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| Riga, Latvia 25th - 28th March 2014 | |  |
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| Subject: | Draft CEPT Brief on WRC-15 Agenda Item 1.2 (WRC-15) | |
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| Summary: | | |
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| Proposal: | | |
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DRAFT CEPT BRIEF ON AGENDA ITEM 1.2

to examine the results of ITU-R studies, in accordance with Resolution 232 (WRC‑12), on the use of the frequency band 694-790 MHz by the mobile, except aeronautical mobile, service in Region 1 and take the appropriate measures;

# ISSUE

WRC-12 added No.5.312A into the Table of Frequency Allocations. This footnote states that in Region 1, the use of the band 694-790 MHz by the mobile, except aeronautical mobile, service is subject to the provisions of Resolution 232 (WRC‑12). See also Resolution 224 (Rev. WRC‑12).

Resolution 232 resolves

1. to allocate the frequency band 694-790 MHz in Region 1 to the mobile, except aeronautical mobile, service on a co-primary basis with other services to which this band is allocated on a primary basis and to identify it for IMT;
2. that the allocation in resolves 1 is effective immediately after WRC‑15;
3. that use of the allocation in resolves 1 is subject to agreement obtained under No. 9.21 with respect to the aeronautical radionavigation service in countries listed in No. 5.312;
4. that the lower edge of the allocation is subject to refinement at WRC‑15, taking into account the ITU-R studies referred to in invites ITU-R below and the needs of countries in Region 1, in particular developing countries;
5. that WRC‑15 will specify the technical and regulatory conditions applicable to the mobile service allocation referred to in resolves 1, taking into account the ITU-R studies referred to in invites ITU-R below,

and invites ITU‑R

1. to study the spectrum requirement for the mobile service and for the broadcasting service in this frequency band, in order to determine as early as possible the options for the lower edge referred to in resolves 4;
2. to study the channelling arrangements for the mobile service, adapted to the frequency band below 790 MHz, taking into account:

* the existing arrangements in Region 1 in the bands between 790 and 862 MHz and defined in the last version of Recommendation ITU-R M.1036, in order to ensure coexistence with the networks operated in the new allocation and the operational networks in the band 790-862 MHz,
* the desire for harmonization with arrangements across all Regions,
* the compatibility with other primary services to which the band is allocated, including in adjacent bands;

1. to study coexistence between the different channelling arrangements which have been implemented in Region 1 above 790 MHz, as well as the possibility of further harmonization;
2. to study the compatibility between the mobile service and other services currently allocated in the frequency band 694-790 MHz and develop ITU-R Recommendations or Reports;
3. to study solutions for accommodating applications ancillary to broadcasting requirements;
4. to report, in time for WRC 15, the results of these studies,

# Preliminary CEPT position

* CEPT supports to set 694 MHz as the low edge of the mobile allocation referred to in Resolves 1 of Resolution 232 (WRC-12).
* CEPT supports studies on channelling arrangements for the mobile service, which should take into account any asymmetry of traffic loads and achievable bitrates in the uplink and downlink to facilitate an optimal frequency usage.
* CEPT considers that the protection of broadcasting from mobile service in cross-border coordination is effectively ensured by the application of the GE06 Agreement, without any need for additional provision in the RR.
* Digital terrestrial television in the UHF band below 694 MHz in particular channel 48 (686-694 MHz), shall be protected. Regarding technical conditions applicable to IMT stations (base stations and user equipment) and ensuring the protection of the broadcasting service below 694 MHz should be included in a new ITU-R Recommendation specifying notably the adequate unwanted emission limit in the band 470-694 MHz for IMT terminal in the 700 MHz band and the revision of Recommendation ITU-R M.1036-4 so as to include harmonized channelling arrangements for 700 MHz in Region 1.
* CEPT supports studies on solutions for applications ancillary to broadcasting including compatibility considerations as well as possible revisions of RR 5.296.
* CEPT supports equitable access at the border between countries.
* CEPT supports the sharing studies between ARNS and mobile service. To ensure coexistence in order to avoid undue separation distances and coordination burden, CEPT may investigate similar process to WRC-12 (AI 1.17) with bilateral agreements before WRC-15.

# Background

During the Study Period 2008-2012, ITU‑R studied compatibility between the mobile service and other radiocommunication services allocated in the 790-862 MHz band under WRC‑12 agenda item 1.17. The outcome of that agenda item was a revision of Resolution 749 (Rev. WRC‑12). In response to proposals into WRC‑12 from administrations, that Conference additionally developed Resolution 232 (WRC‑12) which covers the 694-790 MHz band, with possible refinement of the lower frequency boundary at WRC‑15.

