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RADIO SPECTRUM POLICY GROUP

RSPG Report

Assessment of future usage of the frequency band 470-694 MHz within the EU

SPG Secretariat, office L-51 05/DCS,
Commission européenne/Europese Commissie, 1049 Bruxelles/Brussel, BELGIQUE/BELGIË
Telephone: direct line (+32-2)29.21.261, switchboard 299.11.11;
E-mail: cnect-rspg@ec.europa.eu
Website CIRCABC: https://circabc.europa.eu/w/browse/f5b44016-a8c5-4ef6-a0bf-bc8d357debcb
Website : https://radio-spectrum-policy-group.ec.europa.eu/index_en

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Executive Summary

In line with its work programme for 2024 and beyond, RSPG has continued to monitor EU Member States (MS) initiatives on their future usage of the band 470-694 MHz. Through a questionnaire and a workshop, RSPG has:

1. carried out an assessment of the prospects for the use of the 470-694 MHz band in the decade 2030-2040 by the different MS, seeking information from relevant institutional stakeholders;
2. collected lessons from early initiatives from MS introducing other usages than broadcasting to address audio PMSE long term developments in order to preserve sufficient spectrum for audio PMSE needs, taking also into account the transition of audio PMSE towards new spectrum efficient technologies; and
3. gathered information from industry stakeholders on expected technological developments in both mobile and broadcasting platforms.

This report presents the results of the work carried out in the two-year period 2024-2025. The draft report was made available on the RSPG website on 23 June 2025 and was subject to public consultation, which ended on 31 August 2025.

Fifty stakeholders from various sectors interested in the topic responded to the consultation. The opinions gathered were analysed and are presented in Appendix I below.

Assessment of the prospects for the use of the 470-694 MHz band in the decade 2030-2040 by the different Member States

In some EU countries, next DTTB licence period is under discussion. Some EU countries have renewed licences for ten to fifteen years, extending operations beyond 2030, and are investing in DTTB evolution with DVB-T2 and UHD upgrades. Other EU countries have already reduced DTTB to a minimal role. In the questionnaire four countries declared to expect the switch-off of DTTB platform in the future. National audience trends diverge sharply.

A majority of MS indicate a requirement to use the entire 470-694 MHz band for audio PMSE over the course of the next decade. Although alternative bands have been identified in some responses, they vary from country to country. Therefore, from the information gathered by RSPG, there is currently no obvious candidate band as a substitute for the band 470-694 MHz for audio PMSE.

Some administrations are considering the implementation of mobile applications for Defence and PPDR in this band even before 2030. They envisage different opportunities (dedicated spectrum or usage of DTTB white spaces, proprietary infrastructures or network sharing) to address requirements of broadband connectivity.

Only one MS plans to deploy IMT in the band before 2030. Some MSs consider the introduction of IMT in the 600 MHz band to be possible in the future.

In the countries using part of the band for observation of extra-terrestrial radio sources, like the sun and pulsars, the radio astronomy service will remain in use in the coming decades.

Lessons from early initiatives from MSs introducing usages other than broadcasting regarding PMSE

Two member states reported on the use of part of the band 470-694 MHz for mobile applications (8 and 16 MHz for defence applications). These early initiatives do not allow to draw any conclusions as to the preservation of sufficient spectrum for PMSE.

Information from industry stakeholders on expected technological developments in both mobile and broadcasting platforms

Broadcasting stakeholders note that DVB-T2 and HEVC are not yet implemented by all MSs. They mention the potential of new broadcasting technologies, including UHD and 5G broadcast to reach new audience.

Mobile industry stakeholders support the introduction of mobile technology in the band 470-694 MHz to improve capacity in rural areas and to respond to PPDR and Defence needs.

Audio PMSE stakeholders underline that the band 470-694 MHz is the only one being harmonised across EU and beyond, without interference from adjacent bands. They assert that technologies like those specified by 3GPP or cognitive PMSE do not meet the requirements of real-world production environments.

Harmonisation opportunities

The 470-694 MHz band is currently harmonised through:

- Decision (EU) 2017/899, Article 4 of which, ensures the availability of the band for DTTB and PMSE services in all Member States until at least 2030. It also permits alternative uses of the band, provided that they do not affect the provision of broadcasting services in neighbouring Member States;
- the GE06 Agreement;
- RR 5.295A (WRC-23) which allocates the band to the mobile service on a secondary basis in all EU countries except Italy and Spain.

There is a growing demand across various sectors for regulatory clarity to effectively plan future spectrum allocations. Broadcasters and mobile operators need this certainty to justify investments in service upgrades and infrastructure, while PMSE professionals require stability to maintain a functional ecosystem within the creative industries.

Due to a lack of concrete deployments in Member States on the basis of the current framework, RSPG did not collect sufficient lesson on the implementation of the flexibility of the Decision (EU) 2017/899, as initially planned.

Current and planned DTTB usage varies significantly across the EU. It is essential to recognize the unique roles of DTTB and PMSE in many EU countries, while some Member States, considering their declining DTTB audience numbers, are exploring new uses for the band alongside or instead of DTTB and PMSE.

Efforts to further harmonize the band face difficulties due to differing national use cases and policy priorities. While some regulators and mobile stakeholders advocate for harmonization to drive innovation and reduce coordination efforts, the diversity of national use cases makes a unified approach unlikely in the near term.

A flexible, forward-looking framework across the Union must acknowledge the roles of DTTB and PMSE in many EU countries, while also addressing the needs for different uses, such as mobile and broadband, in other EU countries.

The 2023 Opinion expressed by RSPG on the UHF band (RSPG23-035) remains valid, in particular on any future EU regulatory action to facilitate, to the extent feasible, the implementation of various scenarios among Member States, emphasizing the pursuit of compatible uses and focusing on the means to achieve them. At this stage, any regulatory action should also take into account possible alternative initiatives already enabled by the implementation of Article 4 of EU Decision 2017/899. At the same time, it is recognised that the EU's position for World Radiocommunication Conference 2031 (WRC-31) will be pivotal in shaping future policies for the use of the band.

CHAPTER I – Introduction

RSPG in its "Opinion[1] on the strategy on the future use of the frequency band 470-694 MHz beyond 2030 recognised differences leading Member States to follow different paths in the next decade, 2030-2040, so that a single scenario of spectrum usage may not be applicable to all Member States. Therefore there is added value in exploring how different scenarios can coexist in EU.

In that context RSPG formed the mandate of the work of the « Assessment of future usage of the frequency band 470-694 MHz within the EU» group as follows:

> 1. *The RSPG should carry out an assessment of the prospects for the use of the sub-700 MHz band in the decade 2030-2040 by the different Member States, seeking information from relevant institutional stakeholders.*
>
> *2. RSPG should also collect lessons from early initiatives from Member States introducing other usages than broadcasting to address audio PMSE long term developments in order to preserve sufficient spectrum for audio PMSE needs, taking also into account the transition of audio PMSE towards new spectrum efficient technologies.*
>
> *The RSPG also should gather information from industry stakeholders on expected technological developments in both mobile and broadcasting platforms.*

The present Report on the future use of the 470-694 MHz band in the EU, is based on the observation that the current regulatory framework, which focuses on DTTB, still seems adequate for the long-term in some EU countries while it no longer reflects the needs of other countries. In order to gather relevant information and collect the experience of relevant initiatives, as a first step the group prepared a detailed questionnaire addressed to five main stakeholder groups:

- Regulators
- Network providers
- Contents providers
- End-users of the Spectrum
- Other interested parties

The purpose of the Questionnaire was to reach out to different stakeholder groups and gather their views on established spectrum and service rights, the effects of possible spectrum refarming in industry, networks, content creators and distributors, consumers, society, culture, political and social life, innovation and growth within the European Union and, if possible, in neighbouring countries.

Spectrum is a public good. In particular, the UHF band below 1 GHz has propagation characteristics that make it valuable for cost-effective implementation of wireless networks with universal indoor and outdoor coverage.

The 470-694 MHz ('sub-700 MHz') spectrum is currently used on a primary basis across the European Union for digital terrestrial television ('DTTB') and on a secondary basis for wireless audio PMSE as well as Radio Astronomy and Radiolocation. The dissemination of cultural content, information and ideas, along with the development of media and the creative, cultural and research sectors rely heavily on it for the wireless delivery of content to end users. At the same time, alternative forms of distribution of such content are already available or spreading, albeit at very different degree of adoption from one country to another.

[1] RSPG Opinion 25/10/2023 "Strategy on the future use of the frequency band 470-694 MHz beyond 2030 in the EU"

Sharing a frequency band between wide-area bidirectional communication services (uplink and downlink) on the one hand, and the unidirectional television broadcasting service mostly combined with the PMSE audio service as well as other secondary services on the other, is technically challenging[2].

It is important for each Member State to consider its national audiovisual policies when repurposing the 470–694 MHz band. It underscores the need to maintain objectives such as social cohesion, media pluralism, and cultural diversity, which are also protected by the European Union.

In the Lamy Report to the Commission[3], published in 2014, it was recommended that to achieve the goal of long-term regulatory predictability for DTTB the sub-700 MHz frequency band should be available for DTTB until 2030, although this would have to be reviewed by 2025. The positioning of PMSE needs should also be considered carefully.

The work that follows is done in the context of the Lamy Report and the Decision (EU) 2017/899[4] , in particular to its Article 4 which requires EU Member States to ensure that the 470–694 MHz band remains available until at least 2030 for terrestrial broadcasting and wireless audio PMSE, based on national needs and technological neutrality.

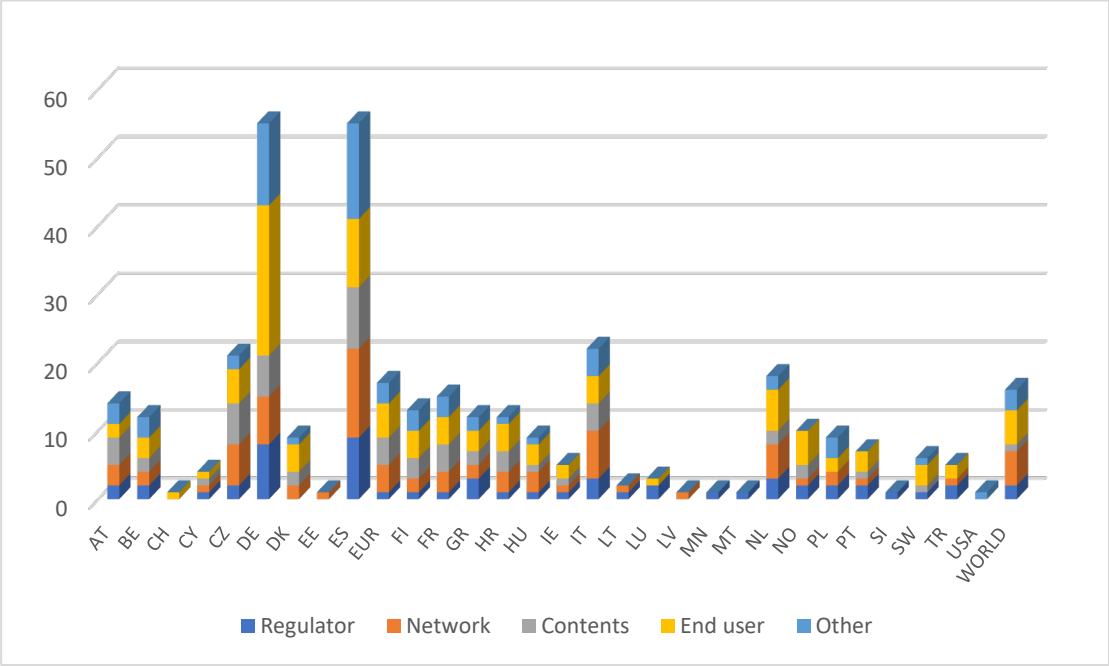
The Questionnaire was structured into five chapters, each targeting one of the five Stakeholders' Groups. The respondents could answer to any questions, independently of the group to whom they declared to belong.

The response to the questionnaire in numbers was:

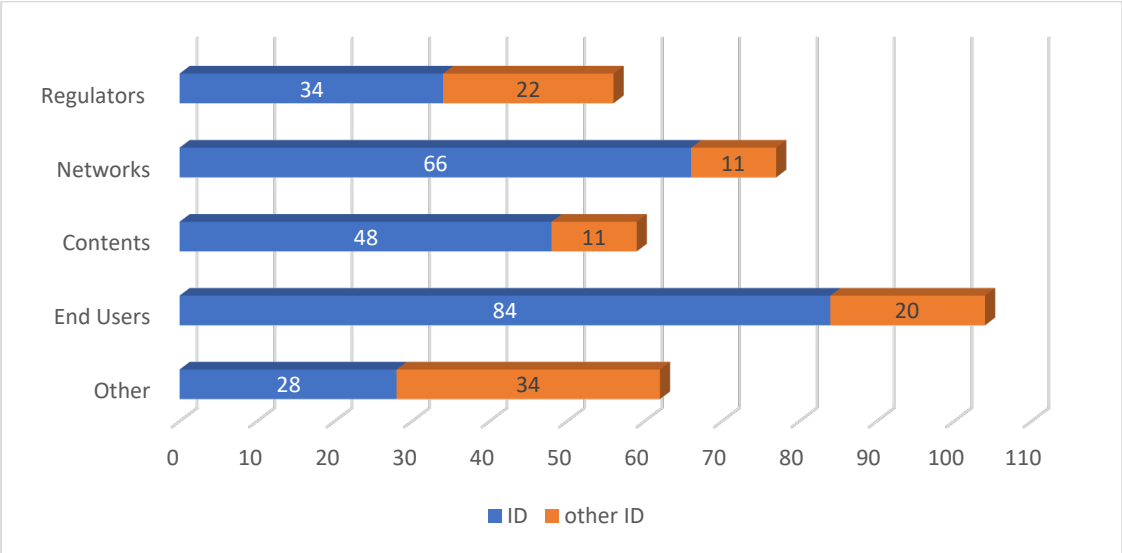
- Replies from 29 countries (25 EU) and 11 international associations
- Regulators from 23 countries replied
- In total 358 responses from 192 entities were received as many stakeholders replied not only to the chapter of the Questionnaire that corresponded to their identification but also to other chapters.

[2] See RSPG23-035, section 3.3 Existing technical solutions – Opportunities and limits.
[3] "Report on the Results of the work of the High Level Group on the future use of the UHF band" by P. Lamy (link).
[4] Decision (EU) 2017/899 of the European Parliament and of the Council of 17 May 2017 on the use of the 470-790 MHz frequency band in the Union (link).

Graph 1 *Replies per country per type of stakeholder*



Graph 2 *Replies in each chapter of the Questionnaire*



Following the completion of the collection of the Questionnaire responses a workshop open to representatives of RSPG member countries and stakeholders was organized at the Albert Borschette Conference Centre, Brussels on 11 April 2025.

The workshop's title was "The future of the 470-694 MHz band within the EU" and consisted of 4 sessions:

Session 1 – The present use of the band
The session was devoted to illustrating the current situation of bandwidth usage, both from a regulatory point of view and based on the results of the questionnaire.

Session 2 – Cases from the four corners of the world
The session explored the regulatory aspects in various countries where future uses of the band are moving in different directions (intensive use for DTTB vs reduced or no use for DTTB in the future), including a look at what is happening in countries outside the EU (UK, UAE).

Session 3 – The future use of the band
The session focused on the views of stakeholders, also in the light of the regulatory aspects presented in session 2. The aim was for each community to provide a picture of its "ideal situation" in terms of band usage over the next decade. In order to get a fair view of the interests of each sector, associations representing the different stakeholders in each community have been invited (DTTB, PMSE, IMT, PPDR, Defense, Radio Astronomy).

Session 4 – Round table: "What if…"
The round table was a more open debate. Session 3 allowed each sector to present its ideal vision, the Round Table asked the speakers to consider the concrete problems of coexistence and balancing different needs that might arise in the next decade, discussing potential solutions and trade-offs.

CHAPTER II – Prospects for the use of the 470-694 MHz band in 2030-2040

A synthesised analysis of the future use of the 470-694 MHz frequency band was carried out, the results of which are presented below. This analysis draws directly from the following two key RSPG evidence-gathering efforts (further details of which are provided in Chapter 1):

- the structured responses to the RSPG Questionnaire (detailed at Annex 1), and,
- the outputs of the multi-stakeholder Workshop held in April 2025 (detailed at Annex 2).

By integrating these two complementary sources, this Chapter identifies and distils the key considerations, concerns and strategic positions expressed by regulators, industry, end users of spectrum and other interested parties. The insights below cover a range of technical, regulatory, economic and societal dimensions. These insights may significantly contribute towards shaping the evolving 470-694 MHz frequency band policy landscape and it is therefore recommended that they be given careful consideration.

The positions and insights expressed in this Chapter are the result of evidence-based analysis and aim to provide a comprehensive, balanced foundation for future policy direction on the future use of the 470-694 MHz frequency band.

1) Regulators

This section draws upon analysis from Annex 1 (Responses to Questionnaire) Section 1 and Annex 2 (The Workshop).

The data clearly show that use of the 470–694 MHz band in the EU is currently dominated by DTTB and PMSE, and the most of the regulators do not anticipate any significant change to this situation. There are, however, also regulators who see that less or no capacity will be needed for DTTB already in the near future. Also, other services such as Radio Astronomy, Radiolocation, PPDR, and Defence either currently share or intend to use the band in future.

The majority of the regulators who replied are not currently considering the possibility to introduce additional services in the 470-694 MHz band.

Some of the regulators are of the view that a primary co-allocation for mobile service may lead to a repurposing at EU level that would reduce the spectrum for DTTB and PMSE, with adverse effects, ranging from undermining the existing business model to the complete shutdown of DTTB services.

On the other hand, some others see the importance of primary co-allocation for mobile service of 470-694 MHz, enabling provision of mobile connections in rural areas and in covering large geographic areas.

At the national level, Radio Astronomy requires coordination procedures and coordination/protection zones.

Many administrations expressed the view, supported also by stakeholders, that further studies on the potential primary co-allocation (either full or partial) of DTTB and mobile service in the band are essential, as the effects on service performance are currently difficult to predict. These studies should consider the current use of the band, future spectrum demands per sector or service, cross-border coordination, technological developments, and the potential advantages and drawbacks of migrating services to other frequency bands.

One significant factor that could influence the future use of the 470–694 MHz band—both in the near term (by 2030) and the longer term (by 2040)—is the validity period of current DTTB licences and each EU country’s plans for their renewal. Most countries intend to renew these licences for periods of 10 to

15 years. As a result, licensed DTTB services will likely continue operating across much of the EU well beyond 2030.

A number of EU Member States plan to upgrade or modify their DTTB networks in various ways before 2030. The number of multiplexes needed in the next licence term is not known in all countries as it may be affected by the technology evolution. These modifications can enable more efficient use of spectrum in 470-694 MHz also releasing spectrum for other use cases below 694 MHz. Four countries have stated that they expect to switch off DTTB services.

There is no common approach across EU countries regarding what will happen once existing DTTB licences expire. None has announced plans to migrate DTTB to another frequency band in order to clear the 470–694 MHz band.

The current usage of this frequency band across Europe is inconsistent and does not follow any clear geographical pattern. In some countries, the band is heavily used for DTTB, while in others only one or two 8 MHz channels are allocated per coverage area. However, DTTB coverage exceeds 90% of the land area or population in most cases, and no country reported that more than 8% of households are unable to receive DTTB services.

That said, the proportion of households that actually choose DTTB as their means of accessing linear TV varies widely across the EU—from as little as 3% in some countries to as much as 92% in others. EU citizens have access to a wide range of alternative platforms, and only two countries reported that DTTB is the most preferred option among viewers.

A key issue identified is that, regardless of how EU citizens choose to consume audio-visual content, there remains a strong reliance on DTTB for the distribution of Free-to-Air (FTA) linear television in most EU countries. This reliance increases at the national, regional, and especially local levels, where DTTB is often essential for accessing culturally or regionally significant content. The migration of linear FTA television to other platforms has not yet been thoroughly considered by national administrations, and broadcasting stakeholders believe that such a transition would be extremely challenging.

Administrations hold mixed views regarding a potential link between the EU's Digital Decade connectivity targets and the migration of free linear TV from DTTB to IPTV.

Another significant issue concerns the obligations and regulations governing free-to-air linear television broadcasting, which are tied to broader public interest goals. These include freedom of expression, media pluralism, impartiality, cultural and linguistic diversity, social inclusion, consumer protection, and safeguarding minors. In general, EU countries apply regulations on linear TV across all delivery platforms. However, platforms capable of non-linear distribution are not subject to the same regulatory framework. Additionally, public service media (PSM) are subject to specific legal provisions, including minimum coverage requirements.

In the event of DTTB discontinuation, most EU countries indicated that they have not actively explored how to continue fulfilling these public interest obligations through alternative means.

EU administrations do not share a common approach regarding the maintenance of existing public service media (PSM) coverage obligations if the 470–694 MHz band were to be repurposed.

The majority of EU countries currently have no plans to refarm the UHF band. Among regulators, opinions are divided on whether the 470–694 MHz band, or parts of it, could help address the digital divide or improve access to information and communication technologies (ICT)—particularly in rural areas—after 2030. Some EU countries indicate that they would consider the introduction of applications of mobile service other than PMSE in this band, in particular in light of the changes introduced by WRC-23 and in accordance with Article 4 of EU Decision 2017/899.

In the question regarding a harmonisation of the 470-694 MHz band in the forthcoming 10 to 20 years, considering the various uses of DTTB across the EU countries, the common market aspects and other relevant elements, the administrations foreseeing further harmonisation are generally of the view:

- that this is the best way forward if other services are to be introduced in the band;
- that the crucial aspects of this harmonisation should be flexibility, avoidance of interference (cross-border and to the incumbent users of the band) and coordination among EU or at least a subset of countries based on existing or new international agreements.

On the other hand, administrations that do not foresee further harmonisation generally consider that:

- it is not required, for certain applications, like SDL, or because they do not foresee any evolution in the band;
- it is unlikely to happen, due to diverse markets dynamics and regulatory approach in EU, because the flexibility offered by article 4 of Decision 2017/899 may be prolonged beyond 2030, and because it would not be satisfactory to all EU countries as a one-size-fits-all solution is not possible;
- there remains extensive DTTB usage in EU and its switch-off is unlikely and, with the band remaining available to broadcasting, innovations like 5G broadcast would be allowed to evolve.

Regarding cross-border coordination, all responding countries reported the existence of active agreements in addition to the GE06 Agreement. One EU Member State has engaged in cross-border coordination specifically due to the 700 MHz band already being in use for mobile services and raised importance of regulatory changes i.e. co-primary mobile allocation to facilitate up-to-date coordination in the EU borders.

Finally, administrations described a wide range of licensing practices for PMSE across Member States. Their views on alternative spectrum options for PMSE are also varied.

2) Networks

This section draws upon analysis from Annex 1 Section 2 and Annex 2.

Network operators from both the broadcasting and broadband sectors were consulted to understand their plans and expectations for the use of the 470–694 MHz band, both now and in the future—specifically beyond 2030 and 2040. The most evident outcome is the stark contrast in perspective between the two sectors regarding the band's usage, the future of DTTB and IMT, and the development of 5G Broadcast.

Broadcasting network representatives initially provided insights into the current state of audio-visual content delivery in the EU, highlighting how closely this is tied to their business models. DTTB remains the dominant incumbent user of the band, and the extent to which broadcasters continue to occupy all or part of it appears to be directly linked to their commercial success within that spectrum.

DTTB networks are generally free to access (at least in their basic form) and are funded by content-related revenues. They are usually subject to legal and regulatory obligations concerning programme content, broadcasting standards, coverage, and image quality. Public broadcasters, in particular, are primarily financed through public funding, with additional revenue from advertising and other sources. Data over the past four years show that DTTB usage across the EU has either remained stable or declined, as audiences increasingly shift to alternative platforms such as satellite, IPTV, and cable.

Given that DTTB is still the principal user of the band, and considering the declining number of users relying on it for linear TV and audio-visual content, network operators were asked whether they plan to invest in modernising their systems to attract larger audiences and make more efficient use of the available spectrum.

Broadcasting stakeholders generally believe that the growth of OTT, IPTV, and cable distribution has only a limited impact on traditional broadcasting networks, which they see as complementary rather than competing technologies. However, not all broadcasters share this view. On the other hand, broadband stakeholders overwhelmingly see the impact of these alternative platforms as highly significant.

Modernising DTTB platforms—which most broadcasters consider crucial for maintaining their relevance—may involve adopting new transmission standards (such as DVB-T2 and 5G), updated video compression formats (HEVC, VVC), and improvements in image and sound quality (e.g., UHD, 4K, HDR). It could also include the introduction of hybrid services like HbbTV. Nevertheless, many of these developments are dependent on technical standards or programme specifications imposed by governments or national regulatory authorities, usually as part of the licensing process. Broadband stakeholders, however, argue that such upgrades alone are insufficient to reverse the decline in DTTB usage.

A critical question raised is whether changing audience behaviour—specifically, how people consume audio-visual content—will influence the trajectory of DTTB and, by extension, the business models and strategies of broadcast delivery. Most broadcasting stakeholders acknowledge that evolving viewing habits will have some impact on their models, though opinions vary in both directions. However, many believe that DTTB can continue to adapt and evolve—particularly by adopting hybrid services and implementing 5G technologies—thereby remaining relevant and potentially expanding its reach. As such, they emphasise the need to retain access to the 470–694 MHz band.

Broadband stakeholders, in contrast, point to a clear shift away from linear TV towards on-demand and mobile viewing. However, they are divided over what this means for broadcasting business models. Most agree, however, that at least part of the DTTB spectrum should be reallocated to mobile services.

This leads to another key question: is there still a need for a dedicated terrestrial wireless broadcasting system to deliver television content to EU citizens, especially given the EU's broadband targets, which aim to make both linear and non-linear content available in every home? The majority of broadcast stakeholders not only dismiss the idea of shutting down DTTB, but also argue that it remains of vital importance. They cite its continued high usage in many countries and highlight its unique strengths—such as universal availability, reliability, robustness, a strong focus on free-to-air content, and energy and cost efficiency. However, some expect its popularity to decline over time.

Broadband stakeholders generally see DTTB as being on a path toward partial or complete phase-out. Stakeholders with ties to both sectors tend to hold more moderate views. As mentioned earlier, EU administrations themselves are divided on this issue.

Public Broadcasting Services have a more distinct role in the social, cultural and political life in EU, and the Broadcasting stakeholders by and large, argue that DTTB possesses unique characteristics that must be considered when discussing the replication of its free-to-air distribution model, especially for PBS. They assert that no other distribution method can fully replicate the DTTB model, with some highlighting that 5G Broadcast could further enhance it by enabling reception on mobile devices.

While broadband stakeholders in both broadcasting and telecommunications acknowledge that some aspects of DTTB are hard to replicate, most argue that widespread access to free content—especially public service channels—via the internet or basic IPTV packages, combined with the growing reach of high-speed and ultra-high-speed networks, can match or even surpass what DTTB currently offers.

5G Broadcast has been discussed frequently, either as a supplementary system for DTTB—especially for mobile viewing—or as a potential standalone successor. Broadcasting stakeholders generally support the adoption of 5G Broadcast to varying degrees, while broadband stakeholders remain more sceptical.

Trials of 5G Broadcast have been conducted in most EU countries, with technical results generally regarded as positive. However, stakeholders note that its success hinges on the availability of compatible devices and adequate spectrum. Broadcasting stakeholders also remain cautious about the return on investment required to deploy 5G Broadcast, despite some optimism about its long-term viability. Several countries believe that their existing high-power high-tower (HPHT) DTTB infrastructure could provide sufficient outdoor coverage for 5G Broadcast with some densification, particularly for indoor reception.

Broadband stakeholders, on the other hand, are nearly unanimous in their doubts about the economic viability of 5G Broadcast. Many believe that if the technology must be deployed via a low-power low-tower (LPLT) network, it would become even less feasible due to increased costs.

Potential synergies between broadcasting and mobile networks—such as sharing spectrum or infrastructure—are often proposed as a way to make more efficient use of resources. However, most stakeholders believe such cooperation offers only limited benefits. While examples of shared infrastructure exist in some countries, these arrangements are not widespread. Furthermore, most respondents do not foresee any meaningful synergy between 5G Broadcast and mobile downlink in the 470–694 MHz band. This scepticism is particularly pronounced among broadband stakeholders, who largely reject the feasibility of coexistence, although some broadcasters are open to the idea. These differing views highlight the challenges of operating DTTB and mobile networks within the same frequency band.

Given the limited expectation for future coexistence of DTTB and IMT in the 470–694 MHz band, stakeholders were asked to describe how they see broadband network development in the band progressing—especially in light of the growing annual mobile data demand—and whether these increases are expected more in urban or rural areas.

Broadband stakeholders unanimously believe that mobile data usage will continue to rise in both urban and rural settings. Broadcasting stakeholders are more sceptical about the extent of this growth. Nonetheless, both sides agree that mobile coverage will be increasingly necessary across all areas, not just in cities.

Additionally, the stakeholders were asked on how they plan to achieve extended coverage in rural areas, considering the constraints in identifying and building new mobile base station sites and the limited range of higher frequency bands, and if a possible solution to this is to acquire additional spectrum in the 470-694 MHz band.

Some broadcasting stakeholders argue that there is no relationship between the EU's Digital Decade connectivity targets and the migration of free linear TV from DTTB to IPTV and maintain that DTTB continues to be highly relevant to citizens and remains a vital tool for achieving public policy goals. Some broadband stakeholders, however, believe that if the EU's connectivity objectives are met, both linear and non-linear TV services will become accessible in every household through fixed broadband connections.

Broadcasting stakeholders generally argue that this band is not essential for meeting the rising demand for mobile network capacity. They note that sub-1 GHz spectrum is not currently saturated and that rural coverage can be improved by densifying existing networks within already assigned bands. For urban areas, they suggest that higher-frequency bands are more appropriate due to their greater data capacity. They also point out that mobile network operators should first optimise and upgrade their current infrastructure. Additionally, they suggest that 5G Broadcast could help ease congestion on mobile networks.

Broadband stakeholders, by contrast, view the 470–694 MHz band as vital for ensuring adequate rural coverage. They argue that it could reinforce existing infrastructure, especially as securing permits for

new sites becomes costlier and more difficult. Some stakeholders have even indicated that additional frequency allocations may be required as early as 2030.

Mobile stakeholders advocate for greater flexibility in how the band is used, whereas DTTB and PPDR stakeholders generally do not support this view.

