Spectrum Trends for Next-Generation Terrestrial Broadcasting Services

Workshop on next-generation broadcasting: challenges and prospects for developing countries

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Spectrum Trends for Next-Generation Terrestrial Broadcasting Services

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Agenda

- **Broadcasting Frequency Planning & Regional Agreements**
- **Digital Switchover**
- **Next-Generation Broadcasting Technologies**
- **Digital Dividend and Future Use of the UHF Band**

Broadcasting Frequency Planning & Regional Agreements

Three areas of work

1 · PLANS

Regional Agreements

Maintenance of the regional Plans and process their modifications under each agreement's procedures.

3 LF/MF **4** FM/TV

GE75, RJ81, RJ88, ST61, GE84, GE89, GE06

2 · NOTIFICATION

Recording in the MIFR

The Master International Frequency Register: the official record of frequency assignments notified by administrations.

Recording gives an assignment **international recognition** and the right to be taken into account by other administrations.

RR Articles 8 and 11 · published in the BR IFIC

3 · COORDINATION

Regional frequency planning

Planning campaigns

- **Central America & Caribbean**
  2017–18 · DTT · 30 administrations
  1,060 DTT assignments agreed
- **Africa · GE84 with the ATU**
  2019–22 · FM · 53 countries
  18,326 FM assignments cleared for usage

Bilateral coordination: support to neighbouring administrations in cross-border frequency coordination.

Seven Regional Agreements

LF/MF sound | FM and TV

1961	1975	1981	1984	1988	1989	2006
Stockholm	Geneva	Rio de Janeiro	Geneva	Rio de Janeiro	Geneva	Geneva
ST61 Rev. 2006 European Broadcasting Area 47–68 MHz 87.5–100 MHz 162–170 MHz **FM and TV**	**GE75** Regions 1 and 3 (LF: Region 1 only) LF 150–285 kHz MF 525–1605 kHz **LF/MF sound**	**RJ81** Region 2 MF 535–1605 kHz **MF sound**	**GE84** Region 1 and part of Region 3 87.5–108 MHz **FM sound**	**RJ88** Region 2 MF 1605–1705 kHz **MF sound**	**GE89** Rev. 2006 African Broadcasting Area + neighbours 47–68 MHz 230–238 MHz 246–254 MHz **Analogue TV**	**GE06** Parts of Regions 1 and 3 174–230 MHz 470–862 MHz **Analogue and digital broadcasting**

GE06 Agreement

KEY FACTS

- Adopted at RRC-06, Geneva, 15 May – 16 June 2006
- DVB-T in 174–230 and 470–862 MHz; T-DAB in 174–230 MHz
- Analogue Plan ended on 17 June 2015 (2020 for Band III in some countries)
- § 5.1.3: a Plan entry can be notified with other characteristics, e.g. DVB-T2

IN NUMBERS

70,493
RRC-06 requirements

~120
signatory countries

113,151
Digital TV entries (09/2026)

15,380
Digital Radio entries (09/2026)

ART. 4 · PLAN MODIFICATION

1. Submission of modification proposal
2. BR validation and identification of affected administrations
3. Publication in BR IFIC Special Section, Part A
4. Coordination period with affected administrations
5. Agreement reached or no objections
6. Publication in BR IFIC Special Section, Part B