## Existing services in the band

Current allocations in the range 694 - 790 MHz in Region 1

The Table of Frequency Allocations has the following allocations and footnotes in Region 1 in the range 694-790 MHz:

* Primary allocation to the broadcasting service
* 5.296 Additional allocation: in Albania, Germany, Saudi Arabia, Austria, Bahrain, Belgium, Benin, Bosnia and Herzegovina, Burkina Faso, Cameroon, Congo (Rep. of the), Côte d'Ivoire, Croatia, Denmark, Djibouti, Egypt, United Arab Emirates, Spain, Estonia, Finland, France, Gabon, Ghana, Iraq, Ireland, Iceland, Israel, Italy, Jordan, Kuwait, Latvia, The Former Yugoslav Republic of Macedonia, Libya, Liechtenstein, Lithuania, Luxembourg, Mali, Malta, Morocco, Moldova, Monaco, Niger, Norway, Oman, the Netherlands, Poland, Portugal, Qatar, the Syrian Arab Republic, Slovakia, the Czech Republic, the United Kingdom, Sudan, Sweden, Switzerland, Swaziland, Chad, Togo, Tunisia and Turkey, the band 470-790 MHz, and in Angola, Botswana, Lesotho, Malawi, Mauritius, Mozambique, Namibia, Nigeria, South Africa, Tanzania, Zambia and Zimbabwe, the band 470-698 MHz are also allocated on a secondary basis to the land mobile service, intended for applications ancillary to broadcasting. 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‑12)
* 5.300 Additional allocation: in Saudi Arabia, Cameroon, Egypt, United Arab Emirates, Israel, Jordan, Libya, Oman, Qatar, the Syrian Arab Republic, Sudan and South Sudan, the band 582-790 MHz is also allocated to the fixed and mobile, except aeronautical mobile, services on a secondary basis. (WRC‑12)
* 5.311A For the frequency band 620-790 MHz, see also Resolution 549 (WRC‑07). (WRC‑07)
* 5.312 Additional allocation: in Armenia, Azerbaijan, Belarus, the Russian Federation, Georgia, Kazakhstan, Uzbekistan, Kyrgyzstan, Tajikistan, Turkmenistan and Ukraine, the band 645-862 MHz, in Bulgaria the bands 646-686 MHz, 726-758 MHz, 766-814 MHz and 822-862 MHz, in Romania the band 830-862 MHz, and in Poland, the band 830-860 MHz until 31 December 2012 and the band 860-862 MHz until 31 December 2017, are also allocated to the aeronautical radionavigation service on a primary basis. (WRC‑12)
* 5.312A In Region 1, the use of the band 694-790 MHz by the mobile, except aeronautical mobile, service is subject to the provisions of Resolution 232 (WRC‑12). See also Resolution 224 (Rev. WRC‑12). (WRC‑12)

## Broadcasting service

The frequency band 694-790 MHz represents 30 per cent of the total remaining UHF broadcasting spectrum.

In 2012, as part of its preparations for submission of material to the ITU-R Joint Task Group 4-5-6-7 preparing for WRC-15, the WP6A prepared and distributed a questionnaire on spectrum requirements for terrestrial television broadcasting in the frequency band 694-790 MHz in Region 1 and the Islamic Republic of Iran (Circular Letter 6/LCCE/78 updated to 24 July 2013)[[1]](#footnote-1).

On the basis of the information received, WP6A has been developing for several months a preliminary draft new Report BT.[DTTBSPECREQ].

The analysis of responses shows that a majority of Region 1 countries need 224 MHz or more (320 MHz) for their terrestrial broadcasting platforms.

The use of the 700 MHz frequency band by the broadcasting service varies across Region 1 countries. In certain CEPT countries, the 700 MHz frequency band is intensively used.

Making the 700 MHz band available for the mobile service would require intensive national replanning and international coordination activities and require substantial investments, both from consumers and from the terrestrial network operators. In addition, such a reallocation, would correspond to a reduction of the capacity for broadcasting, which would require in many countries the implementation of new technologies (DVB-T2/HEVC). [A transition will have to take into account the end dates of existing DTT licenses in the various countries.]

The terrestrial broadcasting service is, in many countries, a cost-efficient solution for high-quality media delivery to the whole population. It is the main TV platform delivering free-to-air TV programmes to citizens.