Broadcasting stakeholders have also noted that refarming the 470–694 MHz band could adversely affect PSM services, while stakeholders from the mobile industry generally hold the opposite view.

PPDR and Defence stakeholders foresee in one hand mobile data traffic grow, both in urban and rural areas and in the other hand they emphasize the importance of rural coverage for PPDR services, highlighting the need for additional spectrum in the 470-694 MHz band for both PPDR and Defence systems. PMSE stakeholders anticipate that mobile data rate growth will stagnate over the coming years and suggest that the utilization of the existing IMT spectrum below 1 GHz should be optimized and argues that additional spectrum would not benefit mobile operators. Furthermore, audio-PMSE requires predictable access to frequency resources as needed. This could be achieved through the establishment of a safe harbour and a geolocation database, granting priority to PMSE operations.

Aside from a minority of respondents, most stakeholders across sectors are calling for clear and consistent regulation of the 470–694 MHz band beyond 2030 at international, European, and national levels.

For broadcasting stakeholders, regulatory certainty means ensuring continued access to the 470–694 MHz band for DTTB well beyond 2030. They argue that such clarity is essential to justify investment in service modernisation and long-term infrastructure planning. Without firm guarantees, broadcasters are unlikely to commit to necessary upgrades or innovations.

For broadband stakeholders, regulatory clarity involves beginning the harmonisation of at least part of the band—particularly the 600 MHz portion—for International Mobile Telecommunications (IMT) use. They also stress the need to resolve cross-border coordination issues, which currently hinder mobile deployment in countries that no longer plan to utilise the band for DTTB services.

In summary, stakeholders across the spectrum of use cases are seeking policy direction. Broadcasters want assurance that DTTB will continue to have a secure place in the frequency band, while broadband actors are pressing for flexible, forward-looking regulation that enables them to meet future connectivity demands, especially in rural areas. Resolving these competing priorities will be central to shaping the future use of the UHF band in the EU.

3) The content industry

This section draws upon analysis from Annex 1 Section 3 and Annex 2.

The content industry stakeholders replying to the questionnaire were equally split between public service media (PSM) and private media entities. Responses also came from organisations in DTTB distribution, IMT, and PMSE sectors, covering 16 of the 27 EU member states.

Most content providers reported free-to-air distribution as central to their services, with DTTB used by nearly all respondents and a strong presence of IPTV and satellite. Linear broadcasting remains dominant, particularly through DTTB, although some national broadcasters indicated plans to reduce terrestrial broadcasting in the future. Regulatory obligations are common, particularly regarding the distribution of news, cultural, sports and children's programming, with public broadcasters subject to the most extensive requirements.

Nearly all respondents acknowledged that enhancements in broadcasting and resolution standards (e.g. DVB-T2, HD, UHD, HbbTV) help maintain DTTB's attractiveness. Content providers, largely also

content producers, reported a wide range of content types including news, live events, European works, and specialised programming for children or local audiences.

The importance of DTTB to content providers varied, reflecting national differences. Some organisations see DTTB as essential for contents distribution, while others consider it marginal or in decline. Forward-looking assessments of DTTB's contribution to their business varied: some forecast stability, others a gradual decline. Few had considered supplementing 5G Broadcast coverage with mobile broadband, which is understandable given the nascent state of 5G broadcast deployment.

The majority of respondents rated subscription-free access as very important (even though free access is inherent to public service media). DTTB is often seen as irreplaceable for free-to-air content, though IPTV and OTT are noted as potential alternatives by some[5]. Many respondents recognised a shift in audience behaviour towards streaming and non-linear content, yet few anticipate a major divestment from DTTB in the short to medium term.

On policy expectations, respondents overwhelmingly called for regulatory support to ensure visibility and viability of current free-to-air and PSM services. Key recommendations included preserving DTTB for universal free access, supporting technological evolution of the DTTB platform, and recognising its environmental benefits. Conversely, some called for more market-driven, technology-neutral policies, with a focus on expanding broadband rather than maintaining legacy broadcasting infrastructure.

On the observed trend that the consumption of audiovisual content is gradually shifting from a 'traditional' model (linear, free, via TV) to a plurality of different approaches (mobile devices, non-linear content, subscriptions, streaming), most of public service media indicate that assessing the share of DTTB in the coming years is irrelevant to them. As their services are not profit-driven, they must serve all devices to fulfill their remit of providing universal and free access. The few content respondents (mainly private) who provided percentage ratings on the same observation indicate that the contribution of the DTTB platform to their business remains mostly stable.

When asked about the most effective platforms for distributing content tied to national and European culture, free-to-air television received the highest ratings, followed by linear TV and streaming. Social media and subscription services were deemed less suitable. News and live events were identified as content types most reliant on free-to-air distribution.

Advertising remains a fundamental revenue source for private broadcasters. They foresee a shift towards hybrid models combining subscriptions with targeted, locally relevant advertising. Public service media, by contrast, highlighted their minimal reliance on advertising and reiterated the importance of universal access.

4) End Users of Spectrum

This section draws upon analysis from Annex 1 Section 4 and Annex 2

PMSE

As a summary, the answers submitted in this section of the Questionnaire primarily highlight the importance of the 470-694 MHz frequency band for the PMSE sector, encompassing broadcasting and various cultural and entertainment industries, while also presenting competing interests from utilities and radio astronomy.

Several respondents emphasize the role of broadcasting in contributing to democracy and culture, highlighting the need for quality productions which rely on wireless technologies in this band. The

[5] 97% of respondents distribute their linear programming over DTTB. 80% of the respondents distribute also their linear programming over IPTV.

Cultural and Creative Industries (CCI) are recognized as a dynamic economic sector essential for cultural diversity and social cohesion, with audio PMSE being critical to many live events.

In this scenario, the indispensable nature of the 470-694 MHz band for audio PMSE applications is advocated, particularly wireless microphones and in-ear monitoring. The key arguments are:

- Physical suitability: the band offers good propagation characteristics, low power consumption and a compact device design with suitable antenna length, making it physically best suited for audio PMSE.
- Harmonization and market availability: it is the only frequency range harmonised across Europe and offers a wide choice of devices on the market, which also can be used on an international basis, an essential requirement.
- Lack of viable alternatives: many sources explicitly state that there are currently no spectrum alternatives to the 470-694 MHz band for audio PMSE, and that other bands are complementary, not substitutes, hence they are reluctant to migrate to other frequency ranges.
- Increased demand and existing shortages: the demand for wireless production tools has been increasing for years, while the release of the 800MHz and 700MHz bands has severely reduced the available spectrum for wireless audio productions. As a consequence, a shortage of frequencies has become more common, leading to more complex frequency coordination, reduced audio quality, and increased costs.

A change in access to the band would have a significant impact for users of audio PMSE equipment and could reverse the growth in the economic and cultural value brought by PMSE industry. Cognitive PMSE and 3GPP 5G are mentioned, but sources like Sennheiser note that cognitive PMSE doesn't reduce spectrum need and 3GPP 5G does not support the requirements of professional audio and does not deliver any value-add, nor does it support nomadic use cases required by PMSE sector.

IMT

IMT end users identify the band below 1 GHz as essential to the future provision of IMT services and call for the full allocation of the 470-694 MHz band for IMT. They see the 470-694 MHz band as critical for expanding broadband connectivity and providing low band 6G connectivity. Additionally, they claim rural broadband deployment would benefit from IMT expansion as lower frequencies allow for cost and energy efficient coverage in remote areas.

IMT end-users suggest that if no common EU position is reached, nations with minimal DTT penetration should have the autonomy to transition their spectrum to IMT.

Defence

To contribute towards protection of the population or crisis management on the national territory and potentially for rescue and for humanitarian actions within foreign countries, defence end users request access to the band 470-694 MHz to compensate for the current lack of UHF spectrum with good propagation characteristics. Several options are under consideration:

- Access to the lower part of the band 470-512 MHz
- Access to 80-120 MHz of spectrum in the band
- Access to DTTB white spaces for ad-hoc, Combat Net Radio (CNR)
- LTE/NR based applications
- Defence end-users consider that the introduction of IMT in this frequency band would prevent the development of military applications.

PPDR

To address modern security threats, PPDR end users note the current PPDR frequency allocations are no longer sufficient for their use cases, highlighting as they identify limitations of allowable

simultaneous voice channels, limitations for video and data transmission, and the need for PPDR Radio Access Networks (RANs) for secure broadband applications and mission critical live video streaming.

Different opportunities are mentioned:

- dedicated usage of 2x30 MHz in the band
- NR/E-UTRA in band n71/71 (663-698 MHz uplink 617–652 MHz downlink)
- sharing of MNO networks
- IoT applications
- nomadic coverage and device-to-device with sufficient capacity for multiple users and applications such as sharing and distributing high-definition video

Radio astronomy

Radio astronomy (RAS) band 608-614 MHz is used for:

- continuum solar observations with overnight calibration on celestial radio-sources,
- observation of pulsars,
- observation of extra-terrestrial radio sources, in conjunction with bands 322 -328.6 MHz and 1 400-1 427 MHz,
- European Very Long Baseline Interferometry (VLBI) Network observations.

To ensure continued access to the band, and proper operation, RAS end users request elevation of the radio astronomy service in the band 608-614 MHz to primary.

Radio location

There was no answer to the questionnaire from end users related to radio location.

5) Other Interested Parties

This section draws upon analysis from Annex 1 Section 5 and Annex 2.

The respondents' open-ended comments support the continuation and long-term viability of DTTB beyond 2030, highlighting its critical role as a public service, its resilience and its importance to various user groups, particularly vulnerable households. While acknowledging the increasing demand for mobile spectrum in the same band, respondents called for careful, long-term planning and consideration of the significant social and economic impacts of any changes.

It is clear from the responses that DTTB's function as a vital public service is widely recognised. The fact that it provides universal, free access to information and audio-visual content is also emphasised in several of the responses. DTTB is particularly noteworthy for its resilience, especially in emergency situations. It should be noted that Public Warning Safety (PWS) is identified as a critical public service that is provided through a terrestrial broadcasting infrastructure.

A significant number of users, particularly those from disadvantaged financial backgrounds and those residing in rural areas, still rely on DTTB for free access to television. Migration from DTT to any other platform can be a challenging process, particularly in remote areas, due to various factors such as user interest, ease of use, accessibility, speed, and cost.

Recent investments in DVB-T2 HEVC migration will take time to amortise and write off, so a short time horizon may not be sufficient. Technological innovation (5G broadcasting, UHD) is seen as important to support DTT as a critical infrastructure.

Conversely, there is a growing interest in high-performance mobile communications along transport routes and in rural areas. Some respondents are in favour of maintaining the current primary allocation for broadcasting services and sustainable solutions for the long-term continuation of PMSE, radio

astronomy and wind profiling radars. Others are in favour of an additional primary IMT allocation in the 470-694 MHz band, while respecting existing regulations such as GE-06.

CHAPTER III - Assessment of the future use of the 470-694 MHz band in the EU

1) Assessment for current incumbents within the band

Future use by DTTB and 5G Broadcast

Broadcasting stakeholders advocate for the continued use of DTTB well beyond 2030, citing its content reliability, neutrality, and accessibility. They stress that DTTB plays its role in delivering public service content, free of commercial influence and data profiling, while fulfilling public obligations. Broadband and mobile stakeholders argue that consumer behaviour is changing and DTTB usage is consequently declining. They also argue that the EU's broadband targets can accommodate both linear and non-linear content via IP-based platforms.

Despite the continued expansion of broadband infrastructure across the EU, most national authorities have not yet developed clear strategies for implementing the social and policy objectives of free-to-air broadcasting delivered by IP-based platforms. Broadcasting stakeholders argue that a transition to IPTV could leave some population segments behind—especially in rural areas or among those less able to afford premium content services. Most stakeholders emphasized the need for subscription-free access and regulatory support to preserve the environmental and social benefits of the DTTB platform. Additionally, the platform's role in supporting democratic access and media sovereignty remains central to the policy debate.

5G Broadcast is emerging as a potential complement—or successor—to DTTB particularly in mobile and hybrid environments. Technical trials in several Member States have shown positive results, particularly where high-power high-tower infrastructure can be adapted for outdoor coverage. Some broadcasters view it as a way to remain relevant in an increasingly IP-centric ecosystem, and as a means to reach audience on the move while maintaining the public service model. However, deployment remains hindered by device compatibility, investment costs, and untested business models. Broadband stakeholders remain cautious about its commercial prospects, particularly in a low-power low-tower configuration, question its relevance to their service models and do not see it as a solution to rising data demand.

Future usage by PMSE

The PMSE sector requests long-term access to the UHF band, as it is crucial for live theatre, broadcasting, cultural events, and international productions that rely on reliable, low-latency, harmonized wireless systems. They express concern that in case of releasing of the 600 MHz band, the remaining capacity would be insufficient to meet demand. Although innovations like Wireless Multichannel Audio System (WMAS) and cognitive PMSE aim to improve spectrum efficiency, PMSE professionals argue that technologies such as those developed by 3GPP or cognitive PMSE fall short in real-world production environments. They advocate for long-term regulatory guarantees, including spectrum prioritization and geolocation databases to effectively manage usage.

2) Assessment for the use by mobile service

Mobile and broadband industries are of the view that using portions of the band for IMT—particularly around 600 MHz—would increase capacity enhancing rural broadband performance and supporting Europe's digital goals. On the other hand, broadcasting stakeholders argue that the band already in use of broadband networks can be used more efficiently and that way cover any potential rise of demand.

Defence and emergency services stakeholders, backed in some cases by administrations, have signalled interest in parts of the band for secure communications. Defence and PPDR stakeholders also outlined pressing needs for secure, mission-critical communication in this band, with defence users seeking access to white spaces or specific sub-bands. Some National militaries and PPDR users are already

employing white spaces below 600 MHz for specific use cases and are seeking additional allocations as part of broader modernisation efforts for training and tactical communications, and some expect demand to increase significantly by 2040.

In some Member States there is opposition among regulators and broadcasting stakeholders to the idea of using the band for mobile service, as they are of the view that it will reduce spectrum for existing services, lead to interference, and a threat to the long-term viability of DTTB.

3) Challenges of harmonisation across EU

Efforts to harmonise further the band across the EU face difficulties due to varying national use cases and policy priorities. While some regulators and mobile stakeholders support harmonisation as a means to facilitate innovation and reduce coordination efforts, others caution that the diversity of national use cases makes a common approach unlikely in the near term.

There is also a need to preserve sufficient spectrum for audio PMSE, while radio astronomy users emphasised the critical need to protect the 608–614 MHz sub-band for scientific research.

Current bilateral and multilateral agreements, on top of GE06, are largely effective, while there are no agreements addressing cross-border coordination between DTTB and IMT.

There is general consensus that further studies are needed to assess the consequences of primary mobile service co-allocation or spectrum sharing, including technical feasibility and economic viability. These studies may lead to the modification of the regulatory framework and result in the development of new cross-border agreements.

There is a growing demand for regulatory clarity and predictability across sectors to effectively plan future spectrum use. Broadcasters and mobile operators require certainty to justify investments in service upgrades and infrastructure, while PMSE professionals need stability to maintain a functional ecosystem within the creative industries. Regulators are focused on efficient spectrum utilization and tools for EU-level cross-border coordination.

The report of the European Commission under Article 7 of Decision (EU) 2017/899 and the EU's position for WRC-31 will be pivotal in shaping future policies. A flexible, forward-looking framework across the Union must acknowledge the roles of DTTB and PMSE in many EU countries, while also addressing the needs for different uses, such as mobile and broadband, in other EU countries.

Policymakers face complex trade-offs, balancing continuity with innovation, sectoral needs with public interest, and national preferences with harmonized solutions. Decisions made in the coming years will determine not only the use of the 470–694 MHz band but also how Europe aligns its digital leadership ambitions with its longstanding commitments to public service and cultural resilience.

4) Overall conclusion

The 470–694 MHz band remains a valuable asset in the EU's spectrum portfolio, supporting broadcasting and media services while facing pressure to adapt to evolving audience expectations and technological advancements.

The future of this band hinges on balancing the diverse needs of traditional broadcasting, public service obligations, wireless audio production and the growing demand for mobile usage. Stakeholders across the broadcasting, mobile, and PMSE sectors require clear and predictable regulatory frameworks to effectively guide their investments and operational strategies.

Moving forward, regulatory certainty, inclusive dialogue, and evidence-based planning are crucial to ensure that the band continues to serve the EU's public interest, technological progress, and strategic autonomy.

As regards the implementation of the flexibility provisions of the current Council and European Parliament Decision, the lack of concrete deployments in Member States has prevented the RSPG from collecting sufficient lessons. Notably, there have been no early adopters of alternative use under the flexibility allowed by Article 4 of EU Decision 2017/899.

The 2023 Opinion expressed by RSPG on the UHF band (RSPG23-035) remains therefore fully pertinent, particularly concerning future EU regulatory actions aimed at facilitating, where feasible, the implementation of various scenarios among Member States.

ANNEX I – The Responses to the Questionnaire

1) The Regulators section

Introduction

This chapter synthesizes the results of a questionnaire sent to European and non-European regulators and stakeholders regarding the current and future use of the 470-694 MHz frequency band. The focus is on understanding the current utilization of the band, exploring potential future developments, and examining the challenges and regulatory considerations involved in reallocating or co-allocating the band. A great number of regulators/administrators from the EU countries (and from some non-EU Countries that participate in the works of RSPG) replied to the questions of the Questionnaire dedicated to them. Additionally, a significant number of interested stakeholders gave also their views on the same set of questions.

Co-allocation of services in the ITU-R context means that two or more radiocommunication services are allocated the same frequency band, either on a primary or secondary basis. The services must operate in a manner that avoids harmful interference with each other, following the rules and priorities defined in the Table of Frequency Allocations. Co-allocated services may be of the same or different categories (e.g. broadcasting, mobile, fixed, etc.). The priority between co-allocated services is determined by whether the allocation is primary (indicated in capital letters) or secondary (indicated in lowercase). National administrations are responsible for managing how co-allocated services are implemented domestically, ensuring compatibility and avoiding harmful interference.

The 470–694 MHz band is co-allocated to the following services, depending on the ITU region:

- Broadcasting service (primary allocation) – globally.
- Mobile service (except aeronautical mobile) – co-allocated on a primary basis in Region 2 (Americas) and in parts of Region 1 (Europe, Africa, Middle East) under certain national or regional decisions following WRC-15 and WRC-23 outcomes. Co-allocation allows for both terrestrial broadcasting (DTT) and mobile services (e.g. IMT, 5G Broadcast) to use the band under national arrangements, provided they respect interference rules and international coordination (e.g., cross-border agreements).
- Fixed service – in some countries or regions, on a secondary or limited basis.
- Wireless audio PMSE operates under the allocation of the frequency band 470-694 MHz to the land mobile service, intended for applications ancillary to broadcasting and programme-making on a secondary basis, as given in ITU-R Radio Regulations footnote 5.296.

Current and Future Use of the 470-694 MHz Band in the EU

The 470-694 MHz band is currently used for a variety of applications across EU and non-EU countries. The key services utilizing this band include:

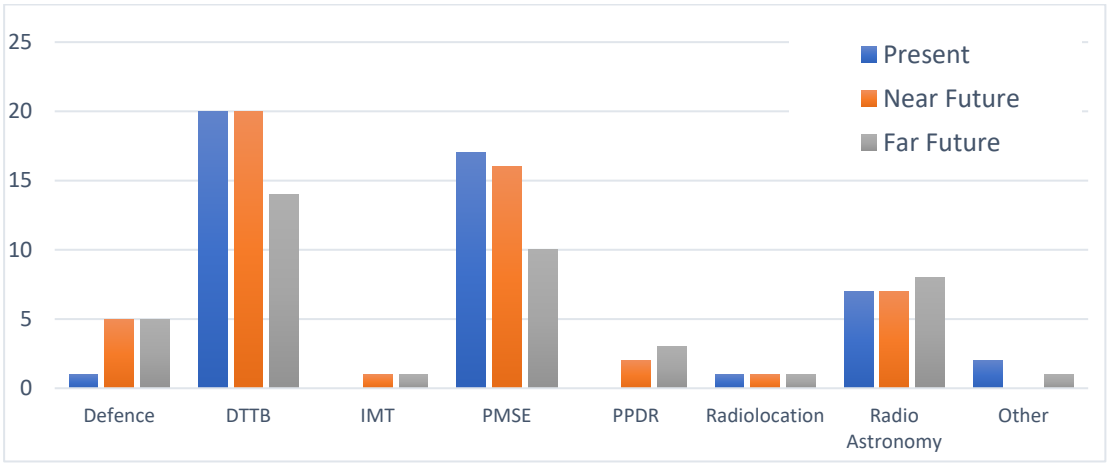
- **Defence**: One country replied that is using the band at present and up to five (5) countries are planning to use various bandwidths in the near and far future.
- **DTTB**: The band is primarily used for DTTB, with 20 countries using it at present and in the near future (12 and 11 of them, accordingly, using the whole 470-694 MHz band) and 14 countries plan to use it also in the far future (7 of them plan to use the whole 470-694 MHz band).
- **IMT**: No country has authorized the use of any part of the band at present. Only one country foresees the usage of the band for IMT. The rest of the countries are either do not see any usage or did not give a reply.
- **PMSE**: A significant number of countries (17) use this band for audio PMSE, and a similar number of countries plan to use it in the near future. Several countries (10) have plans for using the band in the far future. Interestingly the majority of the countries who replied are using now

and are looking in the future to allow use of audio PMSE in the white spaces in the 470-694 MHz band.

- **PPDR**: Limited plans exist for introducing PPDR applications, with only few countries considering it in the near or far future.
- **Radiolocation**: One country is using the band and plans to use it in the future too. The rest of the countries either do not use nor plan to use it, or did not reply at all to that question.
- **Radio Astronomy**: Eight (8) countries are using the band and plan to use it in the future too. The rest of the countries either has not authorized the use of any part of the band nor plan to do so, or did not reply at all to that question.
- **Other Applications**: One country currently uses the band for PMR and one for Cognitive radio but there are not any plans for the future.

It is obvious from the data collected that the use of the band 470-694 MHz is dominated by DTTB and PMSE and most of the Regulators do not foresee any great change to that status. Additionally, other services like Radio Astronomy, Radiolocation and Defense coexist and plan to use the band in the future.

Graph 3 *Present and future usage of the 470-694 MHz band in EU*



Impact of a possible future primary mobile service co-allocation in the EU

Regulators were asked about the consequences of a partial or total co-allocation of the band to the mobile service.

Noting that the whole 470-694 MHz band was allocated to the mobile service on a secondary basis by WRC-23, the majority of responses place themselves in the context of a primary allocation, and/or deployment of the mobile service, typically IMT.

The responses anticipate the consequences of a situation where no more bands are safeguarded for broadcasting and PMSE.

It is worth noting that no player supports a partial primary co-allocation of the 470-694 MHz band to the mobile service.

Some countries with significant number of viewers on broadcasting note that broadcasting meets legal obligations, and that dependence of the audience on the broadcasting platform could make its removal difficult, if not impossible.

Respondents recall the mechanisms used in previous digital dividends, such as support for viewers who lose the broadcasting service.

Countries that still have a significant use of broadcasting anticipate the following consequences in the event of partial primary co-allocation to the mobile service:

- Reduction in the number of multiplexes, and therefore in the content available on the DTTB platform
- A risk to the sustainability of the free-to-air distribution model for viewers
- Possible loss of free, anonymous service and access to public service media (PSM)
- Creation of monopoly positions, which could affect pluralism and reliability of information, social inclusion and democracy
- A challenge to the coexistence of public and private broadcasters, in countries where their cooperation is essential to the smooth operation of the platform
- higher broadcasting costs for publishers and broadcasters
- A risk to the sustainability of the HPHT model, whose profitability may no longer be sufficient, with possible consequences for sound broadcasting (FM and DAB) regarding costs of diffusion
- The impossibility of upgrading the platform with new technologies such as DVB-T2, UHD and/or 5G broadcasting
- Reduced spectrum available for PMSE

In the event of a primary mobile allocation of the entire band, the consequences anticipated by respondents include:

- The extinction of DTTB and the migration of linear delivery to another platform
- The possibility of a major impact on public service media, complicating the fulfilment of their missions.

On the technical side of frequency sharing between the mobile service and broadcasting, some respondents point out that to avoid interference from broadcasting to the mobile service, major coordination efforts at borders would be needed to ensure protection of mobile like IMT uplink. Use of the band by the mobile service in the downlink direction (base station to end user)) could facilitate band sharing and reduce coordination efforts at borders.

Some stakeholders are in favour of a primary mobile allocation throughout the band, which they believe could enable flexible use of the band. Nonetheless, the flexibility provided for in Article 4 of Decision 2017/899 is not commented on. The same respondents are of the opinion that the availability of a broadband/fiber (FTTH) connection could cushion the impact of the removal of the broadcast platform. However, other respondents fell that since broadband access is not free, it cannot be considered equivalent to the DTTB platform.

Other respondents believe that opening up the band to mobile services could produce socio-economic benefits, by extending the coverage of mobile broadband services, and the availability of the latest technologies, including 5G.

In the absence of a common interest among European Union countries, flexible use of the band based on mixed use of the band by mobile and broadcast services would require delicate planning or re-planning to enable them to operate without interference.

With regard to PMSE, the responses mention:

- That PMSE usage is increasing,
- that it is not possible for IMT and PMSE to share the same frequencies,
- that if the 470-694 MHz band was used by the mobile service, the broadcasting white spaces used by PMSEs would no longer be available,
- that no other band currently offers equivalent quality and harmonization,
- that the impact on PMSEs would be greater if the entire band were allocated.

Cultural circles (theatres, concert halls, tour operators, etc.) express their fears regarding the loss of this band for PMSEs, and in particular that all or part of their equipment would become unusable.

On the subject of radio astronomy, it is mentioned that its protection requires national coordination procedures that may include exclusion zones for mobile deployment.

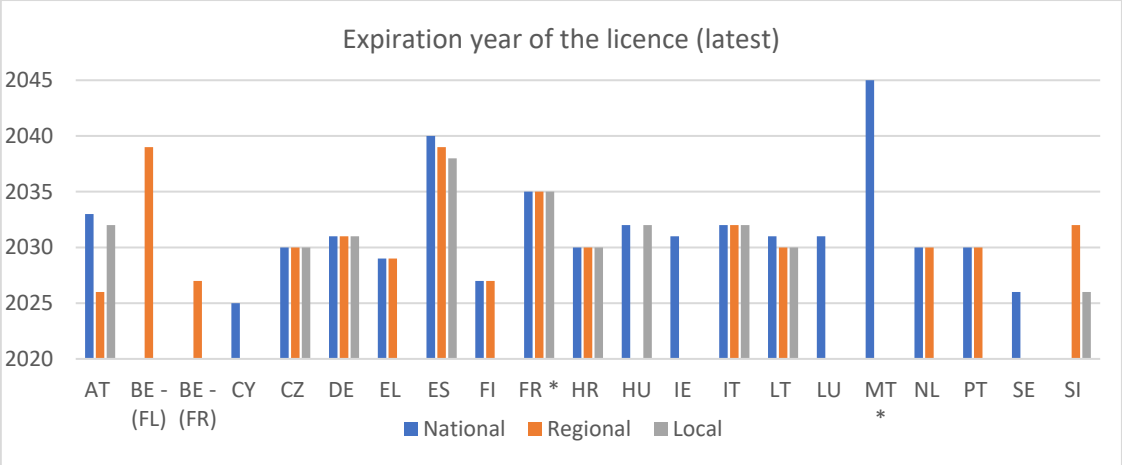
A number of responses mentioned the need for further studies to determine or identify:

- broadcasting licenses due to expire after 2030
- spectrum requirements by service
- technical conditions for coexistence between services in shared or adjacent bands
- broadcasting evolution prospects (number of programs, technical improvements, audience and coverage)
- the capacity of mobile networks to broadcast linear content
- broadcasting re-planning and coordination needs at borders (within and outside the EU)
- regulatory evolution needs, taking into account article RR 5.295A (secondary allocation to the mobile service in 44 countries including all EU countries except Spain and Italy) created by WRC-23, and article 4 of decision EU 2017/899 already offer flexibility in the band
- how to meet the spectrum needs of PMSEs, particularly during major events
- how to migrate PMSEs to other bands, noting the lack of consensus on alternative bands among responding administrations

a. the social and economic benefits of partial or total primary mobile allocation

License regime of DTTB in the sub-700MHz in EU

Graph 4 *Expiration year of the DTTB licenses in EU*



FR: possible further extension of up to 5 years for the national licenses granted in 2025*

MT: the license is valid indefinitely*

Note: *The graph above indicates the expiration year of the current licenses as of 2025, not the definitive closure date of these licenses.*

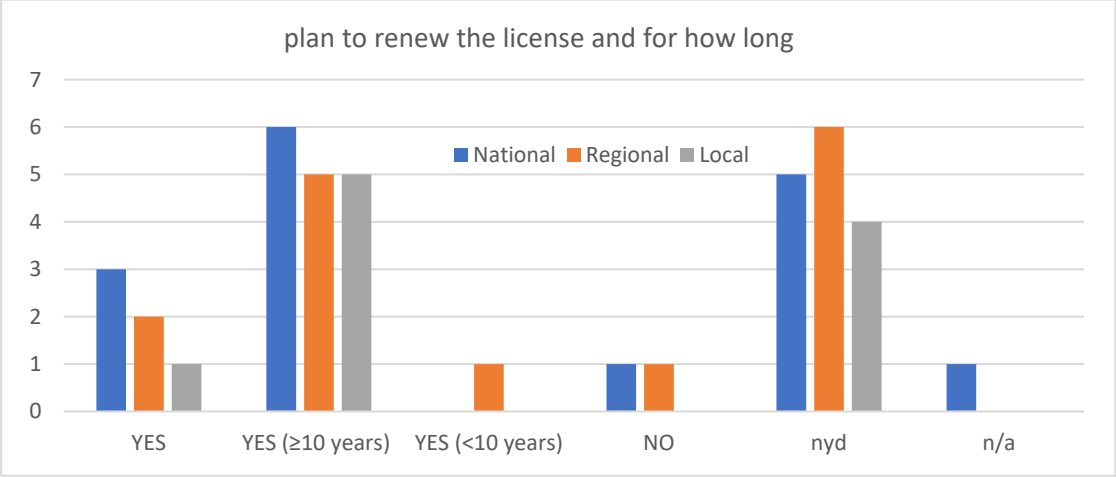
Table 1: *Is there a plan to renew the license and for how long?*

Country	**National**	**Regional**	**Local**
AT	YES (10 years)	YES (10 years)	YES (10 years)

BE - (FL)		nyd	
BE - (FR)		YES (5 years)	
CY	YES (15 years)		
CZ			
DE	nyd	nyd	nyd
EL	YES	YES	
ES	YES (15 years)	YES (15 years)	YES (15 years)
FI	nyd	nyd	
FR *	YES (10 years)	YES (10 years)	YES (10 years)
HR	YES (10-15 years)	YES (10-15 years)	YES (10-15 years)
HU	nyd	nyd	nyd
IE	nyd	nyd	nyd
IT	YES (12 years)	YES (12 years)	YES (12 years)
LT	YES	YES	YES
LU	nyd		
MT *	n/a		
NL			
PT	NO	NO	
SE	YES		
SI		nyd	nyd

nyd: not yet decided
tbd: to be determined.

