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GENEVA2024

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2–6 December 2024
Geneva, Switzerland

ITU World Radiocommunication Seminar

Broadcasting trends and
Regulation

2-6 December 2024, Geneva, Switzerland

OVERVIEW

- Terrestrial Broadcasting
- Future of terrestrial television
  - DTT (2nd generation)
  - 5G Broadcast
- 5G Broadcast and Spectrum allocations
- Spectrum aspects and challenges
- Operation & Deployment Challenges
- Regulatory framework examples (UHF)
- Future work– Issues to be addressed
- Key Takeaways

Why terrestrial Broadcasting??

Strengths

Free to air, wide public, reception is always possible both in cities and rural areas.

Localized Content: tailored to the cultural and linguistic needs of specific areas.

Less Affected by Weather: (e.g., heavy rain, storms) that can disrupt e.g. satellite signals.

Most trusted media

Public warning, disaster mitigation and relief (**Report ITU-R BT.2299-0**)

Ongoing digitalization, i.e. better quality, more choice and new features

Challenges

Lack of frequencies (congestion)

Increasing competition: Streaming, OTT, IPTV/RoIP, Satellite, Cable,…

Reduced Advertising Revenue (Competition from digital platforms)

Lack of Two-Way Communication limiting interactivity

Change in Audience habits and technology,

etc.

What to expect??

FIXED DTT: DVB-T2, ISDB-TB, ATSC 3.0, DTMB-A

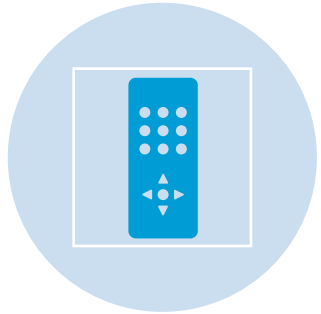
Higher Picture Quality; Better Audio; Efficient spectrum use; Data Services

IP-BASED: HBBTV

On-Demand Content; Interactive Services; Second Screen Experiences…

INTEGRATION WITH 5G BROADCAST

Reach Mobile Devices without SIM card; Public Service Broadcasting: emergency alerts and public information. Wide-Area Broadcasting



CONVERGENCE OF LINEAR TV AND STREAMING: Hybrid models, Catch-up TV and Apps

2nd DTT generation

Spectrum Refarming: by reallocating TV spectrum to mobile broadband services due to the high demand for data, TV spectrum could be reduced.Thus leading to the use of:

More efficient standards and compression techniques.

SFN: to reduce interference and make more efficient use of the available spectrum.

Sustainability and Cost Efficiency

Energy Efficiency: investing to lower costs and reduce environmental impacts.

Cost-Effective Broadcasting: Compared to satellite and cable, terrestrial TV remains cost-effective for delivering content to large audiences, particularly where broadbband infrastructure is limited.

Universal Access: FTA broadcasting remains a primary source of news and information, especially in rural or underserved areas. Its reach and accessibility make it a reliable choice for emergency broadcasting and public services.

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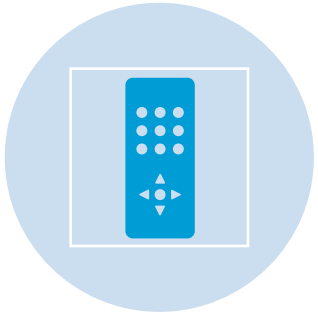


CONVERGENCE OF LINEAR TV AND STREAMING: Hybrid models, Catch-up TV and Apps

5G Broadcast is seen as a way to enhance traditional FTA broadcasting by allowing content to be delivered via mobile networks without using data plans.

5G Broadcast

5G Broadcast is an innovative technology that integrates **5G network capabilities** with **traditional broadcast media** to deliver high-quality, mass-scale content over 5G networks.

Standard: examples of FeMBMS(Further evolved Multimedia Broadcast Multicast Service), TTMB System L(Terrestrial Television Multimedia Broadcasting) 3GPP and ETSI TS 103 720 V1.2.1 (2023-06)

Key Features:

High-Quality Content Delivery: 4K/8K, HD, immersive media, etc

Efficient Spectrum Usage: allows for a **single transmission** to serve multiple devices at once,

Multi-Device Accessibility: Viewers can access content on a wide range of devices, in real-time.