European long-term strategy for UHF broadcasting band is being developed in ECC TG6 with a target of finalising the work by summer 2014.

[Editor’s note: the following proposal for a new section on “co-channel issue” has not been discussed in CPG PTD]

[Co channel issue]

[During WRC-07, CEPT was strongly involved in carrying out the necessary technical studies about the potential impact of the cumulative effect of interference from base stations, which individually did not trigger the need for coordination with broadcasting. ]

[According to the CPM Report to WRC-12, “the studies showed that the potential impact of the cumulative effect of interference from base stations, which individually did not trigger the need for coordination with broadcasting, could be significant. On the other hand, taking into account the elements previously mentioned, the potential impact of cumulative interference might be less significant in practice” (For complete information, see section 3/1.17/4.1 of the CPM Report: http://www.itu.int/md/R07-CPM11.02-R-0001/en).]

[Therefore, JTG 5-6 drew the attention of administrations on this issue and offered the choice between three options. Independently from the options, the method to satisfy the agenda item/Issue A within the GE06 area should comply with the following principles:]

1. [No addition should be made to the GE06 Agreement or the Articles of the Radio Regulations (RR)]
2. [Interference issues should be dealt with on bilateral and multilateral levels]
3. [In the preparation of bilateral meetings, the results of studies on the impact of cumulative interference carried out in JTG5/6[1] are available to assist administrations.”]

[CEPT considers that result is applicable in WRC 15. In addition, the study which has been the basis for WRC-12 conclusion has been update and completed and is now included in the JTG 4-5-6-7 materials.]

[Editor’s note: the following proposal for a new section on “adjacent issue” has not been discussed in CPG PTD]

[Adjacent issue]

[CEPT supports sharing studies to ensure mobile / DTT coexistence at 694 MHz in case on mobile service usage above 694 MHz]

[The issue of coexistence between mobile systems and broadcasting at 694 MHz is ongoing mainly to identify:]

[the out-of-band (OOB) emission limit of the mobile (IMT) User Equipment (UE) and ]

[the required guard band between 694 MHz and the mobile (IMT) uplink ]

[in order to protect the broadcasting transmission in TV channel 48 and below from interference from the mobile service (IMT) in the band 694-790 MHz]

[CEPT will consider the impact of TV receiver selectivity vs impact of OOB IMT User Equipment in order to identify the acceptable out-of-band (OOB) emission limit ]

[The coexistence between Broadcasting and possible PPDR above 698 MHz is also under consideration]

## Aeronautical radionavigation service

The ongoing sharing studies in ITU-R JTG 4-5-6-7 are diverged and the group has not reached a common view regarding the question of taking into account multi-service effect for protection of ARNS or not. Sharing studies between mobile and aeronautical radionavigation service should take into account the different channelling arrangement(s) which could be used for mobile service in the band 694 - 790 MHz in Region 1.

## Mobile services

[Editor’s note: CPG-PTD(14)025 proposed to delete Sub-option 1.1 and Option 2 from this figure]

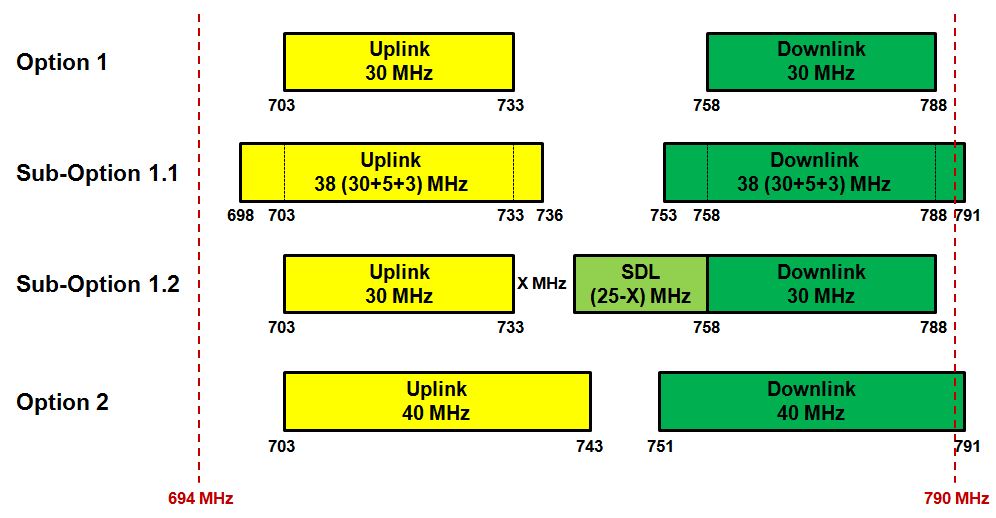


Figure 1: Potential channelling arrangements in the 700 MHz band agreed at CPG PTD#3.