Graph 5 *Plan to renew DTTB Licenses and for how long*



The majority of the countries, that replied, have licenses that expire close or even beyond 2030 and a significant number of them have plans to renew them until well beyond 2040.

The regulators indicated that there are few alternative options after the current DTTB licenses expire even though most of the participating administrations did not answer at all, or stated that they have not yet consider the future use of the band:

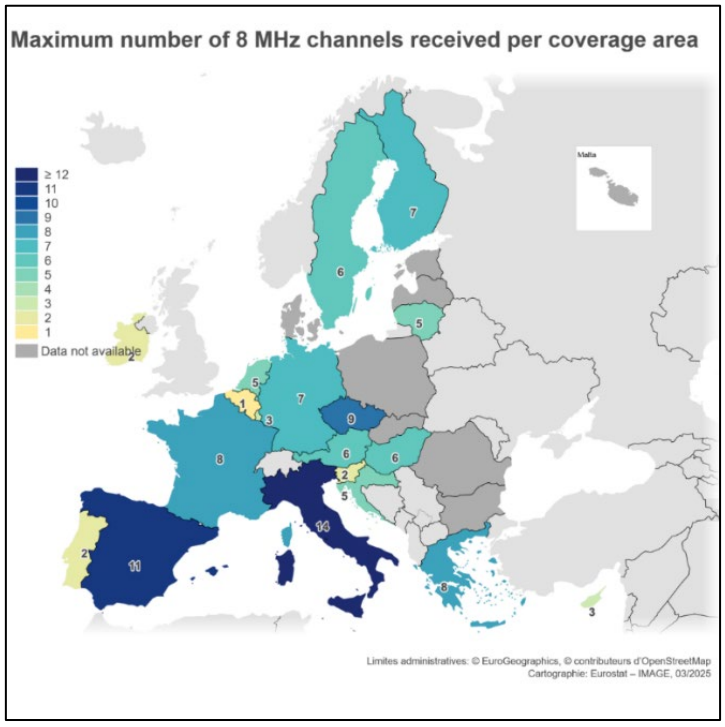
- Maintain the current use (primary DTTB, secondary PMSE) and number of DTTB layers, renewing licenses until year Y
- Reduce the use for DTTB from M to N layers, renewing licenses until year Y
- Introduce other services in the band
- Cease DTTB operation within the band
- Other / Not yet considered

No answer is associating DTTB licenses expiration with an evolution of the use in the band 470-694 MHz, and 6 countries even intend to maintain the current use of the band.

Only one EU country has plans to introduce MFCN in the band

Current usage of the sub-700MHz band for DTTB in EU

Graph 6 *Maximum number of 8MHz channels received per coverage area in EU*



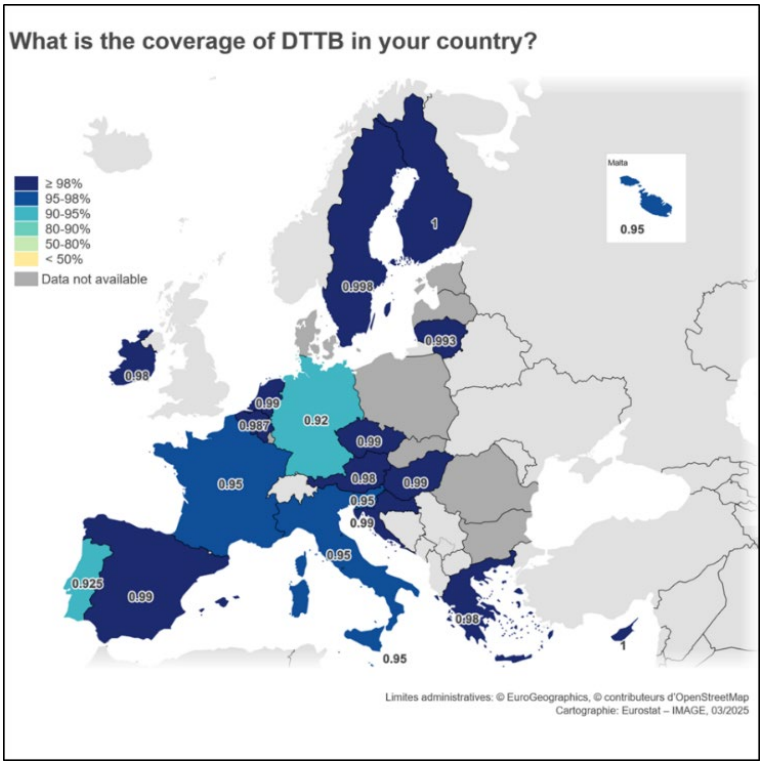
Who can and who chooses to watch DTTB in EU

As it can be seen in the graphs below, the coverage of DTTB in Europe is extended, covering more than 90% (an in many countries more than 98%) of the land / population.

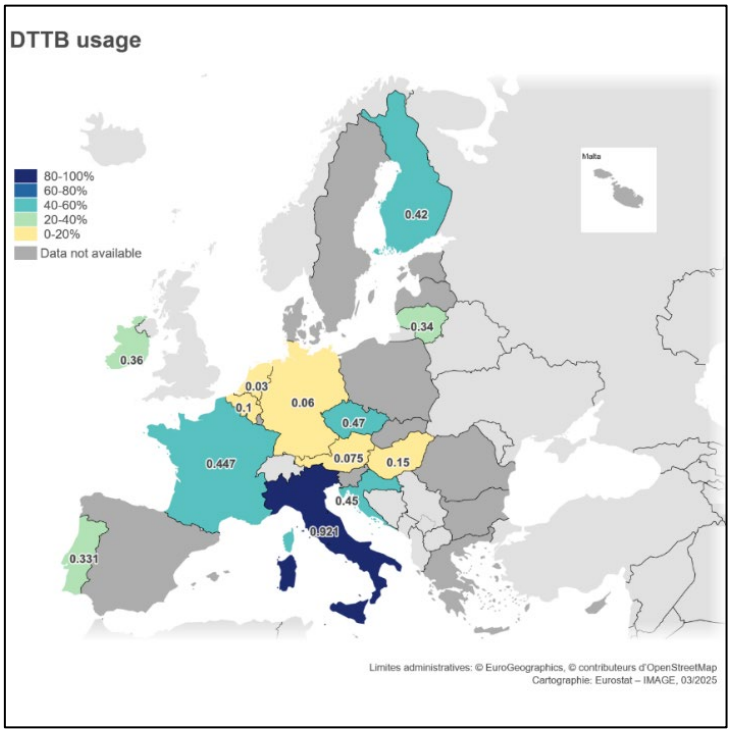
That is also verified with the answer to the question "What percentage of households do not have access to DTTB coverage", where no one gave a percentage above 8%.

On the other hand, the percentage of households that select to access linear TV through DTTB is varying among the EU countries from a low 3% to a high 92%. These values, interestingly enough, are not distributed among the countries following a geographical kind of pattern.

Graph 7 *Coverage of DTTB in EU countries*



Graph 8 *Percentage of households that actually use DTTB for accessing linear TV per EU country*

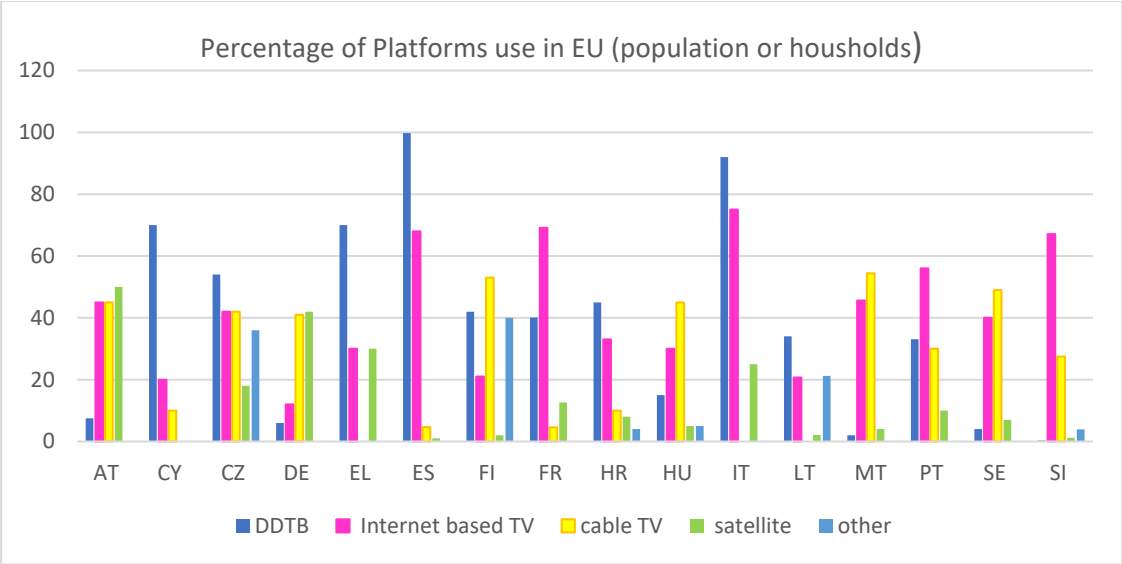


The households select to access alternative platforms offered like:

- Satellite
- IP TV/FWA/FTTH
- Cable

Two countries noted that no alternative to DTTB is offered.

Graph 9 *Percentage of various platforms used in EU for audio-visual content distribution (administrations' views)*



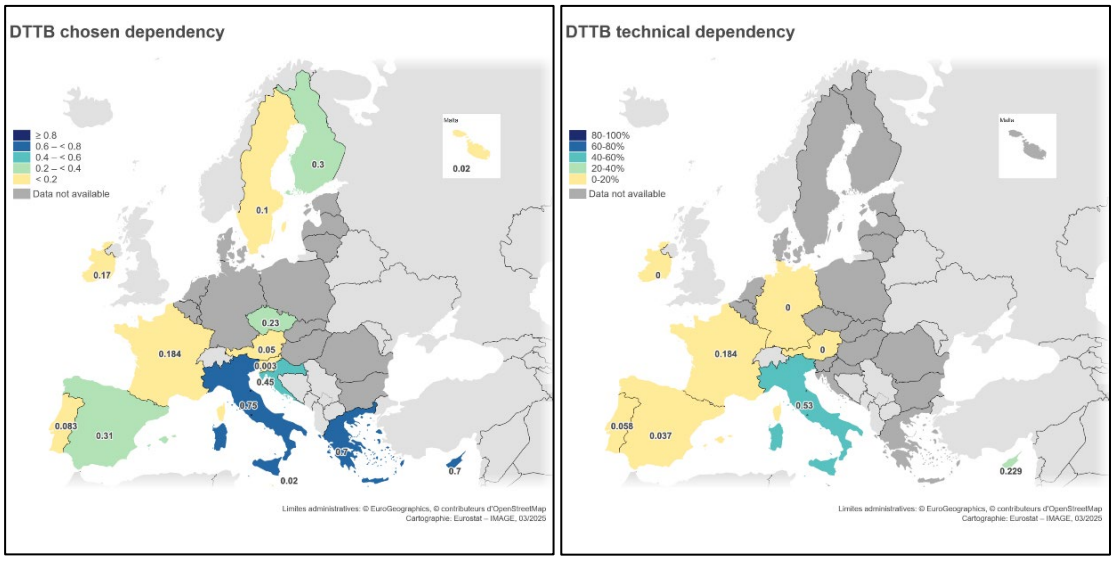
Other:

- *HR: OTT service*
- *HU: streaming providers*
- *LT: IPTV*
- *SI MMDS, BWA*

Very interesting is also the answer to the question "what percentage of households are dependent only on DTTB in your Country" where the countries clarified whether dependency was a consequence of a lack of availability of an alternative platform, or a choice of the audience/user/household.

As it can be seen, EU countries, in general, do not lack alternative platforms to the access audio-visual program (technical dependency) and in only two countries (out of those who replied) the highly preferred choice is DTTB

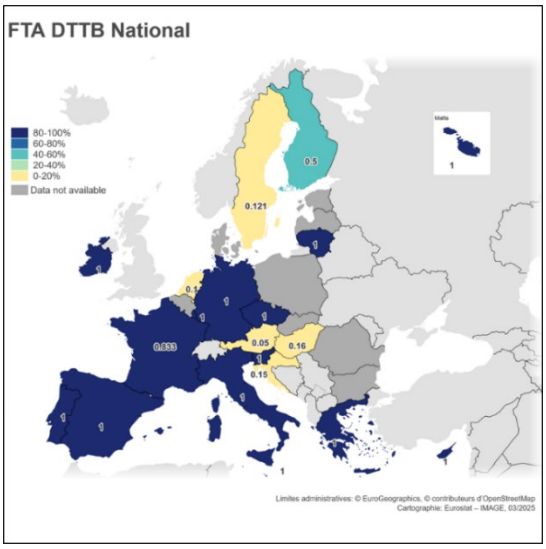
Graph 10 *DTTB chosen dependency vs technical dependency*

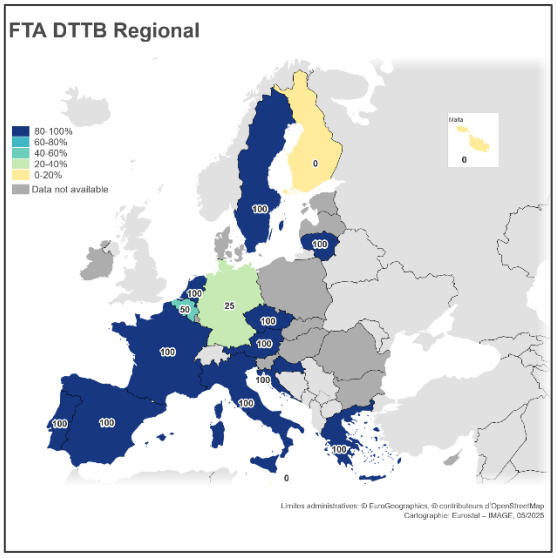


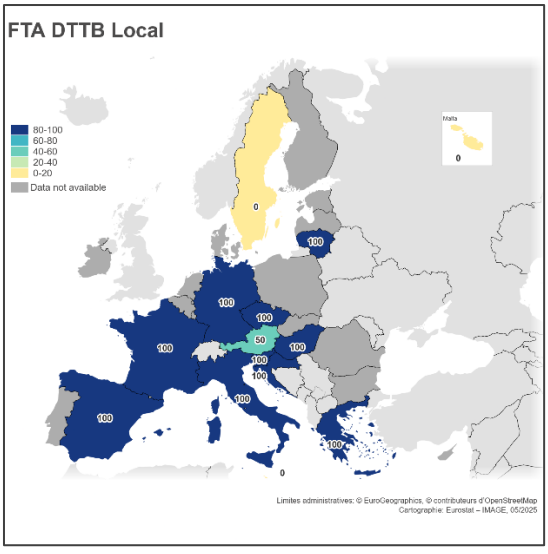
Due to FTTH not being free, the availability of fixed broadband connectivity may not be considered as an alternative to FTA DTTB.

When the discussion comes to who and how Free to Air (FTA) content is provided in National, Regional and Local level, the dependency on DTTB is very high in the majority of EU countries and is getting higher from National to Local level, meaning that people depend on DTTB to access content of local/regional interest, culture etc

Graph 11 *Free to Air (FTA) DTTB in National, Regional and Local level across EU countries*







Situation varies among communities of Belgium in regard to regional delivery: 100% FTA in French speaking communities, 100% pay TV in Flemish speaking communities

What is the future of DTTB

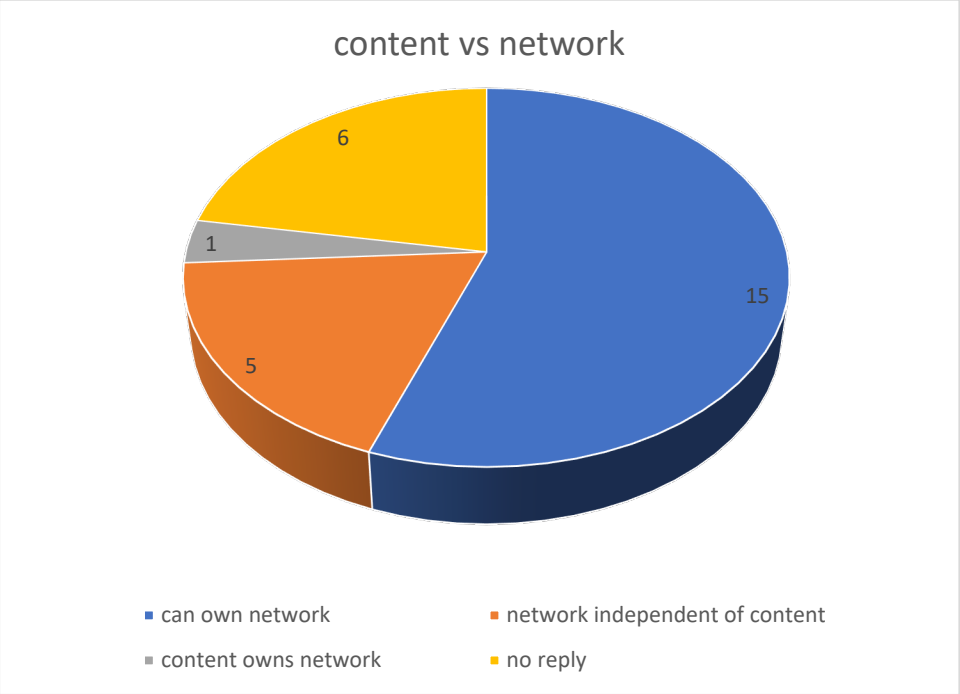
Most DTTB networks in EU fulfil coverage obligations set by administrations. The Administrations are involved in frequency planning, at least regarding cross-border coordination, and HPHT stations.

In most countries, despite the coverage targets and constraints associated with cross-border coordination, the network operator keeps a certain amount of freedom to select stations and details of operations.

In the majority of EU countries content providers can be the owner of their own networks, or part of the delivery network. In only 5 EU countries the network providers are independent from the content providers and in only one country the content provider owns the delivery network.

Despite the coverage targets and constraints associated with cross-border coordination, in most countries the network operator keeps a certain amount of freedom to select stations and details of operations.

Graph 12 *The relation between Content and Network providers in DTTB in EU*

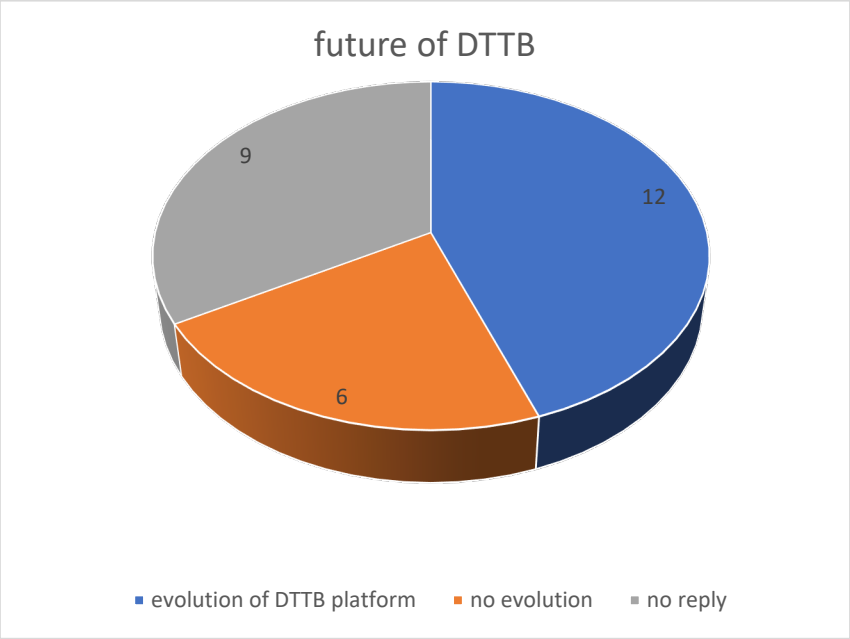


3 non-EU countries report that content providers can be the owner of their own networks, or part of the delivery network

EU countries plan to upgrade/modify the DTTB network in the near future (before 2030) in various ways:

- 12 EU countries mention possible evolutions of the DTTB platform in the future
  - modify the number of layers in operation;
  - new technologies
    - DVB-T2,
    - HEVC,
    - UHD,
    - 5G broadcast,
    - HbbTV;
  - modify the percentage of population covered;
  - modify the number of programs;
  - HbbTV as a possible evolution.
- 6 EU countries do not foresee an evolution of their DTTB platform.
- 9 EU countries did not answer.

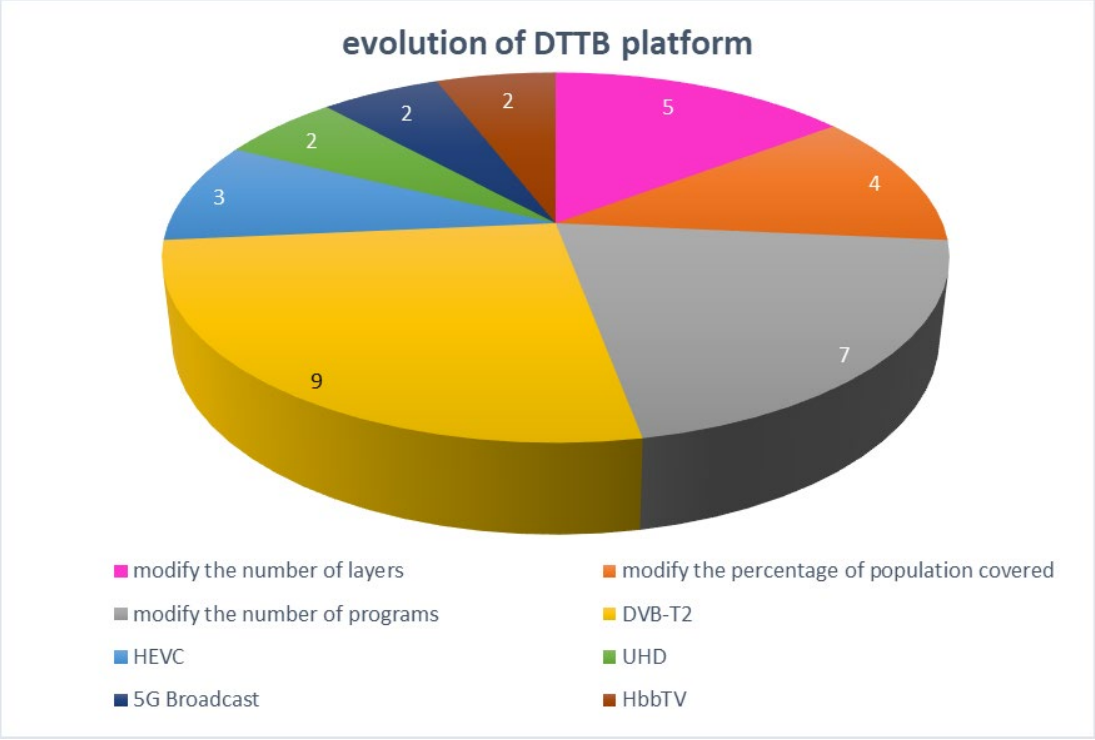
Graph 13 *The Future of DTTB in EU*



In addition:

- *1 non-EU countries did not answer*
- *1 non-EU country mentions stations switch-off, leading to coverage reductions*
- *1 non-EU countries do not foresee an evolution*

Graph 14 *The type of Evolution of DTTB in EU*

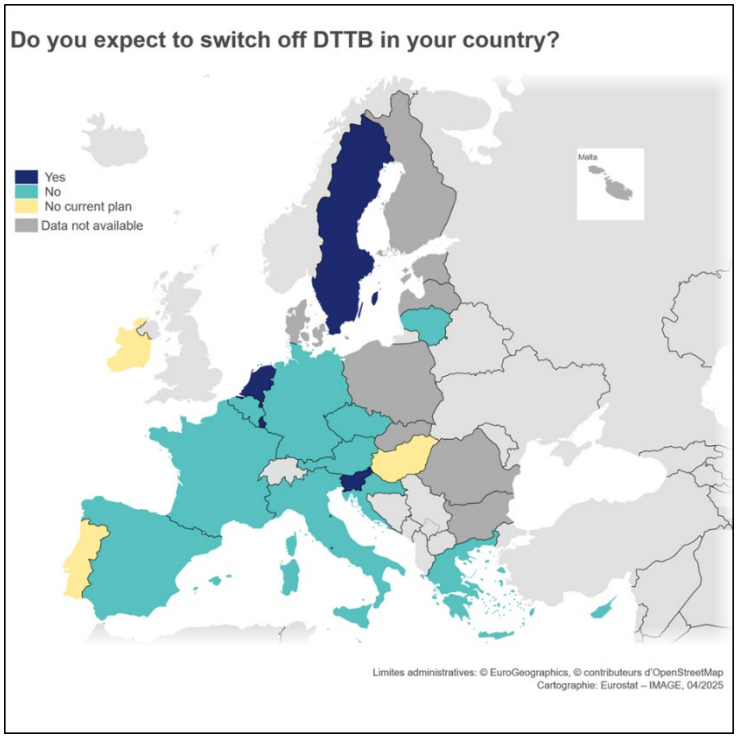


Some countries provided more than one reply.

All answering countries (20 EU and 3 non-EU) mention in-force cross-border agreements in addition to the GE06 Agreement.

In the very direct question of if the EU countries expect to switch off DTTB, only four (4) replied positively. The vast majority do not plan to do so.

Graph 15 *DTTB switch-off expectations in EU countries*



In addition:

- *2 non-EU administrations don't expect to switch off DTTB*
- *1 non-EU administration did not reply*

Countries anticipating to switch off DTTB, subject to a political decision, mention the following reasons:

- decline of audience
- decline of profitability

On the other hand, stakeholders, without being precisely asked about it, have noted that the reasons to keep DTTB are:

- no viable alternative considering technical and economic aspects
- other aspects such us public policy goals, impact to culture, freedom of choice and local industry
- need to ensure national resilience and redundancy to communicate to citizens in case of emergency

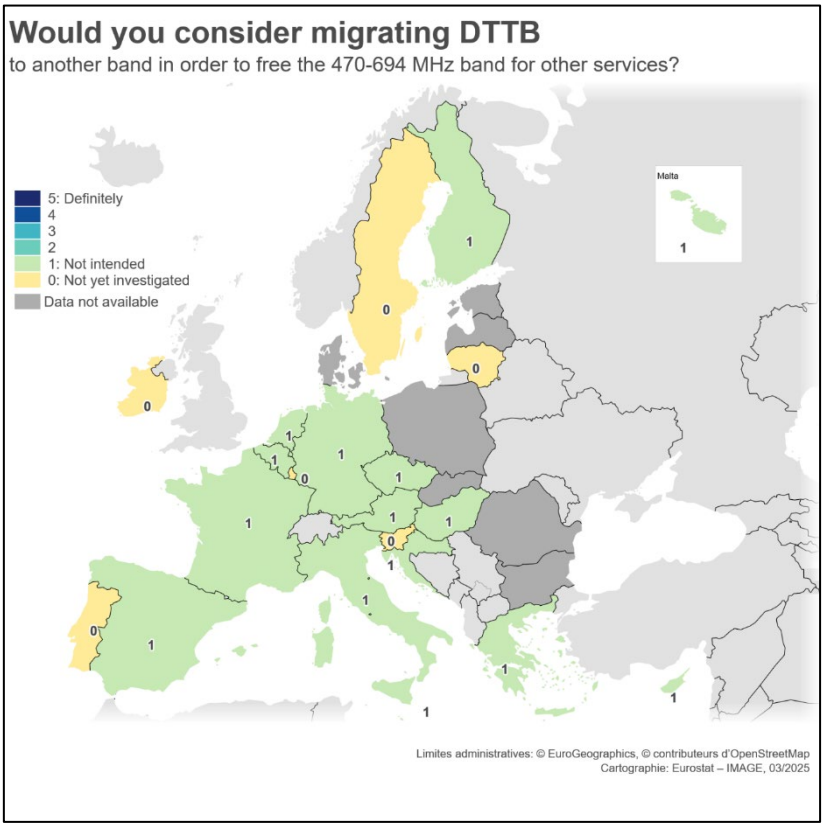
Migration of DTTB to other bands

Two EU countries have DTTB or plan to introduce it in the band 174-230 MHz and two more note that the band 174-230 MHz could be used for DTTB.

However, one stakeholder notes that the band 174-230 MHz is mostly dedicated to DAB+, and hence, its possible use for DTTB may be limited.

The reply of the EU countries to the more general question about DTTB migrating to another band can be seen in the chart below, and can be summarized to that no one is planning to migrate DTTB to another band:

Graph 16 Consideration of *DTTB migration to another band in EU countries*



2 non-EU countries indicate they have no intention to consider migrating DTTB to another band.

Migration of Linear FTA TV viewers to other platforms

The administrations were then asked if the migration of linear free-to-air viewers from DTTB to any other platform is a process that can run smoothly in their country.

