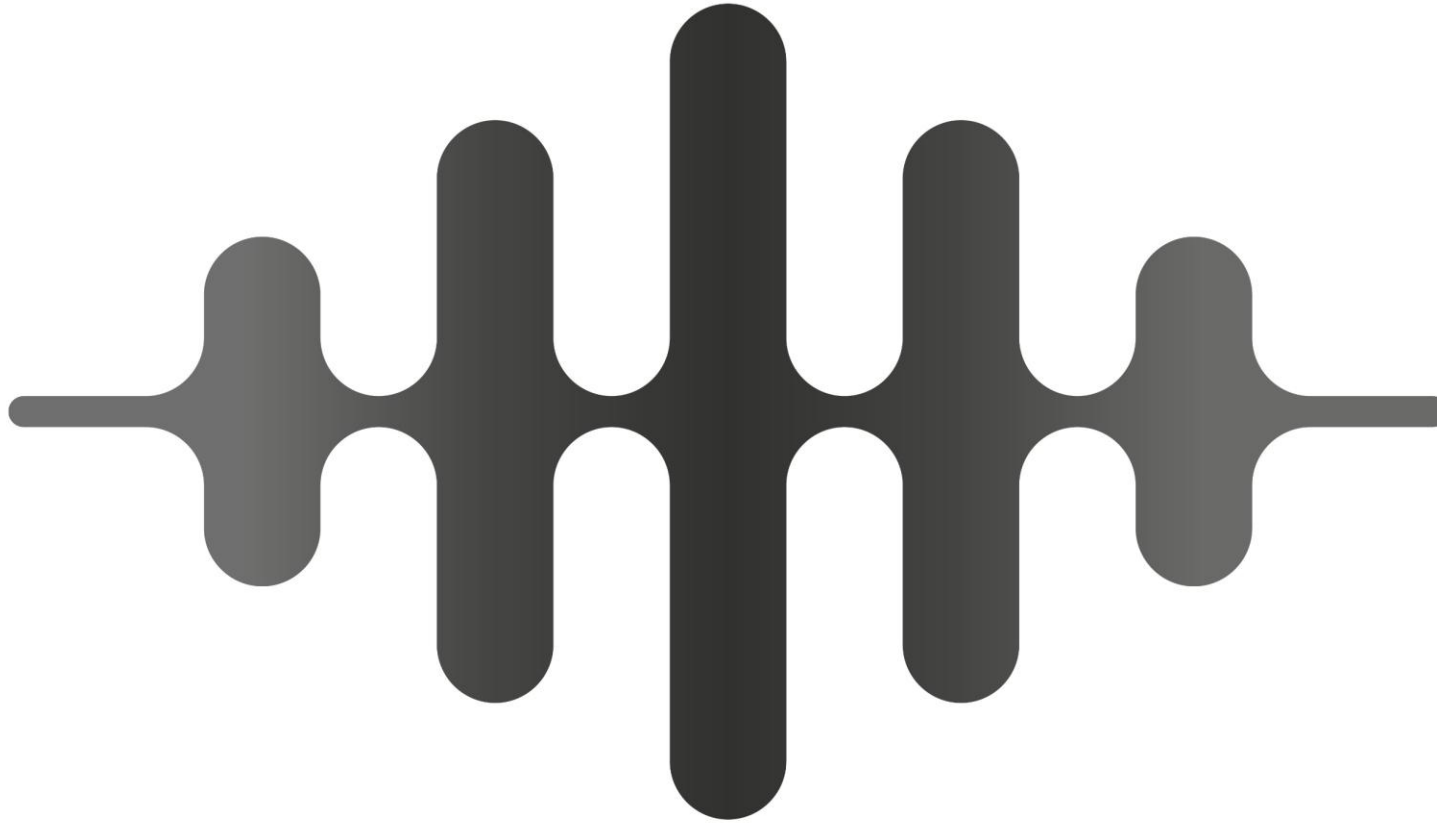
32ND ITU WORLD
RADIOCOMMUNICATION SEMINAR

ITUWRS GENEVA2026

7–11 December 2026
Geneva, Switzerland

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ITU World Radiocommunication Seminar

Broadcasting trends and Regulation

7-11 December 2026, Geneva, Switzerland



Television Broadcasting trends and production

Broadcasting and delivery

Terrestrial TV

DVB-T2, ATSC 3.0, ISDB-T3, DTMB-A , 5G Broadcast

HbbTV and connected services

Migration and emergency information

Production and experience

IP and cloud workflows

UHD, HDR and higher frame rates

Immersive and personalised sound

VR demonstration and 4D cinema

Technology choices link audience benefit with coverage, receiver support and cost.

