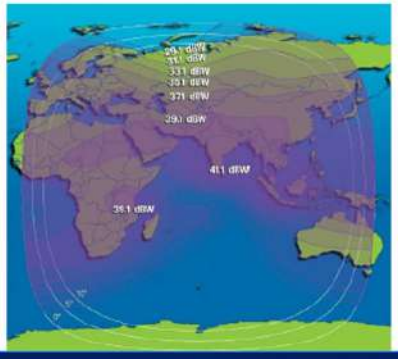
200 + satellites with TBPS capacity world over

C Band is core frequency bands for broadcasting industry in India and *there is no substitute for these bands*

SIAINDIA

Why C-Band remains the distribution platform of choice

The most efficient, reliable, and economical medium for distribution of Media distribution

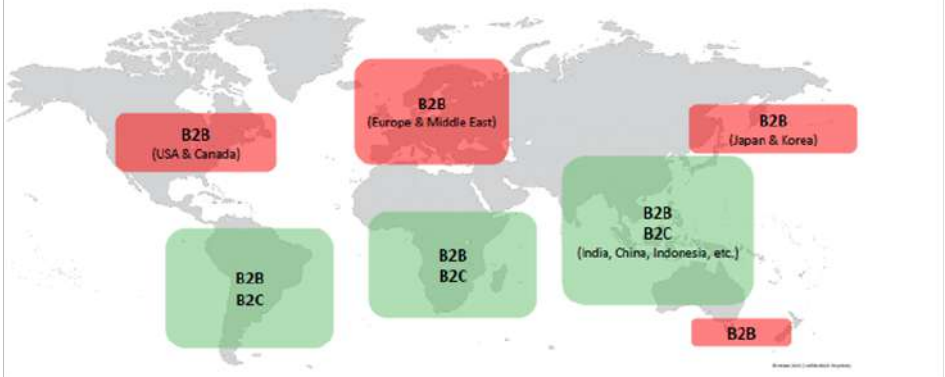


- **REACH**: C-band beams cover large geographic areas, facilitate intercontinental and global communications.
- **ECONOMICS**: 100s of thousands of installed earth stations around the world; over a hundred satellites in orbit, global reach and distribution efficiency;
- **RESILIENCE:** C-band has unique propagation and coverage characteristics that cannot be replicated in other frequency bands

C-band is irreplaceable and not substitutable

SIAINDIA

FSS C-band is extensively used around the world by Broadcasting Industry

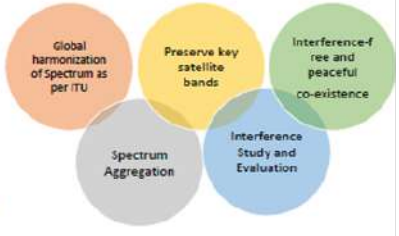


C-band satellite networks are used for various services such as maritime and aeronautical services, education, oil and gas production, and emergency relief services. It's essential to protect them from any interference while allocating C-band frequencies for 5G deployment.

SIAINDIA

Expectations from Spectrum Assignment

- The Spectrum policy should align with the ITU-designated frequency spectrum usage for the ITU region, promoting global harmonization of the spectrum for space activities.
- TRAI must preserve the key satellite bands for satellite operators. Protection of already allocated C-Band frequencies to Satellite Broadcasting
- Protection of the existing satellite systems operating in the C-band from any form of interference is crucial while allocating C-band frequencies for any additional IMT deployment.
- Adjacent band compatibility between FSS and IMT needs careful consideration as FSS earth stations are sensitive to interference from IMT systems
- India must find ways for peaceful co-existence between FSS and IMT, restoring quality of service without imposing costs on satellite/earth station operators.



Spectrum policy should align with the ITU-designated frequency spectrum usage for the ITU region


SIAINDIA
Satcom Industry Association
ABOUT US
SIA-India, a dynamic, not-for-profit space sector association, is dedicated to advancing sectoral interests, accelerating industry growth, and catalysing innovation through strategic engagements with key governmental and global stakeholders, policymakers, regulatory bodies, and standardization entities, aiming to create a vibrant and innovative ecosystem within the space.
Our Vision: 'Thought Leaders' for the Satellite Ecosystem in India
2


OUR MEMBERS
ANANTH
anantlaw
AsiaSat
ASTRANIS
astroborne
Astrogate
augsenselab
b&p
bharucha & partners
COMSAT SYSTEMS PVT LTD
CI Metrics
CPI
DHRUVA
DSK Legal
ETHEREAL X
GALAXEYE
Gilat
HUGHES
inmarsat
INTELSAT
KaleidEO
LAMHAS
LEO LABS
MANASTU SPACE
omnispace
OrbitAID
PA
Saankhya Labs
Saptang Labs
SES
Space Machines Company
TELESAT
Transcend
Viasat


SIAINDIA
An association for space industry
INDIA
SPACE
CONGRESS'24
NEW DELHI
26-28 JUNE
India Space
INDIA SPACE CONGRESS 2024
CONFERENCE & EXPOSITION
SIA-INDIA
Supported by
20


Thank You
Also find us on:
Anil Prakash- Director General
SatCom Industry Association (SIA-India)
Mobile: +91-9811155846
Tel +91-11-46048743
Email : anil.prakash@sia-india.com
SIA-India
31

Mr. Harsimranjit Gill, Country Manager, Intelsat

INTELSAT

Intelsat in India

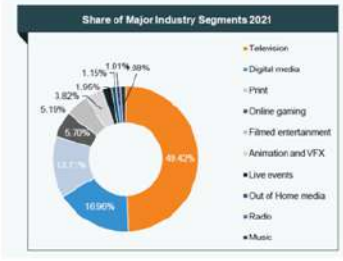
Since 1990s

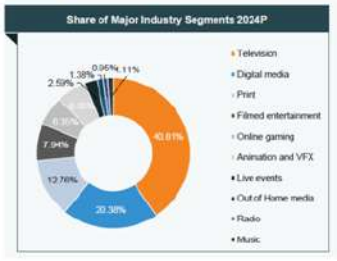
Satellite ventures with ISRO	Top media partner	India gateways
Including joint payloads and satellite-related services	Distributing ~half the market TV content	Mobile connectivity In-flight connectivity Maritime connectivity

INTELSAT

Indian Media and Entertainment Industry

Television is largest and digital is fastest growing segments





- Television would account for 40% of the Indian media market in 2024, followed by print media (13%), digital advertising (12%), cinema (9%), and the OTT and gaming industries (8%)
- India's TV industry by 2026: $10.36 billion and OTT video industry: US$ 2.63 billion

IBEF M&E Report 2023,PwC 2023

INTELSAT

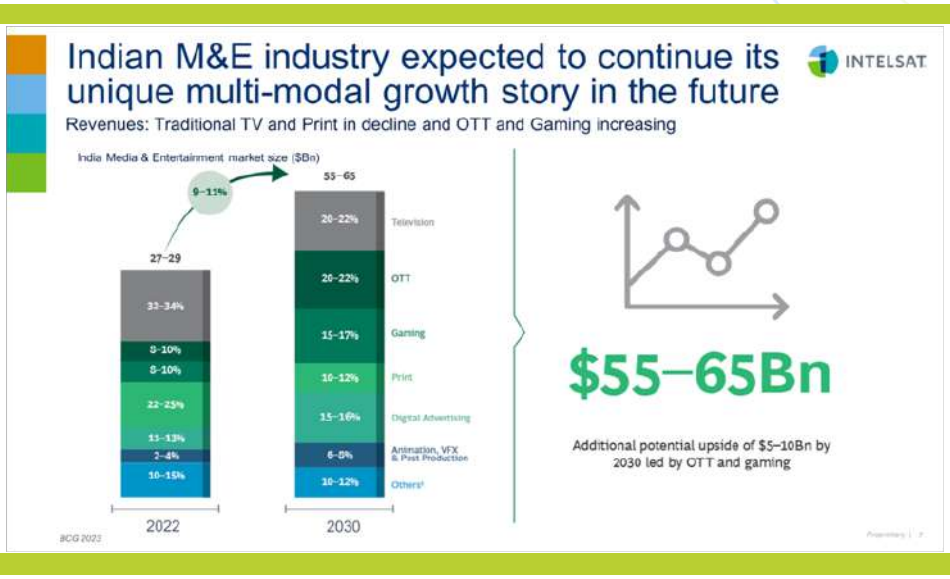
Television: Still holding strong

TV still holding its ground against digital

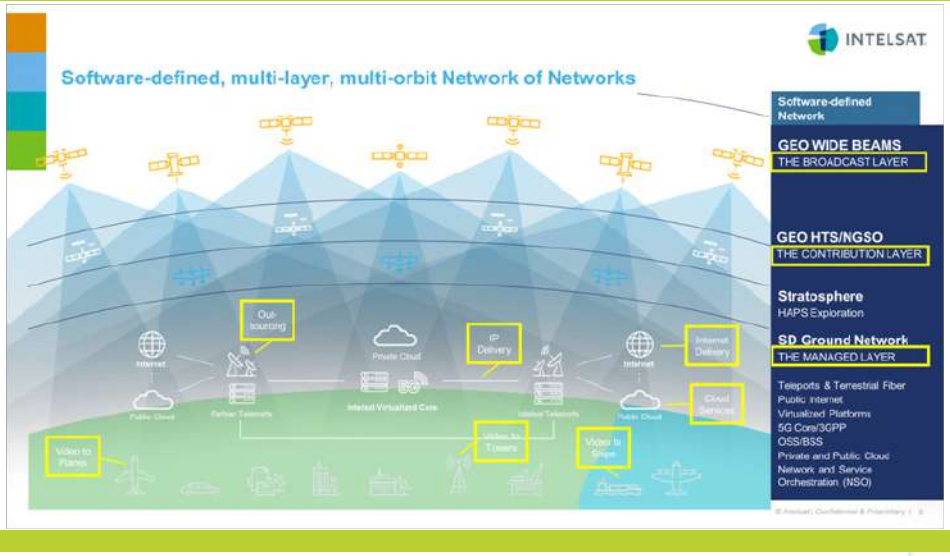
+2–4%	-8%	+0.6Hrs	+10%
YoY increase in TV households (Total 205Mn in 2022 led by FreeDish)	Decline in ARPU over the past 3 years driven by change in Cable-DTH-Free Dish mix	Increase in average time spent watching TV per day since 2019	Total TV ad volume growth from 2020 to 2022

Growth to be majorly driven by advertisements comprising 55%–60% of the total 2030 revenue

BCG 2023


Indian M&E industry expected to continue its unique multi-modal growth story in the future
INTELSAT
Revenues: Traditional TV and Print in decline and OTT and Gaming increasing
India Media & Entertainment market size ($Bn)
9–11%
27–29
55–65
33–34%
8–10%
8–10%
22–25%
11–13%
2–4%
10–15%
20–22%
20–22%
15–17%
10–12%
15–16%
6–8%
10–12%
Television
OTT
Gaming
Print
Digital Advertising
Animation, VFX & Post Production
Others¹
2022
2030
$55–65Bn
Additional potential upside of $5–10Bn by 2030 led by OTT and gaming
BCG 2023


INTELSAT
We Are Unifying the Global Ecosystem
Our size, scale, and advanced technology will help to drive this global unification
Unified Network
Our technology will unite the multiple orbits and multiple bands of today's satellite and terrestrial networks in a single software-defined 5G network that sets the standard.
Open Architecture
Intelsat's open architecture network is technology-agnostic, providing 'plug and play access' for our customers, enabling partner networks, and ensuring seamless connectivity. It's state-of-the-art today, and ready for what is on the horizon.
World's Largest
As the world's largest satellite communications network providing global coverage of 99% of the world's populated regions, we can uniquely create an infrastructure orders of magnitude larger than the world has today.
Carrier Grade
The world's governments, telecoms and media companies rely on Intelsat's highly secure and reliable multi-layered infrastructure, making our technology essential to global operations, communications, and security.


INTELSAT
Software-defined, multi-layer, multi-orbit Network of Networks
Software-defined Network
GEO WIDE BEAMS
THE BROADCAST LAYER
GEO HTS/NGSO
THE CONTRIBUTION LAYER
Stratosphere
HAPS Exploration
SD Ground Network
THE MANAGED LAYER
Teleports & Terrestrial Fiber
Public Internet
Virtualized Platforms
5G Core/3GPP
OSS/BSS
Private and Public Cloud
Network and Service Orchestration (NSO)
Out-sourcing
IP Delivery
Internet Delivery
Cloud Services
Private Cloud
Public Cloud
Internet
Intelsat Virtualized Core
Video to Towers
Video to Planes
Video to Ships

INTELSAT

Three Key Pillars of the Unified Network

Enabled by end-to-end orchestration and use of universal standards

Software-defined Satellites
Dynamic and predictive design concentrates and allocates bandwidth on-the-fly when and where it's needed most. Eliminates network bottlenecks.

5G
Scale and access to a broader ecosystem: 5G tools and chipsets and 3GPP waveform. A frictionless customer interface enables roaming and peering with partner 5G networks.

Smart Edge Terminals
A host of new end-user terminals, including flat panel antennas and software-defined modems, enable 5G, edge compute elements, and improve access to customers in all verticals.

INTELSAT

Emerging Media use cases

Our Unified, Software-defined 5G Non-terrestrial Network

OTT over Satellite & Live TV for aviation & maritime
- New use cases emerging for media distribution in maritime & commercial aviation
- Deliver add-ons via satellite for hybrid user experience

Contribution Links
- HTS with better return path throughput enabling smaller terminals in remote locations for media contribution
- Opens up new opportunities for regional sports/live events

Intelsat One IP
- Seamless Global satellite+terrestrial network to provide converged solutions to broadcasters.
- One stop shop for media distribution

Thank you

Mr. Gurvinder Chohan, QTSCINC, Canada

2 SPACE SOLITIONS

The right Space Partner
All the way from design to in-orbit operation and data delivery in order to let our clients concentrate on their business on Earth

Coverages Project FS02

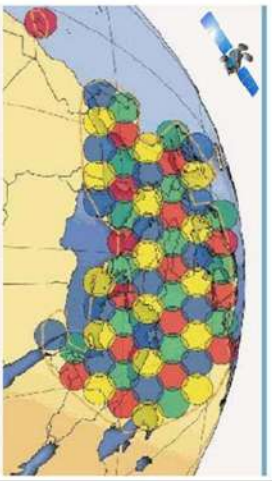
- Shown below is a distribution of the 64 User Beam spots
  - All spots shown have a 1 degree diameter, which includes the BPE (beam pointing error)
  - This distribution of spots is preliminary, and in particular 0.85 degree diameter including BPE is now being considered
  - The 4 or 3 color scheme

2 SPACE SOLITIONS

The right Space Partner
All the way from design to in-orbit operation and data delivery in order to let our clients concentrate on their business on Earth

Coverages FS02 Q/V Ka - 97gbps HTP

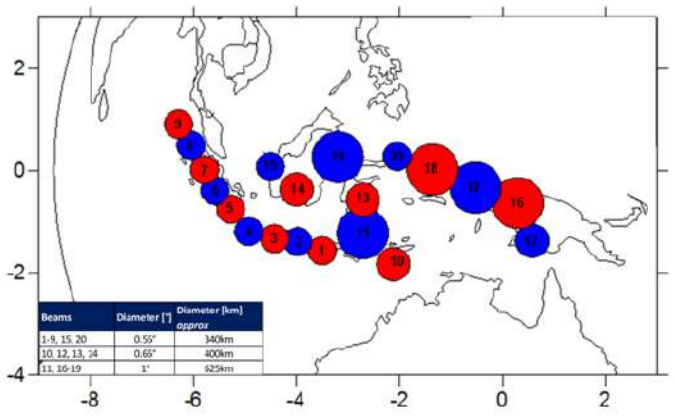
Application	GEO broadband communication solution based on proven space flight components along with long industrial experience and research knowledge.
Orbit	GEO
Total throughput	91Gbps (53044.5 Mbps FWD + 37726 Mbps RTN = 90.76 Gbps
Mass	1700 kg
Size	1.5 x 1.4 x 1.4M
Payload Power	4.0kW
Propulsion	Full Electric Propulsion System
Lifetime	Design Life 18 years (15 years EOL)
Launch Vehicle	F9, Ariane, Proton
Available	Scheduled launch Q1 2023
Return Link Capacity	• 2Mbps User Inbound used as baseline • 41d8/K G/T GWs • based on an average spectral efficiency of 3.4 bps/Hz
Link Capacity	• 1.2m 3W Enterprise Terminals • 2Mbps User Inbound used as baseline but range of rates are possible but will affect RTN link spectral efficiency • 7.2m 95dBW EIRP GWs
Features	64 Multibeam advance communication satellites based upon small satellite platform for lowest size, weight and power consumption; fully optimized.



2 SPACE SOLITIONS

The right Space Partner
All the way from design to in-orbit operation and data delivery in order to let our clients concentrate on their business on Earth

Coverages AN-05 Ka band 20 beams – 35gbps HTP



Beams	Diameter [°]	Diameter [km] approx
1-9, 15, 20	0.55°	340km
10, 12, 13, 14	0.65°	400km
11, 16-19	1°	625km

2 SPACE SOLITIONS

The right Space Partner
All the way from design to in-orbit operation and data delivery in order to let our clients concentrate on their business on Earth

Ku-Band Coverage - 95gbps HTP

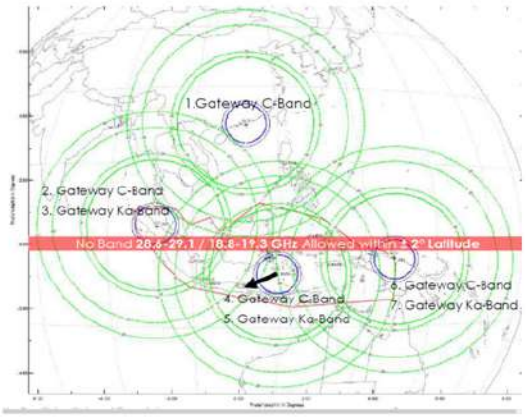
- Up to 64 spot beams covering Indonesia, Malaysia, the Philippines and Singapore.
- Spot sizes 1 degree diameter (including BPE).
- By centering the user antenna boresight, the maximum required beam scan is 4.8 deg.
  - As suggested in the coverage area shown below, out of the 64 spot beams:
    - 25 have both HP and VP downlink
    - 39 have only HP downlink
    - NOTE: the figure only shows 63 beams
      - 25 dual-pol, 38 HP D/L only

2 SPACE SOLITIONS

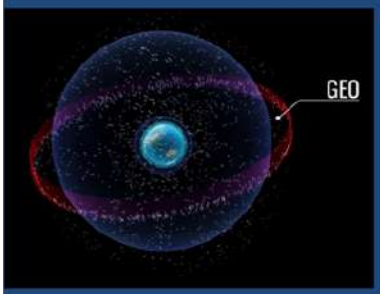
The right Space Partner
All the way from design to in-orbit operation and data delivery in order to let our clients concentrate on their business on Earth

C-Band and Ka-Band Gateway spots

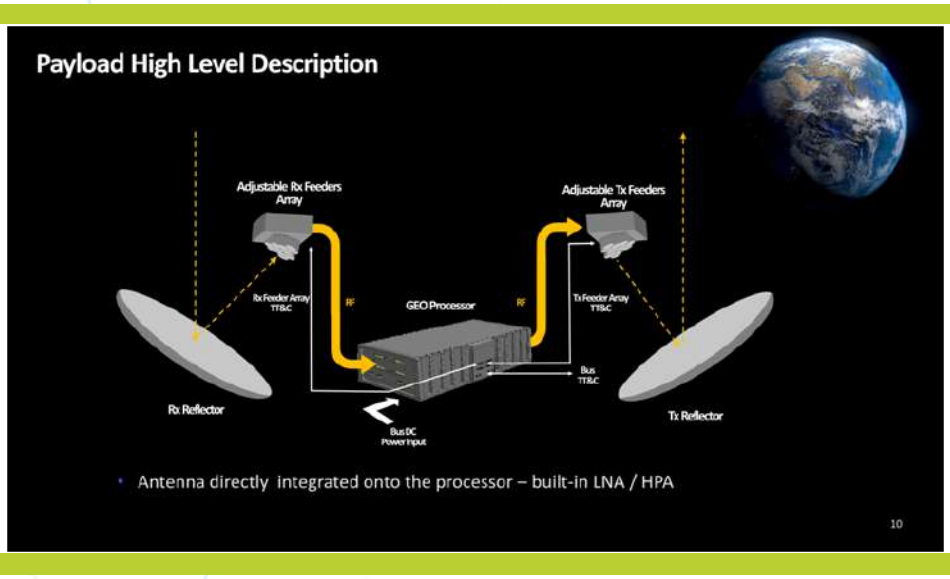
- 4 C-Band spots
  - 3.5 deg diameter
- 3 Ka-Band spots
  - 1 deg diameter
  - Optional