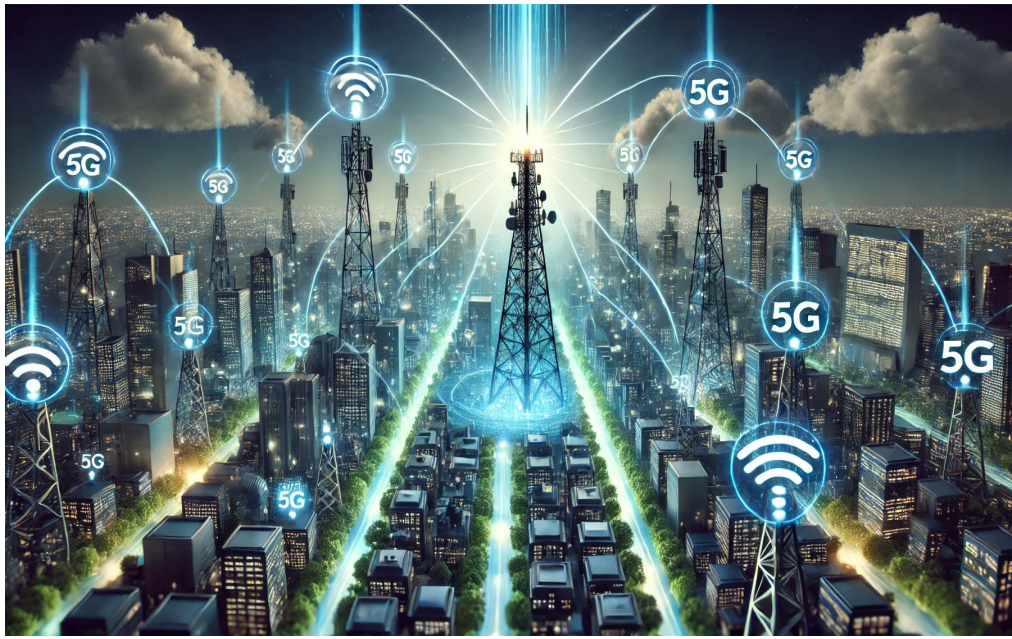
multi-cast technologies: broadcasting content to many users simultaneously for efficient coverage.

Use Cases of 5G Broadcast: Live Events, Public Safety, Public Media and Entertainment, IoT and Connected Devices (such as smart TVs or connected vehicles).

5G Broadcast and DTT

Broadcast Mode of 5G can operate similarly to DTT

- HTHP /LTLP
- OFDM signal
- SFN and MFN
- 6, 7, 8 MHz bandwidths added to the 3GPP Release 17



The key spectrum bands used or considered for 5G Broadcast include:

UHF Band: 470 - 694 MHz	700 MHz Band	L-Band : 1.452 - 1.492 GHz:	Sub-6 GHz	Millimeter Wave Bands: 24 GHz, 26 GHz, 28 GHz
• Traditionally used for TV broadcasting, provides good coverage and penetration, making it ideal for broadcasting purposes.	• Some countries have already reallocated portions of the 700 MHz band from traditional TV broadcasting to mobile broadband. It's a balance between coverage and capacity.	• Some regions use this spectrum for broadcasting applications, as it provides a balance between bandwidth and coverage.	• 2.3 - 2.4 GHz: can be used for broadcasting or other mobile broadband applications. • 3.4 - 3.8 GHz: Typically used for mobile broadband but can be repurposed for broadcast-type services if necessary.	• Although these bands are typically used for high-capacity, short-range communications, there is potential for targeted 5G broadcast services, particularly in dense urban areas.

3GPP Release 18: to include bands 612-652 MHz and 470-698 MHz Downlink

Spectrum aspects and challenges

- Spectrum Usage Models for 5G Broadcast
  - Dedicated Spectrum: Specific bands are exclusively reserved for 5G Broadcast services, similar to how traditional TV channels operate:
    - Efficient Content Delivery: without congesting the network.
    - Proper spectrum allocation ensures a wide area and good indoor coverage.
  - Shared Spectrum: 5G Broadcast shares spectrum with other services, like mobile broadband, DTT, using dynamic spectrum sharing (DSS) techniques.