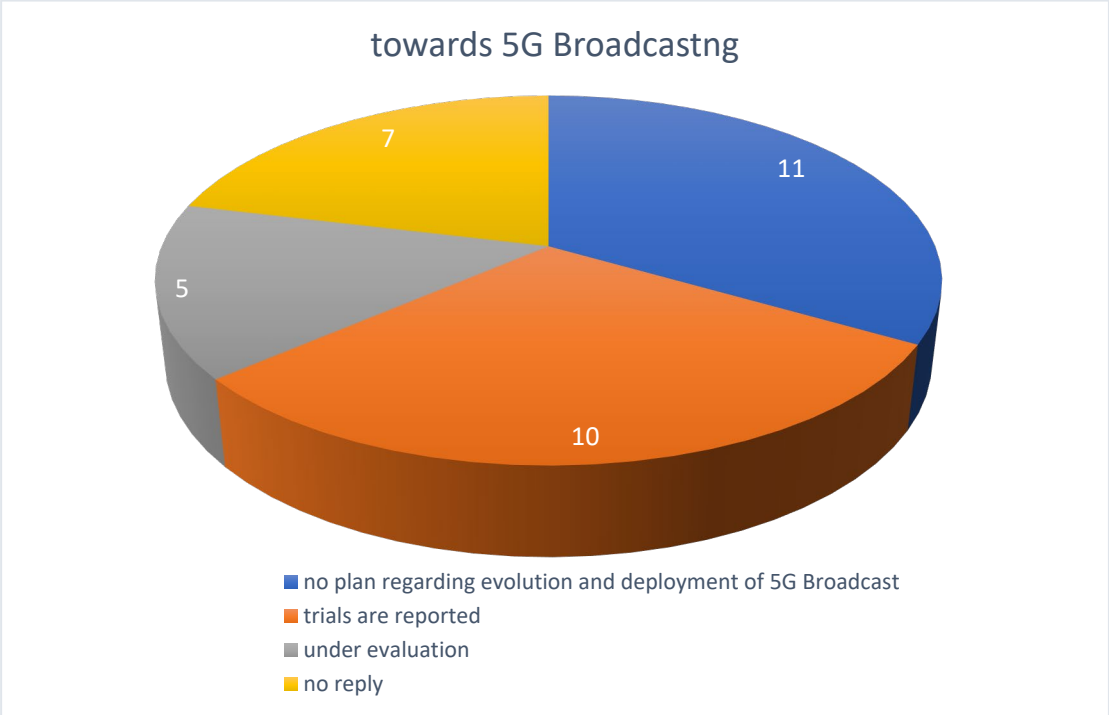
Their replies show that this is a process that has not been well thought yet by the administrations:

- 11 EU countries have not yet investigated the question.
- 9 EU (and 1 non-EU) countries answer, with an average of 3.85 on a scale of 1 (really easy) to 5 (very difficult).
- 6 EU (and 1 non-EU) countries did not answer.
- 2 countries (1 EU and 1 non-EU) have already migrated linear free to air viewers from DTTB to other platform(s).
- 1 country mentions that such migration would require ubiquitous access to alternatives such as, for example, IPTV.

Broadcasting stakeholders on the other hand are of the view that such migration would be very difficult, and one of them is of the view that "there are no alternative platforms which are at the same time FTA, nationwide available and independent of other electronic communication services."

The response of the administrations towards the possibility of implementing 5G Broadcasting was that the overall technological and business model is still under study and development:

Graph 17 *5G Broadcasting plans in EU*



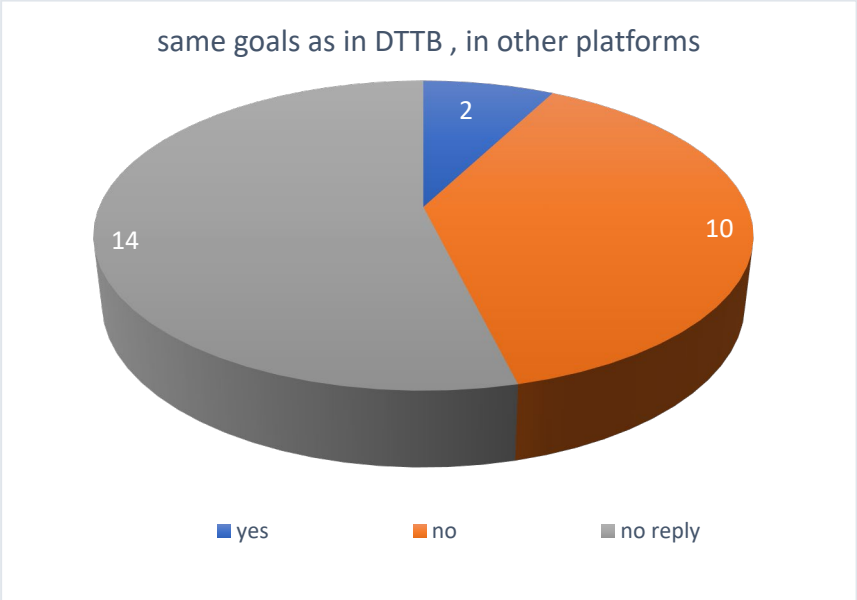
In addition:

- *2 non-EU countries have no plan regarding evolution and deployment of 5G Broadcast*
- *1 non-EU country is conducting initial evaluation of 5G Broadcast*
- *1 EU country is of the view that 5G Broadcast won't be a substitute to DTTB*
- *Some stakeholders indicate that there were no reports of interference during 5G Broadcast trials.*

Free linear television broadcast (which may mean not only DTTB) is regulated for reasons of general interest objectives, such as freedom of expression, media pluralism, impartiality, cultural and linguistic diversity, social inclusion, consumer protection and the protection of minors. Overall, in EU countries, regulation of linear TV applies to all delivery platforms, but platforms capable of non-linear distribution are not submitted to the same regulatory framework. In addition, PSM are submitted to specific provisions.

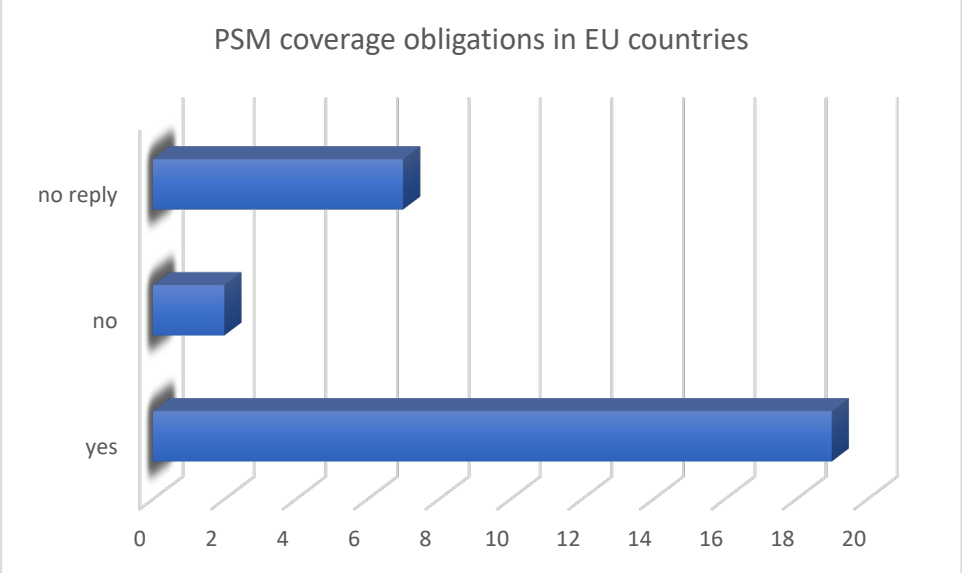
In the case of the DTTB platform discontinuity, most EU countries replied that they do not actively study the possibility of achieving the same, aforementioned, goals.

Graph 18 *Can DTTB goals be achieved in other type of platforms*



The Public Media Service is a special case of audio-visual content provision as they may carry special coverage obligations:

Graph 19 *PSM coverage obligations in EU countries*



3 non-EU administrations have also coverage obligations

As it can be seen from the graphs above EU administrations do not have a common approach on the issue of maintaining the existing coverage obligations of PSM or if this can be done by migrating the service to another platform, if there is a refarming of the 470-694MHz band.

The broadcasting stakeholders on the other hand noted that a possible refarming of the 470-694MHz band would harm the PSM in various ways:

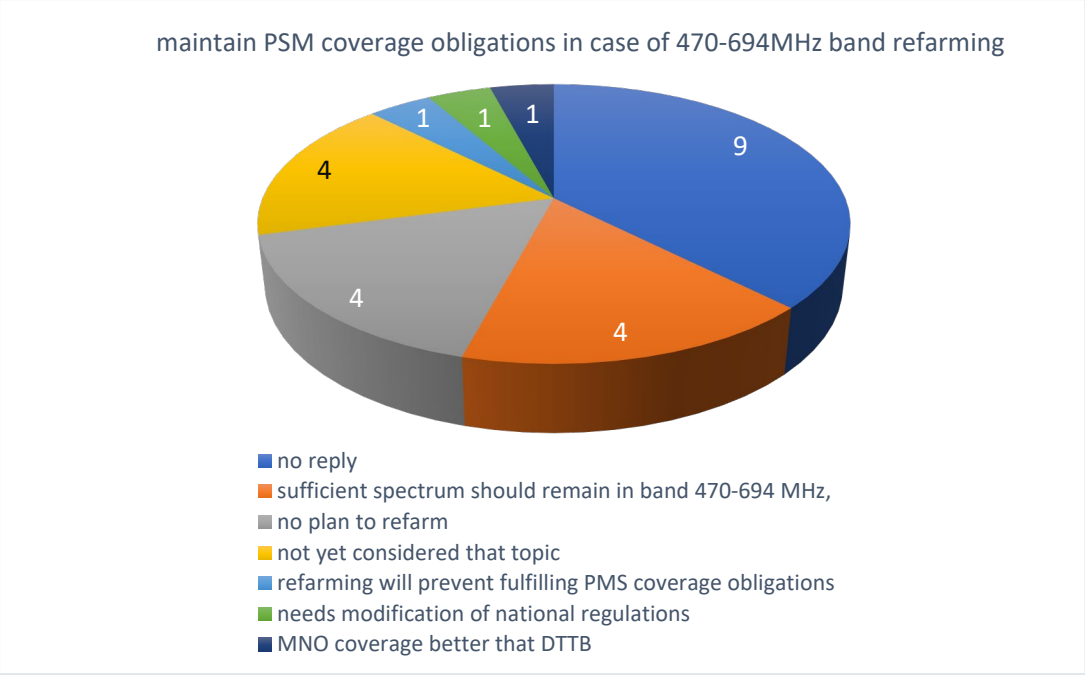
- insufficient quantity of spectrum for DTTB therefore could put media plurality in risk by limitation of commercial broadcasters and content providers.
- not possible without a massive major disruption to the public service and the citizens

- to cope with coverage obligations after any potential refarming of the band, whatever it could be, would require massive investments and would represent a huge disruption for citizens.
- If the refarming affects the PSM coverage obligations the essence of PSM will be compromised, as well as its remit, which is largely based on providing to all citizens universal, equal and unimpeded access to quality broadcast content.

Finally, mobile industry stakeholders have a different view:

- even today countries with no or little DTTB manage to pursue the PSM objectives on alternative distribution paths
- see no close link between maintaining the DTTB platform and the PSM objectives

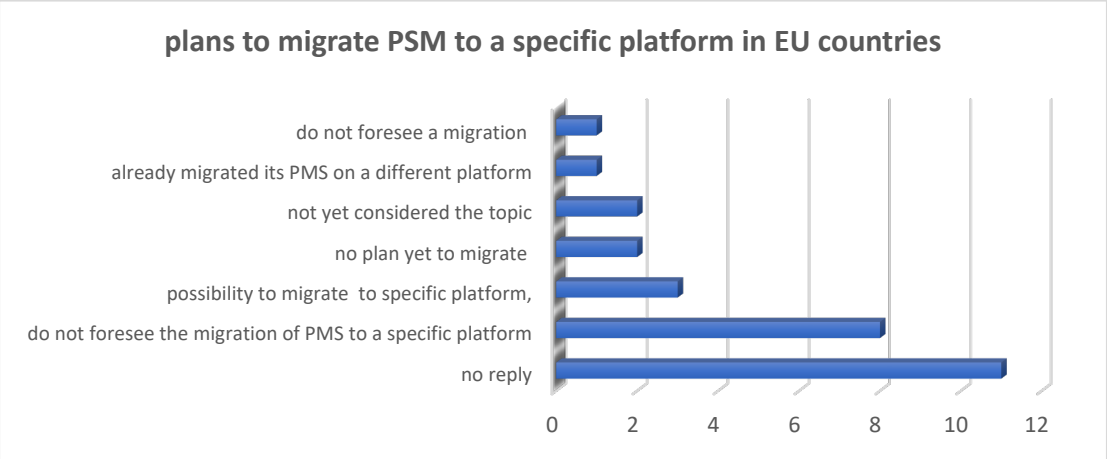
Graph 20 *EU countries views on maintaining the PSM coverage obligations in case of 470-694MHz band refarming*



In addition:

- *1 non-EU country is of the view that a refarming would prevent PSM from fulfilling their coverage obligations,*
- *1 non-EU administration mentions that its coverage obligations are technology neutral.*

Graph 21 *EU countries plans to migrate PSM to a specific platform*



In addition:

- *2 non-EU administrations do not foresee the migration of PSM to a specific platform,*
- *1 non-EU administration mentions that moving to a specific platform wouldn't be technology neutral.*

Administrations have mixed views on the possible relationship between the EU Digital Decade connectivity targets and the potential migration of free linear TV from DTTB to IPTV.

The average of answers is 2.4, on a scale ranging from 1 (there is no relationship) to 5 (there is a relationship). In addition, 7 administrations didn't answer and 5 administrations have no opinion yet. In two countries, different administrations have different views on that matter.

3 stakeholders note that given the EU targets[6] for connectivity to households are achieved, all audio-visual content delivery to fixed locations, both linear and non-linear are envisaged via highly performant home broadband connections and 5G mobile rather than DTT broadcast.

BNE[7] and 11 broadcasting stakeholders of Italy, Poland and Spain are of the view that there is no relationship between the Digital Decade connectivity targets and the potential migration of free linear TV from DTTB to IPTV, and that DTTB remains highly relevant for citizens and key for achieving public policy goals.

Shure[8] (a PMSE stakeholder) is of the view that spectrum below 1 GHz won't help to reach the Digital Decade connectivity targets, as the available spectrum won't be sufficient to offer enough capacity, and because high capacity for IMT will be provided by spectrum above 3 GHz.

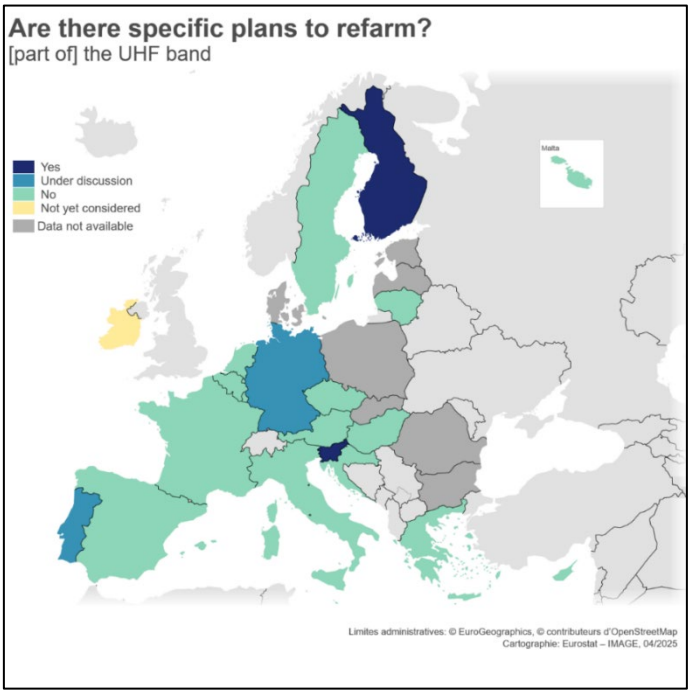
Refarming the 470-694 MHz band / Future use of the band

The EU countries were asked if they plan to refarm all or part of the UHF band and assuming that this happens what is the preferred or needed option.

As it can be seen in the following graphs only few EU countries have plans to refarm the UHF band, and there is no agreement on what level regulatory changes should be done if they decide, in the future, to refarm the band.

[6] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32022D2481
[7] BNE - Broadcast Network Europe
[8] https://www.shure.com/en-EU

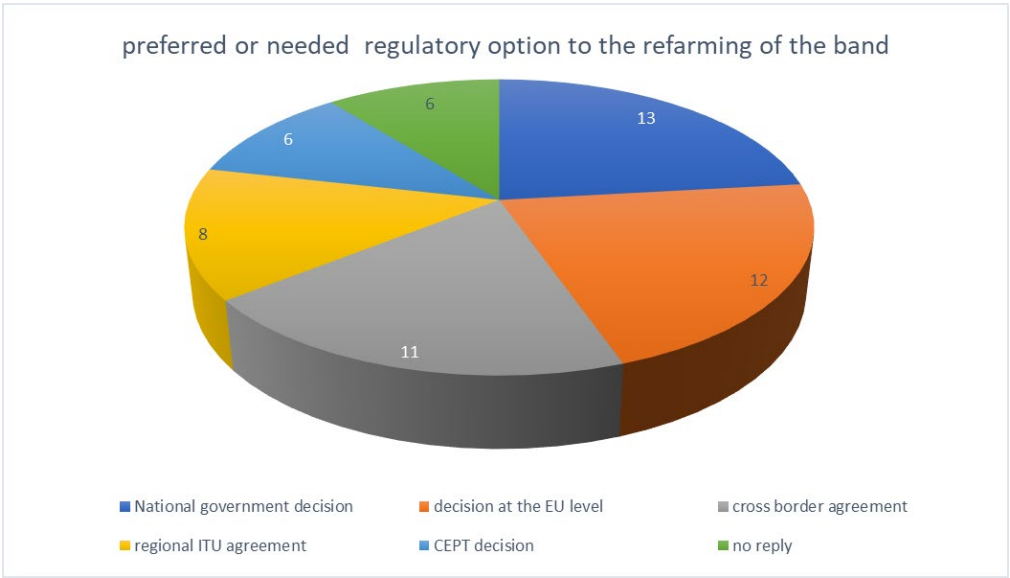
Graph 22 *EU countries plans to refarm the UHF band*



In addition:

- *2 non-EU administrations said they have no plans*
- *1 non-EU administrations did not reply*

Graph 23 *Preferred or needed regulatory option to the refarming of the band*



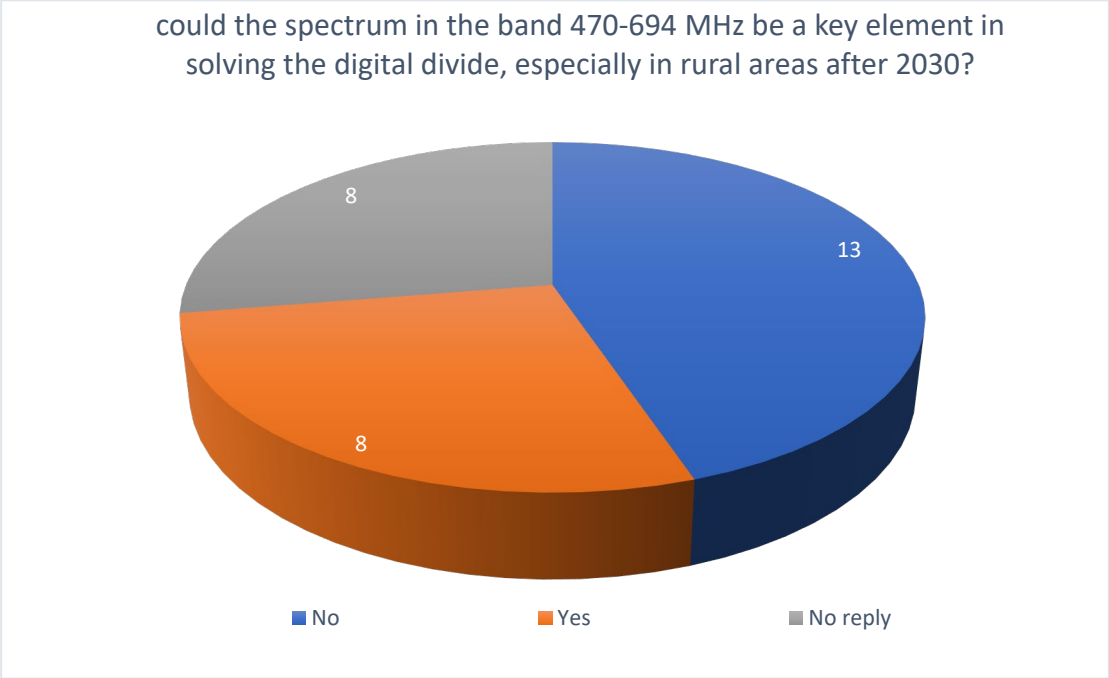
Some countries gave multiple answers

- *one non-EU countries mention National government decision as a preferred or needed option,*
- *one non-EU countries mention a decision at the EU level as a preferred or needed option,*
- *one non-EU countries mention a regional ITU agreement as a preferred or needed option,*
- *one non-EU countries mention a CEPT decision as a preferred or needed option*

Refarming to solve Digital Divide

One possibility could be to use the 470-694 MHz frequency band, or part of it, as a key element in solving the digital divide or further enhancing access to information and communications technologies (ICT), especially in rural areas after 2030. The regulators' views are split.

Graph 24 *Views on if spectrum in the band 470-694 MHz could be a key element in solving the digital divide, especially in rural areas after 2030?*



- *2 non-EU administrations said No*
- *1 non-EU administrations said Yes*
- *In 2 countries, different administrations have opposite views on the matter.*

Additionally, the following comments are provided by EU administrations:

- 3 are of the view that other frequency bands and/or technologies may bring connectivity in rural areas (like D2D or FTTH),
- 3 are of the view that the band 470-694 MHz would be useful to cover large areas, including rural areas,
- 1 is of the view that reallocation of the frequency band 470-694 MHz would be detrimental to DTTB coverage in rural areas, thus increasing the digital divide and undermining social inclusion and cohesion,
- 2 are of the view that due to low capacity, the benefit of the bands 470-694 MHz or 600 MHz would be limited regarding access to ICT,
- 1 note that among all bands, those below 1 GHz are the most used by MNOs,
- 1 is of the view that network densification may address the need for additional capacity below 1 GHz,
- 1 has no uncovered area and no lack of spectrum for IMT,
- 1 sees a need for additional capacity below 1 GHz for MNOs.

Outside EU:

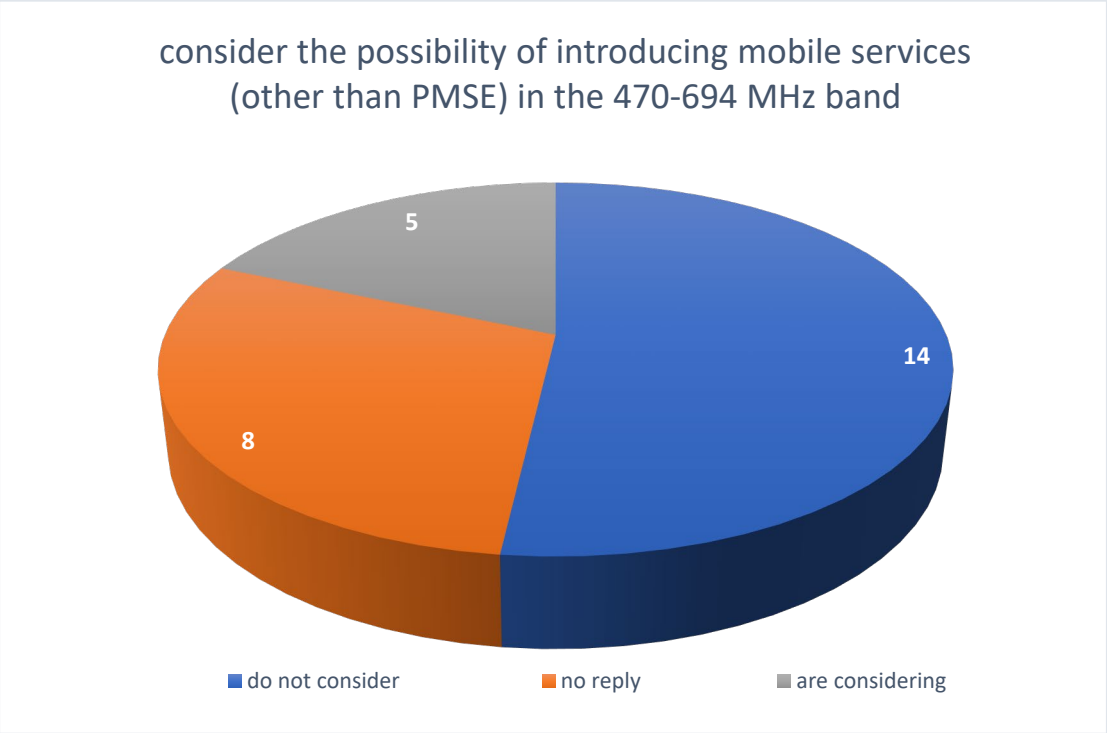
- 1 country reports that the band 470-694 MHz is not considered to be a key element in bridging the digital divide,

- 1 country is of the view that the band 470-694 MHz would be crucial to bridging the digital divide in rural areas.

Introduction of Mobile services

In the light of the changes introduced by WRC-23 and in accordance with Article 4 of EU Decision 2017/899 Administrations expressed their views on the possibility of introducing mobile services (other than PMSE) in the 470-694 MHz band, or part of it.

Graph 25 *Views on the possibility of introducing mobile services (other than PMSE) in the 470-694 MHz band*



Additionally, the following comments are provided by those few EU administrations that consider the introduction of mobile services in the band:

- 2 EU countries will reconsider the situation after 2031 or WRC-31.
- 1 EU country mentions introduction of defence usage in TV white spaces.
- 1 EU country is of the view that sharing between DTTB and other technologies (downlink only and ad hoc networks) may be further investigated first.
- 1 EU country mentions the need for cross-border coordination.
- 1 EU country plans to use empty MUXs for SDL for 4G/5G unicast or 5G Broadcast until the refarming or new EC DEC.

However, there are some contents from stakeholders on the same question. Mobile stakeholders promote flexibility on the usage of the band while DTTB and PPDR stakeholders cannot see that.

Broadcasting stakeholders:

- there are currently no known mobile services (other than PMSE) which could coexist in the 470-694 MHz band next to DTTB and PMSE. Introducing mobile services (other than PMSE) in the 470-694 MHz band must not interfere current incumbent services

- 3 broadcasting stakeholders are of the view that: "WRC23 and Art4 of UHF Decision already allows the introduction of other services on the band under certain conditions. However, no major developments at this regard have been reported."

Defence and PPDR stakeholders:

- PPDR demands for spectrum of 60 MHz. Military demands for spectrum of 48 MHz up to 100 MHz. Talks are being held between organisations and authorities.

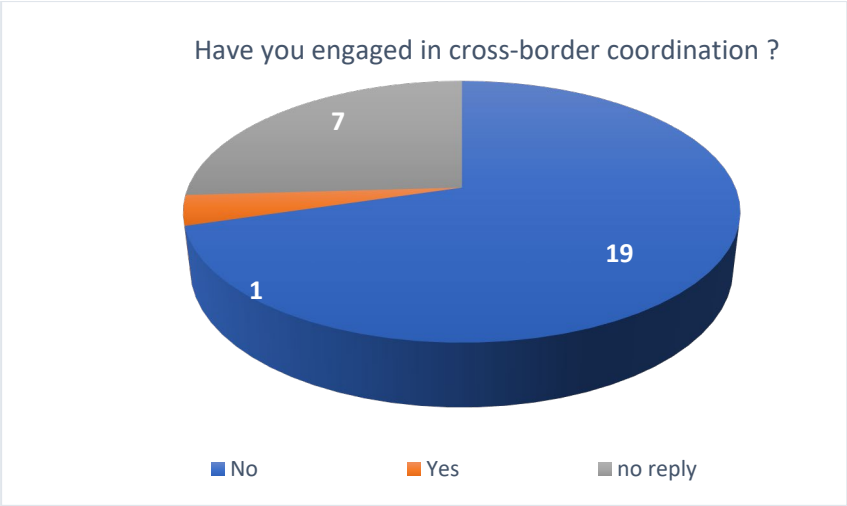
Mobile stakeholders:

- 3 stakeholders promote flexibility in the full band range 470-694 MHz. While they support a primary mobile allocation of the band, they note that WRC-23 decision on a secondary mobile allocation in 44 CEPT members states provides some regulatory base for such flexibility.
- 2 stakeholder notes that even a use with 6 DTT MUXs (6x 8 MHz = 48 MHz out of 224 MHz) considered as intense, translates into less than 25% of the total spectrum discussed in any given location. A flexible use would be the most beneficial in Europe.
- 1 stakeholder further develops a scenario of mixed usage among Europe, with group of countries transitioning to mobile FDD, thus limiting coordination issues to their borders. It quotes TMG consulting in their study[9] which outline on high level options to introduce 600 MHz FDD operation in one country while maintaining DTT operation on its neighbour countries.

Cross-border coordination

Only one EU country have engaged in cross-border coordination with neighbouring countries in view/anticipation of implementing mobile applications in accordance with the flexibility provided by Article 4 of EU Decision 2017/899, in order to reach bilateral or multi-lateral agreements, because the 700 MHz is already used by mobile applications.