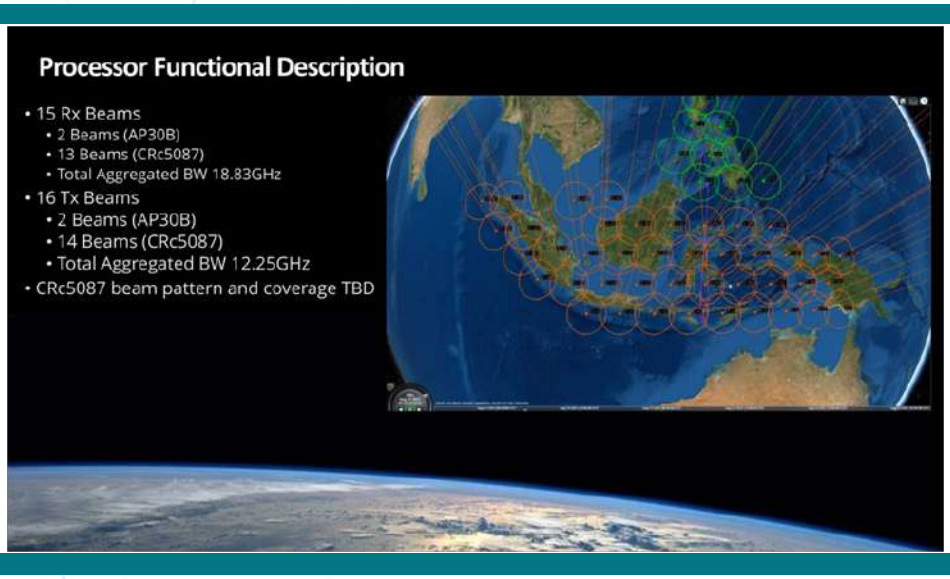


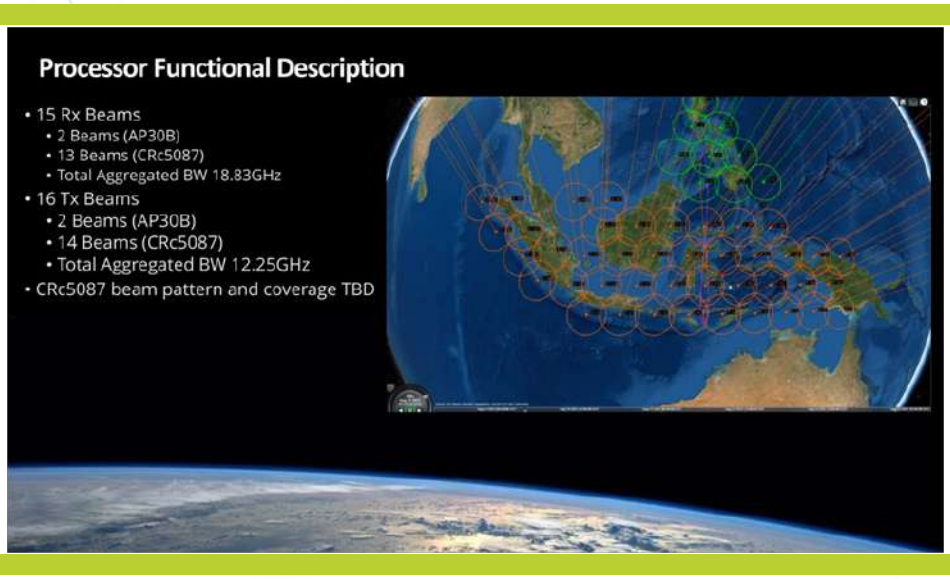
OBP FEATURES



- Channelization
  - Low power per processed BW
  - Scalable to 100's of GHz
  - 1MHz Sub-channel granularity
  - Polarization Multiplexing
- Beamforming
  - Channelized Beamforming
  - Scalable to over 100GHz
  - 1000's of simultaneous beams
- Regenerative Modem Stack
  - Full DVB-S2X/RCS2 Stack
  - DVB-S2X Beam-hoping
  - Scalable to 100's of Gbps
- Advanced Features
  - Spectral Analysis
  - Interference Mitigation
  - Geolocation
- Differentiation
  - Simple to Operate
  - Aggressive SWaP
  - Fully SW-defined
  - Fast Time to Market


Payload High Level Description
Adjustable Rx Feeders Array
Adjustable Tx Feeders Array
Rx Feeder Array TT&C
RF
GEO Processor
RF
Tx Feeder Array TT&C
Bus TT&C
Rx Reflector
Bus DC Power Input
Tx Reflector
Antenna directly integrated onto the processor – built-in LNA / HPA
10


Processor Functional Description
• 15 Rx Beams
• 2 Beams (AP30B)
• 13 Beams (CRc5087)
• Total Aggregated BW 18.83GHz
• 16 Tx Beams
• 2 Beams (AP30B)
• 14 Beams (CRc5087)
• Total Aggregated BW 12.25GHz
• CRc5087 beam pattern and coverage TBD


Processor Functional Description
• 15 Rx Beams
• 2 Beams (AP30B)
• 13 Beams (CRc5087)
• Total Aggregated BW 18.83GHz
• 16 Tx Beams
• 2 Beams (AP30B)
• 14 Beams (CRc5087)
• Total Aggregated BW 12.25GHz
• CRc5087 beam pattern and coverage TBD

2 SPACE SOLITIONS

The right Space Partner
All the way from design to in-orbit operation and data delivery in order to let our clients concentrate on their business on Earth

Ku-Band Coverage - 95gbps HTP

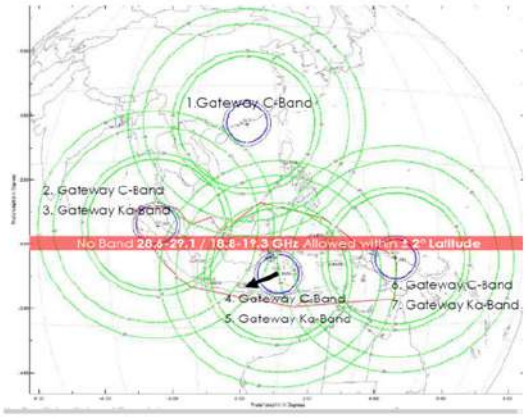
- Up to 64 spot beams covering Indonesia, Malaysia, the Philippines and Singapore.
- Spot sizes 1 degree diameter (including BPE).
- By centering the user antenna boresight, the maximum required beam scan is 4.8 deg.
- As suggested in the coverage area shown below, out of the 64 spot beams:
  - 25 have both HP and VP downlink
  - 39 have only HP downlink
  - NOTE: the figure only shows 63 beams
    - 25 dual-pol, 38 HP D/L only

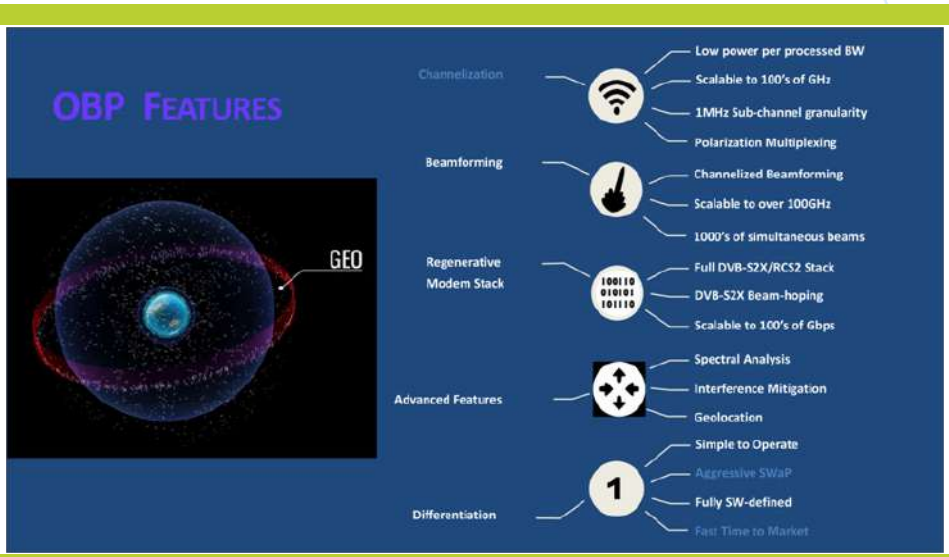
2 SPACE SOLITIONS

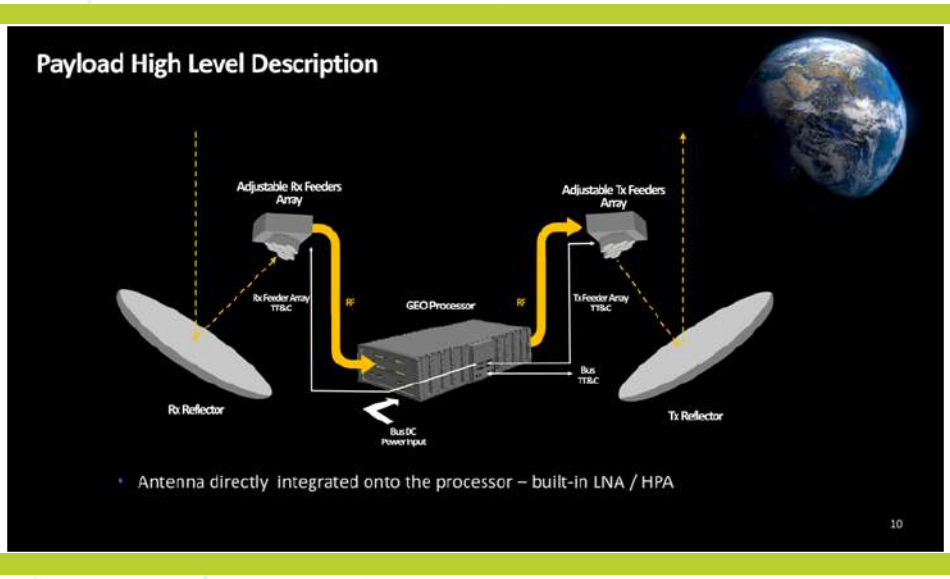
The right Space Partner
All the way from design to in-orbit operation and data delivery in order to let our clients concentrate on their business on Earth

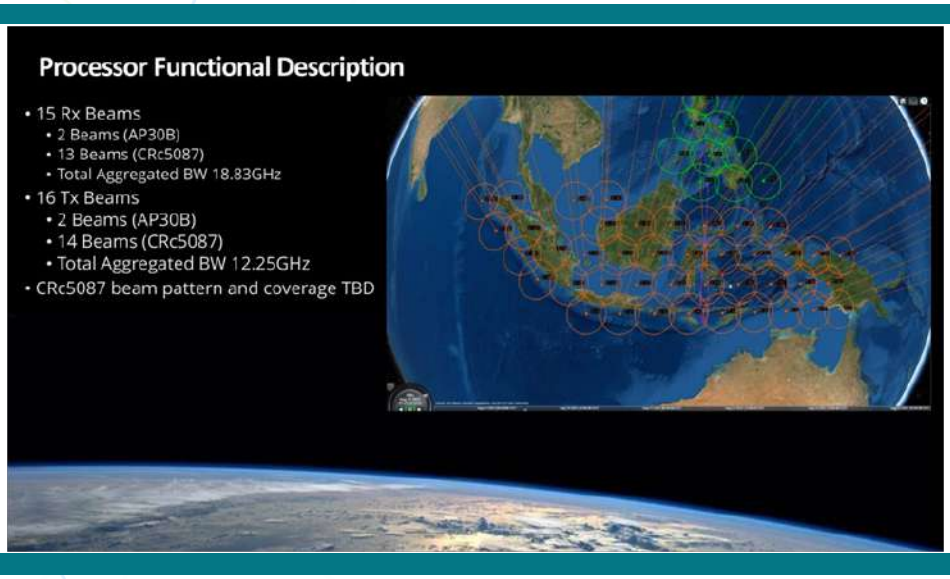
C-Band and Ka-Band Gateway spots

- 4 C-Band spots
  - 3.5 deg diameter
- 3 Ka-Band spots
  - 1 deg diameter
  - Optional






Payload High Level Description
Adjustable Rx Feeders Array
Adjustable Tx Feeders Array
Rx Feeder Array TT&C
RF
GEO Processor
RF
Tx Feeder Array TT&C
Bus TT&C
Rx Reflector
Bus DC Power Input
Tx Reflector
Antenna directly integrated onto the processor – built-in LNA / HPA
10


Processor Functional Description
• 15 Rx Beams
• 2 Beams (AP30B)
• 13 Beams (CRc5087)
• Total Aggregated BW 18.83GHz
• 16 Tx Beams
• 2 Beams (AP30B)
• 14 Beams (CRc5087)
• Total Aggregated BW 12.25GHz
• CRc5087 beam pattern and coverage TBD


THANK YOU
Qstc
QSTC INC.
300 Joseph Carrier,
Vaudreuil Dorion Qc.
J7V 5V5 Canada
Email: info@qstc.space
Toll Free: 1 514-375 1098
https://www.qstc.space/

DAY 3

SESSION 6- WRC-23: IMPACT ON INDIAN REGULATORY FRAMEWORK

Mr. MK Patnaik, Senior Deputy Wireless Advisor, WPC, GoI

28th International Conference & Exhibition on Broadcast & Media Technology – BES EXPO 2023, 15-17 February 2024, New Delhi

WRC-23: Impact on Indian Regulatory Framework.

M K Pattanaik, Sr. DWA (ISR Group)
Wireless Planning and Coordination Wing
Department of Telecommunication
20 Ashoka Road, New Delhi 110 001

Outline:

1. World Radio Conferences and WRC-23: A Brief overview
2. Main Objective of WRC meetings/ The Radio Regulations
3. Preparation for WRC meetings
4. The Working Parties of ITU-R
5. WRC-23 outcomes that have an impact on Broadcasting services.
6. The mandate of the study under Agenda item 1.5
7. Output of the WRC on AI 1.5
8. 470-694 MHz frequency band and its uses
9. WRC-23 decisions (WRC-23 decisions)
10. Analysis of WRC 23 output on 1.5
11. A point to consider
12. The WRC decision on AI 1.10 (Agenda Item for WRC 27)

1. World Radio Conferences and WRC-23: A Brief overview

1) are the Apex meeting of the ITU- (Radiocommunication) Sector
2) held approximately in every 04 years for a period of about 04 weeks.
3) The recent-most WRC was held in Dubai in from 20th November to 15th December 2023.
4) About 3900 delegates from 163 countries participated in WRC-23
5) not just an obscure, tech-centric event; it's where the realms of global markets and geopolitical strategies intersect, impacting civil society in significant ways.
6) WRC discussions become arenas where countries and corporations compete for global influence.
7) This is because access to specific spectrum bands and orbits translates to market dominance – and;
8) decisions made can shape who leads in various technological sectors, directly impacting market shares and economic influence, at times at the expense of societal and human rights considerations.

2. Main Objective of WRC meetings/ The Radio Regulations

1) To decide how new spectrum demand owing to technological advances can be accommodated into a global radio regulatory framework governed by the Radio Regulations or in brief the RR
2) Radio Regulations is an international treaty and is binding in nature on its member countries.
3) RR contain regulatory provisions to make coexistence among various radiocommunication services possible- services : can be terrestrial-based or satellite-based.
4) regulatory provisions in the RR broadly serves the purpose to ensure that specific use of a frequency band by one country does not prohibit another country to use the same frequency bands,
5) which is generally a neighboring country for terrestrial services. For satellite services, the coexistence must be ensured among countries that are even far apart. This is due to the global nature of the satellite emission.
6) The WRC decisions are taken by consensus

3. Preparation for WRC meetings

1) Preparation for a WRC starts many years in advance. For certain topics proposals are considered as much as 8 years in advance. However, the agenda for a WRC is finalized only at its preceding WRC.
2) Agenda items are studied by the ITU-R members: which are of few kinds: the Member States, Sector Members, Associate Members and Academia, Regionla Telecom Organisation.
3) For example, India is one of the member States of ITU, ITU-APT foundation of India is a Regional Telecom Organisation Member, COAI is a Telecom operator (industry), and IIT Hyderabad is an academia member.
4) The studies on specific agenda items are carried out by the member organisations, i.e. Sector members, academia, Telecom operators.
5) The Results of the studies are discussed at the Working Party level and are finalized at the Study Group level.
6) The studies are discussed at the WRC where the differences are resolved and agreement is reached on the technical, operational and Regulatory conditions for the new service or use
7) Finally, the Radio Regulation is amended to include such changes as are agreed by consensum in the WRC.

4. The Working Parties

1) 06 study Groups, SG-1 (Spectrum management), SG-3 (Radio Wave propagation, SG-4 (satellite communication), SG-6 (Broadcasting services), etc.
2) Each Study Group is further divided into a few Working Parties, which carries out studies in specific area

❑ Study Group 6 (Terrestrial Broadcasting Service)
- Working Party 6A (WP 6A) - Terrestrial broadcasting delivery
- Working Party 6B (WP 6B) - Broadcast service assembly and access
- Working Party 6C (WP 6C) - Programme production and quality assessment.

❑ Study Group 4 (Satellite Services)
- Working Party 4A (WP 4A) - Efficient orbit/spectrum utilization for FSS and BSS
- Working Party 4B (WP 4B) - Systems, air interfaces, performance and availability objectives for FSS, BSS and MSS, including IP-based applications and satellite news gathering
- Working Party 4C (WP 4C) - Efficient orbit/spectrum utilization for MSS and RDSS

5. WRC-23 outcomes that have an impact on Broadcasting services.

WPC 23 dealt with two important outcomes having implication for the Broadcasting Services.

- First was under an Agenda Items 1.5 where the spectrum needs in the 470-694 MHz in ITU-R Region-1 was reviewed. This was dealt by Working Party 6A under Study Group 6

- The second was under Agenda Item 10 where the agenda item for WRC-27 was finalized. The agenda item for WRC 27 will study the possibility of a new BSS allocation in the 17.3-17.7 GHz.

6. The mandate of the study under Agenda item 1.5

1) To review the spectrum use and study the spectrum needs of existing services within the frequency band 470-960 MHz in Region 1, in particular the spectrum requirements of the broadcasting and mobile, except aeronautical mobile, services

2) to carry out sharing and compatibility studies, as appropriate, in the frequency band 470-694 MHz in Region 1 between the broadcasting and mobile, except aeronautical mobile, services

3) to conduct sharing and compatibility studies, as appropriate, in order to provide relevant protection of systems of other existing services,

7. Output of the WRC on AI 1.5

1) Initially this was considered a straightforward agenda item discussions. However, it was realized that the subject was much more complicated than expected and this was among the last to be finalized.
2) Some countries wanted a primary allocation to Mobile services. This was however opposed by several other countries who believed that use of this frequency band for Mobile services under a primary allocation will cause radio interference for existing uses (services) in other countries.
3) As a result, only a "secondary allocation" to Mobile Services in this band was agreed. Two footnotes for a secondary allocation to Mobile Services in some countries were added to the RR.
4) A secondary allocation means that the new service can neither cause interference to or claim protection from Broadcasting services, the later having a primary allocation in this band. In other words they can deploy Mobile services in a localized manner and avoid deployment of mobile services along the international border. One of the footnote makes specific mention of PMSE use as the only use case for the secondary service.
5) The Broadcasting services continue to remain the only Primary allocation in the 470-694 MHz in Region 1.
6) The situation will be reviewed after 08 years in 2031.

Allocation to services		
Region 1	Region 2	Region 3
470-694	470-512	470-585
BROADCASTING	BROADCASTING	FIXED
	Fixed	MOBILE 5.296A
	Mobile	BROADCASTING
	5.292 5.293 5.295	
	512-608	5.291 5.298
	BROADCASTING	585-610
	5.295 5.297	FIXED
	608-614	MOBILE 5.296A
	RADIO ASTRONOMY	BROADCASTING
5.149 5.291A 5.294 5.296	Mobile-satellite except	RADIONAVIGATION
5.300 5.304 5.306 5.312	aeronautical mobile-satellite	5.149 5.305 5.306 5.307
	(Earth-to-space)	

8. 470-694 MHz frequency band and its uses

1. Unlike in Region 1, where Broadcasting is the only primary allocation in the frequency range, in Region 3, this band also has a primary allocation to the MOBILE Services.
2. Hence, there will always be a demand to use this band for Mobile services considering that this band gives wide coverage, a characteristic which holds equally true for both broadcasting and mobile operations.
3. However, in the context of Broadcasting this is both for urban and rural areas, for Mobile services this is true mainly in rural areas, and in fact may not be good for cities.
4. There is another perspective to broadcasting that is PMSE.
5. The importance of PMSE in today's life in cities does not meet the eye easily. When we witness a cricket match, when major events like G20, or Asiad and Olympics, PMSE is an important medium for communication and coordination
6. But PMSE can coexist with broadcasting. It can not coexist with large scale deployment of Mobile services, such as IMT

9. WRC-23 decisions (footnotes)

MOD 5.296 Additional allocation: in ....., the frequency band 470-694 MHz is also allocated on a secondary basis to the land mobile service, intended for applications ancillary to broadcasting and programme-making. Stations of the land mobile service in the countries listed in this footnote shall not cause harmful interference to existing or planned stations operating in accordance with the Table in countries other than those listed in this footnote. (WRC-23)

5.15A Additional allocation: the frequency band 470- 694 MHz is allocated to the mobile, except aeronautical mobile, service on a secondary basis ..... For the protection of the broadcasting service, stations in the mobile service shall not create a field strength for more than 1% of the time at the highest of the clutter height or 10 m above ground level at the border of the territory of any other administration that exceeds the field strength value as calculated using § 4.1.3.2 of Annex 2 to the GE06 Agreement ....