✓ **GE06 Plan officially updated**

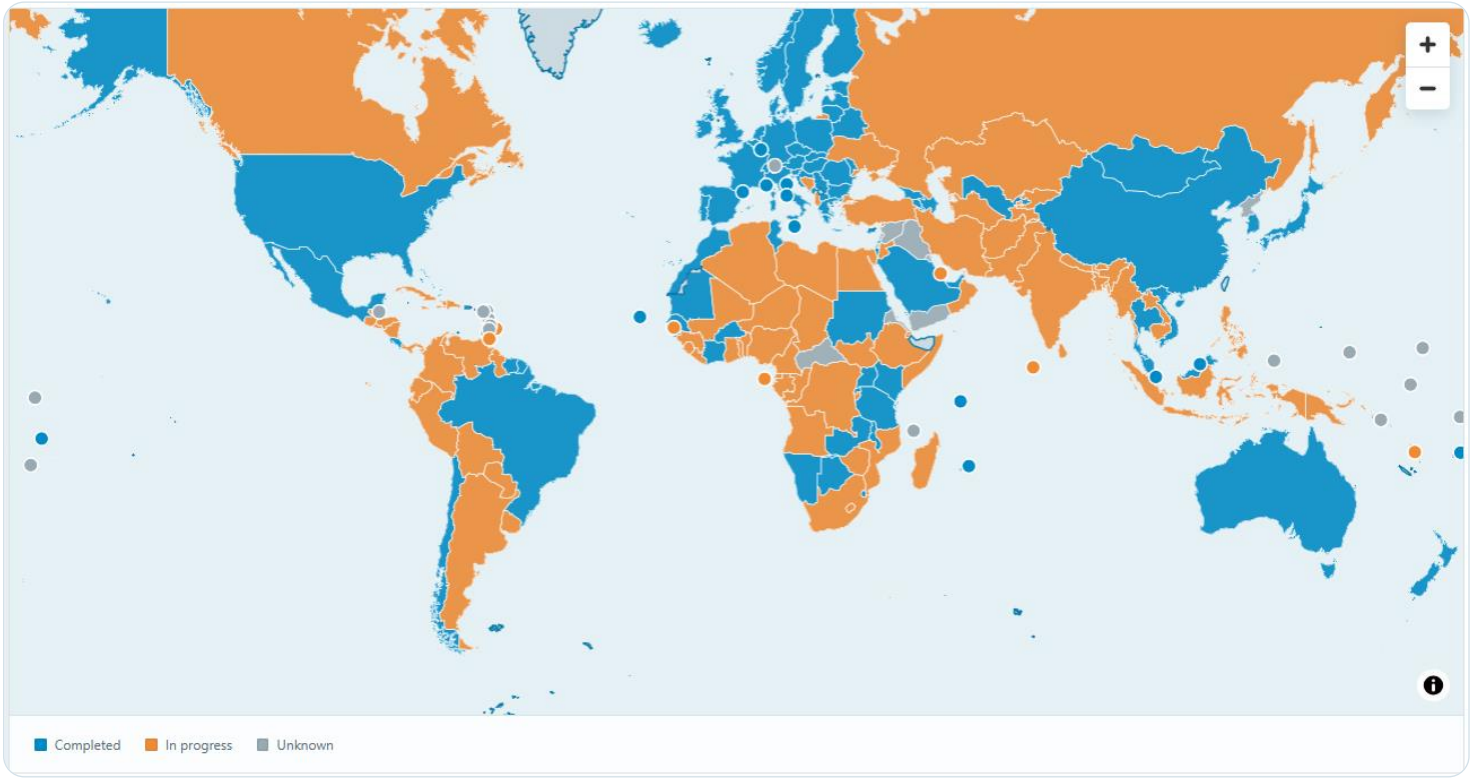
ART. 5 · MIFR NOTIFICATION

1. Assignment notified to the BR
2. Publication in BR IFIC, Part I
3. Examination of regulatory and technical conformity
4. Publication in BR IFIC, Part II

✓ **Recorded in the MIFR**

Digital Switchover

Switchover status worldwide



About this map: Not an ITU position. Independent research in progress. Status as of September 2026.