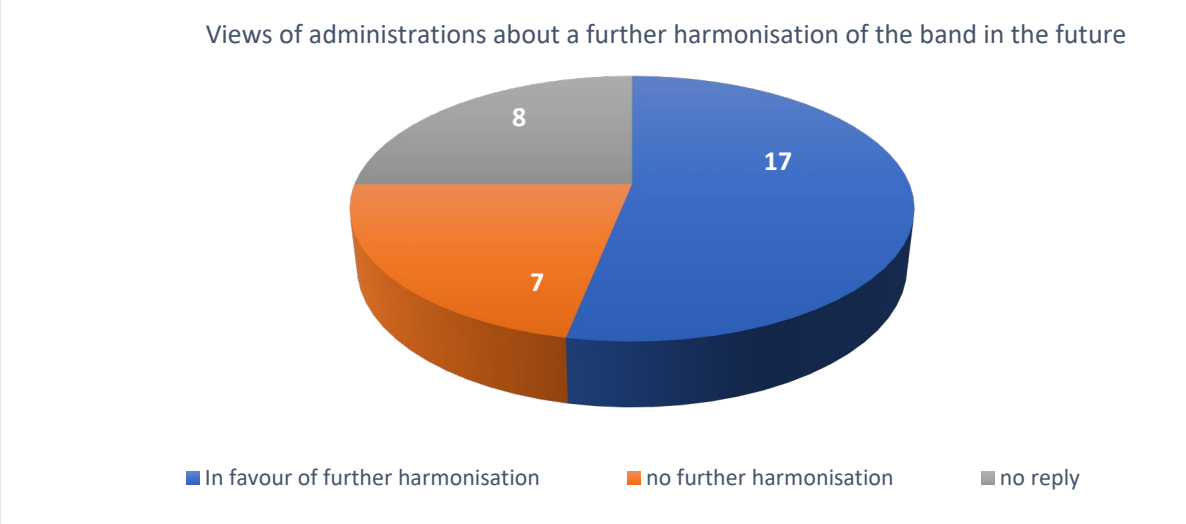
Graph 26 *Cross-border coordination in view/anticipation of implementing mobile applications in the 470-694 MHz band*



[9] https://www.tmgtelecom.com/publications/guidelines-for-implementation-of-imt-in-uhf-bands

Harmonisation of the 470-694 MHz band in the forthcoming 10 to 20 years, considering the various uses of DTTB across the EU countries, the common market aspects and other relevant elements

Graph 27 *Views of administrators about a further harmonization of the 470-694 MHz band in the future*



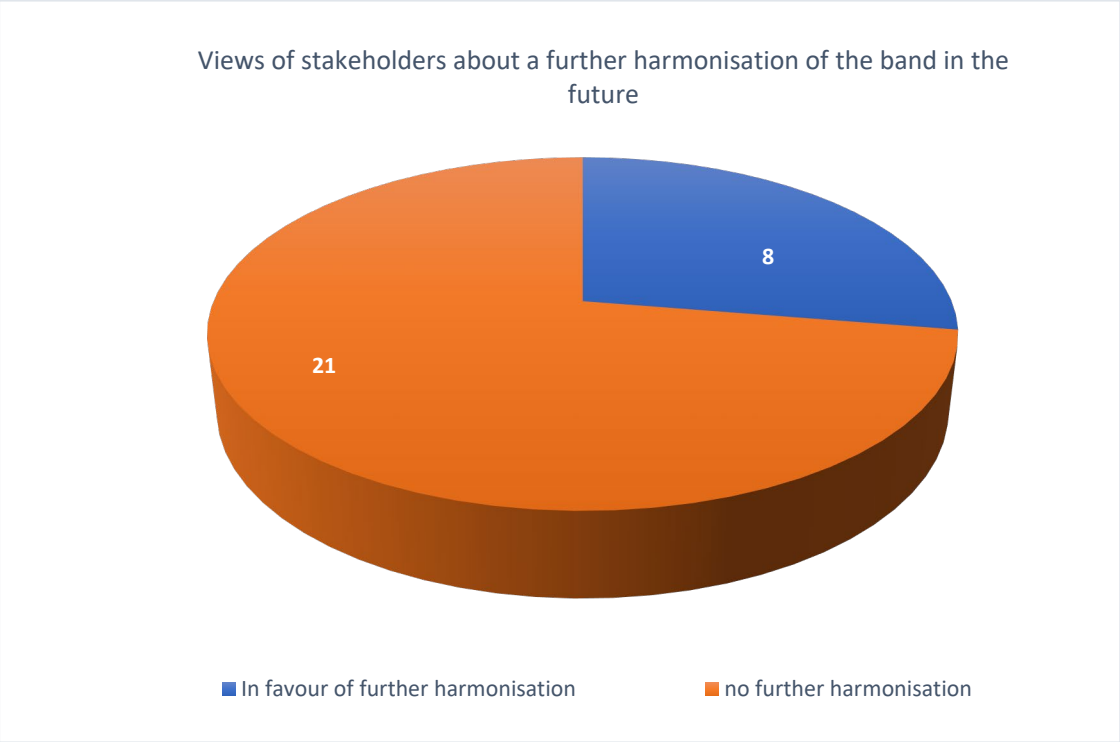
- *1 non-EU country did not reply*
- *1 non-EU administration is of the view that harmonisation won't be possible until the number of DTTB subscribers have decreased*

The administrations in favour of further harmonisation or anticipating further harmonisation believe in general that this is the best way forward if other services are to be introduced in the band. The crucial aspects of this harmonisation should be flexibility, avoidance of interference (cross-border and to the incumbent users of the band) and coordination among EU or at least a subset of countries based on existing or new international agreements.

The administrations that are not in favour of harmonisation for various reasons:

- *Not required*, for certain applications, like SDL, or because they do not foresee any evolution in the band
- *It is unlikely to happen*, due to diverse markets dynamics and regulatory approach in EU, because the flexibility offered by article 4 of Decision 2017/899 may be prolonged beyond 2030, and because it would not be satisfactory to all EU countries as a one-size-fits-all solution is not possible.
- *DTTB related:* as its usage is extended in EU and its switch-off is unlikely, and by the band remaining available to broadcasting innovations like 5G broadcast would be allowed to evolve.

Graph 28 *Views of stakeholders about a further harmonization of the 470-694 MHz band in the future*



The stakeholders in favour of further harmonisation, or anticipating further harmonisation suggest some approaches:

- considering the use of 3GPP band 71 in North America and Middle East, harmonisation efforts should consider uplink in 663-698 MHz (3x)
- 5G broadcast or downlink only may provide a technical solution for migration at different pace in EU countries (1x)
- usage of the band below 617 MHz should be discussed in a frame wider than EU (3x)
- further harmonisation may improve efficient use of the band (1x)

The stakeholders in favour of no further harmonisation, nor anticipating further harmonisation believe that

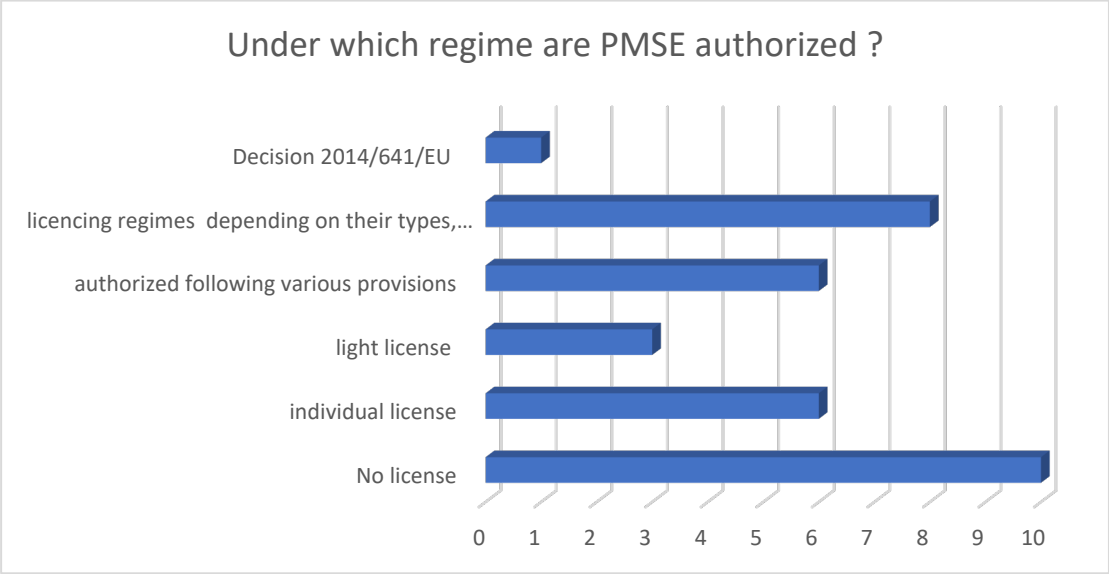
- the band is now used (by the incumbent services) efficiently, effectively, and need to be used like that, covering also social and financial aspect of EU life (freedom of expression, media pluralism, impartiality, cultural and linguistic diversity, social inclusion, consumer protection and the protection of vulnerable groups, public service, public policy, European cultural diversity, democracy and competition) (
- difficulty of sharing between IMT and incumbent services, that may lead to DTTB switch off.

Under which regime are PMSE authorized

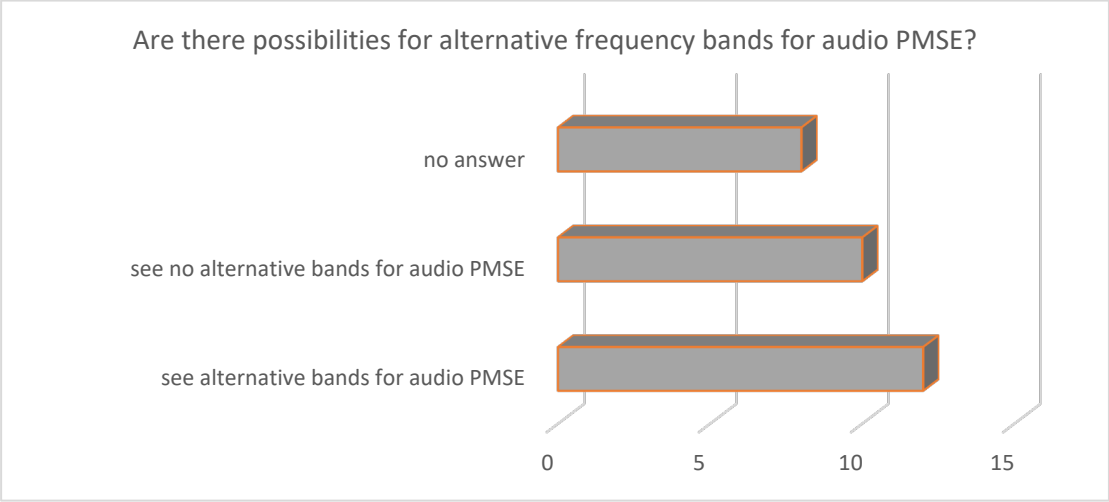
The administrations were asked to describe the licensing situation of PMSE in their country. From the replies gathered it seems that there is not any common method among the EU and non-EU countries that replied.

The administrations were also asked if they see any alternative bands for PMSE.

Graph 29 *Authorization regime of PMSE in EU*



Graph 30 *Views of administrators on the possibility of alternative frequencies for PMSE*



The suggested alternative bands for PMSE span from 29,7MHz up to 470MHz and from 694MHz up to 2900MHz. UK for example[10] have successfully opened as a complimentary resource for PMSE the band 960-1164 MHz supported by equipment for professional audio PMSE. However, the PMSE stakeholders are in favour of the 470-694 MHz band and quite reluctant to migrate in another band:

- Due to physical aspects the UHF band below 700 MHz cannot be substituted and is the core band for audio-PMSE
- To date, no viable alternative to the UHF band has been identified for Audio PMSE
- Any alternative frequency band would need to have suitable physical characteristics for audio PMSE applications, sufficient capacity to satisfy the peak demand, and sufficiently low interference level to enable high quality productions.
- International harmonisation and licensing conditions similar to those in the UHF band would be needed.
- Sufficient time would need to be allowed for an equipment ecosystem to emerge.
- Transition of PMSE users out of the UHF band and into an alternative spectrum would need to be managed by national authorities.

[10] New Spectrum for Audio PMSE - Ofcom

2) The Networks section

Introduction

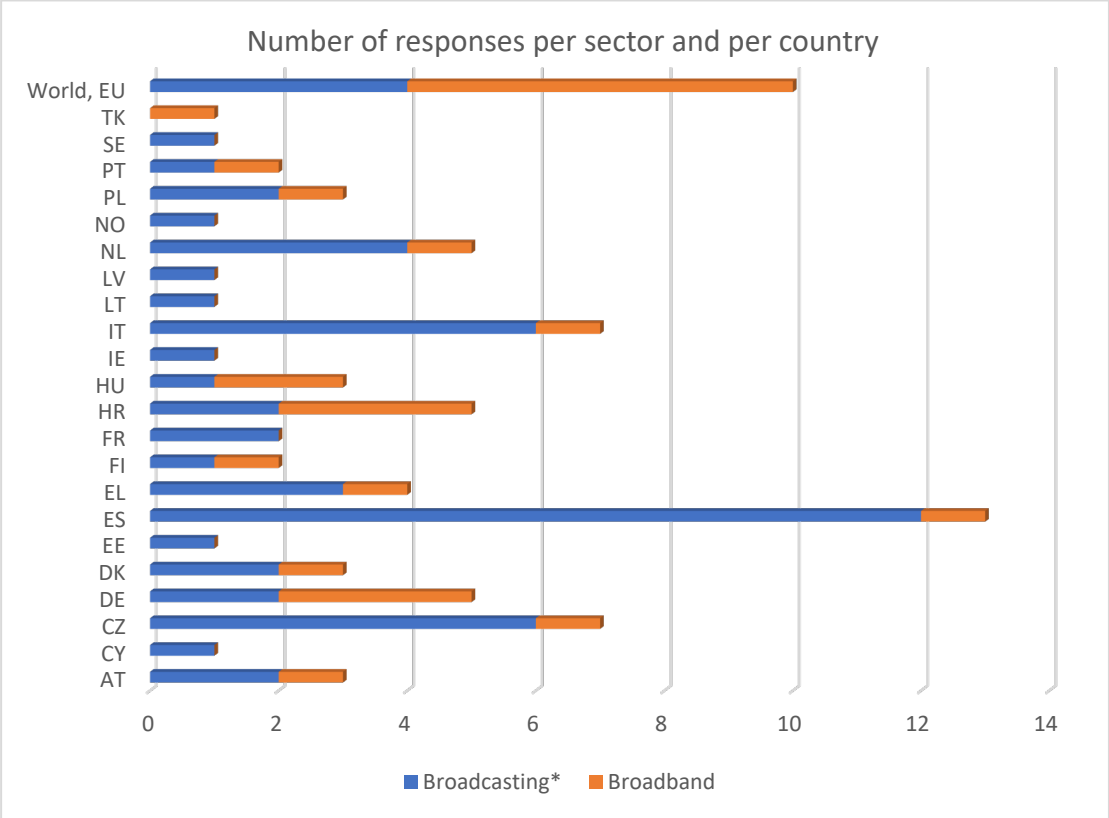
82 respondents answer the network part of the questioner (see Appendix 1).

57 respondents from the television sector participated, including 49 directly linked to DTTB, compared to 25 broadband stakeholders, representing a ratio of approximately two-thirds broadcasting stakeholders to one-third broadband stakeholders. It should be noted that 6 respondents are both categorized as broadcasting and broadband stakeholders.

Another 6 respondents shared their views, including:

- 3 from the PMSE sector (Sennheiser, Shure and APWPT);
- 2 from the PPDR and/or Defence sector (SWE Armed Forces and Pro-M);
- 1 member state (France).

Graph 31 *Statistics of networks' replies*



Given the significant divisions between the broadcasting and broadband sectors, as well as the often-identical responses from stakeholders within each sector in the same country, it was deemed appropriate to group respondents from each sector by country (see graph above). This approach highlights the differing positions. However, it is important to note that the television sector submitted more than twice as many responses as the telecommunications sector.

Not all respondents answered every question. The median response rate per question is approximately 76%.

Audio-visual delivery at present

A quite important issue for the future of the services in the band in question is the financial one. Network providers were asked to identify the sources that finance their network, the "must carry" obligations they may have from their licenses, the share of the audio-visual distribution market they serve, in order to draw a better picture of their status in the usage of the band.

The financing of the networks

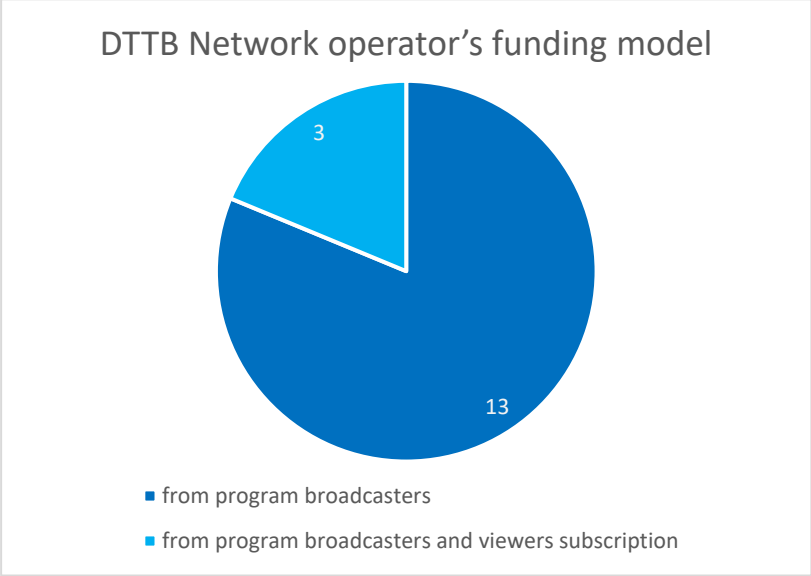
DTTB network operators: in most countries (81% of the ones for which data is available), program broadcasters finance the network. In Germany and Norway (13%), this funding is supplemented by a share of viewers' subscription fees.

In all countries for which data is available, DTTB is subject to legal and regulatory obligations governing the programmes permitted for broadcast (typically public service and licensed services), coverage, as well as broadcast standards and image quality.

Public TV: Data is available for only six countries (Austria, Czechia, Germany, Denmark, Greece, Netherland), and in all of them, most of the funding comes from public sources (such as the state budget or a dedicated tax), supplemented, where applicable, by advertising and other revenue streams.

ISP: ISP are primarily funded by their subscribers.

Graph 32 *DTTB networks Funding*



Access to basic linear TV over the air is considered free across all EU countries (no subscription to receive DTTB). However, in 8 out 18 (44%) the citizens with one way or the other have to pay a fee/tax that is mainly directed to support PSM.

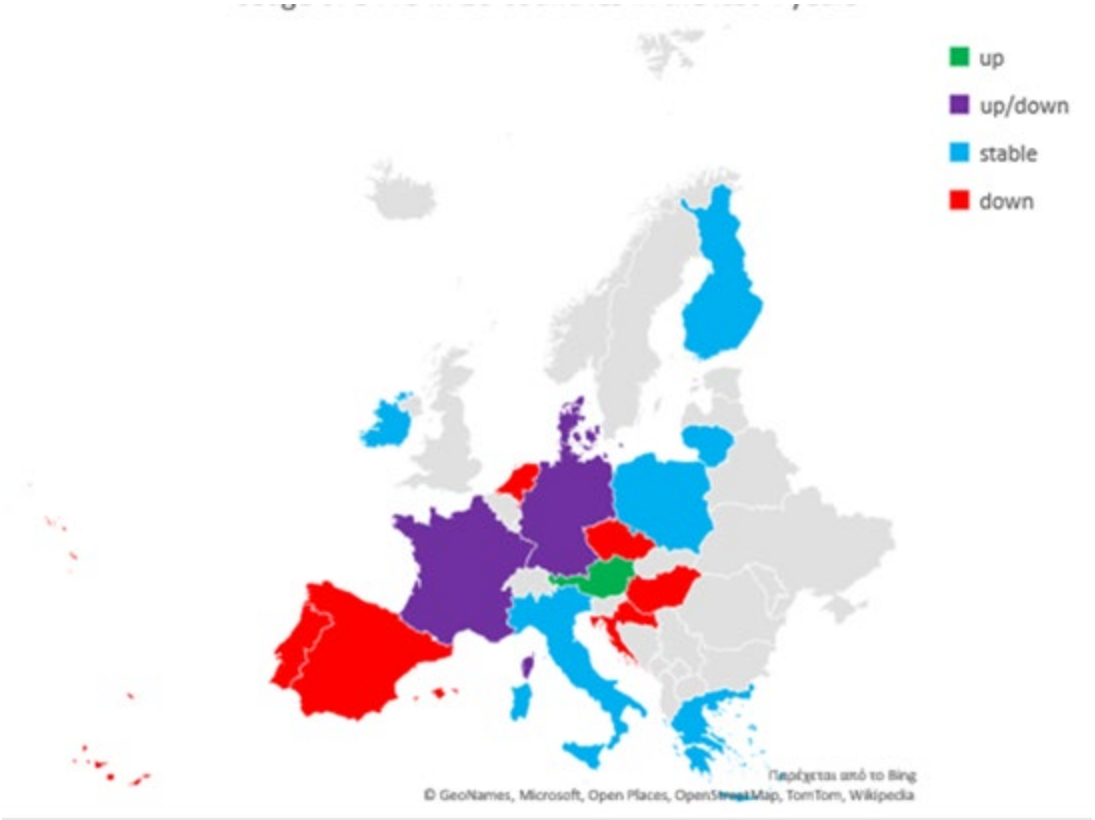
In some countries anything more that basic DTTB (e.g. HD) needs a subscription.

Regarding IPTV platforms (from the few replies received), access to linear television typically necessitates a subscription, whereas the situation for satellite television appears less clear-cut.

DTTB in the linear TV market, compared to other reception modes

In most EU countries the usage of DTTB to access linear TV is declaiming in favour of alternative platforms, mainly IPTV.

Graph 33 *DTTB expected usage trends in EU countries*

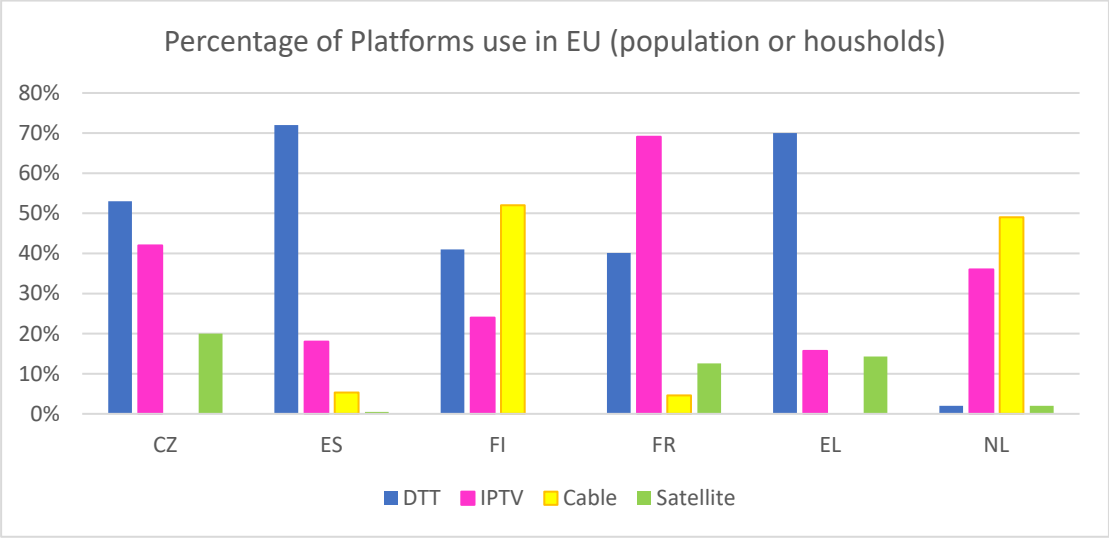


- *In France usage is stronger in more rural regions and lower in Paris area having a significative impact on the national average.*
- *In Germany there is an increase in DTTB mobile reception but a decline in fixed reception*
- *In Denmark stakeholders submitted conflicting opinions*

EBU and BNE estimate that 40-42% of TV European households receive DTTB on at least one TV set in the household (source BNE-EBU DPM data base 2024).

The responses concerning the share of DTTB in the linear TV market in EU countries, compared to other reception modes such as IPTV, cable TV, satellite TV, or other, offered inconsistent data, such as the proportion of the population using a specific reception mode versus the share of the audience associated with that reception mode. Nevertheless, the most cited criterion remains the proportion of the population using a reception mode. This allows for direct comparison in only 6 of the 17 member states for which data is available (around 35%). Graph 34 should be seen in direct comparison with Graph 9 where similar data are presented from the replies of the administrations. There is a general agreement, apart from the part concerning the percentage of households that use IP based TV where the estimation of the networks is significantly lower than that of the regulators.

Graph 34 *Percentage of Platforms use in EU (views of the network providers)*



The limited availability of comparable data, along with inconsistencies in counting methods, only permits cautious general conclusions to be drawn:

DTT: The adoption of DTT appears strong in 41% of the countries for which data is available while it seems marginal in another 41%. Generally, in countries were the coverage of DTTB is extended, DTTB still holds notable importance.

Satellite TV: Its usage remains significant in 18% of the countries for which data is available, but is marginal in 29%.

IPTV: IPTV appears to be on the rise in the Member States for which data is available, with OTT reception also emerging as a new trend. However, adoption levels vary significantly between countries. IPTV appears particularly strong in 29% of the countries for which data is available

Cable: In some countries, cable is now integrated as a component of IPTV. Nevertheless, cable remains a significant mode of reception in 24% of the countries for which data is available.

As a final remark, it is obvious that DTTB networks are highly dependant (in financing terms) from the content providers, and the way they decide to distribute their "product" and the way the audience selects to access it.

DTTB Evolution

As DTTB is the major user of the band at present and as shown in the previous section the percentage of users that selects it as a platform to access audio-visual contents and linear TV is declining, the DTTB network providers were asked if they are planning to invest in modernising DTTB by adopting new video coding standards (such as HEVC and VVC), broadcasting transmission standards (such as DVB-T2), image formats (such as HDR and UHD), and/or additional services (such as HbbTV) in order to address greater audiences in one hand and use more effectively the available spectrum on the other.

According to respondents, in around half of the countries for which data is available, obligations to adopt technical standards or define DTTB programme characteristics have been imposed by either the government or the national regulatory authority, primarily via licensing in the latter case. The modernisation of DTT platforms has included the following developments:

New broadcasting transmission standards:

DVB-T2: Except for Portugal, Lithuania, and Latvia, 14 countries for which data is available have at least begun deploying DVB-T2, with half having made the standard widely available. Latvia (LRTV) mentions plan to launch DVB-T2, while Portugal, Malta and Lithuania indicate no such plans.

5G Broadcast: Most countries are considering this for mobile broadcasting, and many have conducted trials. However, the lack of compatible devices is delaying the development and implementation of deployment plans.

New video coding standards:

HEVC: Of the 15 countries for which data is available, 11 already use or plan to use HEVC, while 5 have no current plans. Adoption remains lower than that of DVB-T2.

VVC: Respondents from Austria, Czechia, and Finland mentioned the potential consideration of VVC migration.

Image and sound enhancements:

UHD 4K HDR: Excluding trials, only Spain and France have begun deploying UHD 4K HDR services on DTT. Of the countries for which data is available, 10 are considering deployment (dependent on sufficient DTTB platform capacity), while 6 have no plans.

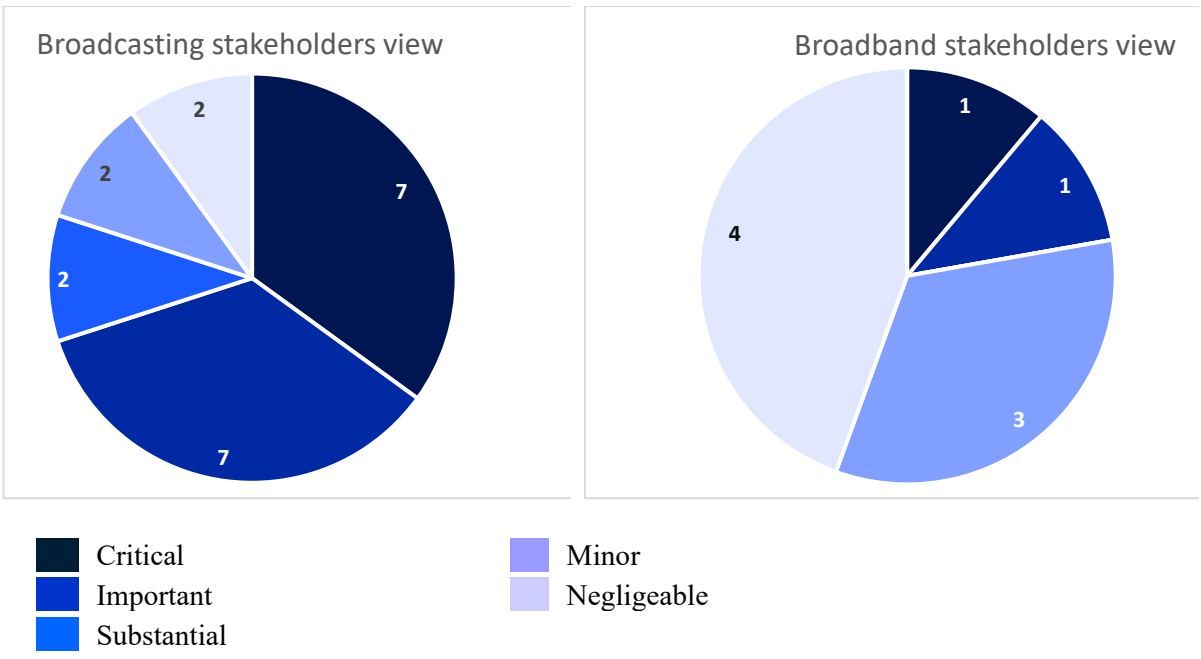
Additional services:

HbbTV and hybridisation: Out of 16 countries, 10 already use HbbTV, and 2 are considering its implementation or other hybrid DTT-IP solutions. A few additional countries are also exploring the introduction of such services.

Broadcasting stakeholders generally view the modernisation of DTTB as crucial to maintaining the platform's appeal.

Broadband stakeholders, on the other hand, argue that these efforts alone will not suffice to counter the decline in DTTB usage.

Graph 35 *Positions of stakeholders per country regarding the impact of modernization on the attractiveness of DTTB*



These results can be seen in conjunction with Graph 13 (future of DTTB) and Graph 14 (evolution of DTTB platforms) where the views of administration/regulators in similar questions are presented.