Why terrestrial broadcasting matters



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.2299-4**)

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.

2nd Generation DTT Systems (Recommendation ITU-R BT.1877-4)

ANNEX 1

DVB-T2

DVB Project · ETSI EN 302 755

Bandwidth
1.7 – 10 MHz

Modulation
QPSK to 256-QAM

Net data rate
up to 63.2 Mbit/s

Multiple PLPs; T2-Lite profile for mobile

ANNEX 2

ATSC 3.0

ATSC · A/300 suite

Bandwidth
6 – 8 MHz

Modulation
QPSK to 4096-NUC

Net data rate
up to 77.2 Mbit/s

IP transport; layered division multiplexing

ANNEX 3

DTMB-A

China

Bandwidth
6 – 8 MHz

Modulation
QPSK to 256-APSK

Net data rate
up to 50.7 Mbit/s

Flexible coverage; UHDTV capable

ANNEX 4

ISDB-T3

ARIB, Japan

Bandwidth
6 – 8 MHz

Modulation
QPSK to 4096-QAM

Net data rate
up to 78.6 Mbit/s

MIMO; channel bonding; hierarchical layers

Note: Migration needs compatible receivers and a codec plan, alongside coverage and network planning.

5G technologies for broadcasting:distribution and production

5G Broadcast delivers the same live content to many compatible receivers.

Broadcast radio access	LTE-based 3GPP eMBMS / FeMBMS, with OFDM and single-frequency network operation.
Direct mobile reception	Receive-only, free-to-air operation can work without a SIM card, Wi-Fi or mobile data.
Broadcast + broadband	Broadcast carries popular live streams. Broadband can add on-demand content and interactivity.
Smartphone readiness	XGN Global / X1 Mobile announced a rugged handset in 2026. Check model availability, supported bands and local coverage.

A compatible 5G Broadcast receiver is essential. Ordinary 5G connectivity alone is insufficient.

Private 5G for production	Private 5G networks support content production and contribution, complementing 5G Broadcast delivery to audiences.

5G Broadcast: spectrum bands used or considered

UHF: 470–694 MHz

Traditional TV spectrum with good coverage and penetration for broadcasting.

700 MHz

Some countries have reallocated portions from TV to mobile broadband, balancing coverage and capacity.

L-band: 1.452–1.492 GHz

Broadcasting applications in some regions, balancing bandwidth and coverage.

Sub-6 GHz: 2.3–2.4 and 3.4–3.8 GHz

2.3–2.4 GHz: broadcasting or mobile broadband.
3.4–3.8 GHz: typically mobile broadband, with possible repurposing for broadcast-type services.

Millimeter wave: 24, 26 and 28 GHz

Typically high-capacity, short-range communications, with potential for targeted 5G broadcast in dense urban areas.



3GPP Release 18

Includes downlink-only bands:
107: 612–652 MHz
108: 470–698 MHz

5G Broadcast: difficulties and three trial cases

Deployment difficulties

Receiver ecosystem

Compatible chipsets, antennas and common receiver profiles.

Spectrum and coverage

Licensing, coordination and reliable indoor/mobile reception.

Business case

Network investment, content rights and audience demand.

Three brief case studies

Germany · 5G TODAY, 2019

Two high-power sites tested FeMBMS TV delivery, focusing on wide-area mobile reception.

Austria · Donauinselfest, 2023

ORS tested live-event delivery in Vienna. Focus: low latency and hybrid broadcast/broadband reception.

France · TDF Live Test, 2024

Paris, Nantes and Bordeaux, with 200+ testers using configured phones. Focus: real-world reception quality.