KEY FINDING

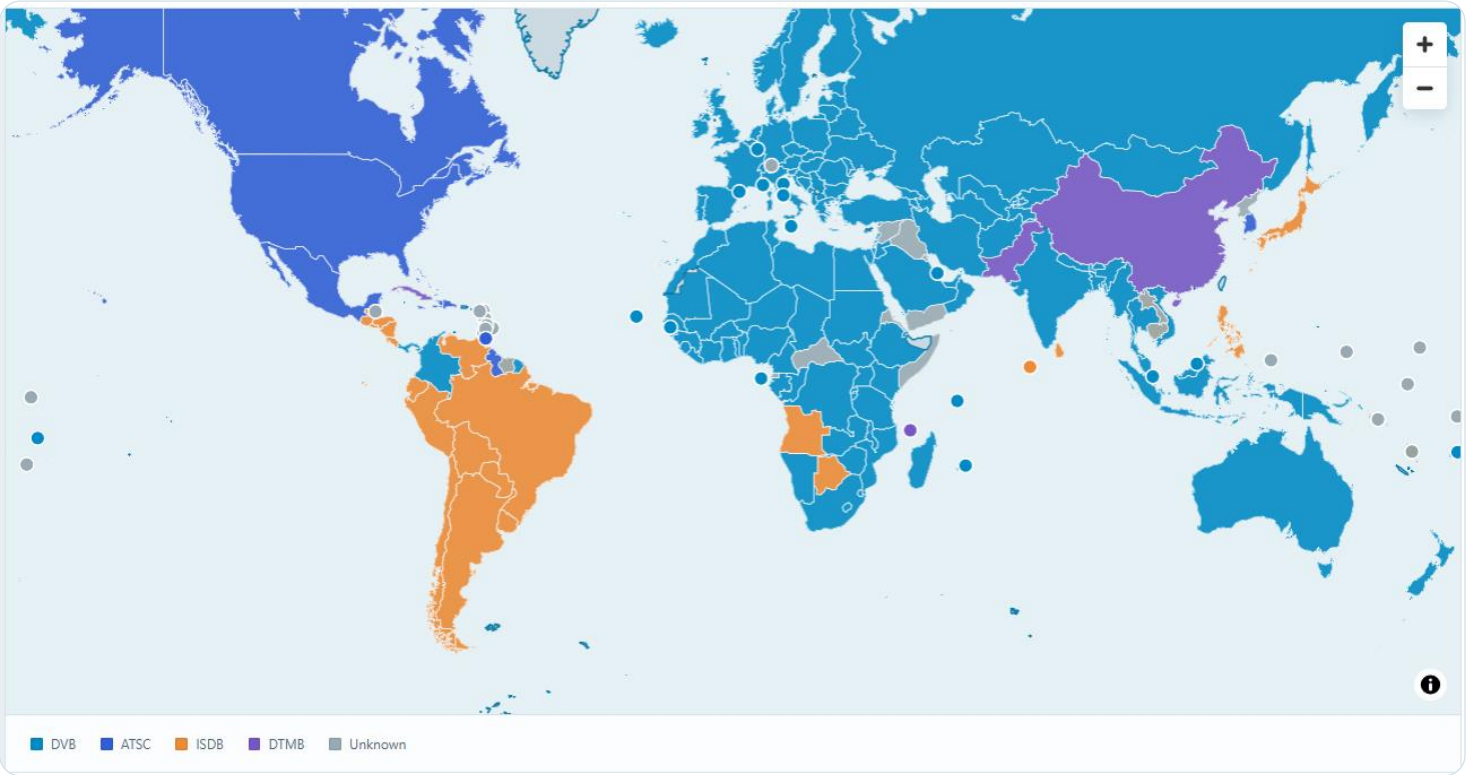
More than half

of countries have not yet completed the analogue-to-digital transition.

WHERE ANALOGUE PERSISTS

Most of Africa, much of South America, Central and South Asia, parts of South-East Asia.

DTT standard families



About this map: Not an ITU position. Independent research in progress. Status as of September 2026.

KEY FINDING

Almost all

countries have already chosen their first-generation DTT standard (a few unknown).

DVB

is the most widely adopted family: Europe, Africa, the Middle East, most of Asia and Oceania.

Trends shaping the transition

COSTS

Cost is the main bottleneck

Set-top box affordability, long and costly simulcast, network financing and public awareness keep many transitions open.

SPECTRUM

The road to WRC-31

Countries still in transition need UHF spectrum for simulcast and DTT roll-out, while a review of 470–694 MHz is on the preliminary WRC-31 agenda.

HYBRID PLATFORMS

Broadcast meets IP

Broadband and OTT compete for the same viewers. Hybrid services (e.g. HbbTV, DVB-I) combine DTT and IP delivery on one screen.

SATELLITE

Satellite as a complement

Free-to-air satellite can fill DTT coverage gaps in rural areas and small island states, lowering network costs.