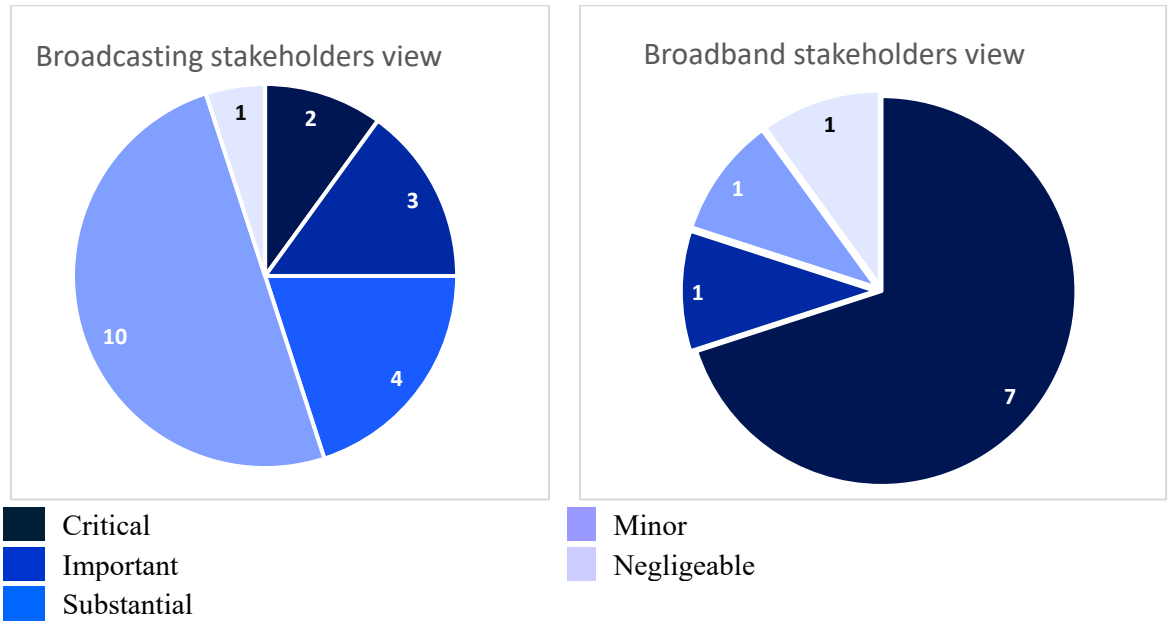
Audio-visual delivery evolution

In the view of a previous section on the way Linear TV is delivered at present the stakeholders were asked to express their views on possible evolution on delivering Linear TV, in alternative platforms like OTT, Cable TV and IPTV over DTTB and Satellite networks.

Broadcasting stakeholders, with the notable exceptions of Austrian, Latvian, and Dutch respondents, generally believe that the growth of television distribution via OTT, IPTV, or cable has only a limited impact on distribution through dedicated broadcasting networks. Czech stakeholders emphasise that these modes are inherently complementary rather than substitutive.

Broadband stakeholders, in contrast, largely view this impact as very significant.

Graph 36 *Positions of stakeholders per country regarding the impact of internet on linear content distribution over TV-specific networks*



Another important aspect on the evolution of Audio-Visual delivery, is the audience behaviour and expectations and how that will impact the strategic plans and business models of broadcasting delivery (DTTB, Sat, other).

Broadcasting stakeholders mostly agree that changing audiovisual consumption habits will have some level of impact on their business models. However, positions vary significantly. Stakeholders from the Czech Republic, Denmark, and Italy do not foresee consumption trends posing a significant challenge to DTTB. In contrast, stakeholders from Hungary, Latvia, the Netherlands, Norway, and Portugal believe that traditional television, particularly DTTB, is losing ground to online services. Notably, Dutch and Norwegian stakeholders even anticipate the potential shutdown of DTT.

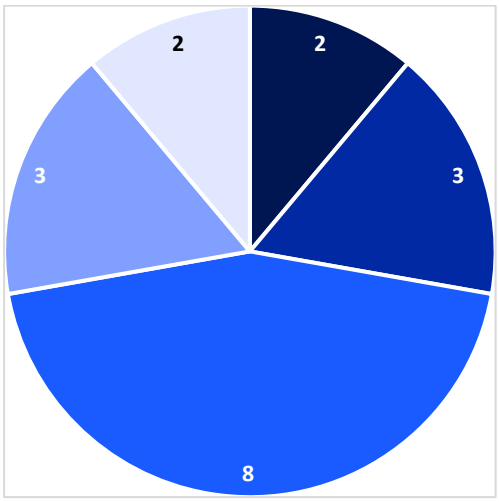
While most broadcasting stakeholders recognise the shift in consumption habits, they believe DTT can adapt and remain relevant through modernisation, particularly with the deployment of 5G Broadcast, which enables DTT reception on mobile devices.

Broadband stakeholders generally observe a clear shift in audiovisual consumption habits, with audiences increasingly moving from linear television to video-on-demand services. However, there is

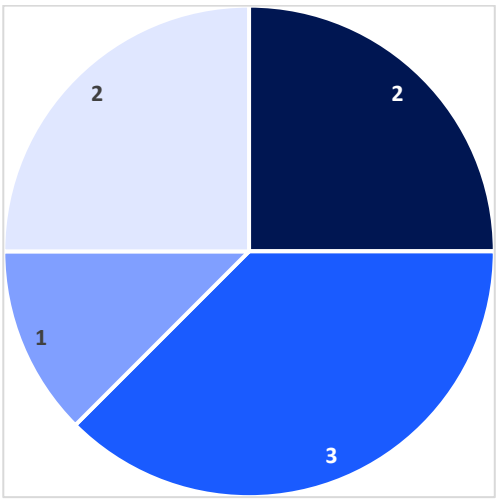
no consensus among these stakeholders on the extent to which these changes will affect broadcasting business models.

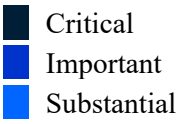
Graph 37 *Stakeholders forecast per country on the impact of changing viewing habits on the broadcasting business model.*

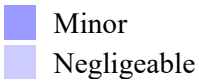
Broadcasting stakeholders



Broadband stakeholders







Having the views on how DTTB is going to evolve technically, in order to maintain or even expand its appeal to a larger audience and the impact the degree of this appeal can have on the broadcasting business model, the next question to be addressed is what are the key technical and/or market developments anticipated in the next five years by the broadcast platform/network operators.

Broadcasting stakeholders (with the rare exceptions of those active in both broadcasting and broadband, as well as Norwegian NTV) believe that DTTB will continue to evolve through the adoption of new technical standards to enhance picture quality, the widespread use of hybrid services such as HbbTV or DVB-I, and the implementation of 5G Broadcast services for mobile devices.

Some broadcasters are confident that audiences will remain stable or even grow by 2030. In this context, broadcasters stress the importance of ensuring access to the 470–694 MHz frequency band to support DTTB's evolution.

Broadband stakeholders, with notable exceptions such as Denmark's Cibicom, Hungary's 4iG, and Poland's PIRC — also active in broadcasting — argue that two key trends justify the need to reallocate at least part of the DTTB frequency spectrum to mobile services by 2030:

- the increasing shift away from traditional television, particularly DTTB, in favour of mobile and on-demand viewing, and
- the rising demand for mobile network bandwidth.

Given the EU broadband connectivity targets aimed at allowing delivery of non-linear as well as linear TV content to any European home, the question to the network stakeholders was how do they foresee the future use of dedicated terrestrial (or not) broadcast networks for fixed reception.

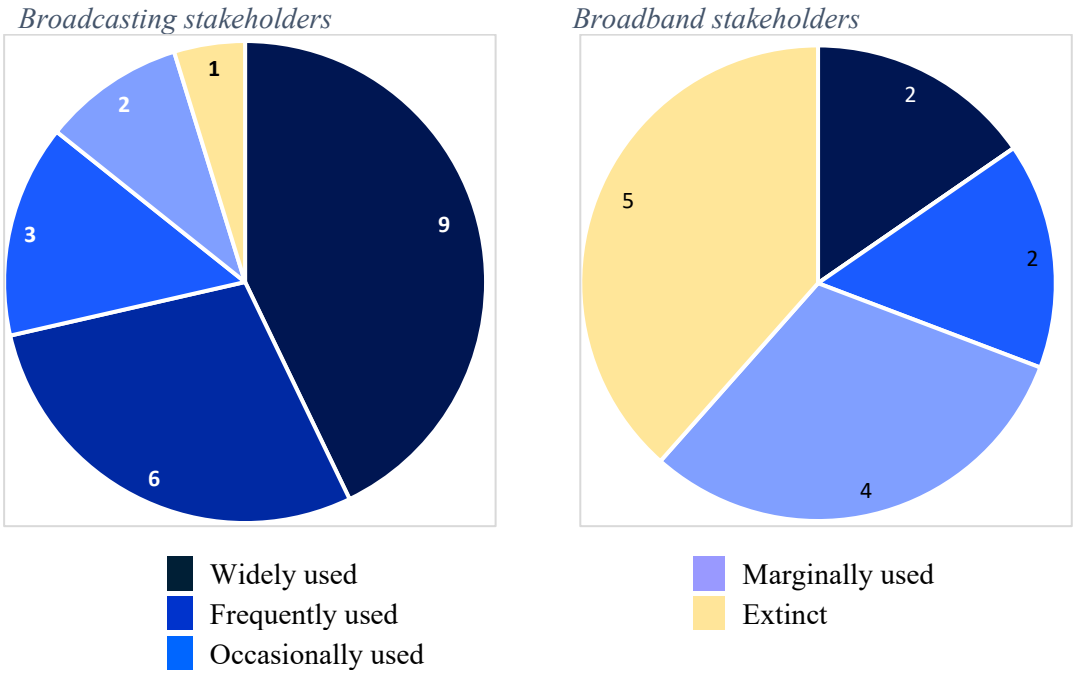
Broadcasting stakeholders generally do not appear to be considering a shutdown of DTTB, except for some with ties to the broadband sector, particularly in Hungary and the Netherlands. Most stakeholders

consider DTTB to remain of prime importance, owing to both the consistently high levels of usage observed in many countries and the unique features of DTTB, such as reliability, universality, and accessibility.

However, responses from Germany, Cyprus, and the Netherlands suggest that DTTB usage is expected to decline in the coming years.

Broadband stakeholders, except for those also connected to the broadcasting sector, believe that DTTB is heading towards either partial or complete extinction.

Graph 38 *Stakeholders' forecast per country for dedicated terrestrial network's future use for fixed reception*



As Public Broadcasting Services have a more distinct role in the social, cultural and political life in EU the network operators were asked how do they foresee particularly the provision of a DTTB-like, free-to-air model for PBS (Public Broadcasting Service) over other distribution paths.

Broadcasting stakeholders, by and large, argue that DTTB possesses unique characteristics that must be considered when discussing the replication of its free-to-air distribution model. These include ease of use, universality in many countries, robustness, a focus on FTA services, and energy and economic efficiency. They assert that no other distribution method can fully replicate the DTTB model, with some highlighting that 5G Broadcast could further enhance it by enabling reception on mobile devices.

Broadband stakeholders — particularly Hungarian mobile network operators and those involved in both broadcasting and telecommunications — acknowledge that some DTTB-specific characteristics are difficult to replicate. However, the majority in this sector argue that the availability of free content, especially public service channels, via the internet or as part of basic IPTV packages, combined with the growing coverage of high-speed and ultra-high-speed networks, is sufficient to replicate or even replace the distinctive features of DTTB.

These results could also be compared with the views on the same subject by the administrators/regulators in Graphs 19, 20 and 21.

5G Broadcasting

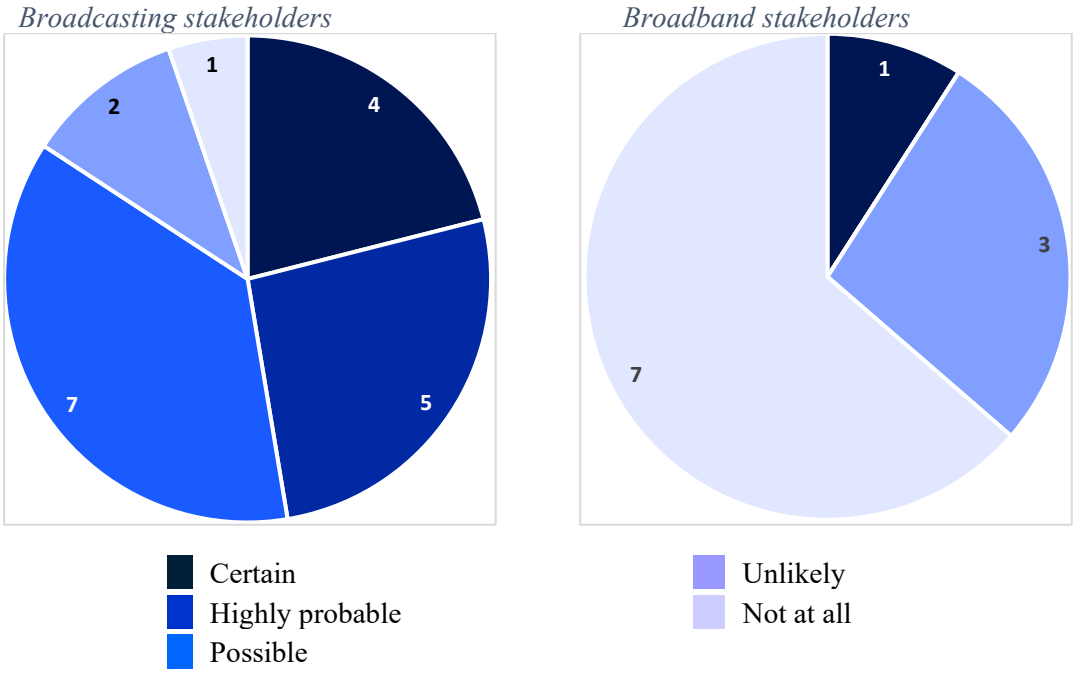
As it was also pointed in the replies of the previous sections 5G Broadcasting appears as a very interesting and promising successor of DTTB (HPHT based usage of the band). In the following sections the views of the network providers focused in this technology are presented.

The first question is if the network operators envisage the use of 5G Broadcast for delivery of TV content in their country

Broadcasting stakeholders generally seem to support, to varying degrees, the adoption of 5G Broadcast in their countries.

Broadband stakeholders, on the other hand, remain a lot more sceptical. The most positive views within the broadband sector come from operators who are also involved in broadcasting.

Graph 39 *Plans of stakeholders, grouped by country, to adopt 5G Broadcast:*

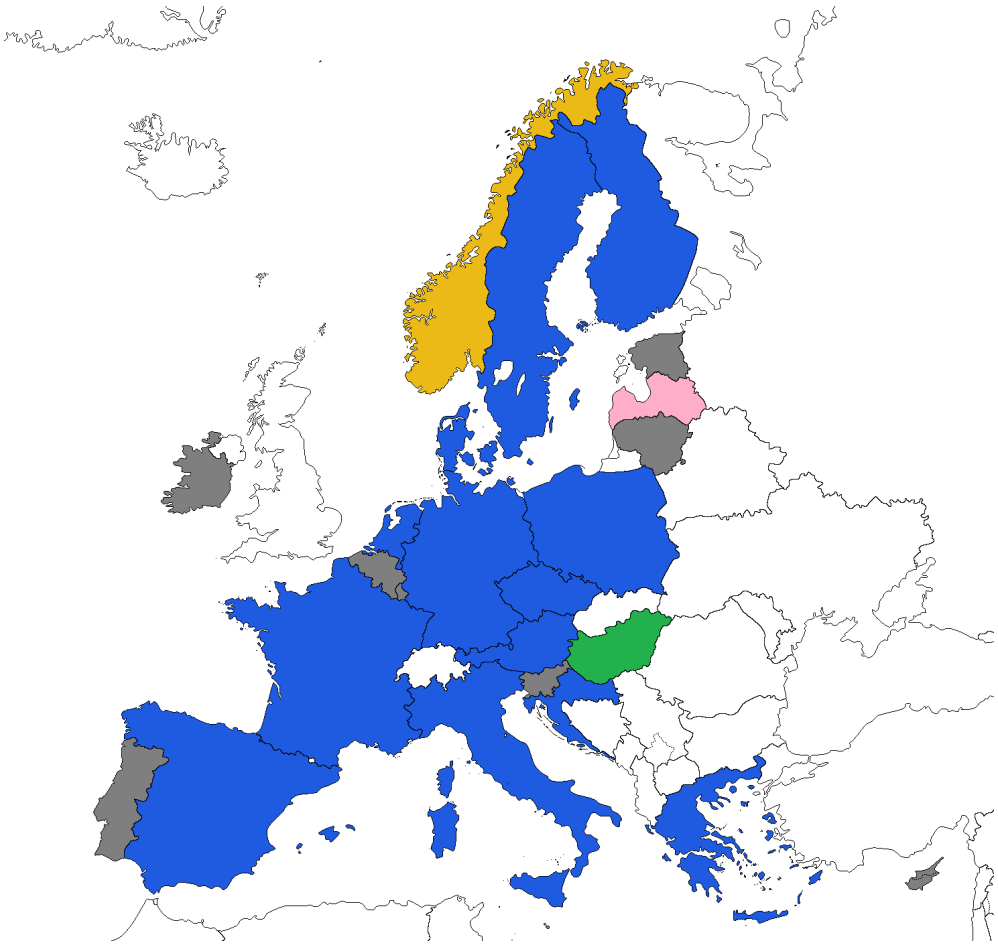


In most of countries that replied, 5G Broadcast trials have been conducted, with the technical results generally considered satisfactory. Most respondents see 5G Broadcast as a complement to the existing DTTB network rather than a replacement, particularly for outdoor mobility use cases. Some stakeholders see the use of 5G broadcasting supporting emergency services and geolocation, used for linear TV rather than for streaming.

However, as several broadcasting and broadband stakeholders have observed, the success of 5G Broadcast depends on the availability of compatible devices and available spectrum. Additionally, many broadband stakeholders remain sceptical about the return on investment for deploying a 5G Broadcast network, especially considering the ongoing shift in consumption trends towards non-linear content.

The following graph and the reparks above should be seen together with the data presented in Graph 17 where the views of the administrators/regulator on 5G Broadcasting are presented.

Graph 40 *5G Broadcast trials in the EU and non-EU countries*



The return on investment in the development of the 5G network is an important factor that can drive its growth. Can a 5G Broadcast system, which is limited to linear content delivery, be financially viable considering the increasing use of non-linear content?

Broadcasting stakeholders fail to reach a consensus on the financial viability of 5G Broadcast, despite relative optimism about its viability as a standalone broadcast technology.

Some broadcasters have provided detailed assessments to support their analysis, suggesting that 5G Broadcast could enable dynamic new use cases alongside traditional 24/7 broadcasting. Rather than relying solely on pure 5G Broadcast, many anticipate a hybrid solution that combines 5G Broadcast with wireless broadband, enabling seamless switching between linear TV and non-linear applications.

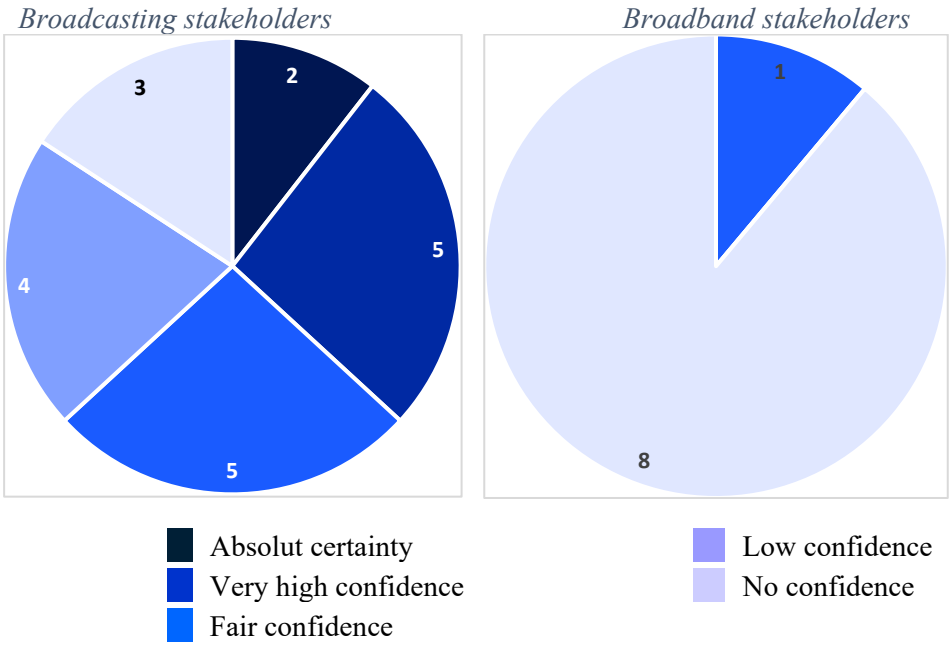
However, the economic feasibility of delivering linear TV via 5G transmission must be carefully considered, particularly in the context of rising CDN[11] costs, which broadcasters increasingly struggle

[11] CDN Contents Delivery Network

to manage, especially during prime time when reaching audiences is most challenging. Broadcasters also stress that retaining and satisfying audiences must remain a key priority, as a loss of viewers directly affects advertising revenue and, ultimately, the economic sustainability of their operations.

Broadband stakeholders, on the other hand, are nearly unanimous in their complete lack of confidence regarding the economic viability of 5G Broadcast.

Graph 41 *The positions of stakeholders, grouped by country, regarding the viability of 5G Broadcast limited to linear content delivery:*

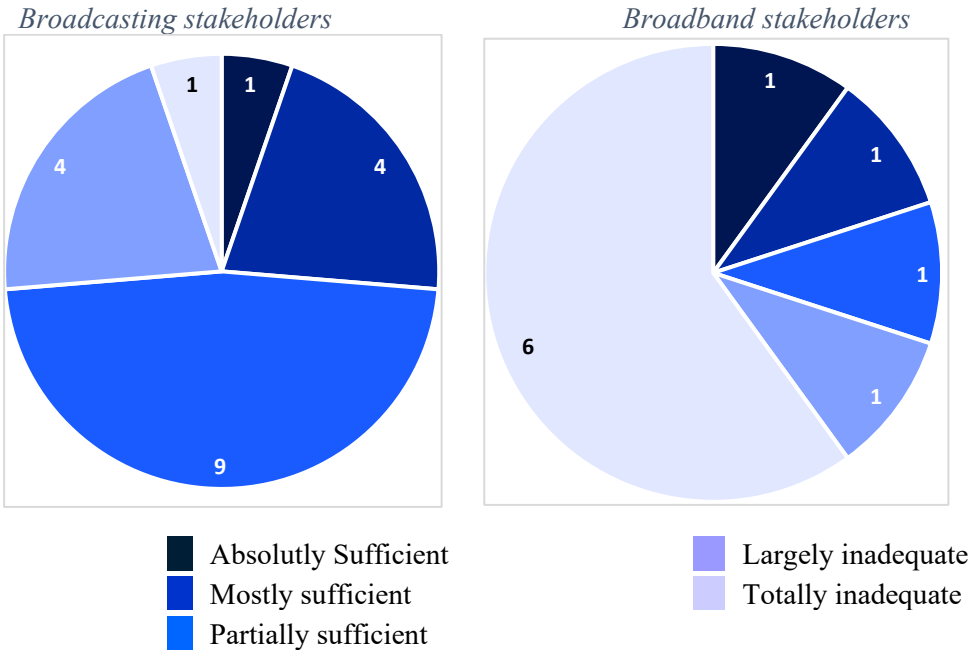


As most of the stakeholders have suggested the 5G Broadcasting network is to be used as complementary to existing (HPHT) DTTB networks, the question is if the current topology of DTTB networks is sufficient for delivery of TV content via 5G Broadcast in most cases (e.g. handheld device usage in public transport in a street canyon) or there a need to complement that with a macro-cellular topology.

Broadcast stakeholders from several countries, particularly Cyprus, Czechia, Germany, Spain, France, Greece, and Poland, believe that the existing DTT HPHT network infrastructure is sufficient for outdoor coverage but will require densification, especially to enhance indoor reception. In contrast, broadcasters from the Netherlands and Czechia consider the transition to a LPLT network as essential.

Broadband stakeholders vastly share the view that 5G Broadcast must be implemented via an LPLT network. The GSMA emphasises that this requirement further impacts the economic viability of the technology.

Graph 42 *The positions of stakeholders, grouped by country, regarding the suitability of the DTTB network for 5G Broadcast requirements:*

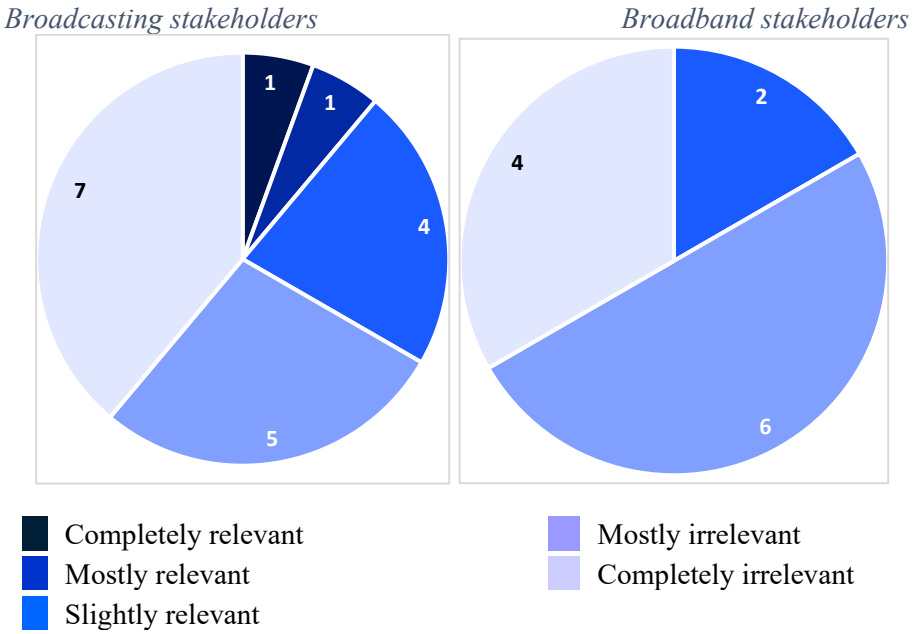


Synergies between Broadcasting and Broadband Networks

The first questions in the potential synergies between the Broadcasting and Broadband networks is if they consider cooperative models between them to commonly leverage spectrum and site infrastructure assets.

Most stakeholders believe that cooperation between broadcasting and mobile networks provides very limited benefits in terms of spectrum resource sharing and infrastructure. However, some respondents have noted that infrastructure sharing is effective and is already being implemented in several countries. This feedback seems to primarily underscore the challenges of DTTB and mobile networks operating within the same frequency band.

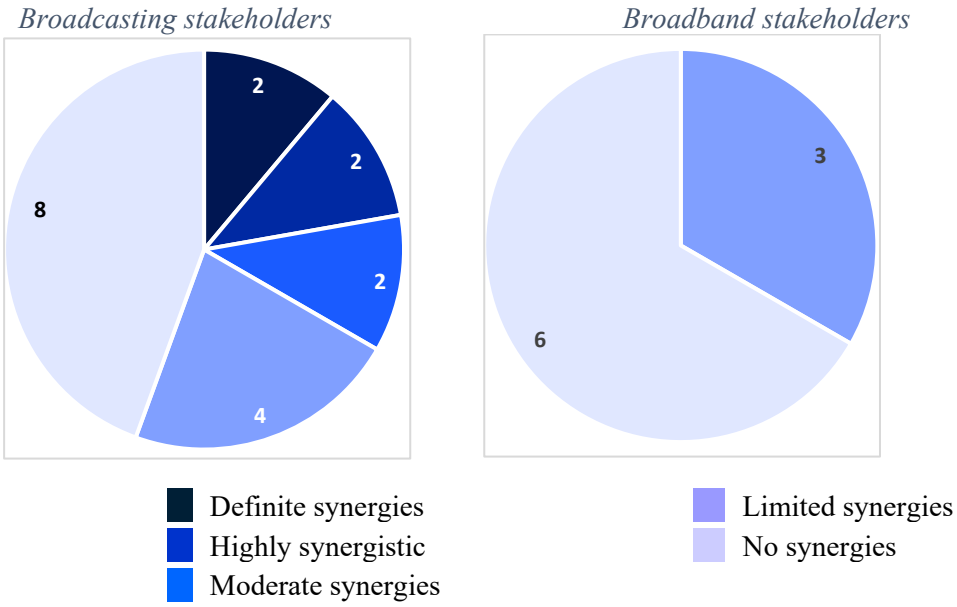
Graph 43 *The positions of stakeholders, grouped by country, regarding possible cooperation between broadcast and broadband networks:*



The second question is looking for synergies between the future 5G Broadcasting network and additional mobile DL resources in the 470-694 MHz band.

Most respondents do not foresee any synergy between 5G Broadcast and mobile downlink in the 470–694 MHz band. This view is particularly pronounced among broadband stakeholders, who largely reject the possibility. However, some broadcasting stakeholders, particularly from Cyprus, Denmark, Hungary, and Latvia, appear open to the idea of potential coexistence, though their positions would benefit from further clarification.

Graph 44 *The positions of stakeholders, grouped by country, grouped by country, regarding the possible synergies between 5G Broadcast and mobile DL:*

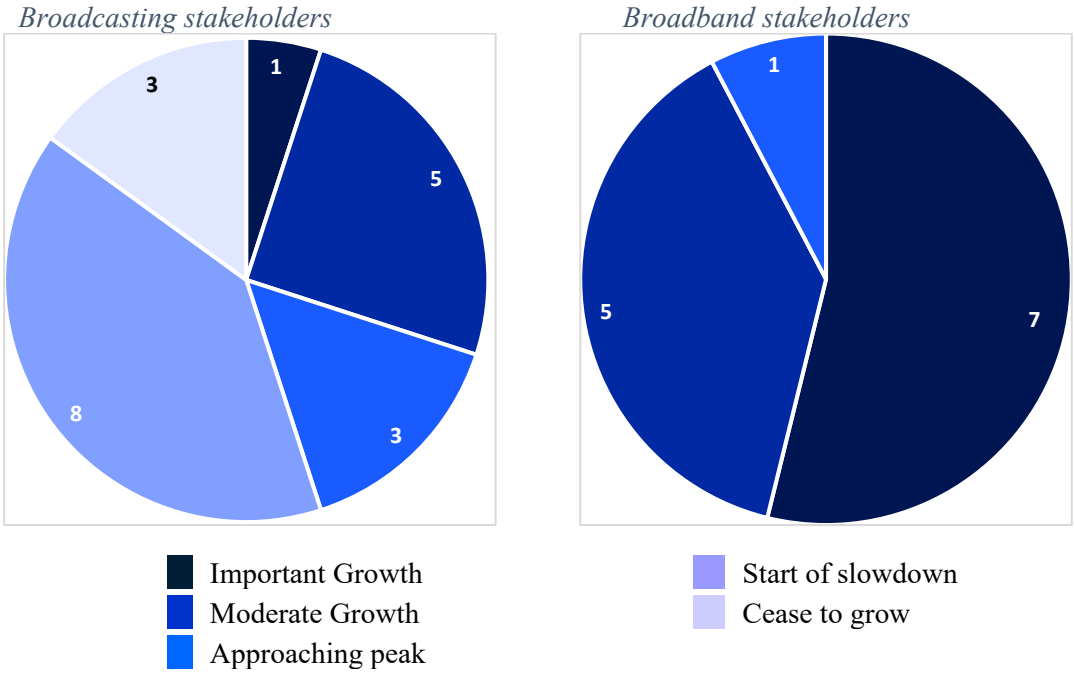


Future use of the 470-694 MHz band

The use of the band 470-694 MHz by Broadband networks is related to the needs of these networks in the future. The stakeholders where asked if the growing trend on annual mobile data growth rates, will persist in the coming years and if it will be more in urban or in rural areas. Additionally, the stakeholders were asked on how they plan to achieve extended coverage in rural areas, considering the constraints in identifying and building new mobile base station sites and the limited range of higher frequency bands, and if a possible solution to this is to acquire additional spectrum in the 470-694 MHz band.