## band Edge

CEPT supports a lower band edge at 694 MHz and made a corresponding proposal to JTG.

CEPT noted any modification of the lower band edge would affect the result of the intensive DTT coordination process in Africa and is unlikely to be satisfactory for the countries in Africa.

Any variation of the lower band edge from 694 MHz will impact the possible channelling arrangement and the relevance of the compatibility studies, in particular in adjacent band between mobile and broadcasting services.

## Solutions for applications ancillary to broadcasting

Many countries in Region 1 are using the additional allocation to the land mobile service on a secondary basis implemented by No. 5.296 for applications ancillary to broadcasting. Due to the radio wave propagation and antenna characteristics as well as the noise level the frequency range 470 – 790 MHz is well suited for SAB/SAP equipment and is currently the core band in particular for professional wireless microphones and in-ear monitoring systems. Thus any change in the usage of the band is likely to have an impact on the usability of the band for these applications. SAB/SAP are important tools for the production of high quality media content. Moreover, for news gathering purposes and many events the usage of wireless production tools is often necessary. Consequently, Resolution 232 (WRC-12) invites ITU-R to study solutions for accommodating applications ancillary to broadcasting requirements. This includes studies on possible options for a revised No. 5.296 as well as relevant information on the spectrum requirements of those applications taking into account the specific nature of the demand which comprises a regular day-by-day demand and a significantly increased peak demand, e.g. for larger regular and extraordinary events. The solutions should also take into account the requirements of a high reliability and a high quality of service for SAB/SAP. As an important element the studies should include the analysis of the suitability of a potential guard band and/or a duplex gap for SAB/SAP depending on the channeling arrangement. This could facilitate the usage of existing equipment in the future. Moreover, in particular to fulfilling the peak demand of SAB/SAP, it might also be studied under which conditions a co-channel usage is possible, taking into account potential future technological developments of SAB/SAP as well as the protection requirements of mobile broadband services.

PMSE issueThe 700 MHz band is also heavily used in certain countries for Program Making and Special Event (PMSE) services, especially wireless microphones. The amount of spectrum available for PMSE services was already diminished when making the 800 MHz band available for IMT, forcing them to migrate downwards, many of them within the remaining part of UHF band including 700 MHz band. There is a need to take account of the spectrum needs for PMSE services, which differ from country to country and usage. (see hereafter),

The JTG 4-5-6-7 concluded in its October 2013 meeting that due to the erosion of the available spectrum for applications for SAB/SAP in the TV bands alternative spectrum must be found, preferably between 1.2 and 1.6 GHz due to the propagation characteristics needed for audio applications.

[Therefore it is proposed to consider the 1375 – 1400 MHz band as a possible solution for SAB/SAP.]

# List of relevant documents

## ITU‑R Recommendations and Reports

Aeronautical radionavigation service:

* Recommendation ITU-R M.1830: Technical characteristics and protection criteria of aeronautical radionavigation service systems in the 645-862 MHz frequency band

Broadcasting service:

* Recommendation ITU-R BT.1368: Planning criteria, including protection ratios, for digital terrestrial television services in the VHF/UHF bands
* Recommendation ITU-R BT.1895: Protection criteria for terrestrial broadcasting systems
* Preliminary Draft New Report BT.[DTTBSPECREQ]
* Recommendation ITU-R BT.2033: Planning criteria, including protection ratios, for second generation of digital terrestrial television services in the VHF/UHF bands
* Report ITU-R BT.2215: Measurements of protection ratios and overload thresholds for broadcast TV receivers

Mobile service:

* Recommendation ITU‑R M.1036-4: Frequency arrangements for implementation of the terrestrial component of International Mobile Telecommunications (IMT) in the bands identified for IMT in the Radio Regulations (RR)
* Report ITU-R M.2039: Characteristics of terrestrial IMT-2000 systems for frequency sharing/interference analyses

SAB/SAP:

* Recommendation ITU-R BT.1871: User requirements for wireless microphones
* Report ITU-R BT.2069-5: Tuning ranges and operational characteristics of terrestrial electronic news gathering (ENG), television outside broadcast (TVOB) and electronic field production (EFP) systems