10. Analysis of WRC 23 output on 1.5

1) A secondary allocation is not ideal for services that have wide scale and large medium power applications, such as High power Television Broadcasting or IMT.
2) But secondary allocations are ideal for applications that have small coverage area (e.g Community Radio Stations, or that need small scale deployment, e.g. private 5G networks.
3) Several countries in Europe and Africa are using this band for terrestrial television.
4) In addition, in many countries especially in Europe, and Americas this band is also used for Programmed Making and Special Events (PMSE); Low Power PMSE and Broadcasting services were able to coexist.
5) These countries have a strong tradition of street music, cultural shows, sports, and they attach much importance to such activities. Folk music and performing arts and other cultural events are popular medium of education, entertainment and way of building social capital among the citizen.
6) Our country is also culturally very rich and keep tremendous interest in sports. Cutting across regions, several street shows are organized in a grand manner, and in addition to renowned Indian artists, artists from other parts of the world also perform in such socio-cultural programs. Further, India has been organizing sports events in Kabaddi, cricket, football and hockey, where PMSE is necessary for the organizers

11. A point to ponder

- In India, the existing policy for the frequency band 470-698 MHz (also called 600 MHz frequency band is as follows
  - 470- 526 MHz will be used for terrestrial TV
  - 526-582 MHz Existing TV stations operating in the frequency band will be grandfathered.
  - 582-698 MHz frequency band will be used for IMT
  - As per ITU Recommendation BT.2302-1, for Region-1 single layer Digital TV broadcast needs about 60 MHz spectrum.
  - The lower part of the band need larger antennas at customer's end.
  - The Direct to Mobile broadcast service can use this band and can coexist with PMSE
- So, participants are encouraged to interpret the above information and derive their own conclusion on what could be a good way forward for this frequency band

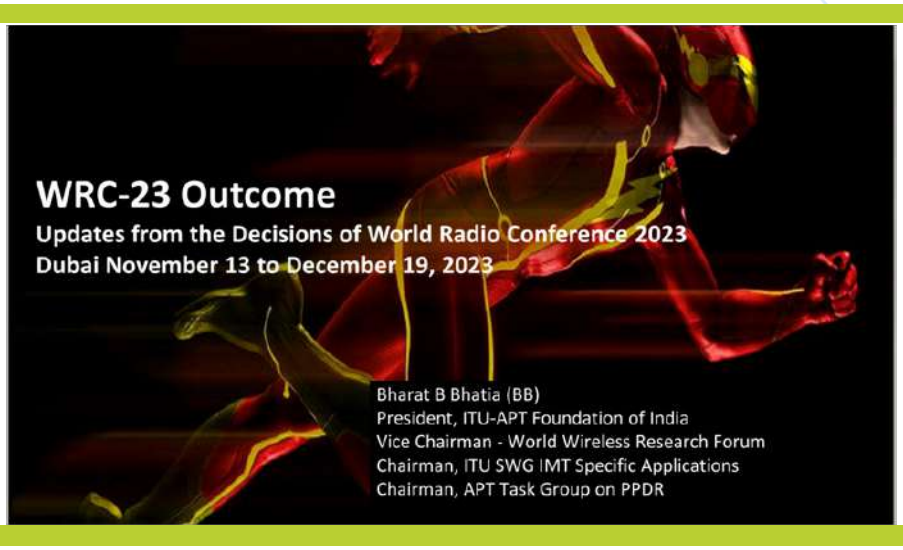
12. The implications of decision on AI 1.10

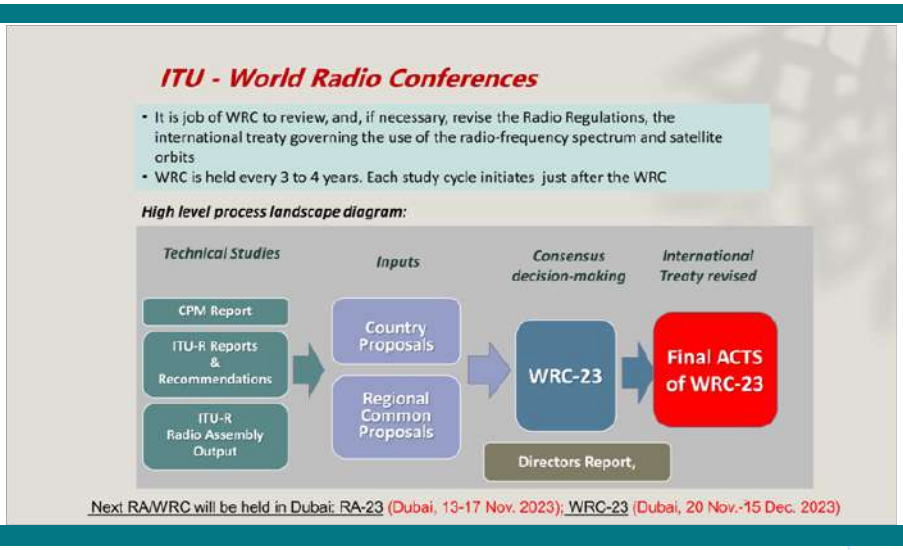
- WRC Agenda Item 10 decided on the agenda items for WRC-27
- Under AI 1.4, WRC-27 will consider a new allocation to BSS in the Frequency Band 17.3-17.8 GHz
- In India, our own BSS capacity is very limited.
- The DTH operates are using the FSS bands to provide services, which is not ideal.
- This has a potential to create shortage for FSS applications, which, among others, support important activities as backhaul for TSPs
- The New Space Policy has opened up new possibilities for private participation in creating satellite-based capacity.
- This can provide a sustainable solution for Linear TV market.
- WRC-23 also decided to allot orbital slots to many countries who until now did not have BSS orbital resources under Planned Band. (Appendix 30 of the Radio Regulation)
- Looking at the number of filings by several countries, affluent as well as not-so-affluent countries, the interest in BSS doesn't seem to be declining.
- Can Indian Broadcasting sector look into the crystal ball and plan its future accordingly?

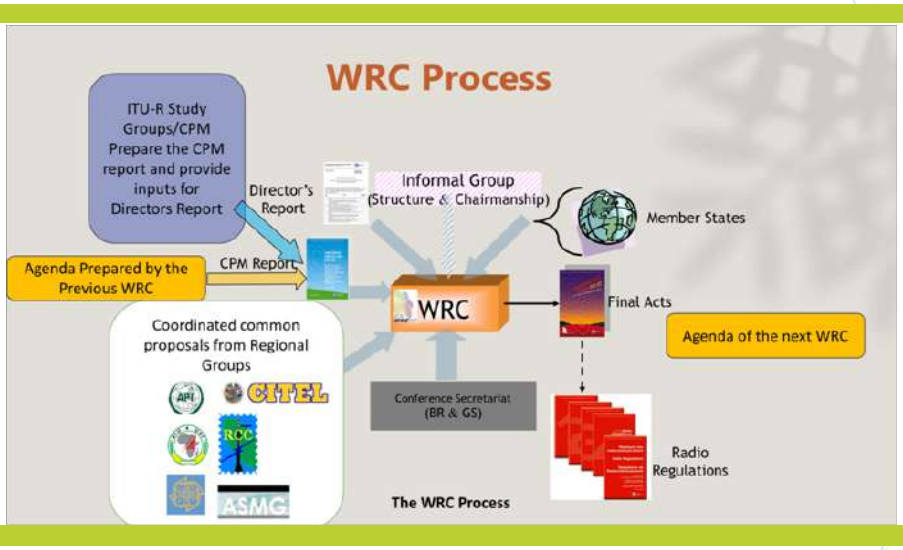
Thank you for your attention

Any Questions?

Mr. Bharat B Bhatia, President, ITU-APT Foundation of India







- ✓ WRC-23 was held in UAE-Dubai from 13 Nov. to 19 Dec. 2023

  RA-23 (Dubai, 13-17 Nov. 2023);
  WRC-23 (Dubai, 20 Nov.-15 Dec. 2023;
  CPM-27-1 (Dubai,18 -19 Dec. 2023)

  Simultaneous work in six languages - English, French, Arabic, Chinese, Russian, and Spanish

  4500 participants

  22% women participants (up 4% from Previous conference in 2019

WRC-23 had 19 specific agenda items and 6 standing Agenda items (2,4,7,8,9,10)

Chapter of CPM Report	Assigned Agenda Items
WP1: Fixed, Mobile and Broadcasting Issues	1.1, 1.2, 1.3, 1.4,1.5, 9.1 (c), RR 21.5 (Doc.550)
WP2: Aeronautical and Maritime Issues	1.6, 1.7, 1.8, 1.9, 1.10, 1.11 Res.427
WP3: Science Issues	1.12, 1.13, 1.14, 9.1 a) , d) and WRC-19 Doc.573
WP4: Satellite Issues	1.15, 1.16, 1.17, 1.18, 1.19 & 7
WP5: General Issues	2, 4, 8, 9.1 b), and 10

WRC-23 recognized that Wireless Communications Services will continue to need more and more spectrum

Band (MHz)	600-960 MHz	1.4 GHz, 2GHz, 2.5 GHz	3-4 GHz	4.4 - 6 GHz	6-15.35 GHz	26 GHz	40,50, 60 GHz
4G/5G	700, 800, 900 MHz	1700-2690 MHz	3300-3700 MHz	4.4 - 4.95 GHz		26 GHz	40 GHz
6G	600-960 MHz	1700-2690 MHz	3300-3700 MHz	4.4- 4.8 GHz	7-8 GHz 14.8-15.35 GHz	26 GHz	40. 50, 60 GHz
Wi-Fi		2.4 GHz		5 GHz	6 GHz		60-70 GHz (V band)

WRC agenda on opening the UHF Broadcast spectrum in Europe for 5G was the most controversial

- ✓ WRC-23 Agenda Item 1.5 was to open parts of 470-960 MHz UHF band in ITU Region 1 – which includes Europe, Middle east and African Region was the most difficult agenda of the WRC
- ✓ The discussions occupied many late-night sessions and was the last to resolve.
- ✓ Finally, the main decision was pushed to 2031
  - ✓ 470-694 MHz retains the primary allocation to the Broadcasting Service but there are 6 footnotes allowing some form of 4G-5G services in various countries with restrictions
  - ✓ Equal opportunity to PMSE and Land Mobile service, both as secondary
  - ✓ Coordination with neighbouring countries

WRC-23 decided to open many new frequency bands for 4G/5G/6G

- ✓ WRC-23 identified new frequency bands for International Mobile Telecommunications (IMT), which will be crucial for expanding broadband connectivity and mobile services in various countries and regions.(IMT is the ITU word for 4G, 5G and, in the future, 6G communications)

3 300-3 400 MHz	**4 800-4 990 MHz (with power limits)**
3 600-3 800 MHz	**6 425-7 125 MHz (in Region 1)**

- ✓ The WRC also recognised the use of 6425 to 7125 MHz for wireless access and RLANS in the Radio Regulation table of frequency allocations for the first time.
- ✓ These are in addition to the 5 new bands that were identified for 5G in mm wave bands above 24 GHz at WRC-19:
  - ✓ 24.25-27.5 GHz (26 GHz), 37-43.5 GHz (40 GHz), 45.5-47 GHz & 47.2-48.2 (50 GHz) and 66-71 GHz for IMT (70 GHz)

WRC-23 also opened many frequency bands for IMT base stations based on High Altitude Platfors

- ✓ WRC-23 also identified a number of IMT bands below 2.7 GHz for use of high-altitude platform stations for IMT base stations (HIBS) and established regulations for their operations. It offers a new platform to provide mobile broadband using the same frequencies and devices as IMT mobile networks. HIBS can contribute to bridging the digital divide in remote and rural areas and maintain connectivity during disasters.

WRC-23 directed new studies to consider many new frequency bands for 6G at WRC-27

- ✓ WRC-23 also approved new studies for identification of IMT for 4G, 5G and 6G at WRC-27 in
  - ❖ 4.4-4.8 GHz,
  - ❖ 7-8 GHz and
  - ❖ 14.8-15.35 GHz
- ✓ These studies will target for additional 2 GHz mid band spectrum for IMT at WRC-27 in time for rollout of 6G technologies
- ✓ WRC-23 also approved new studies for satellites to have direct connectivity with mobile phones in UHF bands between 700 MHz and 2700 MHz. These studies will lead to use of NGSO satellites to connect directly with ground based mobile terminals using IMT technology

WRC-23 decisions on Satellites support ubiquitous connectivity
including increased spectrum access for mobile connectivity on sea, air and ground

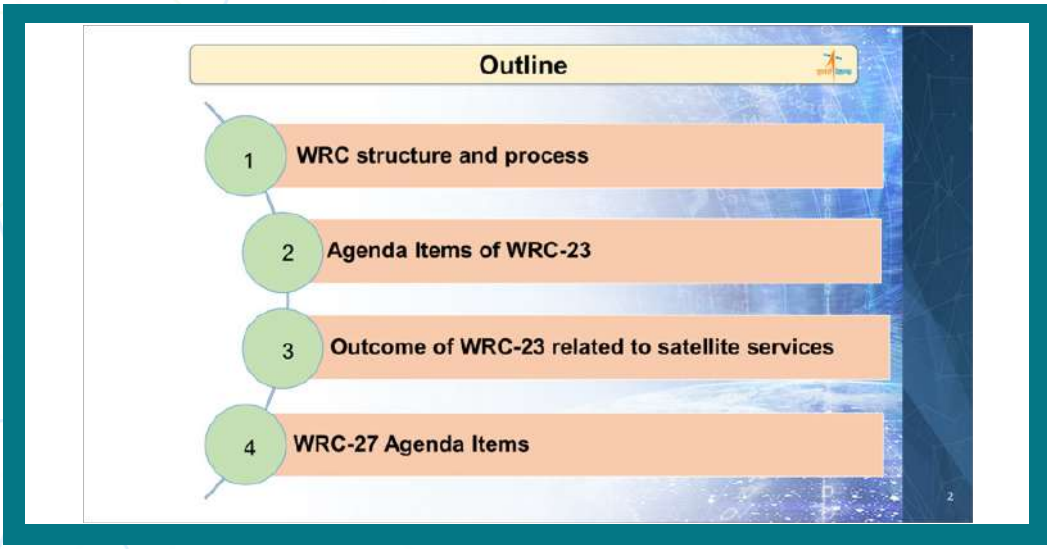
- ✓ WRC-23 permitted NGSO Earth Stations in Motion (ESIMs) to use new frequencies to deliver high-speed broadband on-board aircraft, vessels, trains, and vehicles. These satellite services are also critical during disasters where local communication infrastructure is damaged or destroyed.
- ✓ WRC-23 took regulatory actions including the implementation of e-navigation systems to enhance distress and safety communications at sea to support the modernization of the Global Maritime Distress and Safety System (GMDSS)
- ✓ WRC-23 also laid down spectrum rules for direct wireless and optical connections between NGSO satellites
- ✓ WRC-23 also streamlined the rules for NGSO satellites to maintain their stations within prescribed limits

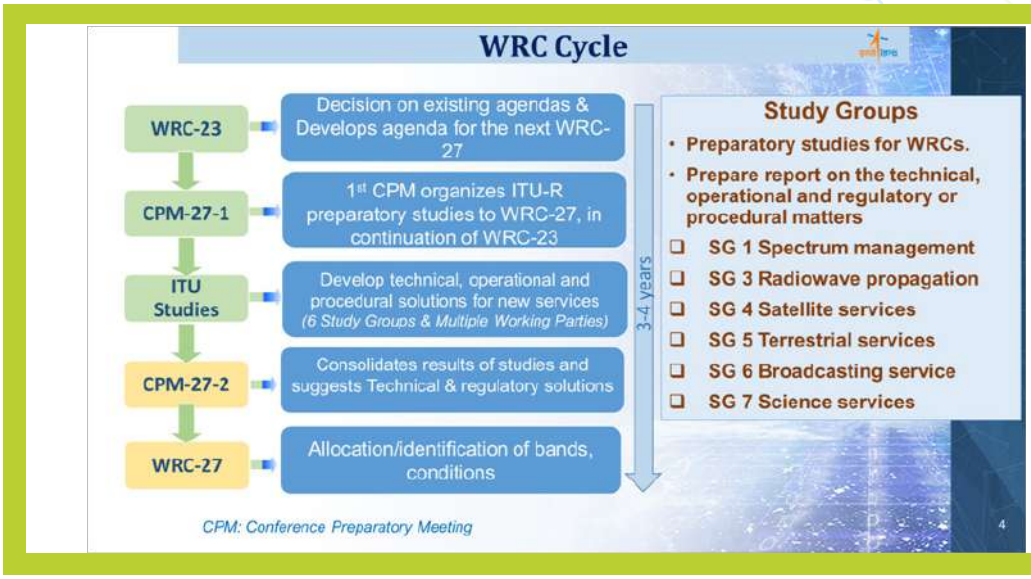
WRC-23 decisions on Satellites support ubiquitous connectivity
including increased spectrum access for mobile connectivity on sea, air and ground

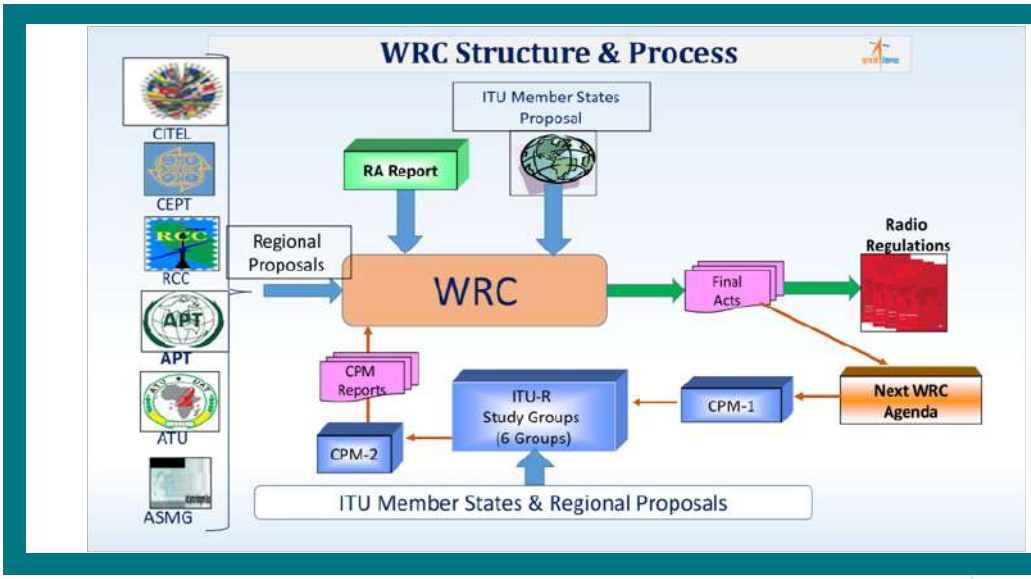
- ✓ WRC-23 decided to protect ship and aircraft mobile service stations located in international airspace and waters from other stations within national territories. WRC-23 also allocated new frequencies to the aviation industry for aeronautical mobile satellite services (117.975-137 MHz).
- ✓ WRC-23 agreed to allocate additional frequencies for passive Earth exploration satellite services to enable advanced ice cloud measurements for better weather forecasting and climate monitoring.
- ✓ WRC-23 agreed for the importance of space weather observation to recognize the operation of space weather sensors as part of the meteorological aid service to observe space weather phenomena including solar flares, solar radiation and geomagnetic storms which can interfere with radio-communication services including satellites, mobile phone services and navigation systems.