Next-Generation Broadcasting Technologies

Study Group 6 Framework

WHERE THE WORK IS DONE

ITU-R Study Group 6 Broadcasting service

Working Party 6A – terrestrial broadcasting delivery

Studied under **Questions ITU-R 132-7/6** and **133-2/6**

Recommendations are updated as new systems mature – BT.1877 has five versions since 2010

FIRST GENERATION DIGITAL SYSTEMS

BT.1306 TV: ATSC, DVB-T, ISDB-T, DTMB

BS.1114 · BS.1514 Radio: DAB, DRM, IBOC, ISDB-TSB, CDR, RAVIS

BT.1877-4 (06/2026)

Second generation DTT systems and selection guidance

BT.2033-2 (01/2022)

Planning criteria, protection ratios and minimum field strengths

Reports BT.2295 · BT.2343-11

Systems overview · Field trials of UHDTV over DTT networks

BT.1877 REVISIONS

2010 · Rev. 0	2012 · Rev. 1	2019 · Rev. 2	2020 · Rev. 3	2026 · Rev. 4
DVB-T2	Update	ATSC 3.0, DTMB-A	Update	ISDB-T3 added

2nd Generation DTT Systems

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

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 GEN 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
2nd gen DTT

BT.1833-5
L since 12/2022

BT.2016-4
L since 12/2022

Rep. BT.2549
System L planning

Rep. BT.2526-2
Field trials

Next-generation broadcasting needs room to migrate

WHY MORE SPECTRUM

New systems need new receivers

Second-generation DTT and 5G Broadcast cannot be received by today's sets, so old and new services must run in parallel. 5G Broadcast is a new service and needs its own channels.

DIGITAL-TO-DIGITAL IS MORE FLEXIBLE

Free channels by reorganising multiplexes

- Compress: MPEG-2 → MPEG-4 or HEVC
- Consolidate first-generation services into fewer multiplexes
- Launch second-generation multiplexes in the freed channels
- Migrate multiplex by multiplex as receivers spread, then switch off

BUT IT IS NOT AUTOMATIC

Complex, and different in every country

- Channels still available after the digital dividends
- Receivers able to decode the new system
- Engineering: coverage, MFN/SFN, cross-border coordination
- Cost of the parallel period

EXAMPLES OF COUNTRIES DOING OR PLANNING IT

Czechia

DVB-T2 through transition networks; completed in October 2020, with the 700 MHz release

Italy

MPEG-4 in 2021–22 during 700 MHz refarming; first DVB-T2 multiplex in 2024

United States

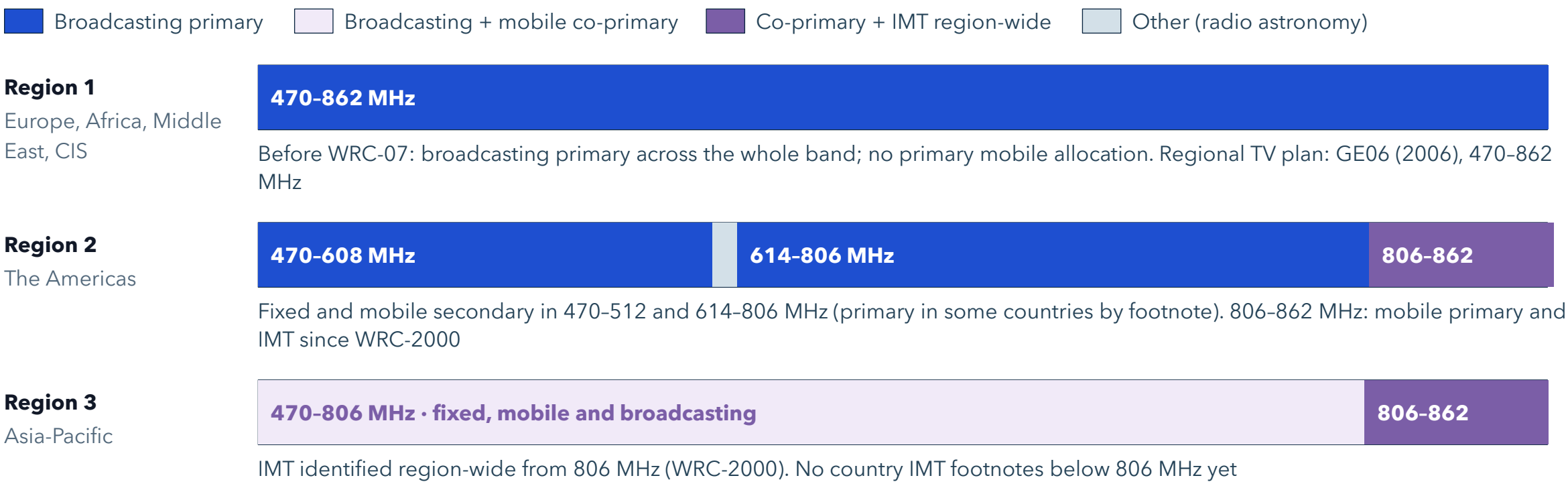
ATSC 3.0 "lighthouses": stations share channels, with no new spectrum