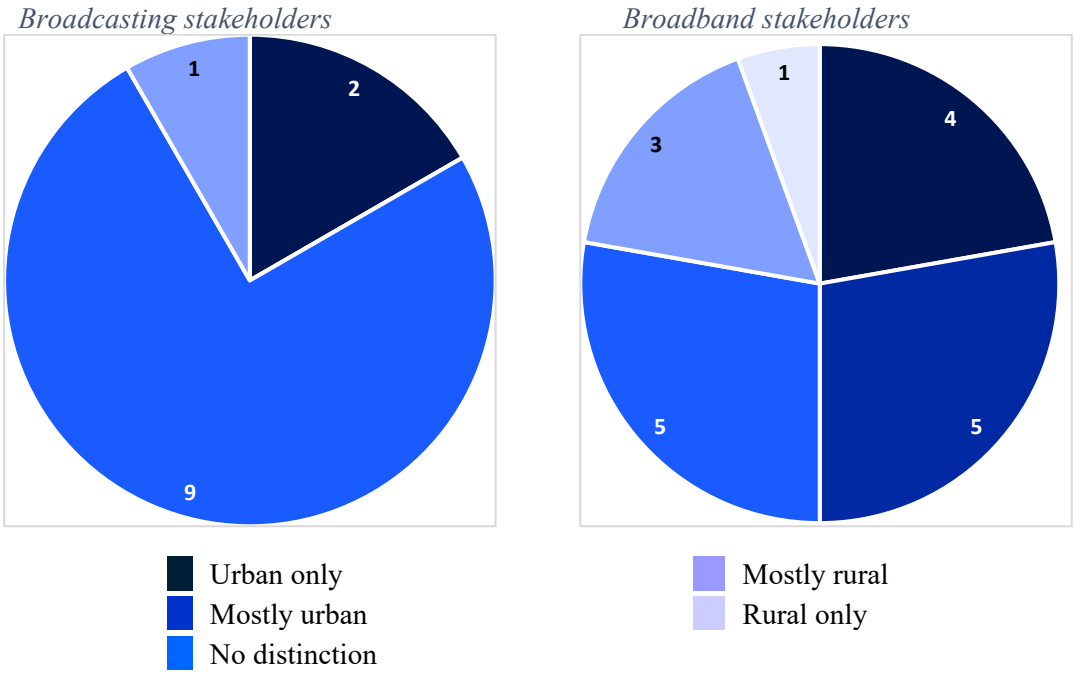
While the broadband sector is unanimous in its belief that data growth on mobile networks will persist, the broadcasting sector is far more sceptical, with several respondents highlighting that the latest available data indicate a slowdown in this growth.

Graph 45 *Forecast of stakeholders, grouped by country, regarding mobile data growth rates:*



Aside from a few broadcasters who believe that new mobile network capacity requirements will primarily be concentrated in urban areas, most broadcasting respondents believe that these requirements will grow uniformly across both urban and rural areas. On the other hand, the views of the broadband stakeholders on the issue are rather diverse.

Graph 46 *Forecast of stakeholders, grouped by country, regarding the need of mobile urban or rural coverage:*



Broadcast stakeholders, for most of them except for a few also active in the telecoms sector and Norway's NTV, consider that the 470-694 MHz frequency band will not address the growing demand for mobile network capacity. Currently, frequencies below 1 GHz are not saturated, with solutions in rural areas focused on further densifying networks within already-assigned bands, while in urban areas, higher-frequency bands with greater throughput are required. Several broadcasters are also encouraging mobile network operators to upgrade their existing networks, while Lithuania's Telecentras and Latvia's LVRTC highlight the potential of 5G Broadcast to alleviate mobile network congestion.

Broadband stakeholders, in contrast — and except for two operators involved in broadcasting (Poland's PIRC and Denmark's Cibicom) and Turkcell, which seeks to use the 470-694 MHz band for NTN[12] networks — consider these frequencies as essential for ensuring adequate rural coverage. This band can strengthen the capacity of existing infrastructure, especially as it becomes increasingly challenging and costly to secure permits for new sites. Certain stakeholders, such as APMS in the Czech Republic and Telefónica in Spain, have highlighted the need for additional frequency allocations even by 2030.

PPDR and Defence: Pro-M responds that mobile data traffic will continue to grow, both in urban and rural areas. They emphasize the importance of rural coverage for PPDR[13] services, highlighting the need for additional spectrum in the 470-694 MHz band. Pro-M identifies significant synergy between 5G Broadcast and mobile downlink operations under 694 MHz. Both Pro-M and the SWE Armed Forces foresee spectrum needs for PPDR, with the latter also identifying requirements for Defence.

PMSE: Sennheiser and Shure anticipate that mobile data rate growth will stagnate over the coming years. Shure suggests that the utilization of the existing IMT spectrum below 1 GHz should be optimized and argues that additional spectrum would not benefit mobile operators. Shure emphasizes that audio-PMSE requires predictable access to frequency resources as needed. This could be achieved through the establishment of a safe harbour and a geolocation database, granting priority to PMSE operations.

[12] *Non- Terrestrial Networks*
[13] *Public Protection and Disaster Relief*

Graph 47 *Views of network stakeholders on potential uses of the 470-694 MHz band after 2030*

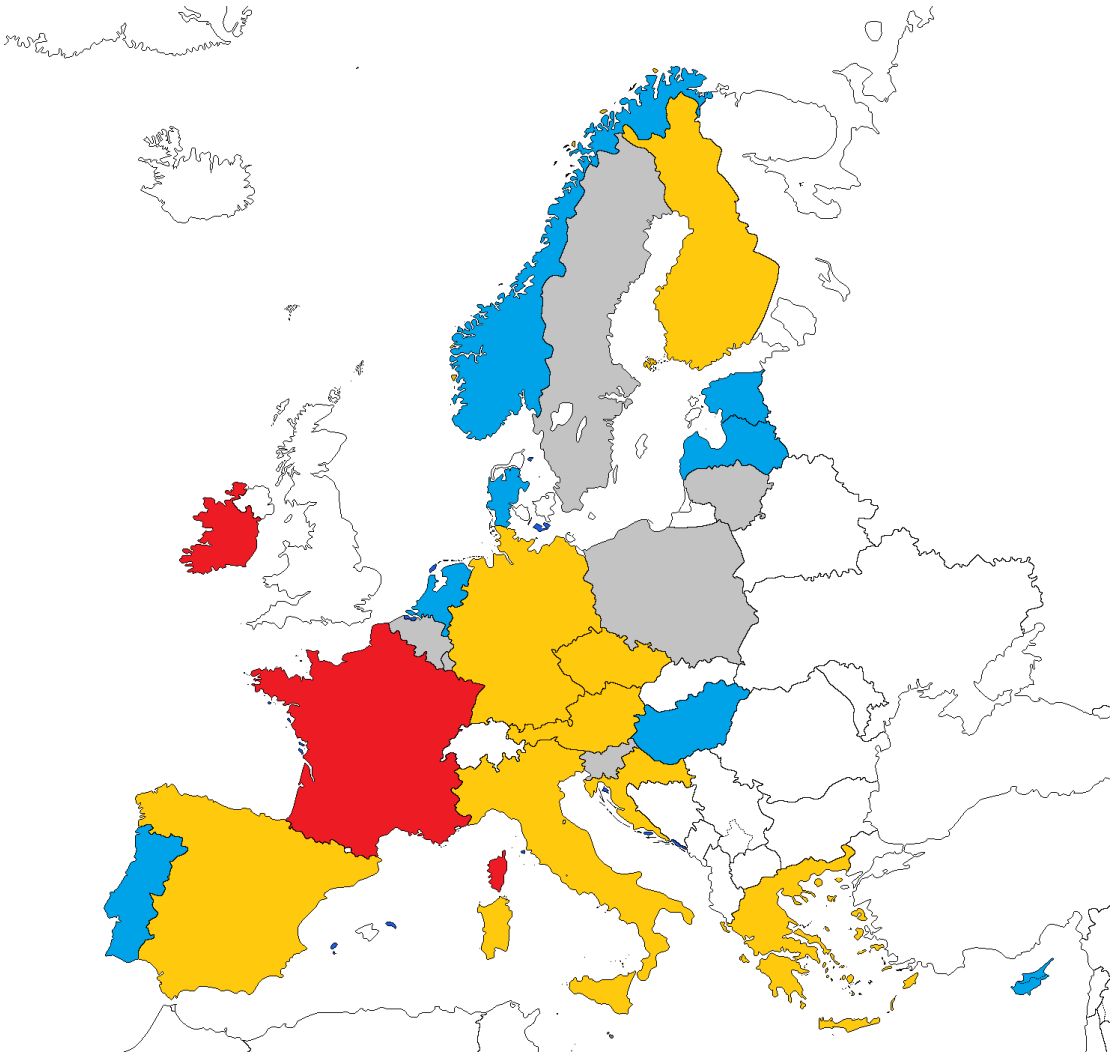


Table 3: *Views of network stakeholders on potential uses of the 470-694 MHz band after 2030*

Country	NoC	Mobile (IMT)	Military	PPDR	Other
AT	x		x	x	
CY				x	
CZ	x	x			
DE	x	x	x	x	
DK					PMSE will need more spectrum.
EE					5G Broadcast for public warning
ES	x	x			
FI	x	x			
FR	x				
EL	x	x			
HR	x	x			
HU		x		x	
IE	x				
IT	x	x			
LT					
LV		x			
NL		x			
NO		x			
PL					
PT		x			
SE					
TK					NTN

The final question to all network stakeholders had to do with the regulatory framework they operate in, and to identify any obstacles (e.g regarding spectrum usage, technology, licensing) that do not allow for the expansion/modernisation of their network (DTTB, IMT, other) in the 470-694 MHz band and the regulation measures should be taken to overcome them.

Although a small minority of broadcasting and broadband stakeholders believe there are no obstacles to the evolution of their services, the vast majority are calling for clarity on the regulatory framework beyond 2030 at international, European, and national levels.

For broadcasting stakeholders, this clarity must ensure continued access to the 470–694 MHz band for DTTB beyond 2030, providing the necessary certainty for investment and the modernisation of services.

For the mobile sector, discussions should begin now on harmonising at least part of the band (the 600 MHz band) for IMT, addressing current border coordination challenges that hinder its use — particularly in countries that no longer intend to utilise it for DTTB.

A small number of players operate in both sectors, and as a result, are inclined to adopt positions aligned with either perspective, which creates contradictions with the current situation.

Additionally, broadcast stakeholders in Austria, the Czech Republic, Denmark, Spain, France, and Lithuania are advocating for at least a national framework to support the development of 5G Broadcast.

Other Comments by Stakeholders identified as Network Providers

Broadcasting stakeholders emphasize the qualities of DTTB:

- 21 stakeholders[14] emphasise the importance of DTTB during times of crisis, as it operates on a robust, internet-independent, sovereign infrastructure and facilitates early warning systems (EWS) to alert populations. 5 stakeholders[15] believe that 5G Broadcast could improve this capability.
- 12 stakeholders[16] emphasize the sovereignty of DTTB and the absence of intermediaries between broadcasters and their audience, particularly to ensure visibility and fair competition for national players.
- 14 stakeholders[17] point out that DTT consumes less energy than internet-based broadcasting (based on studies by Locat 2022, OFCOM 2024, ARCOM 2024).
- 11 stakeholders[18] also emphasize the social and cultural benefits of DTT, which is universally accessible, free of charge, and essential for social cohesion.
- 6 stakeholders[19] highlight that radio benefits from DTTB through shared infrastructure, and 5G Broadcast could further enhance this synergy.

Additionally, KPN and Digitenne note that the DTTB network (50 sites) is significantly smaller than the mobile network (5,000 sites), while ERT believes it is necessary to mandate the integration of HbbTV in televisions and 5G Broadcast in mobile devices, including vehicles.

Regarding Broadband stakeholder:

- APMS and Vodafone highlight the inefficiency of frequency use by DTT, as some broadcast services are only viewed by a very small audience. For Vodafone, this inefficiency is linked to the public broadcasters' funding model, which is based on a mandatory license fee that does not promote efficient spectrum use.
  Magyar Telekom fears that Europe will fall behind the United States and Asia in term of connectivity as the access of IMT to the 470-694 MHz frequency band is too complex.

[14] *CDG, CRA, Media Broadcast, ORF, DR, EBU, Swedish Radio, Levira, LVRTC, NTV, Uteca, Telecentre, Itelazpi, RTVE, Unired, 4iG, Digita Oy, 2RN, Cellnex, Digea*
[15] *ORF, DR, EBU, Swedish Radio, Broadcast Partners*
[16] *BNE, PIRC, Itelazpi, RTVE, Unired, ARD, Cairo Network and CRTV, EI-Towers, Eletronica Industriale, Persidera, Digea*
[17] *Wider Spectrum Group, AXION, Media Broadcast, ORF, DR, EBU, Swedish Radio, BNE, PIRC, Digita Oy, TDF, 2RN, Cellnex, OIV*
[18] *CDG, CRA, BNE, PIRC, Uteca, Itelazpi, RTVE, Unired, Cellnex, Digea, OIV*
[19] *Wider Spectrum Group, ORF, DR, EBU, Swedish Radio, AER*

3) The Contents section

Introduction

Most of the respondents who identified themselves as content providers are also producers of the contents that are then distribute. As the majority of respondents are general interest (and not thematic) television services, a great variety of contents produced is evident. The production includes news, live events, European works, general or high interest programmes, advertising, educational content and documentaries. Some respondents also produce and distribute content for specific audiences, such as children, as well as content related to sports, music, entertainment, culture and local communication.

49 respondents answered the "Contents" part of the questionnaire; some responses came from the same organisation, so 45 separate responses were counted.

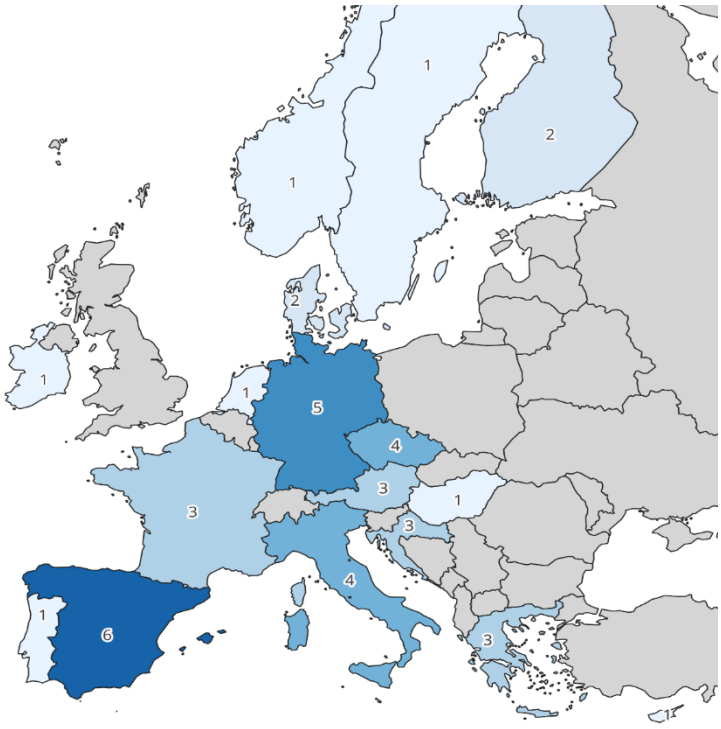
34 of them identified themselves as Content provider. 17 responses came from Public Service Medias, including EBU. Other 17 responses were identified as coming from private media stakeholders.

Another 11 respondents shared their views on this section, including:

- 4 related to DTTB distribution,
- 3 from the IMT sector (Deutsche Telekom, Telefonica, Hrvatski Telekom),
- 2 from the PMSE sector (Shure and Wider Spectrum Group).

Responses were received from 16 of the 27 EU states.

Graph 48 *Number of responding entities by countries for the Contents section*



Distribution of contents

Among the 34 respondents identified as content provider, the vast majority offers free distribution of their contents. In addition, some respondents offer pay services on a subscription basis.

The various content distribution technology platforms are used according to this breakdown:

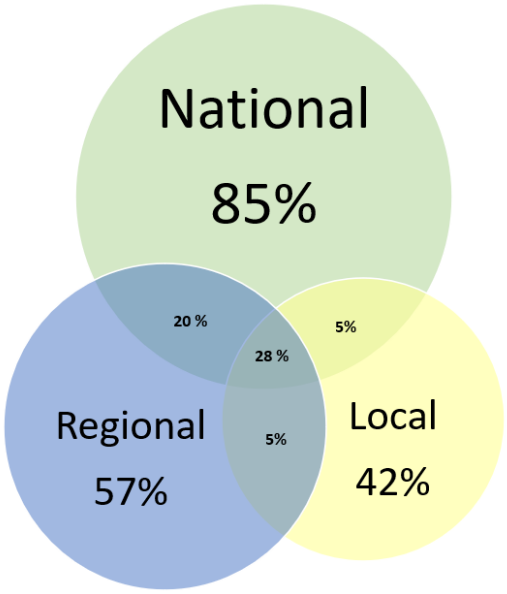
Table 4

Distribution mode	% of respondents among content providers
DTT	97%
IPTV / Cable	80%
Satellite	60%
Others	37%

All but one propose linear programming over DTT. 80% declare as well distribution over IPTV.

Respondents distribute content with programmes that may have national, regional or local coverage. This is the percentage breakdown of the respondents, noting that some of them distribute programmes on several scales.

Graph 49 *Scale of coverage*



All respondents are subject to some form of regulatory obligation regarding the distribution of specific content, particularly news content. Other content subject to obligations are culture, sports and children's programmes, mentioned by several respondents.

Public service broadcasters have greater obligations to distribute all types of content.

Table 5

	Total	Among PSM
Entertainment	80%	82%
Information (News / Political)	97%	100%
Education	69%	88%
European works	74%	82%

Almost all respondents acknowledged that improvements in DTT standards have helped (or will help) to maintain the attractiveness of DTT and the proportion of their distribution dedicated to DTT.

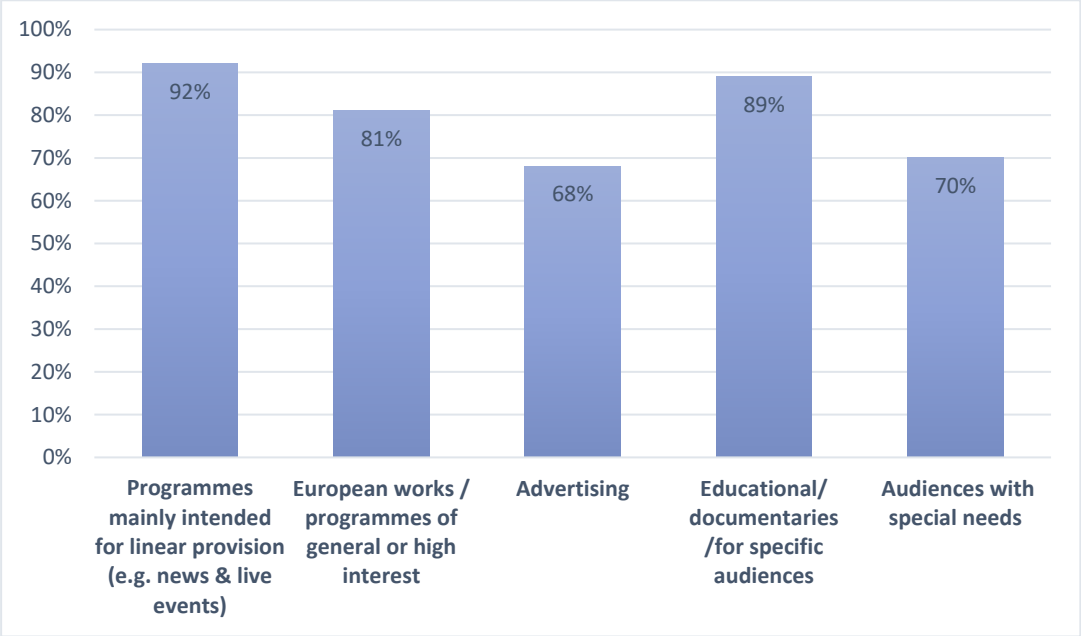
However, the Finnish and Swedish PSBs gave the opposite answer, admitting thus that they are withdrawing from terrestrial broadcasting.

Table 6

Transmission standards (DVB-T / DVB-T2 / 5G Broadcast …)	86%
TV resolution standards (e.g. HD / UHD / HDR / 3D…)	89%
Advanced/ alternative services (e.g. Hybrid / HbbTv)	89%

Among other respondents, unsurprisingly, IMT respondents are of the opinion that interest in DTT will decline regardless of improvements in standards.

Graph 50 *Types of programs produced / distributed*



For the distribution of their own content, the weight of DTTB varies widely between countries and organisations. Overall, the collected responses highlight the diversity of opinions with respect to the weight of DTTB, with some organisations considering it a crucial part of their business and others seeing it as a declining or marginal channel. The few respondents who extrapolated data on their market share over the next fifteen years show stabilisation (7 respondents) or decline (6 respondents).

Future of the use of the DTTB platform

Concerning the evolution of DTTB's share in the linear TV market compared to other reception modes (such as IPTV, Satellite, cable TV), the answers varied widely, highlighting a lack of understanding of the expected indicator.

Many respondents provided the total market share of each transmission mode. However, in this regard, it seems preferable to refer to the responses collected from regulators or network operators (see corresponding sections).

It should be noted that the responses reflect the range of different situations, with the percentage of each reception mode varying considerably from one country to another.

However, DTT remains significant in most cases, although its decline is often mentioned.

It was also asked whether, in locations not reached by the 5G Broadcast signal, content providers consider supplementing coverage with mobile broadband capabilities. 71% of respondents have not yet

considered this question, a justifiable position given that the standard is still in its early stages and no commercial deployment is planned.

Among the few interested, it is worth noting that Austria is one of the most advanced countries in terms of testing 5G broadcast and hybrid solutions.

The importance of maintaining a subscription-free access to multimedia content was rated on a scale of 1 to 5.

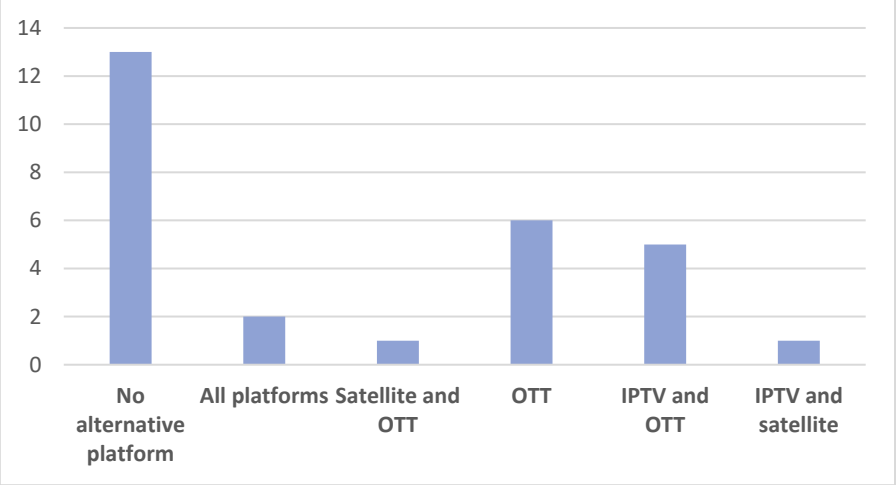
Table 7

Rate	Number of responses	%	Among relevant respondents	Among PSM	
0	18	40%		Nb	%
1	0	0%	**0%**	**0**	0%
2	1	2%	**4%**	**0**	0%
3	2	4%	**7%**	**0**	0%
4	8	18%	**30%**	**4**	**40%**
5	13	29%	**48%**	**6**	**60%**

A significant portion of respondents (Spanish, German and Danish PSMs, EBU among others) disagreed with the wording of the question, arguing in particular that free access is inherent to public service media. However, the vast majority of respondents agree on the importance of subscription-free access (percentages 4 and 5).

Regarding which platforms could be adopted instead of DTTB for free content distribution, the answers were spread as follows.

Graph 51 *Alternative to DTTB to subscription-free media content distribution*



13 content providers state that DTTB has no alternative, given its advantages (high reliability, efficiency, environmental aspects, ...) and is therefore the best solution for free-to-air broadcasting. A further 13 respondents (including 10 content providers) mentioned IPTV/OTT as an alternative.

Observing that the consumption of audio-visual content is gradually shifting from a 'traditional' model (linear, free, via TV) to a plurality of different approaches (mobile devices, non-linear content, subscriptions, streaming), it was asked whether content providers were able to estimate the contribution of the DTT platform to their business, at present and for the next 5-10-15 years.

Several public service media indicate that this assessment is irrelevant to them, as their services are not driven by profit generation. The few respondents who provided percentage ratings indicate that the contribution of the DTT platform to their business remains mostly stable.

Some (private) content providers indicate that they have invested in online platforms to follow consumer trends, but many still do not expect a significant divestment from DTTB.

Many emphasise the special and unique status of DTT compared to other distribution modes.

The ability to watch audiovisual content on the move is considered fairly or very important by at least 92% of respondents.

Table 8

		All replies		Content providers			
	Rate	Number of responses	%	total	%	Among PSM	
not at all	1	1	2%	0	0%	**0**	0%
	2	1	2%	0	0%	**0**	0%
	3	3	7%	2	6%	**2**	13%
	4	2	5%	1	3%	**1**	7%
fully	5	33	80%	31	91%	**12**	80%
	Mean	**4,6**		**4,9**		**4,7**	

Expectations on public policies

Regarding the role that public policy and regulation should play in the evolution of content distribution to the public, the most frequent responses emphasise the need for regulators to continue to ensure the visibility of existing media and to maintain market stability, e.g. by guaranteeing free access to current FTA and public service media (PSM) content on all platforms, preserving a stable market for DTTB and FTA broadcasting, supporting broadcast distribution and ensuring affordable, balanced and sustainable content distribution.

Some answers relate specifically to DTTB transmission and its assets. Expectations are, for example: to preserve DTTB as essential for universal free-to-air TV; to commit to a potential major technological evolution of the DTT platform by supporting DTT operators; to consider the environmental impact of audiov-isual consumption, as DTTB is the method that emits less CO2 and consumes less energy.

Other responses, however, call for more flexibility and less regulation. Some respondents advocate a technology-neutral approach, letting the market decide the best distribution methods. They argue that the Internet provides a more efficient and accessible platform for content distribution and that public resources should be allocated to expanding broadband access rather than supporting traditional broadcasting platforms.

Some IMT respondents are in favour of policies that promote liberal approaches and prioritise the most efficient and affordable distribution of PSM.

Dissemination of culture

These are the respondents' opinions of the platforms they consider best for distributing audio-visual content related to national/European culture (average values on a scale of 1 to 5).

Table 9

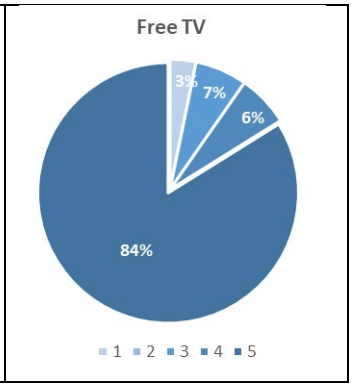
Type	Average
Free TV	4,7
Linear TV	4,3
Streaming	4,2
Subscription TV	3,4
Social media distribution	3,1

In more detail:

Table 10 (a)

Free TV

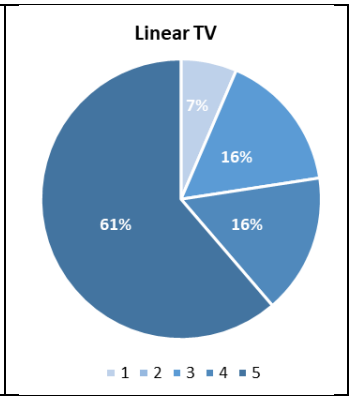
Rate	Number of responses	%	Among PSM	
not at all 1	1	3%	**1**	7%
2	0	0%	**0**	0%
3	2	6%	**0**	0%
4	2	6%	**0**	0%
fully relevant 5	26	84%	**14**	93%
	4,7			4,7



(b)

Linear TV

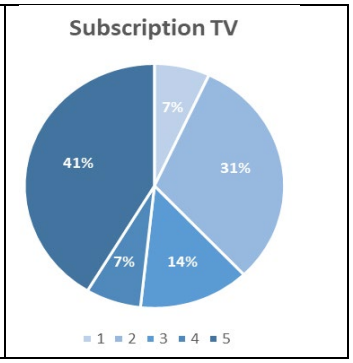
Rate	Number of responses	%	Among PSM	
not at all 1	2	6%	**1**	7%
2	0	0%	**0**	0%
3	5	16%	**2**	13%
4	5	16%	**0**	0%
fully relevant 5	19	61%	**12**	80%
	4,3			4,5



(c)

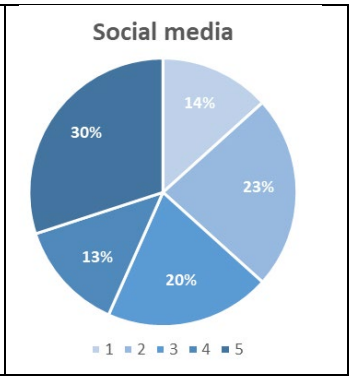
Subscription TV

Rate	Number of responses	%	Among PSM	
not at all 1	2	6%	**1**	7%
2	9	29%	**3**	20%
3	4	13%	**2**	13%
4	2	6%	**0**	0%
fully relevant 5	12	39%	**8**	53%
	3,4			3,8



(d)

Social media				
Rate	Number of responses	%	Among PSM	
not at all 1	4	13%	**0**	0%
2	7	23%	**2**	13%
3	6	19%	**4**	27%
4	4	13%	**2**	13%
fully relevant 5	9	29%	**6**	40%
	3,2			3,9



The survey results indicate that free television is considered the most effective distribution method for content related to national and European culture, with 84% of respondents rating it as "fully relevant". Streaming and social media distribution are considered less effective than traditional linear television, with respondents giving lower ratings to these methods.