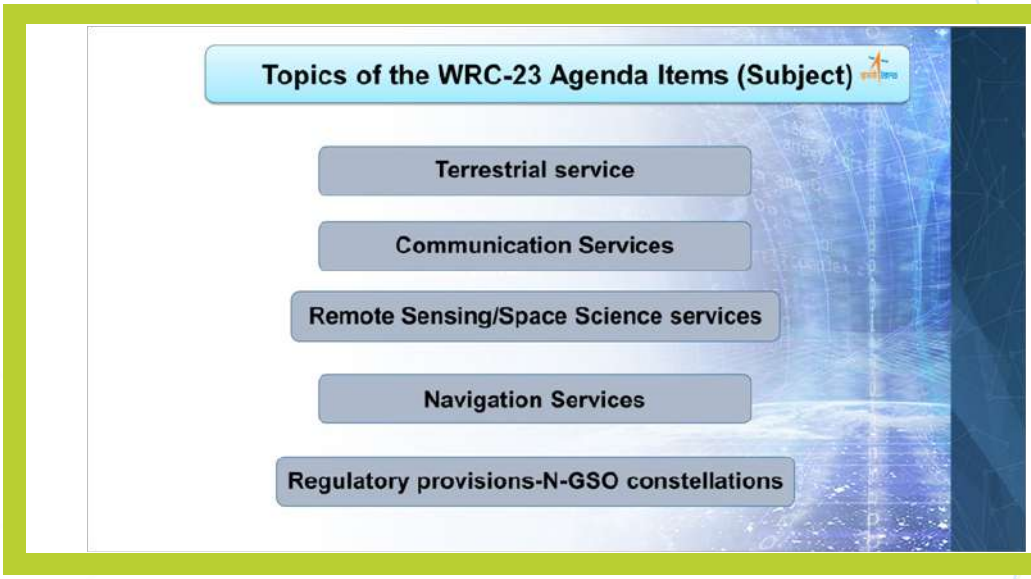

THANK
YOU
Bharat.Bhatia@itu-apt.org

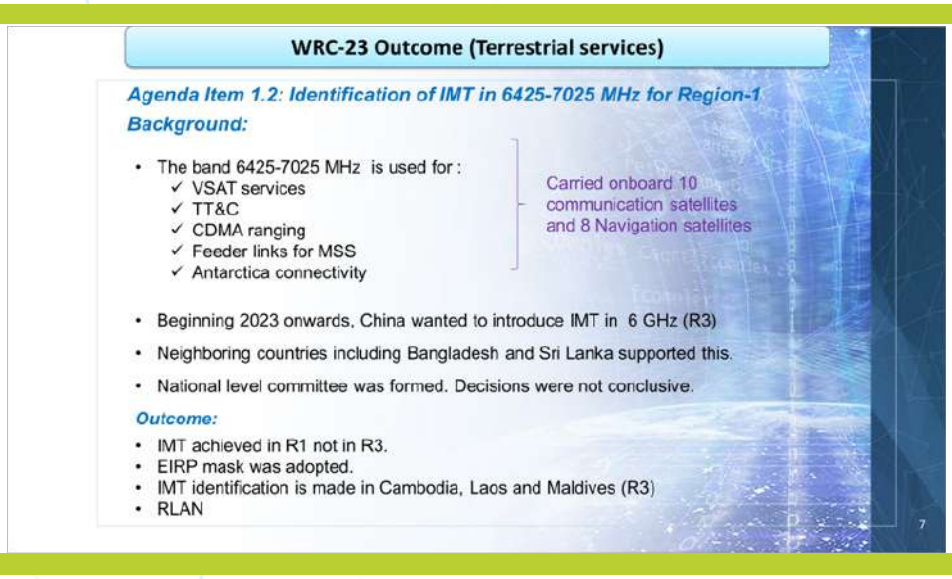
Mr. H. Rayappa, Director, Satcom, ISRO HQ

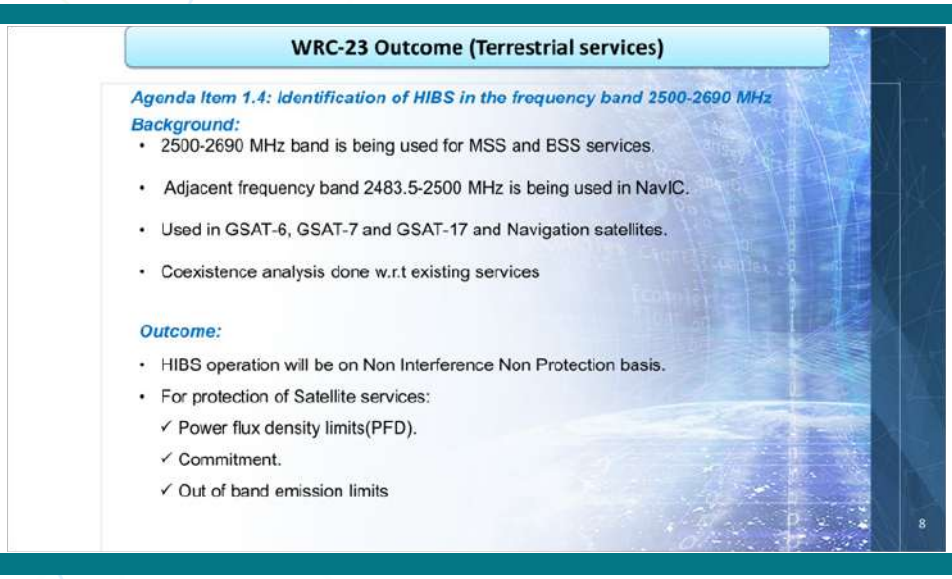


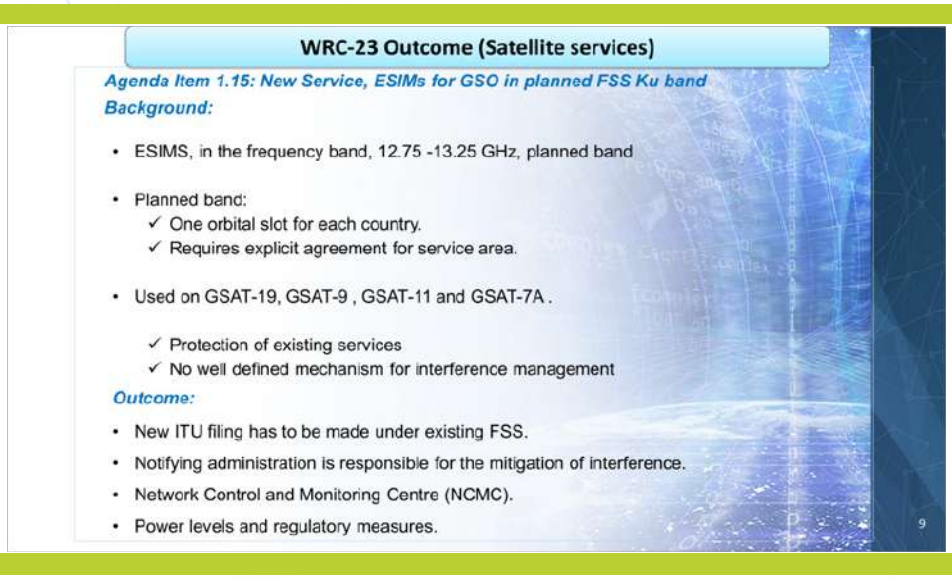

WRC Cycle
WRC-23
Decision on existing agendas & Develops agenda for the next WRC-27
CPM-27-1
1st CPM organizes ITU-R preparatory studies to WRC-27, in continuation of WRC-23
ITU Studies
Develop technical, operational and procedural solutions for new services
(6 Study Groups & Multiple Working Parties)
CPM-27-2
Consolidates results of studies and suggests Technical & regulatory solutions
WRC-27
Allocation/identification of bands, conditions
3-4 years
Study Groups
Preparatory studies for WRCs.
Prepare report on the technical, operational and regulatory or procedural matters
SG 1 Spectrum management
SG 3 Radiowave propagation
SG 4 Satellite services
SG 5 Terrestrial services
SG 6 Broadcasting service
SG 7 Science services
CPM: Conference Preparatory Meeting
4


WRC Structure & Process
CITEL
CEPT
RCC
APT
ATU
ASMG
ITU Member States Proposal
RA Report
Regional Proposals
WRC
Final Acts
Radio Regulations
CPM Reports
ITU-R Study Groups (6 Groups)
CPM-1
Next WRC Agenda
CPM-2
ITU Member States & Regional Proposals


Topics of the WRC-23 Agenda Items (Subject)
Terrestrial service
Communication Services
Remote Sensing/Space Science services
Navigation Services
Regulatory provisions-N-GSO constellations


WRC-23 Outcome (Terrestrial services)
Agenda Item 1.2: Identification of IMT in 6425-7025 MHz for Region-1
Background:
The band 6425-7025 MHz is used for :
✓ VSAT services
✓ TT&C
✓ CDMA ranging
✓ Feeder links for MSS
✓ Antarctica connectivity
Carried onboard 10 communication satellites and 8 Navigation satellites
Beginning 2023 onwards, China wanted to introduce IMT in 6 GHz (R3)
Neighboring countries including Bangladesh and Sri Lanka supported this.
National level committee was formed. Decisions were not conclusive.
Outcome:
IMT achieved in R1 not in R3.
EIRP mask was adopted.
IMT identification is made in Cambodia, Laos and Maldives (R3)
RLAN
7


WRC-23 Outcome (Terrestrial services)
Agenda Item 1.4: Identification of HIBS in the frequency band 2500-2690 MHz
Background:
2500-2690 MHz band is being used for MSS and BSS services.
Adjacent frequency band 2483.5-2500 MHz is being used in NavIC.
Used in GSAT-6, GSAT-7 and GSAT-17 and Navigation satellites.
Coexistence analysis done w.r.t existing services
Outcome:
HIBS operation will be on Non Interference Non Protection basis.
For protection of Satellite services:
✓ Power flux density limits(PFD).
✓ Commitment.
✓ Out of band emission limits
8


WRC-23 Outcome (Satellite services)
Agenda Item 1.15: New Service, ESIMs for GSO in planned FSS Ku band
Background:
ESIMS, in the frequency band, 12.75 -13.25 GHz, planned band
Planned band:
✓ One orbital slot for each country.
✓ Requires explicit agreement for service area.
Used on GSAT-19, GSAT-9 , GSAT-11 and GSAT-7A .
✓ Protection of existing services
✓ No well defined mechanism for interference management
Outcome:
New ITU filing has to be made under existing FSS.
Notifying administration is responsible for the mitigation of interference.
Network Control and Monitoring Centre (NCMC).
Power levels and regulatory measures.
9

WRC-23 Outcome (Satellite services)

Agenda Item 1.16: New Service, ESIMs for N-GSO in Ka band

Background:

- ESIMs, in Ka band for N-GSO (Full Band).
- Previous WRC's identified ESIMs for GSO's in Ka band.
- Protection of other incumbent services like GSO and terrestrial services.
- Interference monitoring considering the dynamic nature of satellites and mobile nature of terminals
- Frequency band used on GSAT-19, GSAT-9 , GSAT-11 and GSAT-7A .

Outcome:

- New ITU filing has to be made under existing FSS.
- Notifying administration is responsible for the mitigation of interference.
- Network Control and Monitoring Centre (NCMC).
- Power levels and regulatory measures.

10

WRC-23 Outcome (Space Science and Navigation services)

Space Science Services

Agenda Item 1.13: **Identification of frequency band 14.8-15.35 GHz for Space research.**

Background:

- S, X and Ka band are currently used.
- In Ku band, there is no allocation for space science missions.
- Protection of existing services in adjacent band.

Outcome:

- Allocated for near earth space research missions (<2m Km), not for deep space.
- Identified for IMT study, in WRC-27

12

WRC-23 Outcome (Regulatory measures)

Agenda Item 7: Mega constellations in N-GSO

Background:

- Current regulations does not address the specifics of this.
- Orbital tolerance has to be evolved.
- Regulatory mechanism to adopt when there is a reduction in the number of satellites.
- Suitability of current EPFD values from N-GSO for protection of GSO satellites.

Outcome:

- No discussion on Space sustainability.
- Orbital tolerance values are specified for orbital altitude lower than 2000 Kms (70Km, 2deg i) and greater than 2000 Kms (5-10% of the altitude, 3-4 deg i).
- Formula based approach adopted to report the constellation size to ITU
- No regulatory changes to alter the existing EPFD. However resolves to further studies.

13

WRC-27 –Main Agenda Items

AI	Details
1.1	A-ESIM & M-ESIM in Q & V Band
1.2	Allow the use of smaller antenna sizes in the frequency band 13.75-14 GHz .
1.4	New allocation to FSS in 17.3-17.7 GHz and BSS in 17.3-17.8 GHz in Region 3,
1.5	Regulatory measures, to limit the unauthorized operations of non-geostationary-satellite orbit (non-GSO) earth stations in FSS and MSS
1.7	Use of **IMT in the frequency bands 4 400-4 800 MHz, 7 125-8 400 MHz and 14.8-15.35 GHz**

AI	Details
1.10	Regulatory provisions for FSS,MSS& BSS in E-Band (71-76 & 81-86GHz)
1.11	ISL in L and S-band 1 518-1 544 MHz, 1545-1559 MHz, 1610-1645.5 MHz, 1646.5-1660 MHz, 1670-1675 MHz and **2483.5-2 500 MHz**
1.13	Direct connectivity between Mobile to Satellite in the frequency **range between 694/698 MHz and 2.7 GHz**
1.15	New allocations, for communications on the lunar surface and between lunar orbit and the lunar surface

14

Impact on Indian Regulatory Framework

WRC-23 :

- ***Indian Broadcast sector is not impacted at present***
- ***Growing global pressures for identifying C-band for IMT***
- ***Ku and Ka being exploited by HTS and NGSOs, including ESIMs***
- ***BSS has potential to address the Broadcast industry – In India used less***
  - ***Indian Space Policy enables***

WRC-27 : Look out

- ***BSS in the Frequency Band 17.3- 17.8 GHz***
- ***New studies of direct to device in 694/698 MHz to 2.7 GHz will enable new communication capabilities.***
- ***Regulatory provisions for FSS,MSS& BSS in E-Band (71-76 & 81-86GHz), embracing new bands – ecosystem to develop.***

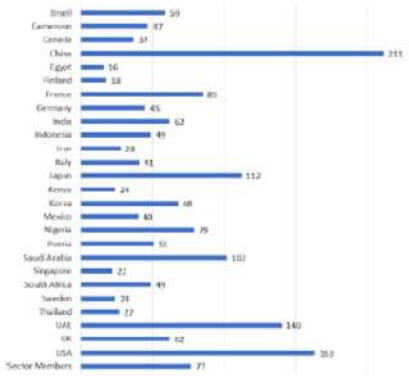
Thank you for your attention

Mr. Jitendra Singh, Director, Qualcomm

World Radiocommunication Conference (WRC-23)

Statistics of WRC-23 Participants

Number of Some Administrations' Delegates



HoD Indian Delegation

- Telecom Secretary
- Wireless Advisor
- Member Technology
- Member Finance

WRC-23 Outcome

The global treaty governing the use of the radio frequency spectrum, both on Earth and in space

Final Acts

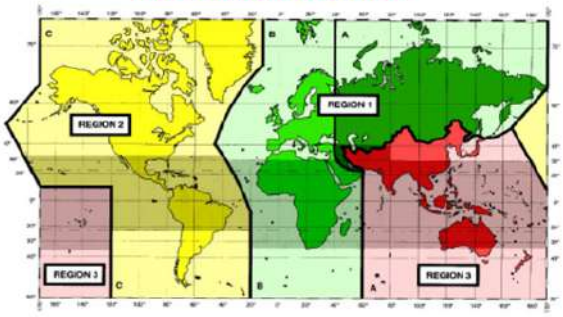
- The Final Acts are the "output" document of the Conference.
- A total of 151 Member States signed the WRC-23 Final Acts.
- The Final Acts constitute a record of the decisions taken at the conference including both the new and revised provisions of the Radio Regulations, all Appendices, and the new and revised Resolutions and ITU-R Recommendations incorporated by reference into the treaty by the conference.

Radio Regulations 2024

- The international treaty on the use of radio spectrum and satellite orbits
- The New RR will be published end 2024

Spectrum Harmonization

RR: WORLD REGIONS

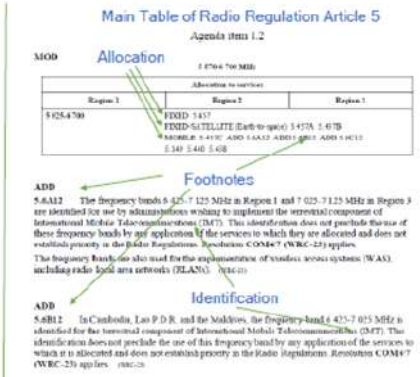


Benefits :

- Reduces the potential for harmful interference
- Enables interoperability and international roaming, allowing citizens to use the same device in different countries
- Increases economies of scale, thereby enabling affordable devices and services
- Supports emergency communications

Some ITU Terms and Concept

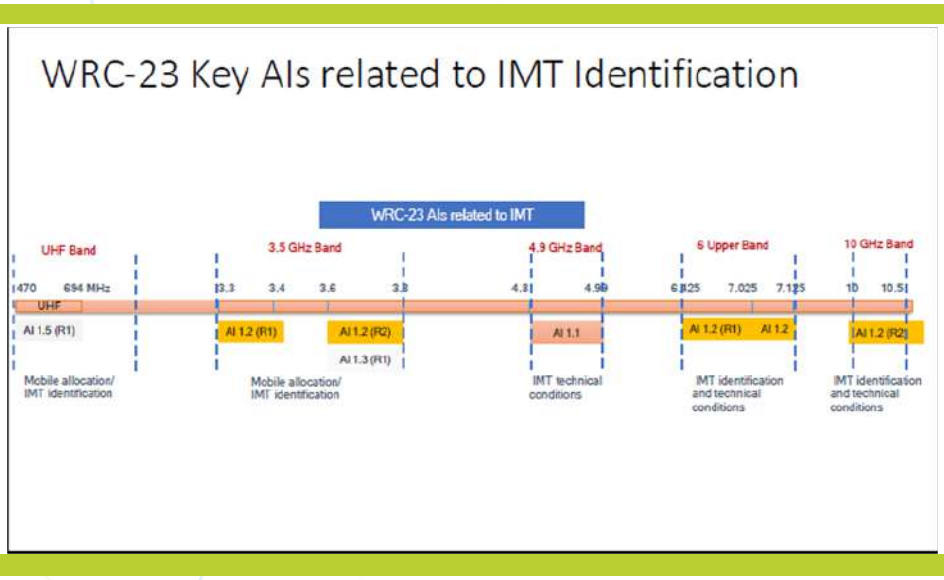
- Spectrum for IMT = mobile operators' spectrum
  - IMT-2000 = 3G, IMT-Advanced = 4G, IMT-2020 = 5G, IMT-2030=6G
- RLAN = Radio Local Area Network (e.g. WiFi)
- Footnote
  - Footnotes are an integral part of the Table of Frequency Allocations in the Radio Regulations and, as such, form part of an international treaty text
- Country footnote
  - A footnote with a number of specific country names
- Allocation
  - Allocation is a procedure to harmonize the spectrum for those services in Main Table of Article 5 of RR
- Identification
  - Identification is a procedure for ITU-R to allow the frequency harmonization for some applications under some service through footnotes in Article 5 of RR regulation.

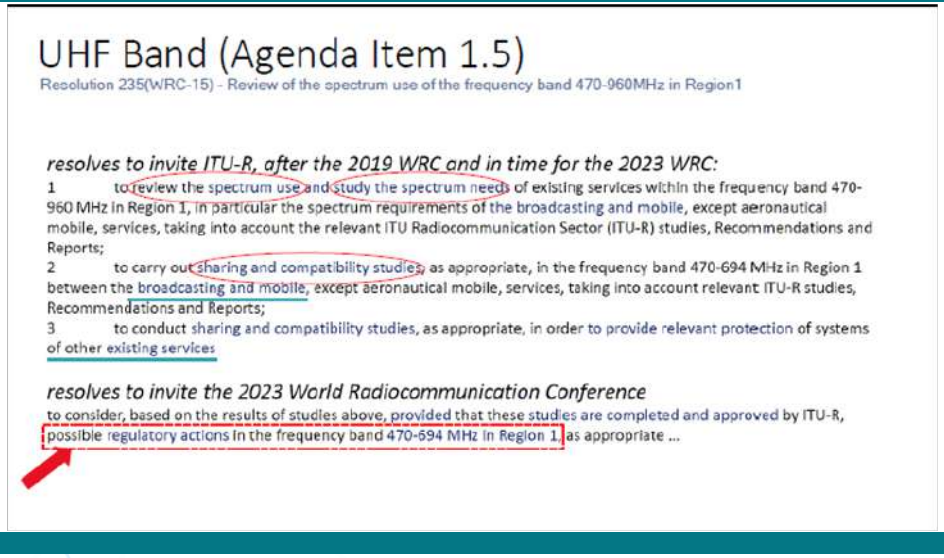


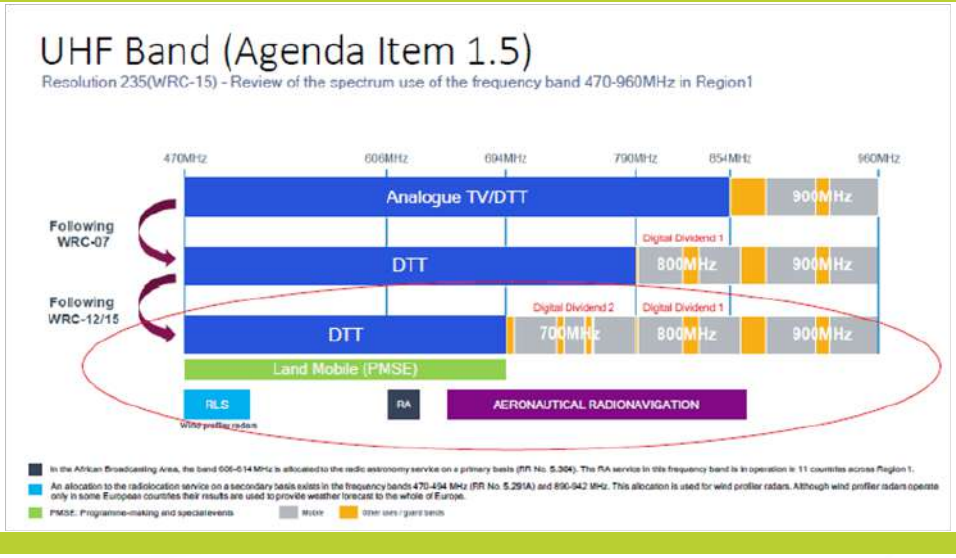
Key decisions made at WRC-23

Mobile spectrum allocation / harmonization

ITUWRC DUBAI 2023


WRC-23 Key AIs related to IMT Identification
WRC-23 AIs related to IMT
UHF Band
3.5 GHz Band
4.9 GHz Band
6 Upper Band
10 GHz Band
470
694 MHz
3.3
3.4
3.6
3.8
4.8
4.99
6.425
7.025
7.125
10
10.5
UHF
AI 1.5 (R1)
AI 1.2 (R1)
AI 1.2 (R2)
AI 1.3 (R1)
AI 1.1
AI 1.2 (R1)
AI 1.2
AI 1.2 (R2)
Mobile allocation/ IMT identification
Mobile allocation/ IMT identification
IMT technical conditions
IMT identification and technical conditions
IMT identification and technical conditions


UHF Band (Agenda Item 1.5)
Resolution 235(WRC-15) - Review of the spectrum use of the frequency band 470-960MHz in Region1
resolves to invite ITU-R, after the 2019 WRC and in time for the 2023 WRC:
1 to review the spectrum use and study the spectrum needs of existing services within the frequency band 470-960 MHz in Region 1, in particular the spectrum requirements of the broadcasting and mobile, except aeronautical mobile, services, taking into account the relevant ITU Radiocommunication Sector (ITU-R) studies, Recommendations and Reports;
2 to carry out sharing and compatibility studies, as appropriate, in the frequency band 470-694 MHz in Region 1 between the broadcasting and mobile, except aeronautical mobile, services, taking into account relevant ITU-R studies, Recommendations and Reports;
3 to conduct sharing and compatibility studies, as appropriate, in order to provide relevant protection of systems of other existing services
resolves to invite the 2023 World Radiocommunication Conference
to consider, based on the results of studies above, provided that these studies are completed and approved by ITU-R, possible regulatory actions in the frequency band 470-694 MHz in Region 1, as appropriate ...