Brazil

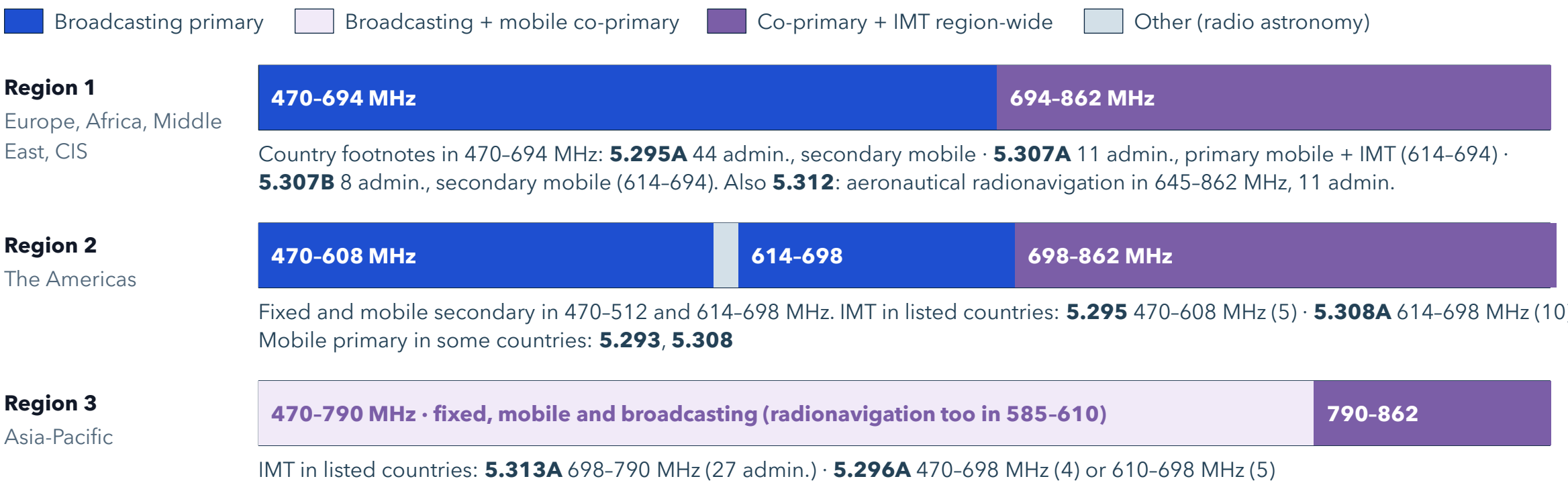
TV 3.0 (ATSC 3.0-based): new channels in 216–372 MHz; sharing where scarce