Mobile Reception

Second generation DTT · BT.1877

Fixed reception first, with mobile modes built in

DVB-T2	T2-Lite profile for mobile broadcasting
ATSC 3.0	Robust mobile reception on a wide range of devices
DTMB-A	Indoor/outdoor, fixed and mobile reception
ISDB-T3	Hierarchical layers; interleaving against fading

5G Broadcast · System L

Not 2nd generation DTT

Designed for handheld receivers

Receive-only mode
Free-to-air, no SIM or subscription

Flexible channels
1.4 to 20 MHz, including 6, 7 and 8 MHz

Large SFNs
Up to 100 km radius (300 µs cyclic prefix)

3GPP STANDARD	ADDED TO ITU-R 12/2022
First: Rel-14 (2017)	BT.1833-4
Current: Rel-19 (2025)	BT.2016-3

BT.1877-4	BT.1833-5	BT.2016-4	Rep. BT.2549	Rep. BT.2526-2
2nd gen DTT	L since 12/2022	L since 12/2022	System L planning	Field trials

Migration, spectrum and receiver readiness

1 Reorganise	Compress and consolidate existing multiplexes where feasible.
2 Introduce	Launch new services while maintaining a managed transition.
3 Equip	Support receiver adoption and test end-to-end interoperability.
4 Complete	Retire legacy services when coverage and audience readiness allow.

DTT and 5G Broadcast need suitable spectrum and receivers. Licensing, SFN/MFN design and cross-border coordination remain central.

HbbTV and DVB-I: connected television

HbbTV: interactive applications

Combines broadcast and broadband services on compatible TVs and set-top boxes.

Catch-up, broadcaster applications and accessibility features extend linear TV.

DVB-I: service discovery

Service lists help receivers find television services across delivery networks.

Integration with HbbTV links applications to broadcast or IP-delivered linear services.

HbbTV complements the transmission system. Connected features need compatible devices and broadband where required.

Key Takeaways: DTT vs. 5G Broadcast

Mass broadcast: live TV and 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.

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

Matching DTT coverage with a dedicated 5G Broadcast network would require substantial additional sites, bringing additional interference issues, including hole punching.

Hybrid Models

Future hybrid models might combine DTT for traditional broadcasting with 5G Broadcast for mobile and on-demand services, maximizing the strengths of both technologies.

Picture quality: UHD, HDR and smoother motion

4K / 8K UHD

More picture detail on large screens or at closer viewing distances.



HDR and wider colour

Brighter highlights, richer tonal detail and a wider colour range.



Higher frame rates

Smoother movement and clearer fast action, especially in sport.



Quality depends on the full capture, production, delivery and display chain.

Immersive sound and personal listening

Object-based audio combines a sense of presence with listener choice.

Spatial sound

Sound elements carry position information, including height, for compatible playback systems.

Personalised listening

Dialogue, language or commentary options depend on the choices the service provides.



Example: MPEG-H Audio adapts a mix to compatible speakers, soundbars or headphones.

VR and volumetric media: a sense of being there

Looking around and moving in a scene

360° video lets viewers look around from a fixed viewpoint.

Volumetric media can add movement and a choice of perspective.

Immersion

A strong sense of being inside the scene.

Interaction

Explore and engage with virtual surroundings.

Spatial sound

Audio can come from around and above.







Broadcast relevance: new storytelling formats require demanding capture and rendering.

4D cinema and wider multisensory experiences

Motion and effects in the cinema

4DX combines synchronised seat motion with effects such as wind and water.

SCREENX extends the image across a 270° panoramic view.



What the labels mean

4K / 8K describe picture resolution.

4D describes a multisensory experience.

“5D” and higher: check the specific effects.

Broadcast consideration: physical effects require dedicated equipment at the viewing location.

Sound broadcasting trends

Digital radio

DAB, DAB+, DRM, IBOC / HD Radio, ISDB-TSB, CDR and RAVIS. Deployment depends on national spectrum and receiver availability.

Hybrid listening

RadioDNS links broadcast radio with the internet, adding station information and service following in compatible receivers.

Personalised audio

Object-based systems such as MPEG-H offer immersive sound, dialogue enhancement and language choices where supported.

Public-service focus: accessible receivers and emergency alerts alongside richer listening.