UHF Band (Agenda Item 1.5)
Resolution 235(WRC-15) - Review of the spectrum use of the frequency band 470-960MHz in Region1
470MHz
606MHz
694MHz
790MHz
854MHz
960MHz
Following WRC-07
Following WRC-12/15
Analogue TV/DTT
DTT
DTT
Digital Dividend 1
Digital Dividend 2
Digital Dividend 1
800MHz
700MHz
800MHz
900MHz
900MHz
900MHz
Land Mobile (PMSE)
RLS
RA
AERONAUTICAL RADIONAVIGATION

UHF Band (Agenda Item 1.5)

Resolution 235(WRC-15) - Review of the spectrum use of the frequency band 470-960MHz in Region1

- Review on the spectrum use and spectrum needs of existing services in UHF band in Region 1 and consider possible regulatory actions in **470-694MHz** in **Region 1**, based on the review
- Securing additional low band spectrum (e.g.: 5G broadcast, IoT, mobile services)
- Various interests in the UHF band (Broadcasting services, mobile, PMSE, and other services)
- CPM methods can be grouped into four categories:
  - 1) "No change" : no allocation to mobile from the early 2030s
  - 2) Co-primary allocation to broadcast and mobile services in 470-694 MHz + identification to IMT in the frequency band 470-694 MHz or parts thereof in Region 1/some countries in Region 1.
  - 2) Co-primary allocation to broadcast and mobile services in 470-694 MHz without identification to IMT in the frequency band 470-694 MHz in Region 1/some countries in Region 1.
  - 3) Co-primary allocation to broadcast and mobile services use in 470-694 MHz with technical condition limiting mobile operations to downlink only in this band.
  - 4) Secondary allocation to mobile services in 470-694 MHz in Region 1
- No consensus in Region 1. The subject is very controversial.
- Recommendations of our strategy: Support any CPM methods based on "co-primary allocation" to mobile service in UHF band".

UHF Band (Agenda Item 1.5)

Regional Views

- **European Conference of Postal and Telecommunications Administrations (CEPT) :**
  - EU 27 Member States recommended to the EC through the RSPG opinion a compromise solution : secondary allocation to the mobile, except aeronautical mobile, service with a WRC-31 Agenda Item to consider a possible upgrade of the secondary mobile allocation.
- **Arab Spectrum Management Group (ASMG):**
  - To emphasis on the protection of existing services and systems, especially the broadcasting service, and not affecting them, and studying the possibility of allocating the band (470-694 MHz) or part of it (example: 614-694 MHz) for the mobile service and identifying it for applications of International Mobile Telecommunications (IMT) by the interested administrations in order to provide future flexibility in the utilization of the band by all services and to take a decision in this regard at the next World Radiocommunication Conference in 2023.
- **African Telecommunications Union (ATU)**: So controversial - No Common agreed position.
  - **Algeria**: NoC
  - **Egypt & Nigeria**: support the method (b) which support the allocation of the 470-694 MHz band to the mobile service to provide future flexibility for operators to use this space with the identification of the 614-694 MHz space for IMT provided that appropriate protection is provided for the systems of other existing services, especially the broadcasting service, with consideration of the date of enforcement of the new allocation and identification at a conference 2023.

UHF Band (Region 1)

WRC-23 Outcome

A No change Position

- A No Change Position on the band currently primarily used for TV broadcast until 2030.
- Broadcast service remains the only primary service in 470-694 MHz across ITU Region 1, for Digital Terrestrial TV and new technologies such as UHDTV.
- No further studies expected for WRC-27, but a revision of Resolution 235 was agreed to review at WRC-31 the band 470-694 MHz for broadcast and mobile, keeping the door open for future co-primary allocation to mobile.

A Compromise reached through country footnotes

- WRC-23 found a balance that allowed for the use of IMT in different parts of the 600 MHz band by allocating a primary and secondary mobile service to some countries through 3 country footnotes while fully protecting the broadcasting service.
- CEPT countries, besides Italy, Spain, Azerbaijan and Uzbekistan, now have a secondary mobile service allocation in the 470–694 MHz band.
- A primary mobile service allocation and IMT identification for 614–694 MHz in Saudi Arabia, Bahrain, Egypt, United Arab Emirates, Iraq, Jordan, Kuwait, Oman, Palestine, Qatar and Syria.
- A secondary mobile allocation of 614–694 MHz in Gambia, Mauritania, Namibia, Nigeria, Senegal, Somalia, Tanzania and Chad.

3.5 GHz Band (Region 1 & Region 2)

3.3-3.4 GHz

- **Region 1**
  The band was identified to IMT through a country footnote (total 49 countries, mostly African countries).
  The countries in the Middle East remained with the primary mobile allocation.
  Europe and CIS (Commonwealth of Independent States) may not use this band for IMT due to existing radiolocation services (radars)
- **Region 2**
  A mobile allocation and IMT identification for 3.3-3.4 GHz was agreed throughout Region 2

  Administrations shall obtain agreement of neighboring countries to protect operations within the radiolocation service

3.6-3.8 GHz

- **Region 1**
  A primary mobile allocation was agreed in 3.6-3.8 GHz throughout Region 1 with conditions in a footnote. These conditions are similar to those in footnote 5.430A for 3.4-3.6 GHz. However, the application of provision 9.21 has been softened and this will only be applied if the pfd limit is exceeded.

  IMT identification was agreed through country footnote in 3.6-3.8 GHz in most countries in Africa and the Middle East and in 3.6-3.7 GHz in a few African countries
- **Region 2**
  The band 3.6-3.7 GHz was identified for IMT in Region 2, while a country footnote contains 15 countries identifying 3.7-3.8 GHz to IMT, with most restrictions removed - but requiring agreement with neighboring countries to protect FSS

4.8-4.99 GHz Band (conditions on use of IMT)

No Change was made to the current conditions. WRC23 decided to retain the regulatory and technical conditions in No. 5.441B unchanged.

- This Agenda Item was very controversial during the 4 weeks of the Conference.
- Consensus was challenging (between NATO and Russia).
- No Change was made to the current conditions.
- WRC23 decided to retain the regulatory and technical conditions in No. 5.441B unchanged.
- The Conference also decided not to continue further studies in this regard and decided to keep unchanged the list of 11 countries where the pfd limit does not apply.
- 14 countries joined FN 5.441B to identify the band for IMT, while 3 retired their nomination.

6 GHz Band (Region 1)

6425-7025 MHz and 7025-7125 MHz bands

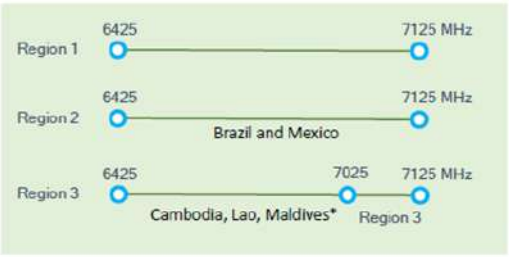
Harmonised identification of 6.425–7.125 GHz in Region 1 and 7025–7125 MHz in Region 3
New footnotes for Regions 2 (6425–7125 MHz) and 3 (6425–7025 MHz) with small numbers of countries
Harmonised expected e.i.r.p. mask and conditions across all Regions

- An IMT identification for 6 GHz (6425-7125 MHz) was agreed throughout Region 1 at WRC-23 with an expected e.i.r.p. mask to protect FSS (E-s) considered positive for mobile. An IMT identification in the band 7025-7125 MHz was agreed in Region 3. The IMT identification footnote includes recognition that the frequency bands are also used for WAS/RLANs.
- Footnote is agreed for IMT identification of 6425-7125 MHz in two countries in Region 2 (Brazil & Mexico). RLAN., 9.21xxx
- 6145-7025 in three countries in Region 3 (Cambodia, Laos, and the Maldives). The intent of additional Region 3 countries (Indonesia, Thailand, Vietnam, China, Philippines, Bangladesh, Myanmar, and Sri Lanka) to join the footnote in 2027) positions the band most as 6G/IMT-2030 as opposed to immediate deployment 5G/IMT-2020.
- Linkage to WRC-27 Agenda Items
  - The WRC-27 AI1.7 new IMT spectrum study resolution recognizes more Region 3 countries can be added thought WRC-27 agenda item 8
    - Excerpt: *Recognizing f) that No. 5.6B12 identifies the frequency band 6 425-7 025 MHz for IMT for certain countries of Region 3, and that some other countries in Region 3 could propose adding their names to this footnote in accordance with Resolution 26 (Rev.WRC-23)*
  - The WRC-27 AI 1.19 will study the EESS (passive) allocation in 4.2-4.4 GHz and 8.4-8.5 GHz.
- Opposing views on 6 GHz identification were from:
  - The WiFi-supporting countries (Saudi Arabia, US, Qatar) used any means possible to cause blockages.
  - Concerns about the protection of FSS uplinks, led by Samoa (Satellite industry)
  - European decision to link 6 GHz identification with opposition for any new IMT Agenda Item

6 GHz Band (Key decisions made at WRC-23)

6425-7025 MHz and 7025-7125 MHz bands

Identification of terrestrial component of IMT



*The intent of additional Region 3 countries (Indonesia, Thailand, Vietnam, China, Philippines, Bangladesh, Myanmar, and Sri Lanka) to join the footnote in 2027 may help position the band for 6G/IMT-2030 as opposed to immediate deployment 5G/IMT-2020.

Conditions to protect incumbent services :

- FSS (Earth-to-space) : Expected EIRP mask of IMT BS

Consideration of Wi-Fi (RLAN) usage

- The IMT identification footnotes include recognition that the frequency bands are also used for WAS/RLANs except the one for Region 3 in 6425-7025 MHz

Linkage between Outcome of 6 GHz and WRC-27 Agenda Items

- The WRC-27 AI1.7 IMT spectrum study resolution recognizes more Region 3 countries can be added in the Region 3 country footnote in WRC-27

10 GHz Band (Region 2)

The Mobile allocation and IMT identification in 10-10.5 GHz were agreed through a country footnote in Region 2 (including 12 countries). However, it is limited in power to allow for coexistence with radiolocation and EESS.

- Mobile allocation and IMT identification in 10-10.5 GHz through a country footnote in Region 2.
- *"In the following countries in Region 2: Brazil, Colombia, Costa Rica, Cuba, the Dominican Republic, Ecuador, Guatemala, Jamaica, Mexico, Paraguay, Peru and Uruguay, the frequency band 10-10.5 GHz is identified for the implementation of the terrestrial component of International Mobile Telecommunications (IMT). The implementation of this identification in Mexico is subject to seeking agreement with the United States under No. **9.21**. The use of the frequency band 10-10.5 GHz by IMT stations in the mobile service shall not claim protection from systems in the radiolocation service..."*
- Maximum e.i.r.p of BS is limited to 30 dB (W/100 MHz) to protect radio location and EESS active services.
- Maximum e.i.r.p. per base station for elevation angles higher than 34 degrees shall not exceed 0.5 dB(W/100 MHz).
- Use of the frequency band 10-10.5 GHz for IMT is only intended for microcell base stations. (recognizing e)
- Mobile industry did not put much effort in this band due to the stringent constraint of transmitted power and out-of-band emission requirement, which make deployment restricted and less attractive.

Industry/Delegates Views

EBU

EBU (UHF)

"Broadcasting remains primary in the 470–694 MHz band, providing regulatory certainty to continue innovating in the digital terrestrial platform."

PMSE (UHF)

"We are happy that the importance of PMSE is acknowledged by WRC-23," said Andreas Wilzeck, head of spectrum policy and standards at Sennheiser. "WRC-23 keeps the spectrum sharing ecosystem in 470–694 MHz stable enough for continued investments and innovations."

GSMA (UHF)

"The most important thing about agenda Item 1.5 was its ability to start us on a journey towards the redefinition of this band," said Ross Bateson, GSMA. "We're really pleased with the result. Europe has a clear vision for redefining UHF spectrum at a pace which keeps all stakeholders happy. The secondary allocation is a signal of intent that they're moving on that journey towards that vision. Along with the new agenda item proposal for 2031, it allows us to have a long conversation about the future of video distribution—a joint project for mobile and broadcasting."

NOKIA (UHF)

"Ulrich Rehfuess, head of spectrum policy at Nokia "The outcome allows for additional flexibility in UHF, giving options to those countries that want to move towards mobile, but not forcing those who cannot do so soon," he said.

"There is no region-wide clearance of the band possible any time soon, due to the very diverging interests of neighbouring countries," he said.

"The development of an ecosystem on the full band will be focused towards downlink use, which makes it much easier to coexist with the existing broadcast user," said Rehfuess. "That means little coordination along country borders. Nokia demonstrated years back that supplemental downlink is possible in live broadcast bands."

GSMA (6 GHz)

"The 6 GHz decision has exceeded expectations of how big a footprint could be achieved at WRC-23," said Ross Bateson, GSMA. "Countries that got the IMT identification are responsible for over 60 per cent of the global population."

"The 6 GHz footprint has started big and is going to get bigger," he said. "We're potentially looking at the vast majority of the world's population to potentially be in the footnote by 2027. I don't think North America will ever join. But outside that, we would expect quite a lot of the global population to be covered."

WiFi Alliance (6 GHz)

"While deciding to identify the upper 6 GHz spectrum for IMT in Europe, Africa and a few other countries, the conference adopted an international treaty provision to explicitly recognize that this spectrum is used by wireless access systems such as Wi-Fi," the Wi-Fi Alliance said. "Importantly, WRC-23 rejected proposals to expand the upper 6 GHz IMT identification to several other countries or to consider such IMT identifications at the next WRC in 2027," the group added.

US Department of State (6 GHz)

The US Department of State said its position reflected "the interest of US companies that are leading developers of Wi-Fi technology," adding that "keeping the 6 GHz band open for unlicensed deployments without further studies will enable countries to take decisions promptly to make this spectrum available for next generation Wi-Fi deployment."

FCC (6 GHz)

The only IMT allocation that China acquired at this WRC was the 7025–7125 MHz block, said Ethan Lucarelli, head of the office of international affairs at US regulator the Federal Communications Commission (FCC). "We were able to prevent Region 3 countries that were looking to add themselves to the 6 GHz footnote from doing so."

AI10 : New Spectrum for IMT proposed for study

Candidate bands proposed to WRC-23

Country	Frequency Band(s) Proposed
Japan	12.75 - 12.95 GHz
China	6 425 - 7 025 MHz (R3)
Mexico	4 800 - 4 900 MHz, 6 425 - 7 025 MHz (R2) 7 025 - 7 125 MHz, 10.5 - 10.68 GHz
USA	3 100 - 3 300 MHz, 12.7 - 13.25 GHz
India	7 125 - 7 750 MHz, 9 800 - 10 000 MHz 10.5 - 10.68 (10.7) GHz, 14.5 - 15.35 GHz
LAO/Vietnam	Portions of 7 125 - 8 500 MHz Portions of 8 500 - 10 000 MHz 12.75 - 13.25 GHz, 13.25 - 14.3 GHz 14.5 - 15.35 GHz
MYA/PNG/SLM/ SAM/TON/VAN	Do not support a new AI. Strongly oppose 10.7 - 14.8 GHz
CEPT	strongly opposed 7-30 GHz
China	strongly opposed 7-30 GHz
ATU	Neutral position
RCC	4.4-4.8 GHz, 10-10.5 GHz, 14.8-15.35 GHz
ASMG	3.8-4.2 GHz, 7-15 GHz
CITEL	3100-3300 MHz, 7125-8500 MHz 14.75-15.35 GHz

Leveraging Key WRC-23 Decisions | New study item for 6G/IMT2030 spectrum

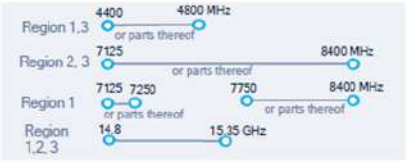
Candidate band proposals to WRC-23

Country	Frequency Band(s) Proposed
Japan	12.75 - 12.95 GHz
China	6 425 - 7 025 MHz (R3)
Mexico	4 800 - 4 900 MHz, 6 425 - 7 025 MHz (R2) 7 025 - 7 125 MHz, 10.5 - 10.68 GHz
USA	3 100 - 3 300 MHz, 12.7 - 13.25 GHz
India	7 125 - 7 750 MHz, 9 800 - 10 000 MHz 10.5 - 10.68 (10.7) GHz, 14.5 - 15.35 GHz
LAO/Vietnam	Portions of 7 125 - 8 500 MHz Portions of 8 500 - 10 000 MHz 12.75 - 13.25 GHz, 13.25 - 14.3 GHz 14.5 - 15.35 GHz
MYA/PNG/SLM/ SAM/TON/VAN	Do not support a new AI. Strongly oppose 10.7 - 14.8 GHz
CEPT	strongly opposed 7-30 GHz
China	strongly opposed 7-30 GHz
ATU	Neutral position
RCC	4.4-4.8 GHz, 10-10.5 GHz, 14.8-15.35 GHz
ASMG	3.8-4.2 GHz, 7-15 GHz
CITEL	3100-3300 MHz, 7125-8500 MHz 14.75-15.35 GHz

WRC-23 Outcome

- Industry prioritized 7125-8500 GHz
- Final decision on the bands were made in a closed-door meeting of heads of the regional organizations:
  - ATU, ASMG, CITEL, India strong vocal support
  - CEPT agreed to compromise on strong opposition
  - China compromised on strong opposition
  - USA silent (no vocal opposition)

A new WRC-27 Agenda Item 1.7 to study 4.4-4.8/7.125-8.4/14.8-15.35 GHz for 6G



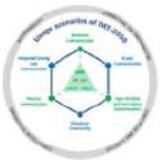
Spectrum Bands Identified for IMT studies

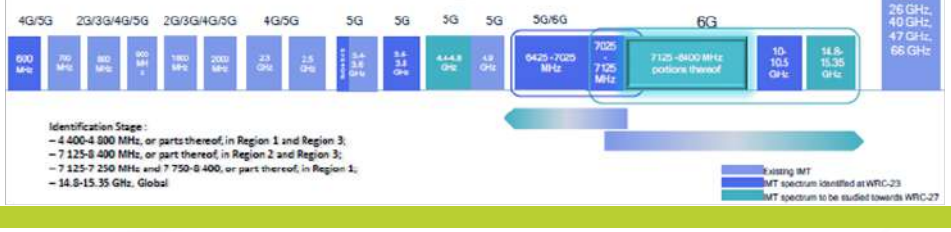
WRC-27 Agenda item 1.7

Administrations or Regions will study new candidate bands for use by 6G/IMT-2030, for decisions WRC-27.

WRC-27 Agenda Item 1.7 to study the use of IMT in the following bands:
- 4 400-4 800 MHz
- 7 125-8 400 MHz
- 14.8-15.35 GHz.

Additional contiguous broadband spectrum in FR3 range is required to support the immersive communication and high-resolution sensing in wide area coverage deployment.





Identification Stage :
- 4 400-4 800 MHz, or parts thereof, in Region 1 and Region 3;
- 7 125-8 400 MHz, or part thereof, in Region 2 and Region 3;
- 7 125-7 250 MHz and 7 750-8 400, or part thereof, in Region 1;
- 14.8-15.35 GHz, Global

existing IMT
IMT spectrum identified at WRC-23
IMT spectrum to be studied towards WRC-27

Mobile Satellite Service Agenda Items

- Triggered by the ubiquitous connectivity goal of UN sustainable development, there is growing demand for mobile satellite service. Total three agenda items related to MSS (Mobile Satellite Service) were established.

WP 4C leads WP 5D,4B and others contribute	WP 4C leads WP 5D,4B and others contribute	WP 4C leads WP 5D,4B and others contribute
WRC-27 AI1.12 MSS allocation for Low-data-rate NGSO mobile satellite system	**WRC-27 AI1.13** MSS allocation in IMT bands for direct connectivity to complement the terrestrial IMT network coverage	**WRC-27 AI1.14** Additional allocation to mobile satellite system
Frequency bands: 1 427-1 432 MHz (s-to-E), 1 645.5-1 646.5 MHz (s-to-E) (E-to-s), 1 880-1 920 MHz (s-to-E) (E-to-s), 2 010-2 025 MHz (s-to-E) (E-to-s)	Frequency bands: the frequency bands between 694/698 MHz to 2700 MHz range with terrestrial IMT deployment	Frequency bands: 2 010-2 025 MHz (E-to-s) in R1&R3 2 160-2 170 MHz (s-to-E) in R1&R3 2 120-2 160 MHz (s-to-E)
Potential Technology: 3GPP IoT NTN Proprietary satellite access tech	Potential Technology: 3GPP LTE, 5G NR 3GPP LTE NTN, NR NTN Proprietary satellite access tech?	Potential Technology: 3GPP NR NTN Proprietary satellite access tech
CEPT and Canada promoted. US, China, Korea, Japan were concerned on the overlap.	All six Regions supported. US/Space-X and Germany did not want the additional constraint from ITU-R to current Space-X operation and collaboration with mobile operator.	US, CITEL, RCC, PNG (Omnispace behind), GSMA strongly supported. CEPT and CJK showed concern on the overlap with R1/R3 IMT bands.