Digital Dividend and Future Use of the UHF Band

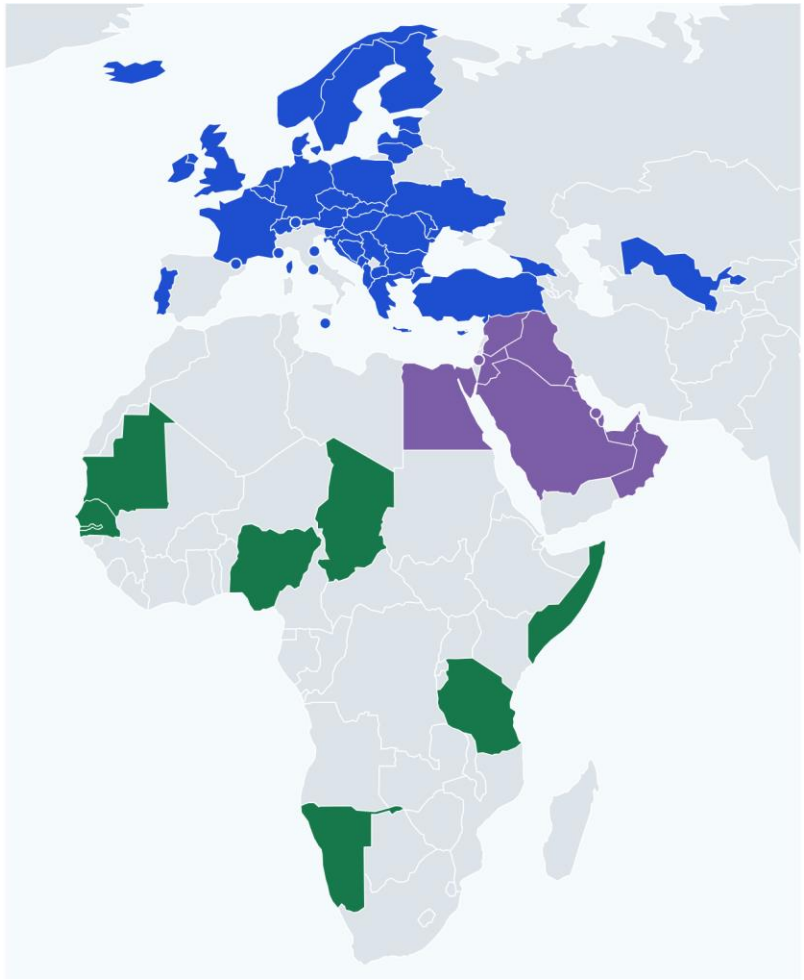
The UHF band before WRC-07



The UHF band today



WRC-23 Recap



AGENDA ITEM 1.5 · DUBAI, NOV–DEC 2023

44 **CEPT administrations + Uzbekistan · RR 5.295A**
Secondary mobile across 470–694 MHz. Not Italy or Spain

11 **Arab administrations · RR 5.307A**
Primary mobile + IMT in 614–694 MHz, cannot claim protection from neighbours' broadcasting

8 **African administrations · RR 5.307B**
Secondary mobile in 614–694 MHz

Everyone else: no change. Broadcasting stays the only primary service in the Region. All three footnotes protect the GE06 Plan; 5.295A and 5.307A also need No. 9.21 agreement.

Looking ahead: WRC-27 and WRC-31

WRC-27 · FOR BROADCASTERS: MAINLY PMSE

No item on the UHF TV band

AI	Bands	Why broadcasters care
1.12, 1.14	2010–2025 MHz	New satellite (MSS) use where wireless cameras and video links operate
1.7	4.4–4.8 GHz 7.125–8.4 GHz 14.8–15.35 GHz	IMT studied in bands used for video links and contribution links
1.13	694/698 MHz – 2.7 GHz	Satellite-to-phone links start just above the TV band
1.17	608–614 MHz	Receive-only space weather sensors; no impact on TV expected

Agenda item 10 →
WRC-27 sets the WRC-31 agenda

WRC-31 · PRELIMINARY AGENDA ITEM 2.14

Review of 470–694 MHz

Scope: broadcasting and mobile use in the band, for the 5.295A countries (Res. 235).

Debate: some want a wider review; broadcasters say it is too early.

In Europe: CEPT discussions on the future of the band are under way.

Summary

Key takeways

PLANNING & REGIONAL AGREEMENTS

Plans protect every country’s rights

Seven Regional Agreements and the MIFR give assignments international recognition. It is important to keep Plan entries and MIFR notifications up to date.

DIGITAL SWITCHOVER

The transition is not finished

More than half of countries are still switching over. Cost, not technology, is the main barrier; satellite and hybrid delivery can help.

NEXT-GENERATION TECHNOLOGIES

ITU-R Standardization

BT.1877-4 now covers four second-generation DTT systems; 5G Broadcast (System L) adds free-to-air reception on handheld devices.

SPECTRUM

470–694 MHz is being discussed

Next-generation DTT needs spectrum to migrate, while WRC-31 reviews 470–694 MHz. Digital-to-digital migration can be phased, multiplex by multiplex.

Thank you!

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