## CEPT and/or ECC Documentation (Decisions, Recommendations, Reports)

SAB/SAP:

* ERC Recommendation 25-10: Frequency ranges for the use of temporary terrestrial audio and video SAP/SAB links (incl. ENG/OB)
* ERC Recommendation 70-03, Annex 10: Radio microphone applications including aids for the hearing impaired
* ECC Report 002: SAP/SAB (Incl. ENG/OB) spectrum use and future requirements
* ERC Report 038: Handbook on radio equipment and systems video links for ENG/OB use
* ERC Report 42: Handbook on radio equipment and systems radio microphones and simple wide band audio links

Mobile service:

* ECC Report 191: Adjacent band compatibility between MFCN and PMSE audio applications in the 1800 MHz range

## EU Documentation (Directives, Decisions, Recommendations, other), if applicable

* RSPG Opinion on Strategic Challenges facing Europe in addressing the Growing Spectrum Demand for Wireless Broadband (June 2013)
* RSPG Report on Spectrum for Wireless Broadband and Broadcasting in the Frequency Range 400 MHz to 6 GHz (June 2013)

# Actions to be taken

* Develop positions and, where appropriate, conduct studies in relation to the following tasks:
* Broadcasting service:

Study the impact of channelling arrangements for the mobile service on the broadcasting service in adjacent spectrum

Study sharing and compatibility between the mobile service in Region 1 and the broadcasting service in the GE06 planning area in the frequency band 694‑790 MHz, taking into account the assumptions on channelling arrangements provided by Working Party 5D and the impact of systems using these channelling arrangements on the broadcasting service in adjacent frequency bands

* Aeronautical radionavigation service:

Study the compatibility between the mobile service and the aeronautical radionavigation service allocated in the frequency band 694-790 MHz

* Applications ancillary to broadcasting:

Study solutions for accommodating applications ancillary to broadcasting requirements in Region 1

* Possible options include:

No change

Limit to 470 – 694 MHz

Limit to 470 – 694 MHz plus potential novel guard bands and/or a duplex gap

Complete Revision of 5.296

* Contribute to ITU‑R JTG 4-5-6-7, and ensure that the CEPT position is adequately reflected in the draft CPM text

# Relevant information from outside CEPT (examples of these are below)

## European Union (date of proposal)

* No information received

## Regional telecommunication organisations:

APT (date of proposal)

ATU (date of proposal)

* The ITU has done substantial work for sub-Saharan Africa for TV services to fit in 470-694 MHz.



Arab Group (date of proposal)

CITEL (date of proposal)

RCC (November 2013)

BS and MS spectrum requirements in the band 694-790 MHz

The RCC Administrations are of the view that the BS requirements (taking into account the development of new technologies in broadcasting including HDTV) are 8 multiplexes for digital broadcasting in the band 470-790 MHz. These requirements can be met in case the frequency band 694-790 MHz is further used for broadcasting.

The MS spectrum requirements for IMT implementation are determined in the position the RCC administrations towards WRC-15 Agenda item 1.1.

The RCC Administrations consider that the use of the MS shall be determined by the administrations depending on their spectrum requirements for the BS.

Compatibility studies

The RCC Administrations support the requirement to define the technical and regulatory conditions for the mobile service in the considered frequency band for the protection of other services based on the characteristics and protection criteria of these services developed by the responsible ITU-R Working Parties.

The RCC Administrations are of the opinion that the MS operating conditions in the considered frequency band shall be based on the technically justified criteria and compatibility estimation methods.

In the compatibility studies between the MS and broadcasting service the minimum cumulative losses (MCL) method and Monte-Carlo method are supported to be used in the frequency band 694-790 MHz and in the adjacent frequency bands.

Refinement of lower edge of allocation to the mobile service (Issue A)

The RCC Administrations consider that the lower edge of allocation to the mobile service (including guard band) shall not be lower than 694 MHz.

The IMT frequency arrangement shall be chosen taking into account the compatibility with the ARNS and with the terrestrial TV broadcasting systems.

The RCC Administrations consider the frequency arrangement based on the existing A5 arrangement in accordance with Recommendation ITU-R M.1036-4 as a preferable one.

The potential frequency arrangements for IMT systems shall be taken into account while defining the protection conditions of the terrestrial TV broadcasting and ARNS systems.