Work Allocation of WRC-27 Agenda Items

Fixed satellite Service (WP 4A)

AI 1.1: A-ESIM and M-ESIM for GSO and NGSO in 47.2-50.2 GHz and 50.4-51.4 GHz
AI 1.2: Uplink FSS with small antenna in 13.75-14 GHz
AI1.3: to enable use of gateway earth station Tx to NGSO in 51.2-52.4 GHz
AI1.4: FSS allocation in 17.3-17.7 GHz, BSS in 17.3-17.8 GHz in R3
AI 1.5: limit the unauthorized operations of NGSO earth stations in the FSS and MSS
AI1.6: equitable access of FSS to 37.5-42.5 GHz, 42.5-43.5 GHz, 47.2-50.2 GHz and 50.4-51.4 GHz

Mobile satellite Service (WP 4C)

AI 1.11: space to space link in 1 518-1 544 MHz, 1 545-1 559 MHz, 1 610-1 645.5 MHz, 1 646.5-1 660 MHz, 1 670-1 675 MHz and 2 483.5-2 500 MHz
AI 1.12: MSS allocation for Low-data-rate NGSO mobile satellite system in 1 427-1 432 MHz ,1 645.5-1 646.5 MHz, 1 880-1 920 MHz and 2 010-2 025 MHz
AI1.13: MSS allocation in IMT bands from 694/698 MHz-2700 MHz
AI1.14: Additional allocation to mobile satellite system in 2 010-2 025 MHz, 2 160-2 170 MHz and 2 120-2 160 MHz

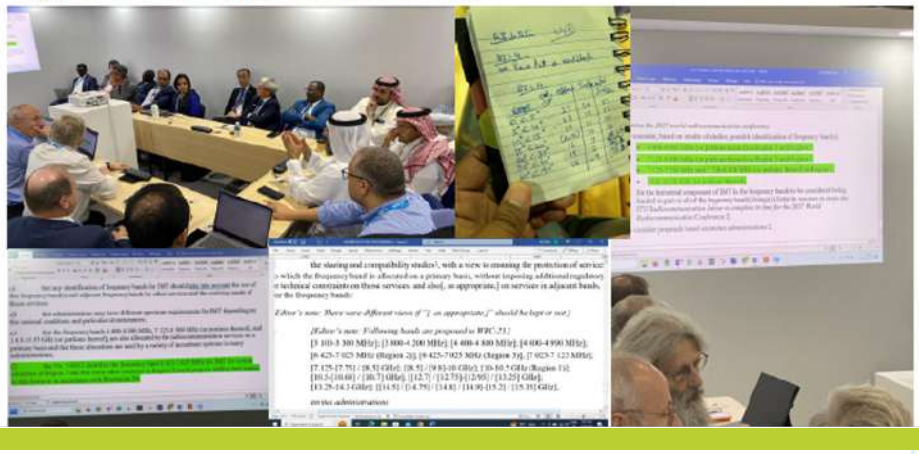
Terrestrial Service (SG5)

AI 1.7: IMT band study in 4 400-4 800 MHz, 7 125-8 400 MHz (or parts thereof), and 14.8-15.35 GHz (WP 5D)
AI 1.8: radiolocation service in 231.5-275 GHz and in 275-700 GHz for mmW and sub-mmW imaging system (WP 5B)
Uplink FSS with small antenna in 13.75-14 GHz
AI1.9: aeronautical mobile (OR) high frequency modernization in 3 025 kHz and 18 030 kHz (WP5B)
AI1.10: Article 21 pfd limit for FSS and MSS to protect fixed and mobile service in 71-76 GHz, 81-86 GHz (WP 5C)

Science Service (SG 7)

AI 1.15: communications on the lunar surface and between lunar orbit and the lunar surface (WP 7B)
AI 1.16: protect radio astronomy operating in specific Radio Quiet Zones (WP 7B)
AI1.17: receive-only space weather sensors (WP 7C)
AI1.18: protect EESS passive and radio astronomy above 76 GHz (WP 7C)
AI1.19: EESS passive in 4200-4400MHz and 8400-8500 MHz (WP 7C)

Light from 'The Dark Room'



Key decisions made at RA-23

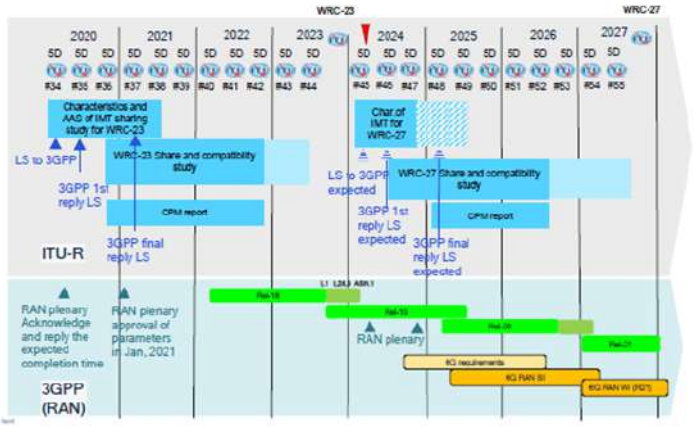
ITUWRC DUBAI 2023

Radiocommunication Assembly (RA-23)

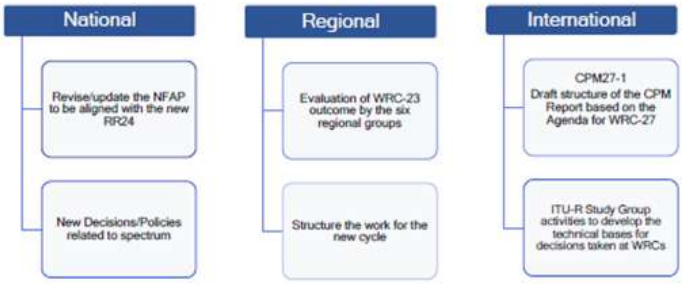
Nov.13-17, 2023, Dubai, UAE

- Radiocommunication Assembly (RA) was responsible for the structure, programme and approval of radiocommunication studies.
- Resolution 56 IMT naming was approved by RA-23
- Resolution 65 Principles for the process of future development of IMT-2020 and IMT-2030 was approved by RA-23.
- Recommendation of **IMT-2030 Framework** was approved by RA-23
- Resolution 1-9 **(Working methods for the RA, SGs, RAG and other groups of the Radiocommunication Sector)** was approved
- Resolution 2-9 **(CPM)** was approved
- New resolution approved **Use of IMT technology under fixed services** where allocation of fixed services is on primary basis
- New Resolution on Space Sustainability was created and approved

ITU-R WP 5D WRC-27 AI1.7 Sharing Study Timeline



WRC-27 : Next Steps



Thanks

DAY 3

SESSION 7: INNOVATION IN CONTENT PRODUCTION AND POST PRODUCTION

Mr. Rashmi Ranjan, Tata Communication: Remote Television Production

TATA COMMUNICATIONS

AGENDA

1. A Watershed Event in Indian History - Ayodhya Ram Janmabhoomi Temple Consecration Event for DD News
2. Remote workflows & Tata Communications
3. Our Customer Stories
   - Cricket & Domestic Leagues in India
   - MotoGP
   - Formula 1

Doordarshan team preparing for Ram Janmabhoomi Temple Broadcast from Ayodhya
Source: ANI

TATA COMMUNICATIONS

A WATERSHED EVENT FOR OUR COUNTRY

The Ayodhya Ram Janmabhoomi Temple Consecration Event

LIVE 4K TRANSMISSION

After G20 Summit, this event was produced in Live 4K UHD and delivered with zero glitches, broadcast globally.

LIVE REMOTE PRODUCTION OVER IP NETWORK

The event marked the first full-scale remote production of a major event of national importance through live contribution of 6x HD-SDI audio-video feeds to DD News facilities in Mandi House, New Delhi for Remote Production

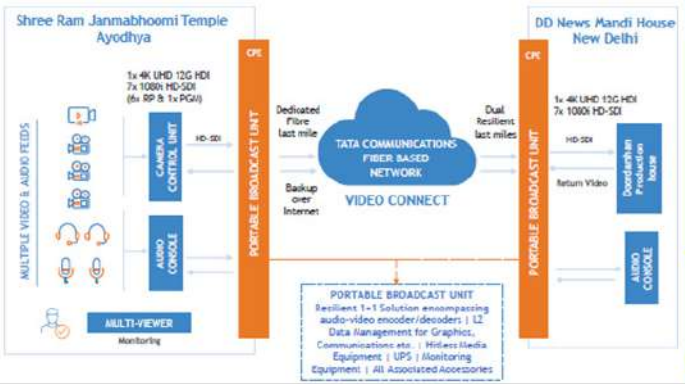
END-TO-END SERVICE DELIVERY & ASSURANCE

Main and backup audio-video services were configured on dual, diverse last miles and redundant network backbones. 24/7 on-ground and remote health monitoring, along with return multi-viewer feed for full visibility.

40+ Cameras
7000+ VIP Guests
1 Crore+ Viewers on YouTube
Active Transmission & Full Monitoring from 0630 to 1630 hrs on Jan 23, 2024

FIBRE-BASED REMOTE PRODUCTION FOR DD NEWS

Ram Janmabhoomi Temple Consecration Event, Ayodhya, 2024



TATA COMMUNICATIONS

SCOPE OF WORK

To deliver a complete managed solution & service for -

- 1x UHD 4K 12G-SDI audio-video
- 1x 1080i PGM audio-video
- 6x 1080i HD-SDI audio-video feeds for Remote Production in HD

THE HOW

- Provisioning of Dual diverse last-miles in Ayodhya and DD News Mandi House
- Dedicated media PBU to support UHD & HD WF Signals and Remote Production
- Dedicated Engineering at sites and network monitoring for seamless delivery

RESULT

Flawless audio-video delivery in tight timeframe, Z+ security protocols, constant civil work and challenging location for fiber

IP-BASED CENTRALIZED REMOTE WORKFLOWS

TATA COMMUNICATIONS

HOW Partnership CAN ENABLE Content Acquisition & Distribution 2.0

5

CONTENT ACQUISITION

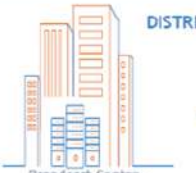
- Key Drivers
- Customisation Of Content
- Lack Of Technical Real Estate At Venues
- Mismatch in the rate of growth of events to availability of quality technical & human resources
- Environmental & Sustainability mandates to reduce carbon footprint
- Organic movement from HD to UHD

CONTENT DISTRIBUTION

- Key Drivers
- Globalisation of Content
- Growth of Content Distribution Platforms - requiring contribution in multiple formats
- Ease Of Business to Transcode From Central Facility
- Organic movement from HD to UHD

IP-BASED CENTRALISED REMOTE PRODUCTION

IP-BASED DISTRIBUTED REMOTE PRODUCTION



Broadcast Centre - Unified Command & Control (UCC)

DISTRIBUTION OVER IP FOR AFFILIATES IN MULTIPLE FORMATS

DISTRIBUTION OVER IP IN UHD

6

PRODUCTION-SIDE DRIVERS

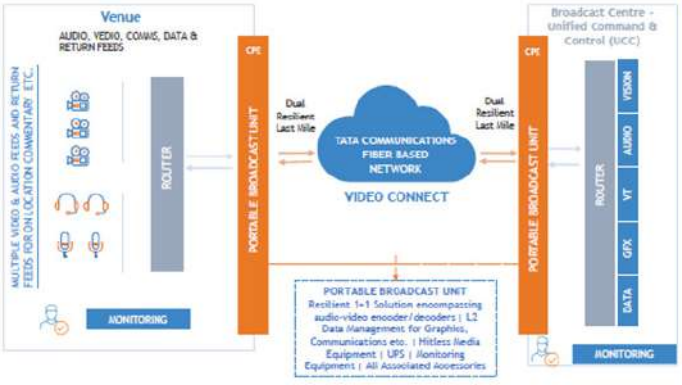
- Need for content regionalization
- Lack of space at venues
- Technical resource and talent quality unable to keep up with number of events
- Environmental and sustainability mandates to reduce carbon footprint
- Organic movement from HD to UHD

DISTRIBUTION-SIDE DRIVERS

- Globalization of content
- Growth of content distribution platforms and formats
- Transcoding from central facility
- Organic movement from HD to UHD

Broadcast Centre - Unified Command & Control (UCC)

IP-BASED CENTRALISED REMOTE PRODUCTION



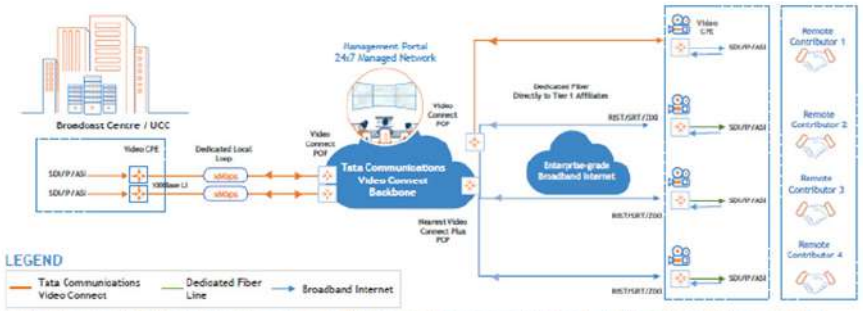
TATA COMMUNICATIONS

SOME KEY CUSTOMERS & PROJECTS

- STAR SPORTS - IPL, ICC, ASIA CUP, PKL
- VIACOM 18 - WPL, SA T20, FIFA,
- SONY - IND v ENG, IND v AUS
- ZEE - ILT20
- F1
- DORNA - MOTO GP
- FORMULA E
- HBS - FIFA DIGITAL
- MLB - Customization for Various Customers
- NBA - Customization for Various Customers

TATA COMMUNICATIONS

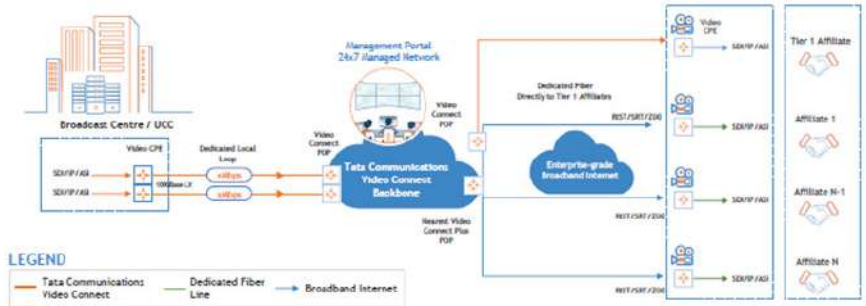
IP-BASED DISTRIBUTED REMOTE PRODUCTION



Open Protocol support - RIST/SRT/Zixi for distribution over Internet || Optional Dedicated connection over fiber if required || Unidirectional traffic flow Dedicated CPE at each affiliate || Stream Manager & Control Manager || 24x7 Managed core network and support

TATA COMMUNICATIONS

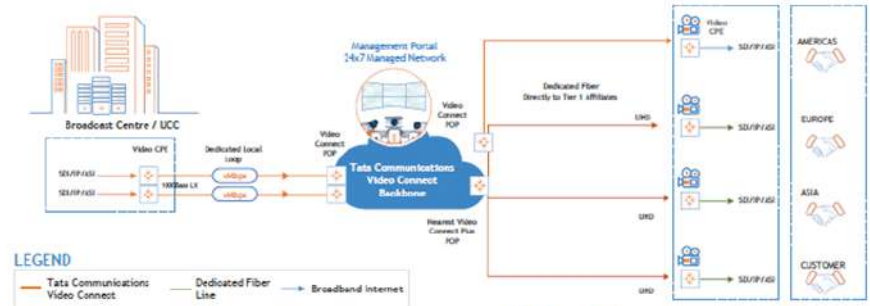
DISTRIBUTION OVER IP FOR AFFILIATES IN MULTIPLE FORMATS



Open Protocol support - RIST/SRT/Zixi for distribution over Internet || Optional Dedicated connection over fiber if required || Unidirectional traffic flow Dedicated CPE at each affiliate || Stream Manager & Control Manager || 24x7 Managed core network and support

TATA COMMUNICATIONS

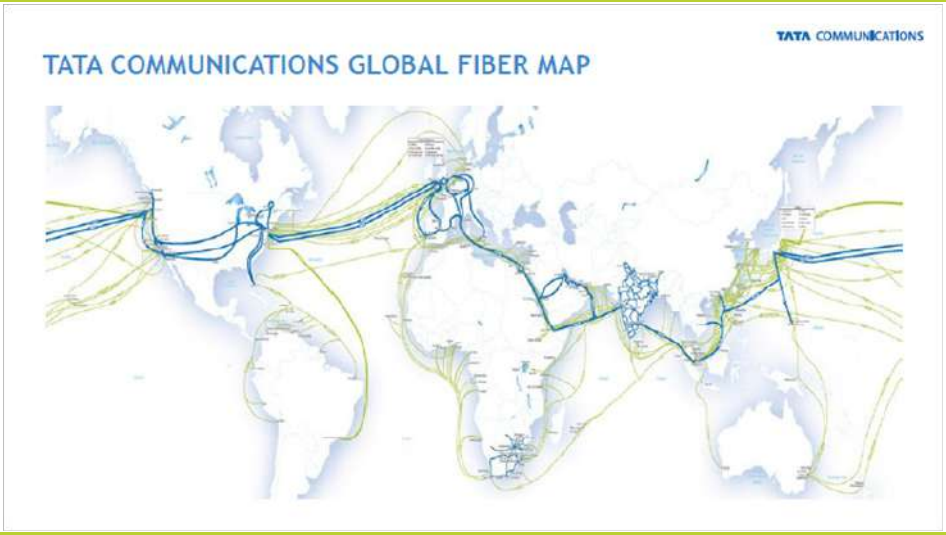
DISTRIBUTION OVER IP FOR AFFILIATES IN UHD

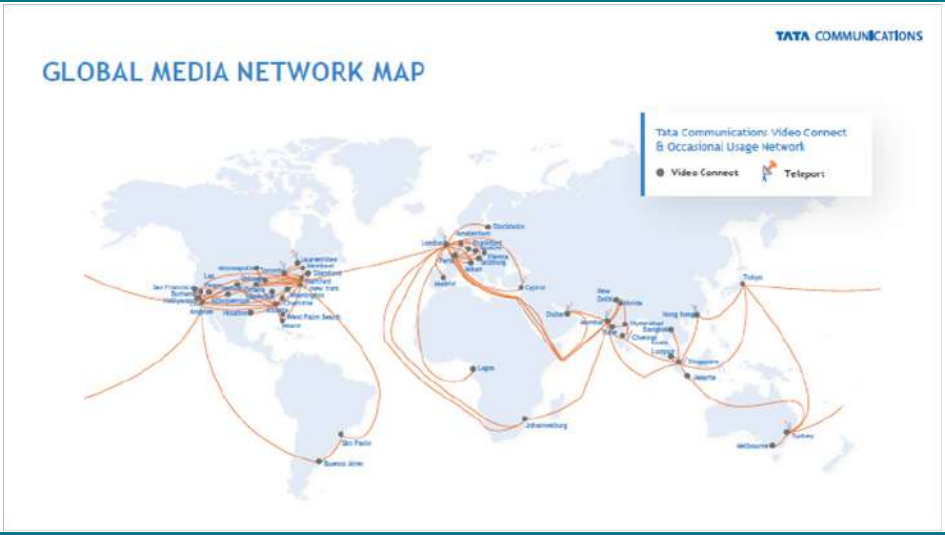


MARQUEE EXAMPLES OF WORKFLOW

PARIS 2024

FIFA WORLD CUP Qatar 2022


TATA COMMUNICATIONS
TATA COMMUNICATIONS GLOBAL FIBER MAP


TATA COMMUNICATIONS
GLOBAL MEDIA NETWORK MAP
Tata Communications Video Connect & Occasional Usage Network
Video Connect
Teleport


OUR MEDIA PORTFOLIO: A SOLUTION FOR ALL ME
GLOBAL CONTRIBUTION & DISTRIBUTION
PRODUCTION
VIDEO CONNECT
A fibre-based global media transport network to over 1000+ media hotspots across 400+ cities supporting broadcast quality real time video and solutions like remote production
SMART CDN & ULTRA-LIVE VDN
CDN optimized for live & on-demand video distribution with a global footprint and super dense edge nodes, including low-latency synchronous streaming rivals the experience and quality of traditional broadcast
CLOUD VIDEO PRODUCTION
Our unique cloud-based production solution (TVIPRO) enabling innovative use-cases like virtualized remote production, virtual video-assisted refereeing and remote commentary
REMOTE PRODUCTION
1000 media backbone deployed over our own fibre channel network allows ability to handle remote production with ease, enabling customers with central operations, less freight, personnel, smarter events and sustainability.
As a managed, scalable, networked service - for occasional or permanent use
Hybrid, in the cloud, or fully remote production