Digital sound broadcasting systems

System	Spectrum / approach	Main characteristics
DAB	Mainly VHF Band III	Multiplex of radio services using MPEG Audio Layer II.
DAB+	Same DAB multiplex	HE-AAC v2 audio coding, more efficient than DAB.
DRM	LF / MF / HF and VHF	Digital audio and data for AM bands and VHF (DRM+).
IBOC / HD Radio	Existing AM / FM bands	Hybrid analogue/digital, in-band and on-channel.
ISDB-TSB	VHF, segmented OFDM	Japanese specification using 1 or 3 OFDM segments.
CDR	FM band	Chinese system with hybrid and digital-only modes.
RAVIS	Narrowband VHF	Russian real-time audiovisual information system.

Deployment and receiver availability vary by country. Standardization does not imply widespread adoption.

Radio and terrestrial TV in emergencies

Warnings and reliable public information can reach large audiences without an internet connection.

Radio: a portable lifeline

Battery-powered sets support listening during power cuts. Spoken local-language guidance helps people act.

Terrestrial TV: guidance people can see

Maps, captions and visual instructions explain affected areas and protective actions.



Resilience needs backup power, working transmitters and receivers, alongside other warning channels.

Shared trends in sound and TV production

Software, cloud services and AI are changing broadcast workflows.

IP and cloud

Cloud processing and shared resources support flexible production.

Resilience and supplier choice remain priorities.

AI-assisted access

Subtitle and audio-description tools can widen access.

Human review remains essential for quality and editorial judgement.

Interoperability

Open standards help services work across equipment and platforms.

Testing spans production, delivery and playback.

Planning implication: assess audience benefit together with reliability and long-term operating cost.

WRC-27: PMSE priorities and study status

No change proposed to the UHF TV band

AI / exposure	Bands	PMSE implications and study status
1.12 / 1.14 High	2010–2025 MHz +2120–2170 (1.14) +1880–1920, 1427–1432 (1.12)	MSS proposals overlap wireless video. 2010–2025 MHz is the only EU-wide harmonised video PMSE band. 2120–2170 MHz also serves video, with audio PMSE next to 1427–1432 MHz. WP 4C: no change / primary / secondary MSS options. LDR definition and aggregate effects unresolved. PMSE separation: 48–90 km. Studies ongoing.
1.7 at 7 GHz High	7.125–8.4 GHz 4.4–4.8 GHz 14.8–15.35 GHz	IMT studies affect cameras and video links (7.0–8.5 GHz tuning range) and fixed production/contribution links. WP 5D final meeting ended 8 Oct. No PMSE-specific study among the annexes as of June 2026.
1.13 at 2.3 GHz High	694/698 MHz–2.7 GHz	Satellite-to-phone studies in bands used or identified for IMT. Video PMSE at 2.3–2.4 GHz and 2 GHz, audio PMSE at 1.4–1.8 GHz. WP 6A developed terrestrial broadcasting protection criteria in Sept. 2026. DTT remains in UHF.
1.17 Low	608–614 MHz	Receive-only space weather sensors within the UHF TV/audio PMSE band. No protection claims or constraints on incumbents (Res. 682). No TV impact expected.

WRC-31 outlook and other broadcasting items

WRC-31: preliminary item 2.14

Review of 470–694 MHz

Scope: 5.295A countries, including a possible mobile review in 614–694 MHz (Res. 235). This is the core DTT and audio PMSE band.

Some seek a wider review. Others consider it premature after WRC-23. CEPT FM51 and RSPG are working on flexible use in Europe.

Key condition: no constraint on DTT or each country's audio PMSE needs in 470–694 MHz.

AI 10: WRC-27 decides whether the WRC-31 item stays, changes or is dropped. Relevance: high.

AI	Other broadcasting considerations
1.5 Watch	All FSS/MSS bands: measures against unauthorised NGSO terminals may affect newsgathering and contribution links.
8 Watch	Country-footnote deletions (Res. 26): monitor 470–694 MHz, including No. 5.296 for PMSE.
1.6 Low	Equitable FSS access, no new allocation: 37.5–42.5, 42.5–43.5, 47.2–50.2, 50.4–51.4 GHz. 40.5–42.5 GHz is primary BS/BSS in all Regions. Indirect distribution effect.
1.9 Low	HF AM(OR), 3–18 MHz (App. 26): wideband modernisation, no Article 5 change. Check adjacent-band and unwanted emissions into HF broadcasting.
1.10 Low	71–76 / 81–86 GHz: pfd/e.i.r.p. limits on FSS, MSS and BSS to protect fixed/mobile services. Future BSS use must meet the limits.

Thank you

Questions

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