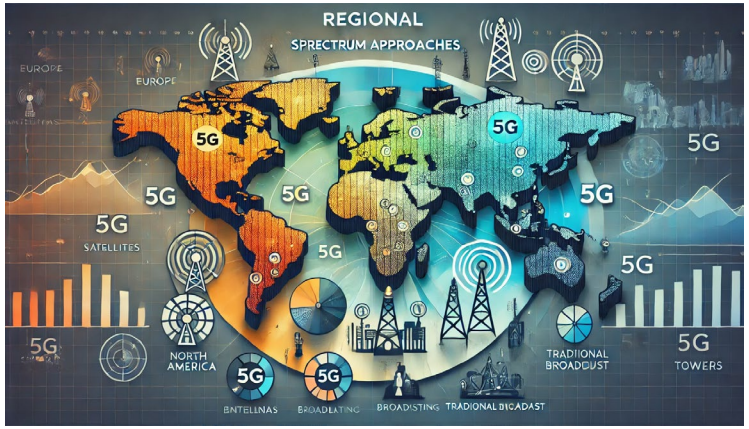
- Challenges
  - Competition with Mobile Broadband: Spectrum for 5G Broadcast competes with the growing demand for mobile broadband services.
  - Frequency Coordination: Different countries have different allocations and priorities, requiring international coordination.
  - Ensuring 5G Broadcast doesn’t interfere with existing wireless and mobile networks (e.g., BS, LTE, Wi-Fi).
  - Technical solutions required for dynamic spectrum sharing.

Operation & Deployment Challenges

- Network Architecture:
  - complexity of implementing a nationwide 5G Broadcast network (e.g., towers, cells, broadcast centers).
  - Handling the simultaneous delivery of content to millions of users while maintaining quality.
- Infrastructure Costs:
  - High initial investment and network updating to support broadcast capabilities.
  - Operational costs for a nationwide 5G Broadcast network.
- Latency and Quality of Service (QoS):
  - especially in densely populated areas with high demand.
- Device Support (still in its early stages):
  - Many existing 5G devices do not support 5G broadcast features.
- Standardization/harmonization
  - Lack of which may lead to fragmentation across different regions or networks.
  - Need for global cooperation to ensure interoperability and efficient use of spectrum.
- Spectrum Licensing:
  - Countries must allocate sufficient spectrum for 5G Broadcast, but broadcast spectrum is often controlled by government agencies and subject to lengthy regulatory processes.
- Privacy and Security:
  - Managing data privacy in a mass-distribution context, while delivering personalized content to consumers.
  - Securing broadcast content from unauthorized access or manipulation.

Regulatory framework examples

- International level: RR, Regional Agreement e.g. GE06 for VHF/UHF Band for Region 1 and Iran:
  - Outside GE06 Agreement : **11.31** of the RR.
  - Under GE06 Agreement: **11.31** and **11.34** of the RR.
    - 5.1.3 of GE06 Agreement applies (targeting a BS Plan Entry).
    - 614-694 MHz: only for the countries listed in No. **5.307A** and 694-862 MHz for all GE06 Agreement countries: Target a recorded Mobile in the OPS List or ADD a new one (Article 4) then apply Article 5 of GE06 Agreement.
- Examples of Regional Approaches
  - Europe: Focus on UHF band (470-694 MHz) for potential 5G Broadcast use, with ongoing discussions about spectrum allocation for TV versus mobile services, moving towards a more harmonized approach.
  - USA : ATSC 3.0 is the primary broadcast standard, and there's less focus on 5G Broadcast in UHF. However, broadcasters are exploring using some of the lower bands.
  - Asia (China, Korea): Utilizing portions of the mid-band (3.5 GHz) for broadcast-related services, with a focus on mobile-first 5G deployment.



Issues to be addressed

Collaborative Efforts	Industry cooperation between mobile network operators, broadcasters, and regulators to align on standards and best practices.
Innovation in Spectrum Management	Solutions for spectrum sharing and flexible spectrum usage to overcome bandwidth limitations.
Improved Regulatory Frameworks	Governments and regulatory bodies working on adapting policies to balance the needs of traditional broadcasters and telecom operators.
Focus on the challenges	Address the key technical and regulatory challenges facing 5G Broadcast.
A call for	global collaboration and innovative solutions to create a sustainable Terrestrial television ecosystem.

Key Takeaways: DTT vs. 5G Broadcast

For Mass Broadcast (Live TV, News): **DTT** is still the preferred choice due to its reliability, wide coverage, and established infrastructure. It remains strong for traditional linear TV and public broadcasting.

For Mobile and On-Demand Content: **5G Broadcast** shines, especially for delivering content to mobile devices, supporting interactive features, and integrating with internet services. It's well-suited for urban areas, personalized viewing experiences, and hybrid content delivery.

Cost and Infrastructure: **DTT** has a cost advantage with existing infrastructure for broad coverage, whereas **5G Broadcast** requires significant investment.

Coverage: For the same DTT coverage, a dedicated 5G Broadcast network would require a substantial number of additional sites. Knowing that more sites means additional interference issues, hole punching etc.

Hybrid Models: The future might involve **hybrid models**, combining DTT for traditional broadcasting with 5G Broadcast for mobile and on-demand services, maximizing the strengths of both technologies.

Thank you!

ITU – Radiocommunication Bureau

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