TATA COMMUNICATIONS
OUR CUSTOMER STORIES

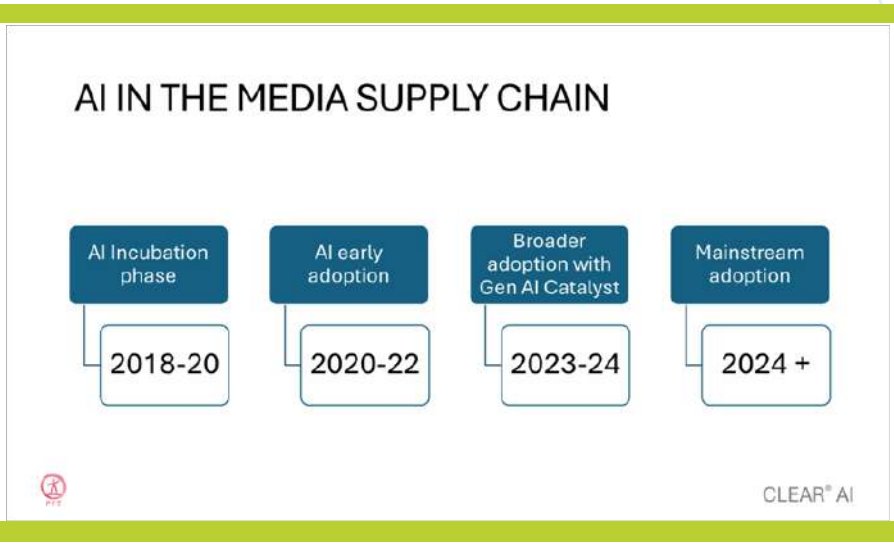

TATA COMMUNICATIONS
REMOTE PRODUCTION OF INDIAN T20 LEAGUE, ICC EVENTS, ASIA CUP ETC.
WORLD FEED REMOTE PRODUCTION OF KABADDI EVENT
CUSTOMER PROFILE
The most popular domestic T20 cricket league, covering 60+ matches over 12 venues in 2 months.
The matches are broadcasted by two leading Indian broadcasters - on traditional and digital channels. Each fixture featured customized feeds in local languages including commentary in 8 regional languages.
Since 2018, for 6 seasons now, Tata Communications has worked to enable remote production services.
SOLUTION
The broadcaster worked with Tata Communications to centralise many of its core operations and manage them remotely from their production hub at Mumbai.
In a first-of-its-kind remote production initiative in India at the scale of this league, key production personnel including the director, vision mixer, audio engineers and graphics team operated out of broadcasters' Mumbai facility.
The centralized team received eight unilateral camera feeds and 15 HD host feeds, along with audio, to create the world feed.
BENEFITS
Extremely high level of reliability to the ultra-low latency inputs received from the stadium located thousands of miles away
Massive savings on personnel and equipment travel to various locations through centralized operations
Unprecedented flexibility for the production team to feature concurrently live matches from different parts of the country leveraging the same set-up
Feeds managed 24/7 by a remote monitoring team at the Tata Communications regional MSOC

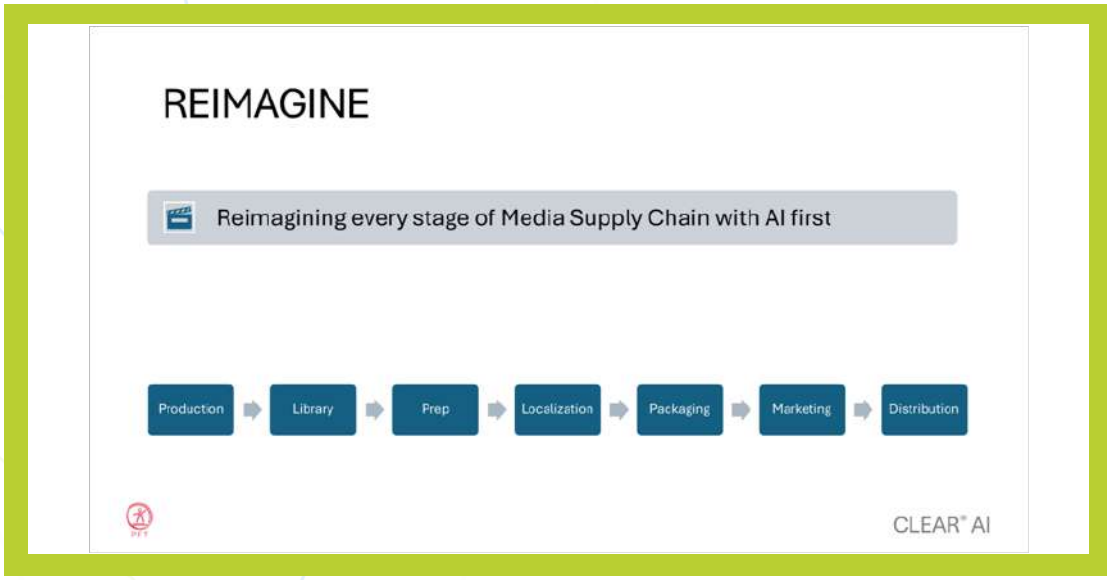

POWERING THE DELIVERY OF F1® AROUND THE WORLD
Video on F1®
TATA COMMUNICATIONS
Official Broadcast Connectivity Provider of Formula 1®
EMPOWERING TOMORROW

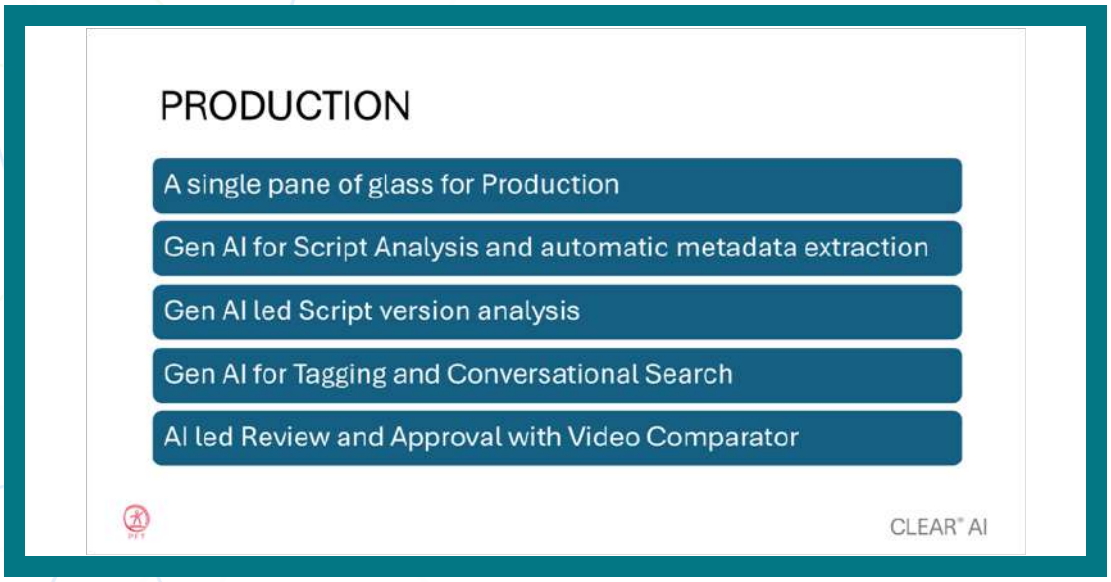

REMOTE PRODUCTION SERVICES FOR DORNA SPORTS - MotoGP
TATA COMMUNICATIONS
CONNECTIVITY SUPPLIER
motoGP
DORNA
Custom-built Tata Communications pods that are transported to each MotoGP race location
SOLUTION
• Our managed connectivity services enables Dorna to operate a centralized remote production facility at their Barcelona HQ, reducing the travel load on their technical personnel and equipment.
• The services enable video and data feed transfer from 120+ circuit and onboard cameras in real-time to Barcelona for production
• Enabling 6 marquee broadcasters to run their unilateral production remotely
BENEFITS
• Remote production allows for a reduced carbon footprint and better resource allocation to produce more and better content for fans.
• A media operations team that has completely adapted to MotoGP's schedule and logistical challenges, innovating their way out of onsite hurdles.
• The Media Pods are fully connected and monitored by the Tata Communications live events Media Control Room in the UK and Network Operations Centre in India.
"From European circuits to Barcelona there is a latency of approximately 120ms, with up to 400ms for the furthest locations. With these impressive figures of less than half a second, I can choose if I want to travel to a race location or direct it remotely from Barcelona."

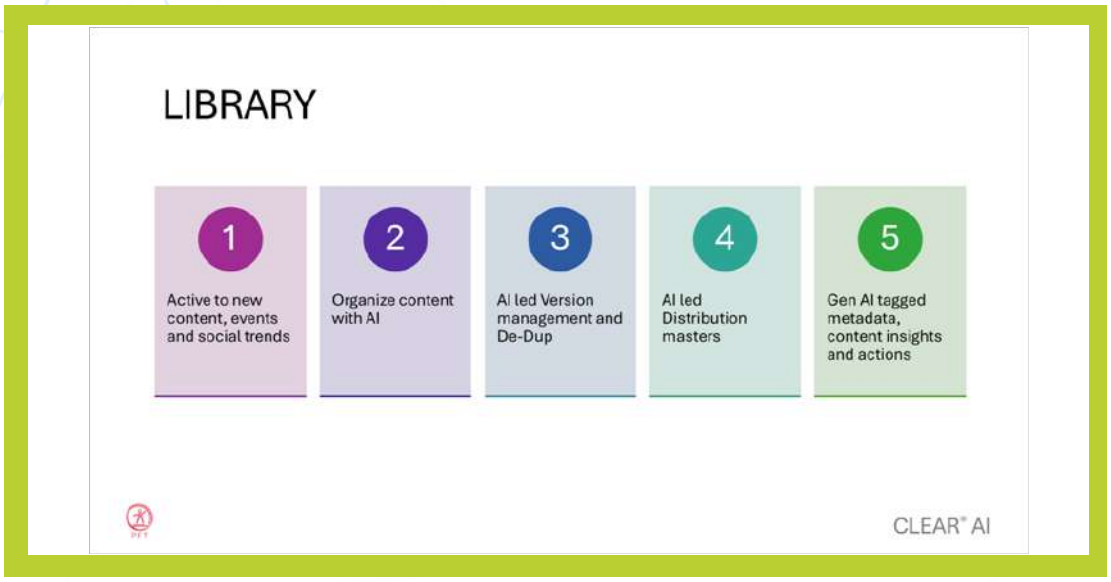

TATA COMMUNICATIONS
TATA
THANK YOU!

Mr. Muralidhar Sreedhar, Global Head and Senior Vice President, Prime Focus Technologies




REIMAGINE
Reimagining every stage of Media Supply Chain with AI first
Production
Library
Prep
Localization
Packaging
Marketing
Distribution
CLEAR® AI

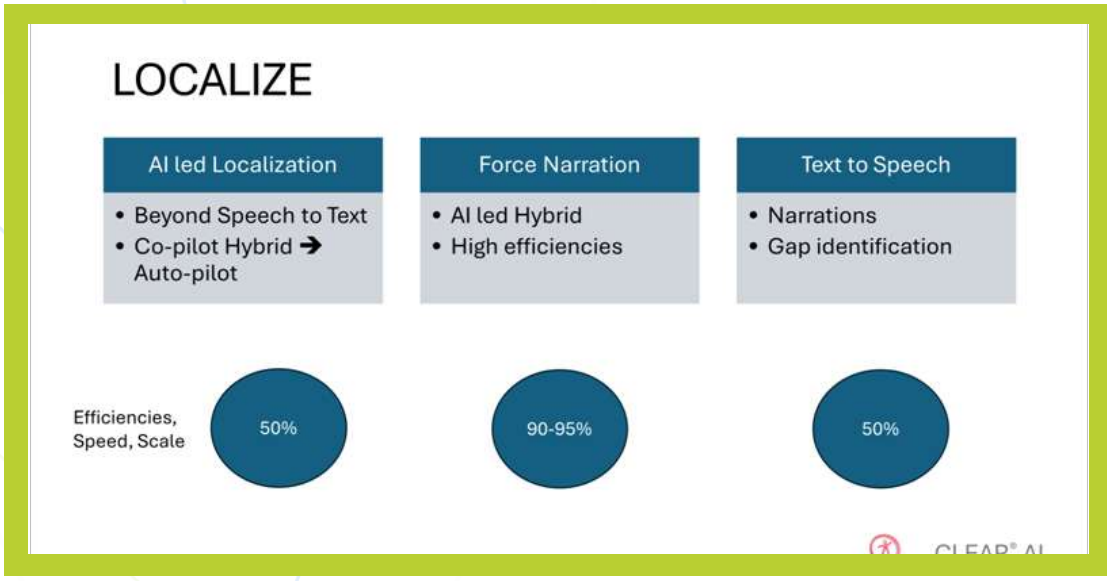

PRODUCTION
A single pane of glass for Production
Gen AI for Script Analysis and automatic metadata extraction
Gen AI led Script version analysis
Gen AI for Tagging and Conversational Search
AI led Review and Approval with Video Comparator
CLEAR® AI


LIBRARY
1
Active to new content, events and social trends
2
Organize content with AI
3
AI led Version management and De-Dup
4
AI led Distribution masters
5
Gen AI tagged metadata, content insights and actions
CLEAR® AI


DISCOVER
Quality data to create and curatesocial media content like never before!
Generate Deep metadata
Search & Discover your catalogue/archives/stock footage
Generative AI – first enterprise grade AI metadata discovery via conversations
Create and share impactful stories.
Faster and at scale marketing & monetization of content to social media platform
CLEAR® AI 7


SEGMENTATION
Detection of Physically Distinguishable Elements in a media file Black Frames, Color Bars, Slates, Recaps, Content
Necessary for identifying Break Insertion points, performing Deep Cataloging.
OTT – Skip Intro, Skip Recap, Skip Credits
Automated Segmentation provides significant 60-80% efficiencies, only QC necessary
Segments Detection & Frame Accuracy : 95-99%
CLEAR® AI 8

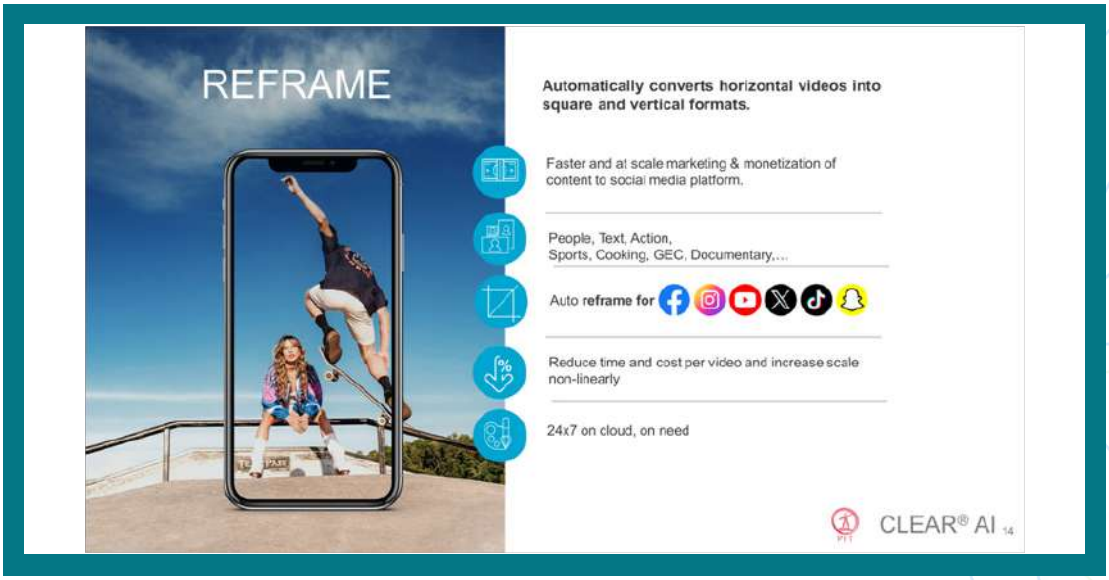

COMPARE
Human like video comparator that can compare versions of videos and visualize brilliantly for downstream decisions and use cases
3X speed of conform by automatically produced XMLs to conform audio from one master to another
De-duplicate archives by comparing intelligently, conforming to one master if required and getting rid of the rest
Re-master by Conforming master to source shots across contents
Find S&P edits, localization edits, etc. quickly
CLEAR® AI 9


LOCALIZE
AI led Localization
• Beyond Speech to Text
• Co-pilot Hybrid ➔ Auto-pilot
Force Narration
• AI led Hybrid
• High efficiencies
Text to Speech
• Narrations
• Gap identification
Efficiencies, Speed, Scale
50%
90-95%
50%

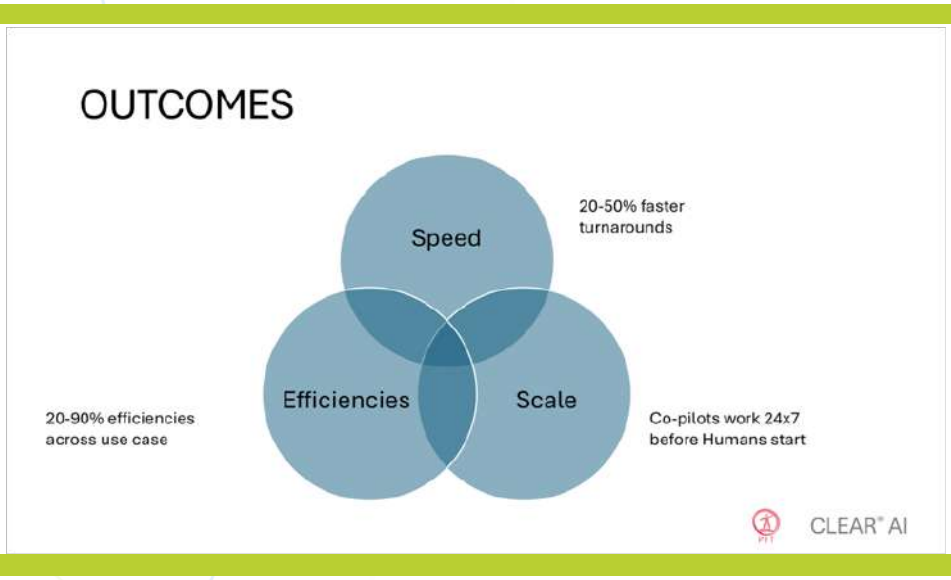

LOCALIZE
Speech to text audio with near frame accuracy and automatic time coding of subtitles
Automatic language to language translation across 120 languages
Identifies language changes like on screen text and audio for forced narration
Retime subtitles automatically to match edits
Enables launching localization projects 3X faster to market
Augment capacity to manage any peak/launch activities without local talent dependency
Less time spent on quality checks


MODERATE
Additional eye in the cloud **reduces error** leak-outs significantly
Detection of compliance flags and tags using AI
Compliance assessments for scheduling and distribution


MARKETING
Insights and Recos
• Promo Scripts
• Highlight moments
• Social posts and tags
Teasers
• Promos
• Cut downs
• Scene lifts
Search
• Gen AI conversational search
Reframe
• AI led Reframe to destinations
• Gen AI transforms
CLEAR® AI


REFRAME
Automatically converts horizontal videos into square and vertical formats.
Faster and at scale marketing & monetization of content to social media platform.
People, Text, Action, Sports, Cooking, GEC, Documentary,...
Auto reframe for
Reduce time and cost per video and increase scale non-linearly
24x7 on cloud, on need
CLEAR® AI 14


PACKAGING and DISTRIBUTION
Ad markers
• Per destination rules
• Contextual ad data
Distributable Masters
• AI led Global distributable master packages
Conform
• Conform versions to have ready packages for distribution
Accessories
• AI led Thumbnails per persona
• Compliance flags/ratings
CLEAR® AI



Presenter Bio : Muralidhar Sridhar

Muralidhar Sridhar has over 25 yrs of experience in the Technology industry, encompassing Product Management, Entrepreneurship, R&D and Organization building. He is currently the Senior Vice President at Prime Focus Technologies, leading PFT's Global Product Management and AI functions. Murali, is responsible for PFT's AI product lines of CLEAR and CLEAR AI, bringing in AI first and AI everywhere solutions to the Media and Entertainment industry, automating functions from Production , Acquisition, Asset management, Localization, Marketing, Packaging and Distribution of Media content with an AI led solution suite.

Murali, in the past has been one of the Heads of Global Software Product management at Nokia and has had several positions in India and Silicon Valley.

Murali has done his Bachelor's of Computer Science and Engineering from BIT and executive education from Wharton. He has filed over 10 patents with more than half of them in Artificial Intelligence and Machine Learning and is the core inventor of the granted US patent on Machine Wisdom.

In his personal time, Murali is a keen student of Indian Philosophy.