While choosing the frequency arrangement the usage of the frequency band 694-790 MHz by the ancillary broadcasting applications shall also be taken into account.

Protection of the broadcasting service (Issue B)

The RCC Administrations consider that the allocation conditions to the MS in the frequency band 694-790 MHz shall include the required technical and regulatory limitations of MS for providing protection for the BS. Imposing restrictions or application of additional requirements for the BS shall not be allowed.

The RCC Administrations support the method under which the regulatory and technical conditions for the MS are defined directly in the Radio Regulations or in WRC Resolution to provide protection of the BS.

To protect the BS from the MS interference the provisions of GE-06 Agreement shall be applied as well as additional regulatory and technical conditions taking into account the aggregate interference effect from the MS stations in the main and adjacent frequency bands.

Protection of ARNS (Issue C)

The RCC Administrations consider that the allocation conditions for the MS in the frequency band 694-790 MHz shall include the required technical and regulatory limitations of the MS to provide protection for the ARNS. Imposing restrictions or application of additional requirements to the ARNS shall not be allowed.

The protection of the ARNS applied in RCC countries under RR No.5.312 shall be ensured by application of coordination procedures under RR No.9.21 for the MS in relation to the ARNS using the coordination thresholds based on the ITU-R study results taking into account the aggregate interference.

The following document provides information from RCC presented at last ITU-R WP 6A meeting ([Document 6A/237](http://www.itu.int/md/R12-WP6A-C-0237/en)). The respected information was taken into account in development of the WP 6A liaison statement to JTG 4-5-6-7 on the spectrum requirements for terrestrial TV broadcasting and also used for development of a preliminary draft a new report "Spectrum requirements for terrestrial television broadcasting" (Annex 10 to WP 6A chairman report).

Copy of the ITU-R document WP 6A/237: 

## International organisations

IATA (date of proposal)

ICAO (date of proposal)

IMO (date of proposal)

NATO (January 2014)

NATO supports an allocation of the band 694 - 790 MHz to the mobile, except aeronautical mobile, service due to support military requirements for high mobile broadband data transmission.

SFCG (date of proposal)

WMO and EUMETNET (date of proposal)

## Regional organisations

ESA (date of proposal)

EUMETNET (date of proposal)

Eurocontrol (date of proposal)

## OTHER INTERNATIONAL AND REGIONAL ORGANISATIONS

DIGITALEUROPE (January 2014)

* DIGITALEUROPE supports the use of 700 MHz band (694-790 MHz) for mobile broadband while ensuring protection to DTT services in the band below. DIGITALEUROPE believes the transition from DTT to mobile broadband services should be managed carefully by administrations and aligned time-wise with the Consumer Electronics Industry. The transition should also be properly resourced, while applying accurate frequency planning and good spectrum engineering practices for Digital Television avoiding any disruptions of the existing DTT services to the consumers.
* Regarding the channelling arrangement for mobile broadband in the 700 MHz, DIGITALEUROPE supports a frequency arrangement in ITU Region 1 that facilitates a global solution, leverages on standardization activity (3GPP Band 28) and is compatible with EU 800MHz band (3GPP Band 20). This allows harmonisation, economies of scale and roaming capabilities across all ITU regions.

EBU (September 2013)

* In principle, EBU supports maintaining the 700 MHz band for broadcasting services in Region 1. The 694-790 MHz sub-band is used for broadcasting services (both digital terrestrial television DTT and PMSE) as heavily as the rest of the UHF band (470-694 MHz) by most European countries.
* However, in the event that any mobile services are introduced in the 700 MHz band, technical and regulatory conditions should ensure coexistence and future cooperation between broadcasting and broadband services, minimising the risk of harmful interference to DTT.
* Broadcasting services below 694 MHz should, therefore, be protected from harmful interference from mobile services, taking into account the GE06 Agreement. In particular, any technical conditions applicable to mobile use of the 700 MHz band (such as OOB emission levels and guard bands) should be clearly specified to ensure the risk of such harmful interference has been minimised.

GSMA

* The band 694-790 MHz that was identified for IMT in Region 1 at WRC-12 provides important spectrum in order to satisfy the increasing demand for mobile broadband data. The GSMA believes that the benefits from use of this band in Europe and elsewhere in Region 1 will be maximised if the frequency arrangements and other technical and regulatory conditions are harmonised with those in other parts of the world

1. WP6A received 33 CEPT responses, out of a total of 48 CEPT members. [↑](#footnote-ref-1)