Mr. Rishi Sinha, Executive Producer, Network 18


VIRTUAL PRODUCTION AND REAL-TIME RENDERING


CLOUD-BASED COLLABORATION AND REMOTE WORKFLOWS


BRANDED CONTENT: INNOVATION IN STORYTELLING
tv+
THE MORNING SHOW

THE RISE OF USER-GENERATED CONTENT & COLLABORATIVE PLATFORMS

BRIDGING THE SKILL-GAP

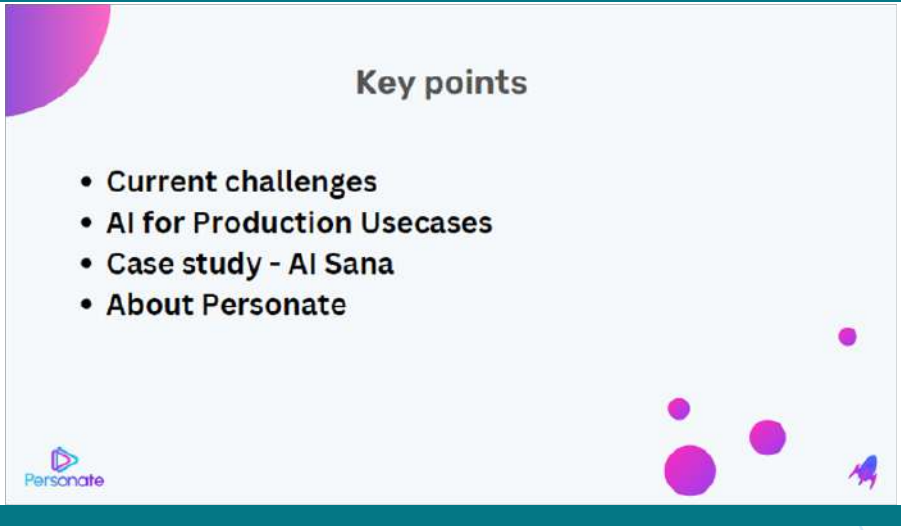
RESPONSIBLE AI AND AUDIENCE TRUST


LIFELONG LEARNING: THE MEDIA PROFESSIONAL'S ADVANTAGE


ARCHITECTS OF THE FUTURE MEDIA LANDSCAPE

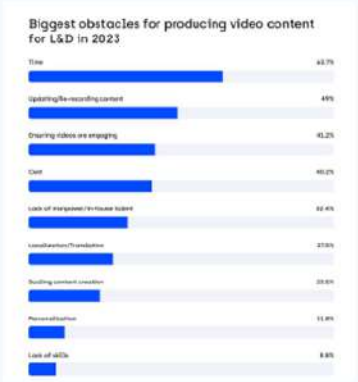

INNOVATION IN CONTENT PRODUCTION
AND
POST PRODUCTION

Mr. Akshay Sharma, Co-founder, Personate



Present Day Challenges

Biggest obstacles for producing video content for L&D in 2023



*Data from over 100+ enterprise stakeholders by an AI video research report

Personate

Traditional Video Generation

- Weeks of production time
- Actors, voice-over/dubbing artists, camera crew, heavy studio equipment and studio setup needed
- Expensive travel for shoot
- Non-personalised videos, non-scalable
- Manual script writing, production in 1 language

Use Cases of AI

1 AI Effects

Blend digital & real worlds seamlessly

- Generate hyper realistic environments or backgrounds, with prompts
- Blend Unreal Engine assets seamlessly into these backgrounds
- Mimic Motion
- Reduce production costs

"Over 34% of businesses say AI has led to measurable ROI in the movie industry"

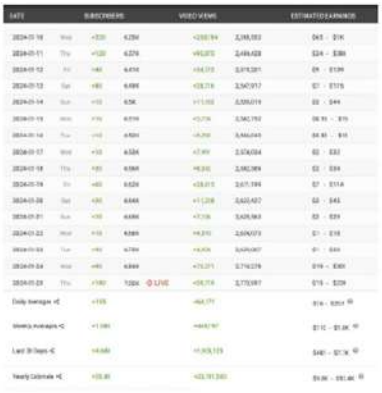
TORCH LIGHT

2 Save Time & Effort with Brand Building

Create Automated Youtube Channels

- Reduce production time from days to minutes
- Use AI for Creating Scripts, Music, Background, Translation, Voice-over, Captions
- Build synthetic AI Brand Ambassadors or AI Clones
- Operate from any device & location

"Our customers generate hundreds of videos per month"



3 Connect at a personal level with stakeholders

Send personalised Videos with your AI Brand Ambassadors/Clones on occasions to customers, employees and partners.

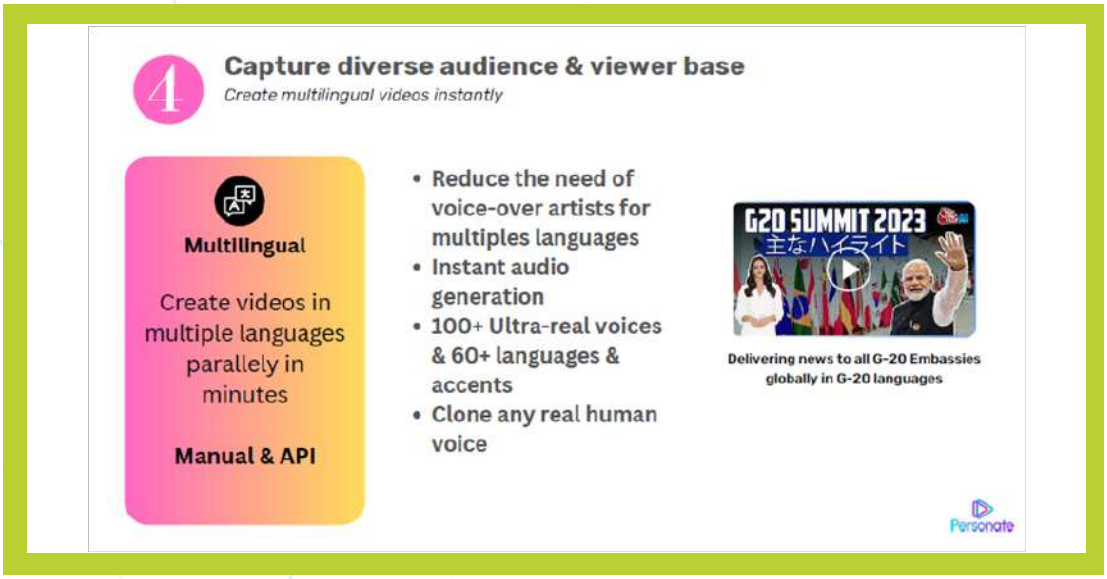
Ankita Mallick
Jagaddhatri

Rachna Banerjee
Didi No. 1

Pallavi Sharma
Neem Phooler Madhu

ZEE TV

Personate


4
Capture diverse audience & viewer base
Create multilingual videos instantly
Multilingual
Create videos in multiple languages parallely in minutes
Manual & API
• Reduce the need of voice-over artists for multiples languages
• Instant audio generation
• 100+ Ultra-real voices & 60+ languages & accents
• Clone any real human voice
G20 SUMMIT 2023
主なハイライト
Delivering news to all G-20 Embassies globally in G-20 languages
Personate


Case Study
AI SANA


AI Sana - World's 1st AI News Anchor (Non-Human)
Launched By PM Narendra Modi at IT Conclave
देश की पहली AI न्यूज एंकर सना
Our AI Hosts India's biggest Prime Time on TV Daily at 9PM
मौसम का ताज़ा हाल
100% Automated Weather on TV AajTak and India Today
आज की राशि
Daily Horoscope Report on TV AajTak and India Today
28 अप्रैल 2023
शाम की खबरें
Multiple Daily Shows on Youtube

Impact on Brand & Engagement

Talking to ShahRukh on Primetime for the launch of Jawan

Sana on DW News Channel (Germany)

Finding match with Celebrity Matchmaker Seema Tapariya

At Business Today Conclave, in talk with Indian Women's Cricket Team

On OTT - RVCJ Webseries

Impact on Business

Major $ Savings in Royalty & production costs

Work 24x7, Thousands of minutes of videos generated per month for TV, Radio & YouTube Channel

100M+ Views across Web & TV

Videos sponsored by Major brands

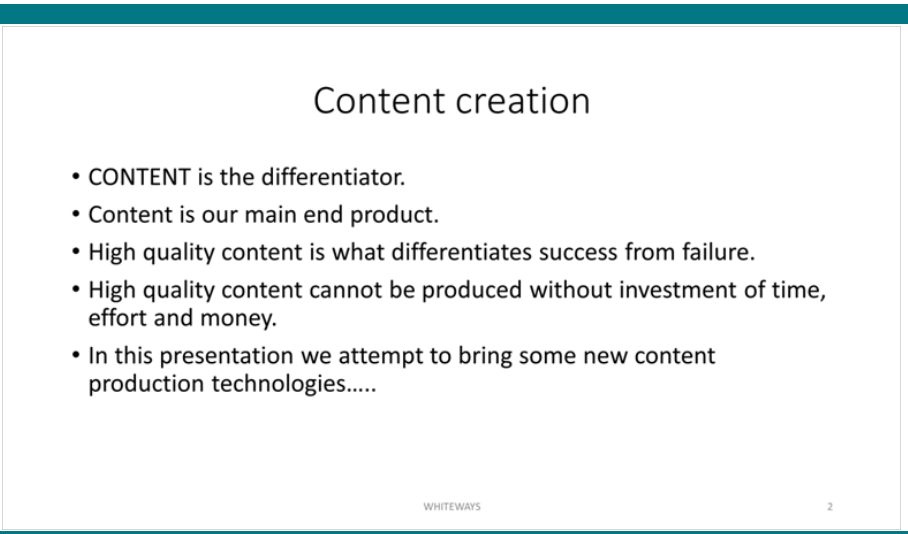
10,000+ Social followers

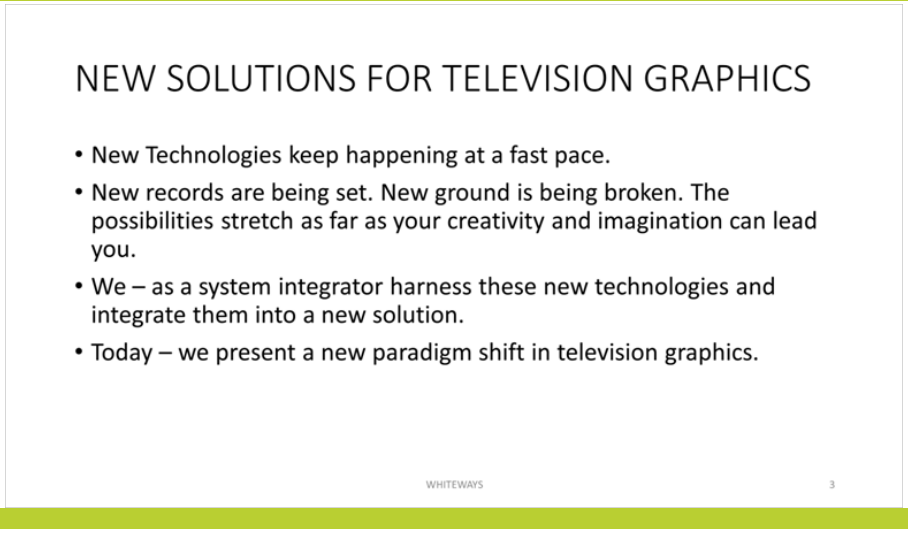
Personate.ai: One platform for all video generation needs

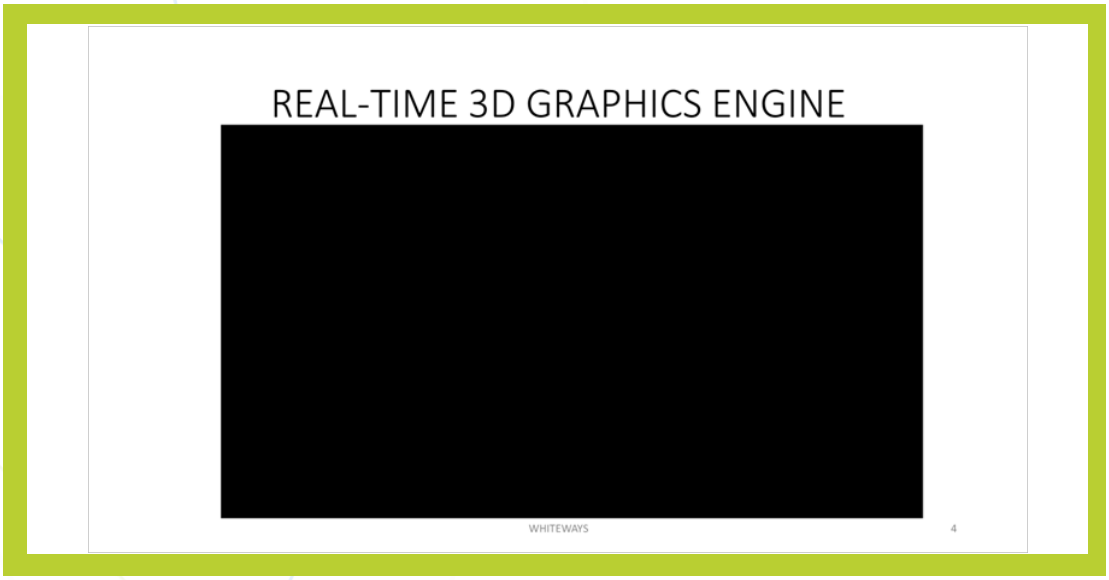
- AI ecosystem to produce end-to-end videos with Ultra-realistic voices, scripts, backgrounds, and translations in minutes
- Cloud based AI Studio SaaS, starts with a free plan
- Instant actor cloning, Produce videos from anywhere, over Any Device
- Generate millions of videos parallely with API, personalised or from urls
- 100+ languages, accents and voice cloning


Personate.ai
THANK YOU
Looking forward to connect!
akshay@personate.ai
9168 620 572
@beyondaksh
www.personate.ai
MAKE IN INDIA
As seen on global media
abc NEWS
DW
Khaleej Times
yahoo! finance
MIA
NIKKEI Asia

Mr. Aniruddh Ghosh, Sr. Manager, Whiteways, Singapore

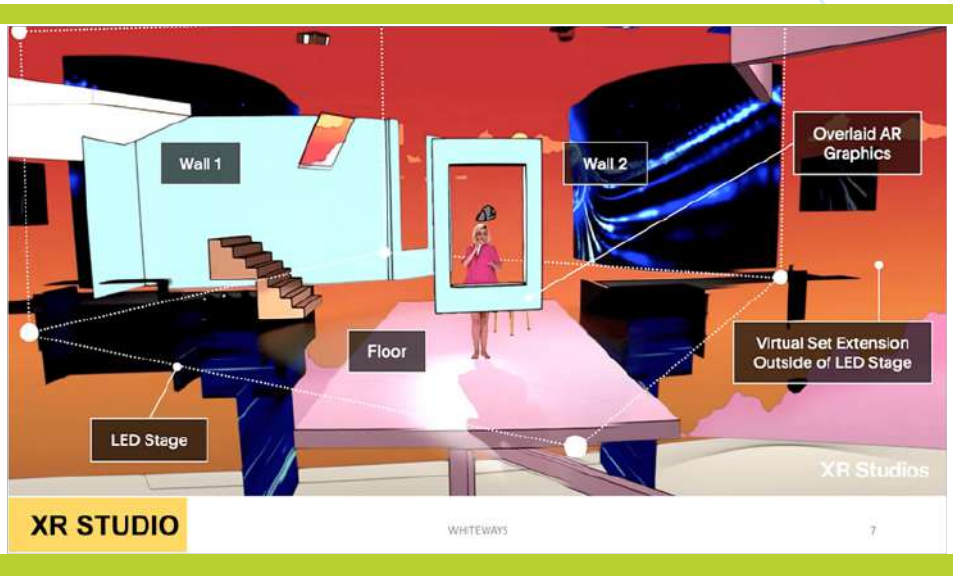





REAL-TIME 3D GRAPHICS ENGINE
WHITEWAYS
4


Real-time 3D graphics
WHITEWAYS
5


WHITEWAYS
XR Studio



XR STUDIO

WHITEWAYS 7

XR STUDIO

How it works ?

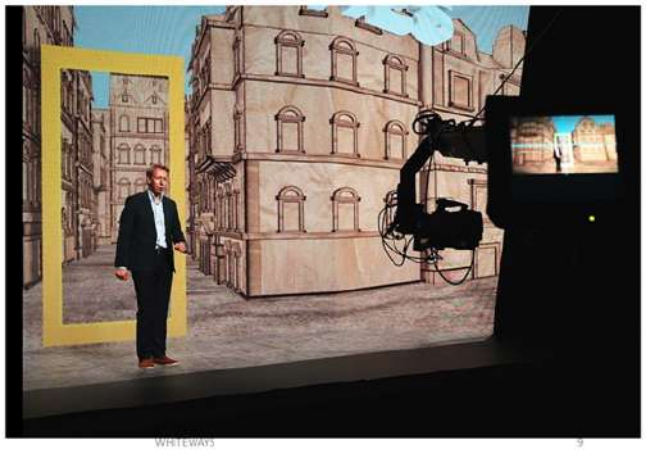
In xR production, a pre-configured 3D virtual environment generated by the graphics engine is displayed on one (or across multiple) high-quality LED screens that form the background to live-action, real world events. When combined with a precision camera tracking system, cameras are able to move in and around the virtual environment, with the real and virtual elements seamlessly merged and locked together creating the combined illusion.

Immersive production and real time edits

Actors, hosts, and producers can see the virtual environments whilst shooting. This means that they can adapt their performances or make edits live on set, which reduces time (and budget) spent in post-production.

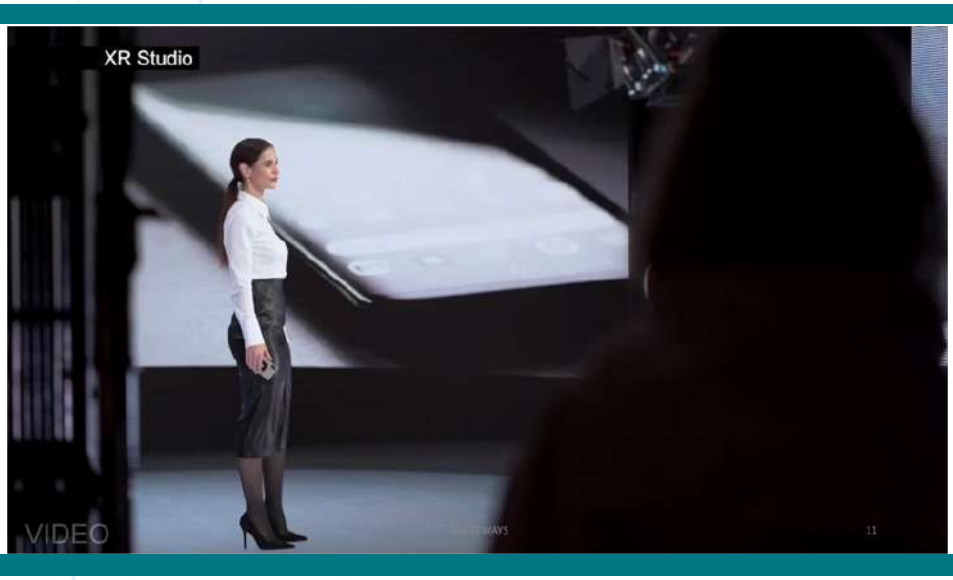
Lighting

Lighting is provided by the LED screens on an xR set. This helps real-world people and objects blend seamlessly into virtual environments, and further reduces time on set adjusting lighting.



WHITEWAYS 9


XR Studio
VIDEO
WHITEWAYS
10


XR Studio
VIDEO
11


THANK YOU
AG
Sr. Manager
International Business
Whiteways.
WHITEWAYS
WHITEWAYS SYSTEMS PTE LTD
1 Ubi Crescent, #06-06, Number One Building,
Singapore 408563
Email – ag@whiteways.sg
Website – www.whiteways.biz
WHITEWAYS
12

Mr. Bharavi Kodavanti, CEO & Animation Head, MARA Creations Pvt. Ltd

EXCEPT A COUPLE OF SUCCESS STORIES, ANIMATION CONTENT FAILS TO REACH AUDIENCE

- Lack of Original Content
- Style & Technique to create compelling characters & Storyboards, Voice etc
- Failure to understand the kids entertainment nuances (Imitation)
- FINANCE / PRODUCERS
- Marketing & Outreach
- Broadcast channels Limitations
- Support from Govt

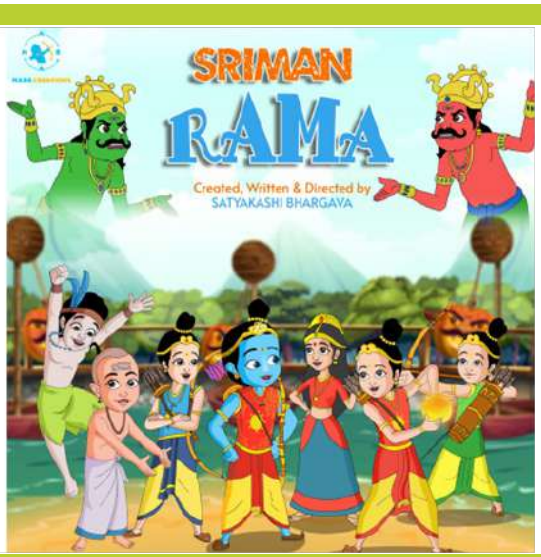
THE BRIGHT PICTURE

- Concentrate on Good Stories, for Bharat, from Bharat- culturally relevant, inspiring and enriching
- Skill Development to think originally - in terms of animation, style, voices and characters
- Create Good Funding Mechanism for the studios which encourage them to create original IPs than service mode (Atmanirbhartha)
- Encourage School to be a part of this.
- Seamless integration of ecosystem

In the year of RAMA

BHARGAVA PICTURES & MARA CREATIONS

Brings...



Organised by

BES — Broadcast Engineering Society India

Supported by

Ministry of Information & Broadcasting

Ministry of Communications

Ministry of Electronics & Information Technology

Prasar Bharati

Asia-Pacific Broadcasting Union

AIBD

AIBMDA — All India Broadcast Manufacturers And Distributors Association

AES India

Sponsored by

HD Radio®

dts