Linear TV remains of paramount importance (with a mean of 4,9/5) for the vast majority of content providers.

Table 11

		All replies		Content providers			
	Rate	Number of responses	%	total	%	Among PSM	
not at all	1	1	2%	0	0%	**0**	0%
	2	1	2%	0	0%	**0**	0%
	3	3	7%	2	6%	**2**	13%
	4	2	5%	1	3%	**1**	7%
fully	5	33	80%	31	91%	**12**	80%
	Mean	**4,6**		**4,9**		**4,7**	

More specifically, as regards the types of content that rely most on free-to-air linear TV, news remains an essential element, followed by live events. Audio-visual content that is not immediate or recent (i.e. recorded) can benefit more from a distribution not based on the free model. It should be noted that the respondents who gave a low rating are mainly IMT stakeholders.

Table 12

Type	**Rate**
News	4,7
Live events	4,5
Political debates	4,4
European works / Culture contents	4,1
Focused / Educational Content	4,1

Role of advertising in the future of audiovisual services

Private stakeholders generally agree that advertising is crucial for the survival of the audio-visual sector and stress the need to adapt it to the growing competition from video-on-demand (VOD) platforms.

They anticipate:

- Hybrid models: Combining subscriptions with advertising to offer flexibility to consumers.

- Focus on local content: Increased importance of local and culturally relevant advertising.
- Content sponsorships: Brands becoming more involved in content production for less intrusive advertising.
- Personalized advertising: Targeted ads through hybrid solutions for ad insertion.

Public stakeholders, on the other hand, generally state that their business model does not depend (or depends very little) on advertising. They emphasize the importance of maintaining free-to-air TV for reaching a broad audience and supporting content production.

Overall, the responders suggest that advertising will continue to play a significant role in the future of audio-visual services, but its form and implementation will need to adapt to the changing landscape of content consumption and the rise of digital platforms.

4) The End Users of Spectrum section

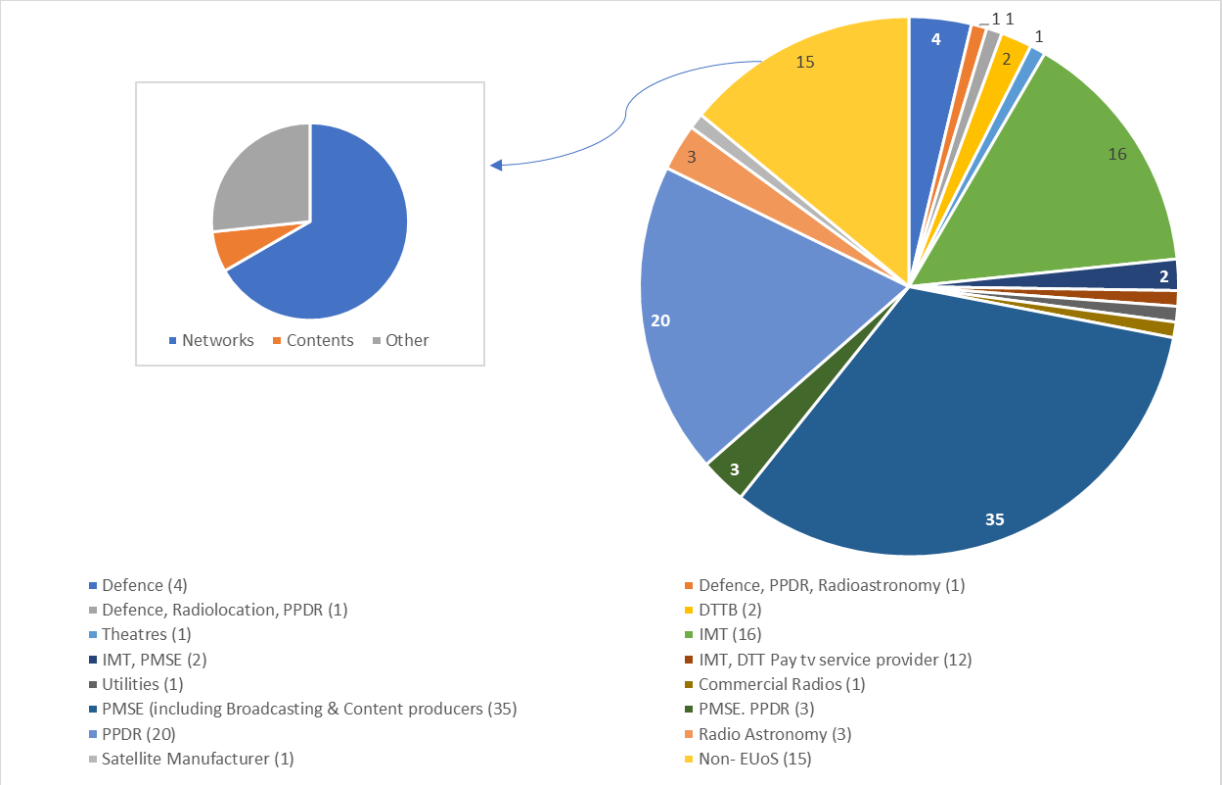
Introduction

End Users of Spectrum (**EUoS**) were requested to identify and respond as belonging to of the following groups: Defence, International Mobile Telecommunications (IMT), Programme Making and Special Events (PMSE), Public Protection and Disaster Relief (PPDR), Radioastronomy, Radiolocation. PMSE and IMT stakeholders emerged as the dominant response group.

Responses across all EUoS groups indicated competing interests and uncertainty on the future allocation of the 470-694 MHz band beyond 2030. Broadly, there is an expectation among IMT EUoS that post 2030 the entire band should be allocated to IMT use. This position is at odds to PMSE EUoS who cite growing PMSE device use demand as justification for retention and expansion of PMSE frequencies in this band, Defence and PPDR EUoS who identify specific frequencies in this band as essential to future defence and security operations, and Radioastronomy EUoS that require clear spectrum for conducting meaningful astronomical observations.

In addition, some individuals and organisations considering themselves to be non-EUoS responded to Subsection 4. These non-EUoS included regulators, Digital Terrestrial Television (DTT) organisations, IMT providers and IMT equipment manufacturers.

Graph 52 *Replies to the End Users of the Spectrum part of the Questionnaire*



PMSE EUoS

Of the 85 EUoS responses, PMSE represented the largest responding group with 38 respondents. These respondents represented a broad range of PMSE manufacturers, national broadcasters and national cultural event production representative bodies.

PMSE EUoS emphasised the critical importance of the 470-694 MHz band for live broadcast, journalism, sporting events, trade shows and the production of cultural events. Throughout, they cite increasing demand for PMSE device use and the constraints the existing 110-220+ MHz allocation places on that rising demand. While PMSE respondents noted demand for PMSE spectrum can vary

depending on time, location and event type, they also highlighted that larger events often require up to 600 PMSE devices; a number beyond what the current spectrum allocation can accommodate. However, respondents did not clarify the frequency with which events requiring up to 600 PMSE devices occurs.

PMSE EUoS wish to address spectrum availability concerns by extending frequency allocation for PMSE devices in the 470-694 MHz band from 2030 and beyond. They see this expansion as necessary to support the identified growing trend of PMSE device use. Given their desire for an increased frequency allocation, PMSE EUoS oppose transferring spectrum or the removal of PMSE from the 470-694 MHz band. They strongly oppose transferring of spectrum to IMT claiming IMT applications restrict access to spectrum and disrupt PMSE operations. Challenges with PMSE operations in the USA following the auction of spectrum to IMT in the 600 MHz band is cited as evidence to support this opposition. Although calls for increased spectrum allocation are evident across most PMSE EUoS responses, Wireless Multi-Audio Systems (WMAS) devices are identified by respondents as a potential emerging technology that could ameliorate the spectrum capacity issue.

While acknowledging competing demands for IMT, PPDR and DTT services, PMSE EUoS respondents stress that maintaining and expanding their spectrum allocation is essential for future transmission quality and reliability, operational reliability and the industry's long-term viability beyond 2030.

IMT EUoS

IMT EUoS respondents represent the second largest response group with 18 respondents. IMT EUoS appreciate the 470-694 MHz band will not be used for IMT purposes up to 2030, citing EU Decision (EU) 2017/899. However, they identify the <1 GHz band as essential to the future provision of IMT services and call for the full allocation of the 470-694 MHz band for IMT.

Beyond 2030, there is an exception among IMT EUoS that the entire 470-694 MHz band will be allocated to IMT arguing this allocation is fundamental to improving 5G, introducing 6G, expanding coverage in rural and indoor areas and addressing the ever-growing demand for IMT services. IMT EUoS see the 470-694 MHz band as critical for expanding broadband connectivity and providing low band 6G connectivity. Additionally, they claim rural broadband deployment would benefit from IMT expansion as lower frequencies allow for cost and energy efficient coverage in remote areas.

IMT EUoS view long-term DTT retention of the sole primary allocation within the 470-694 MHz band as being unjustifiable. Low and decreasing DTT penetration is cited as justification for reallocation of the entire band to IMT, as is the rise of Internet Protocol Television (IPTV). Additionally, IMT EUoS view mobile services as a more spectrum-efficient use of resources than DTT. They argue the spectrum should be repurposed to IMT post 2030, or immediately in low DTT uptake countries. They also suggest that if no common EU position is reached, nations with minimal DTT penetration should have the autonomy to transition their spectrum to IMT. While the prevailing IMT EUoS opinion is that declining DTT penetration justifies the allocation of the entire 470-694 MHz band to IMT, respondents do not seem to have considered how this reallocation would impact PMSE, PPDR, Defence or Radioastronomy applications.

IMT EUoS forecast 20-30% annual growth in mobile spectrum demand, reinforcing the need for additional low-band spectrum from 2030 onward. They strongly advocate for the primary allocation of the 470-694 MHz band to IMT, arguing mobile services require more potential for capacity delivery in this band and the suitability of this band for supporting future 5G and 6G expansion.

PPDR EUoS

PPDR EUoS stakeholders from France, Germany, Denmark, Czech Republic, Netherlands, Italy, Finland, Ireland, and Norway broadly note the current PPDR frequency allocations are no longer sufficient for their specific national use cases. Specifically, France highlights limitations of allowable simultaneous voice channels while Italy highlights limitations for video and data transmission. These limitations are echoed by the responses of 13 EUoS from Czech Republic, Denmark, Germany, Ireland

and Netherlands with aspirations of establishing PPDR Radio Access Networks (RANs) for secure broadband applications and mission critical live video streaming.

Respondents highlight the NR/E-UTRA operating band n71/71 (663-698 MHz for uplink paired with 617-652 MHz for downlink) as the intended band to establish future PPDR networks and that primary allocation of those frequencies for PPDR is favourable for pan-European cooperation and technology investment.

Defence EUoS

Defence EUoS stakeholders from France, Germany, Hungary, Spain, Netherlands and Sweden all noted national use cases requiring portions of the 470-694 MHz band for military use up to 2030 and beyond. All defence EUoS stakeholders identified current non-availability of wideband spectrum with good propagation characteristics as a constraint for military applications in the 470-694 MHz band. Defence EUoS in France and Spain are advocating for a portion of this band to be dedicated solely to military UHF use. All Defence EUoS respondents, less Spain and Sweden, argue military use cases cannot co-exist if the entirety of the band is allocated to IMT.

Defence EUoS outline clear use cases for ongoing access to the 470-694 MHz band. They argue dedicated military spectrum should be a requirement for future frequency allocation frameworks, and highlight repurposing the 470-694 MHz band wholly to IMT as a threat to the already constrained military UHF applications.

Radioastronomy EUoS

Three Radioastronomy EUoS responded to the questionnaire, collectively noting the importance of the 470-694 MHz band to their applications. Specifically, they cite the 608-614 MHz band for regular solar observation, European Very Long Baseline Interferometry (VLBI) Network observations at 618 MHz, and precise pulsar timings as important radioastronomy use cases.

Radioastronomy respondents expressed concerns that reallocating the 470-694 MHz band beyond 2030 will generate new sources of spectral leakage into their observation bands, or how the introduction of new services in adjacent or overlapping bands, such as DTT or IMT, will impact radioastronomy.

Radioastronomy EUoS suggest any new framework for the allocation of the 470-694 MHz band must consider the requirements of radioastronomy applications. Given the fragility of satellite, telecommunications and utilities infrastructure to space weather and the radioastronomy EUoS community's clear reliance on this band for solar observation, further engagement with radioastronomy EUoS is recommended to identify opportunities to satisfy their ongoing observational requirements.

Non-EUoS

Non-EUoS raised concerns, issues and opinions regarding the potential for contested and congested future use of the 470-694 MHz band. IMT-facing non-EUoS organisations, such as GMSA, Nokia and Qualcomm echo the general points of IMT EUoS discussed above. They note sharing of the same frequency band for IMT and DTT usage is suboptimal while highlighting the potential benefit to mobile service applications and end users should the entirety of the band be allocated to IMT.

DTT/broadcast and PMSE-facing non-EUoS organisations stated the ongoing use of PMSE devices in DTT frequency white space as well as the importance of PMSE applications in the 470-694 MHz band. They note the band as advantageous for PMSE given its low power, good propagation and small device size characteristics. They also highlight extant PMSE band harmonisation and the reasonable expectation among European PMSE users of continued use in this band, arguing any reallocation would cause disruption and financial burden to the PMSE industry.

5) The Other Interested Parties section

Introduction

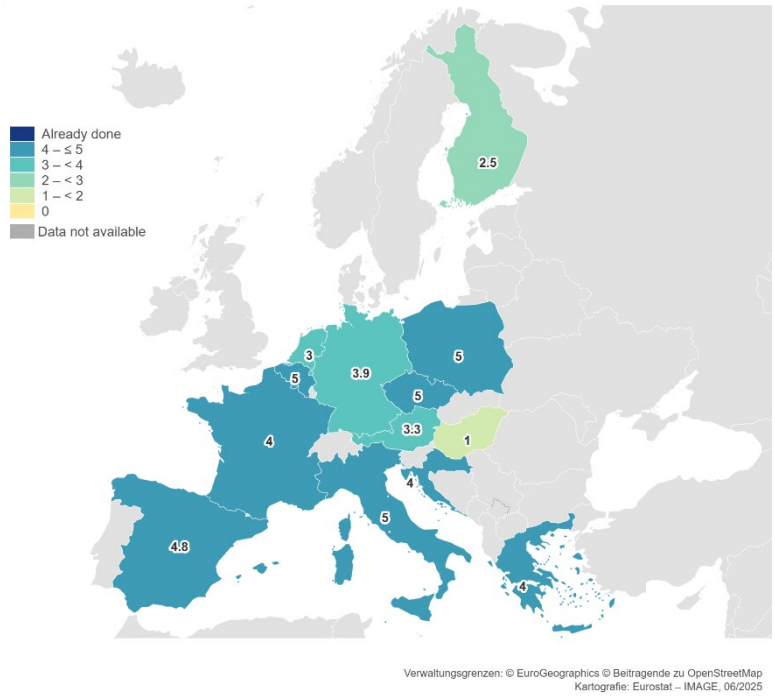
In the analysis of this section, the answers were grouped by country of origin. Where questions were answered on a scale of 1 to 5, if more than one answer per country was received, averages were calculated without considering '0' or 'Data not available'.

For 12 EU countries, no responses were received from any representatives: this is reflected by the 'Data not available' value in the diagrams below.

Responses were also received from non-EU countries (Norway, USA or representatives of associations at European and global level), which are not shown in the diagrams.

General questions

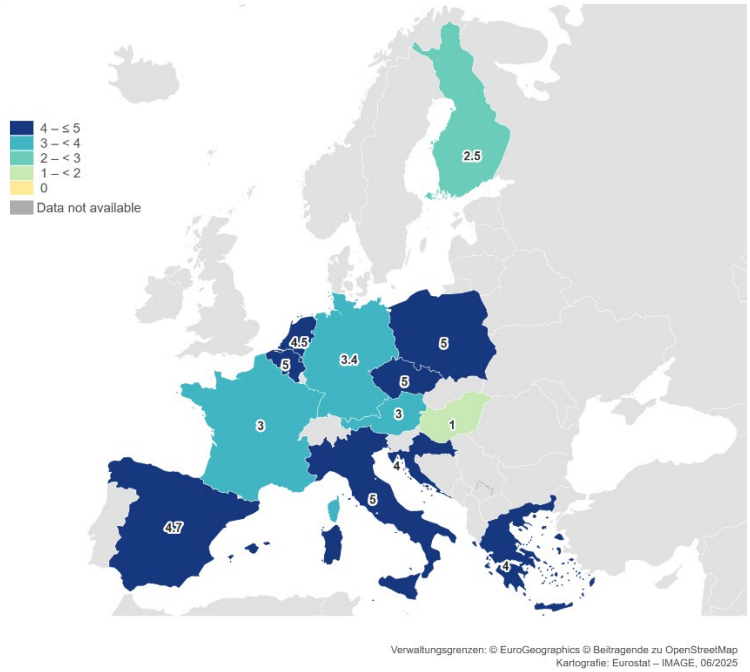
Graph 53 *migration of linear free-to-air TV from DTTB to any other platform*



Scale: 1 (really easy) to 5 (very difficult), 0 (not yet investigated).

Average: 3.8, with 13 EU countries providing an answer.

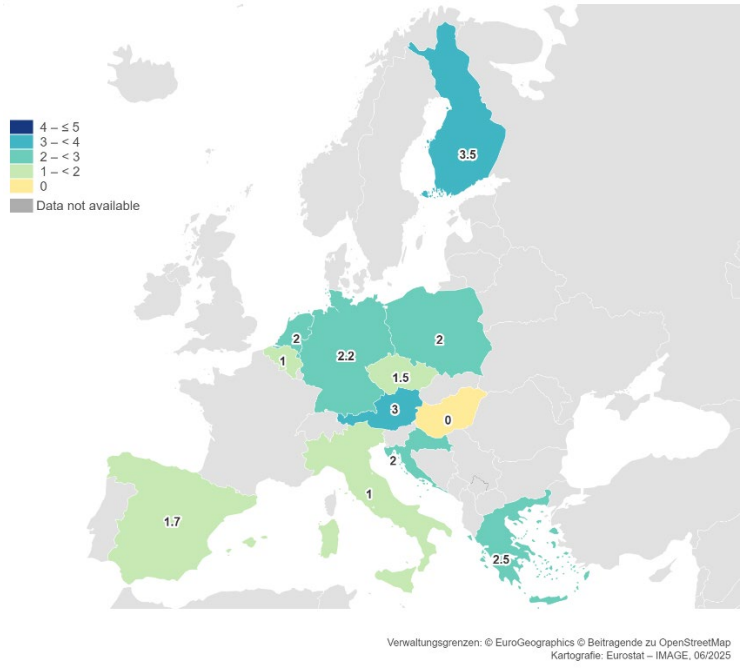
Graph 54 *Consequences if in the period 2030-2040 linear TV were to move to a platform other than DTTB*



Scale: 1 (no consequence) to 5 (strong consequences)
0 (depends on how abrupt or costly the transition will be).

Average: 3.8, with 13 EU countries providing an answer.

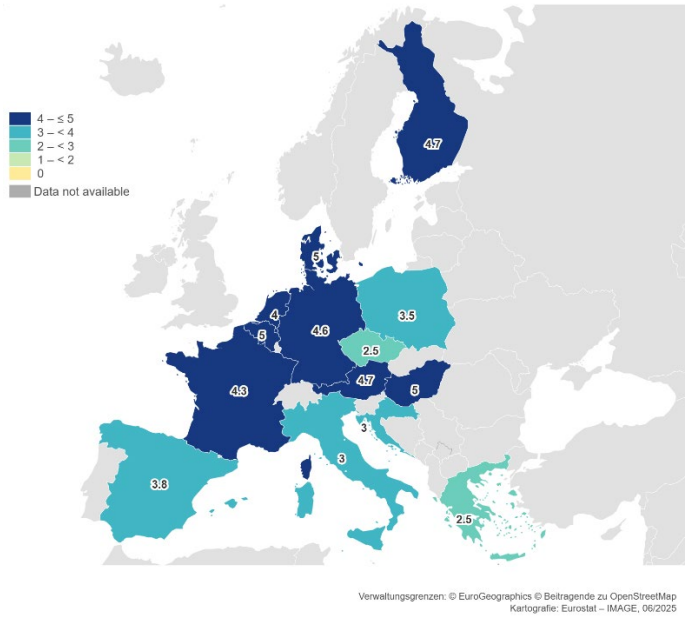
Graph 55 *Expectation of future decline in linear TV programmes*



Scale: 1 (no reduction) to 5 (huge reduction), 0 (no opinion)

Average: 1.9, with 12 EU countries providing an answer.

Graph 56 *Importance of having audiovisual contents available on the move*



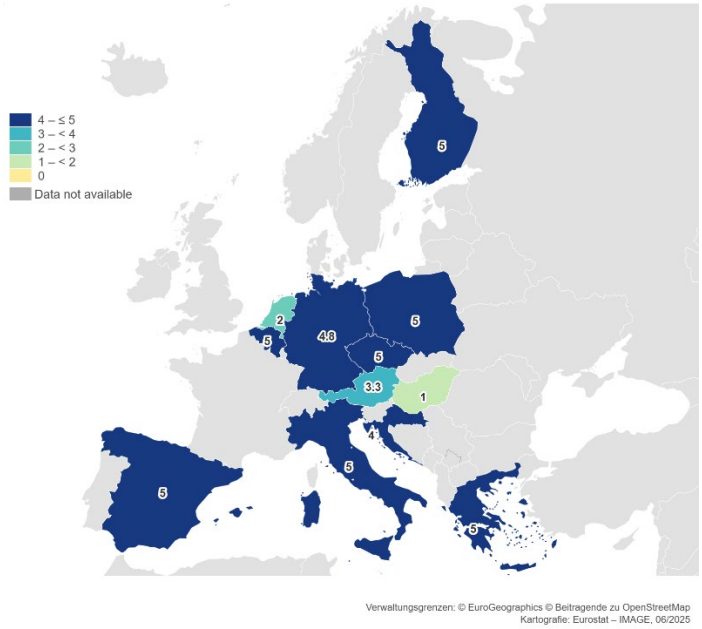
Scale: 1 (not important) to 5 (indispensable), 0 (no opinion)

Average: 4.0, with 14 EU countries providing an answer.

Viewers and consumers representatives

Consumer associations consider it very important to continue receiving linear TV and free content (rating between 4 and 5 on a scale of 1-5 in related questions), and of interest the possibility of having the same services on mobile devices (rating between 3 and 4 on a scale of 1-5 in related questions).

Graph 57 *Importance of full national coverage for free linear TV*

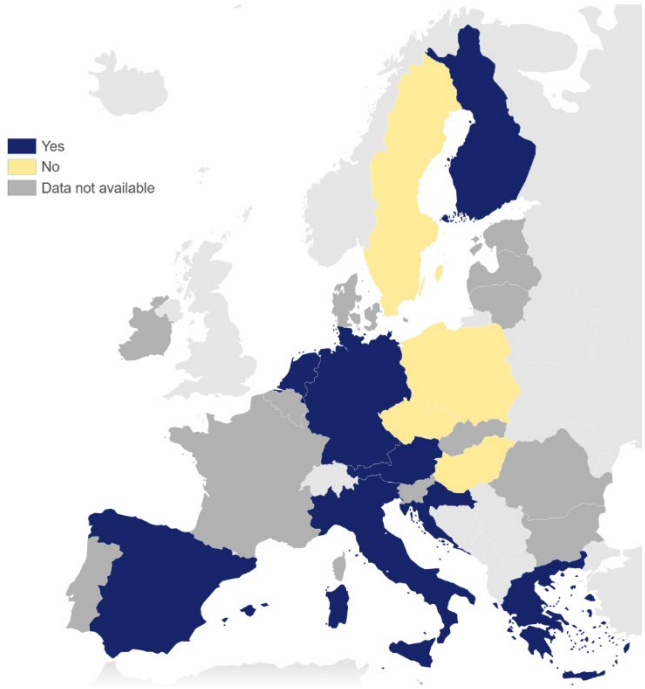


Scale: 1 (not important) to 5 (highly desirable), 0 (no opinion)

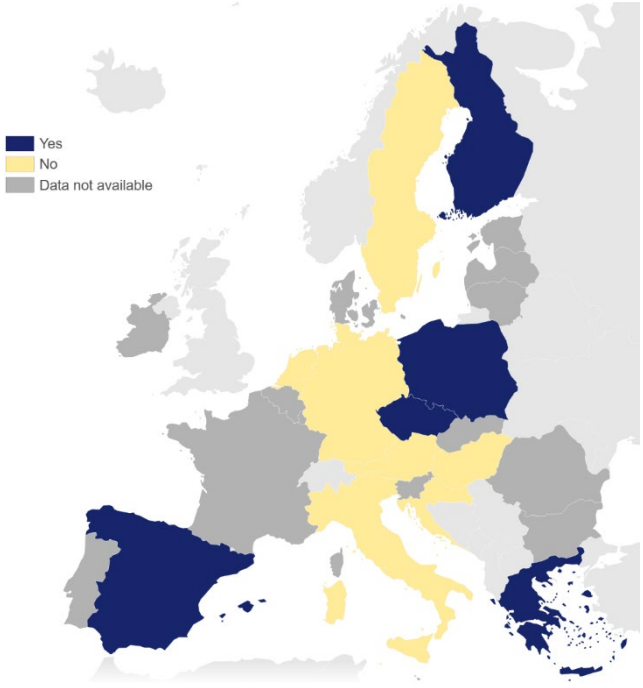
Average: 4.1, with 12 EU countries providing an answer.

Graph 58 *Alternatives currently available to consumers for accessing audiovisual content in areas not covered by DTT networks*

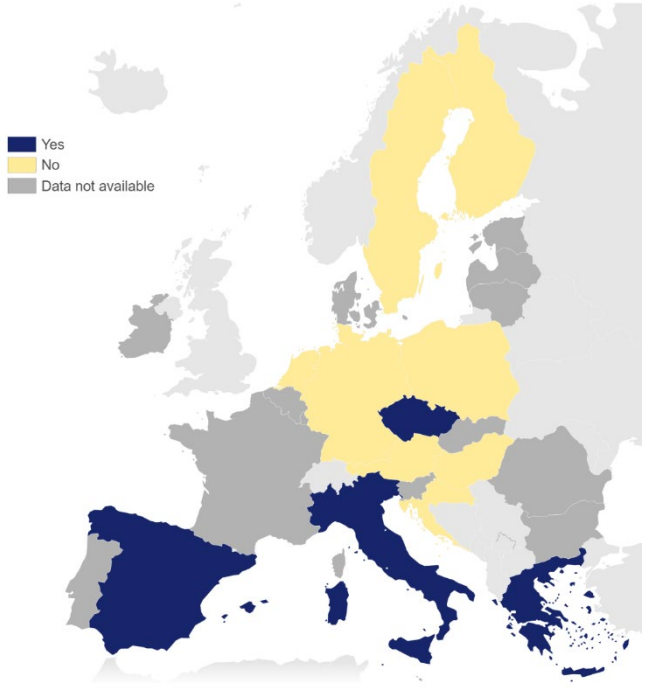
(a) Free access to satellite TV



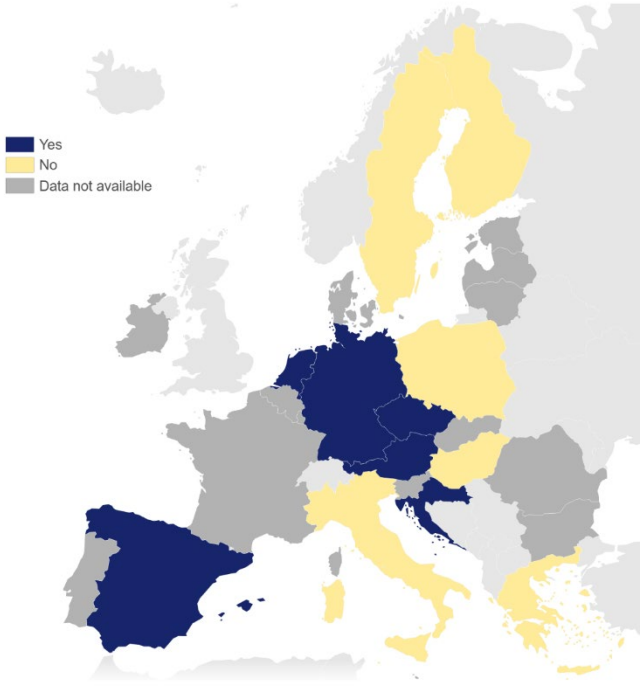
(b) Gap fillers by the network provider



(c) Gap fillers installed by local authorities/local private sector

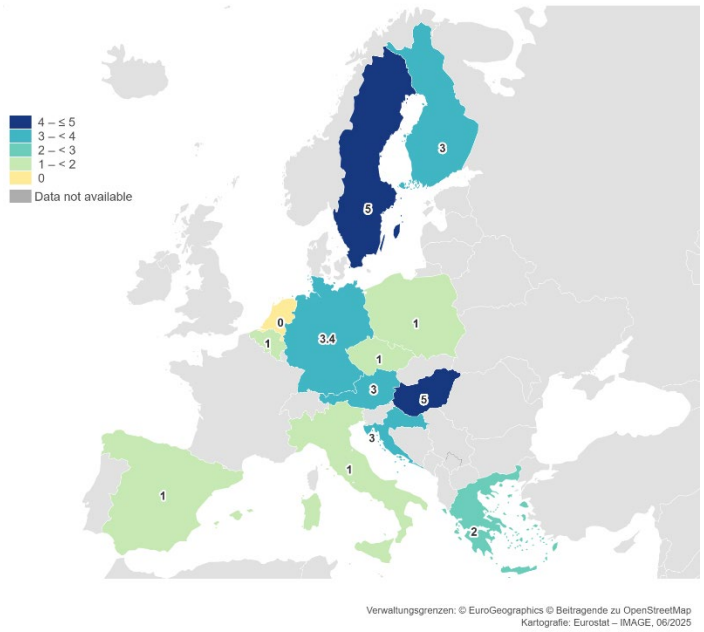


(d) Free access through broadband networks



Respondents from some countries mentioned further alternatives: mobile networks/IMT (4 countries), IPTV (3 countries), cable TV (3 countries), broadband networks with costs (1 country).

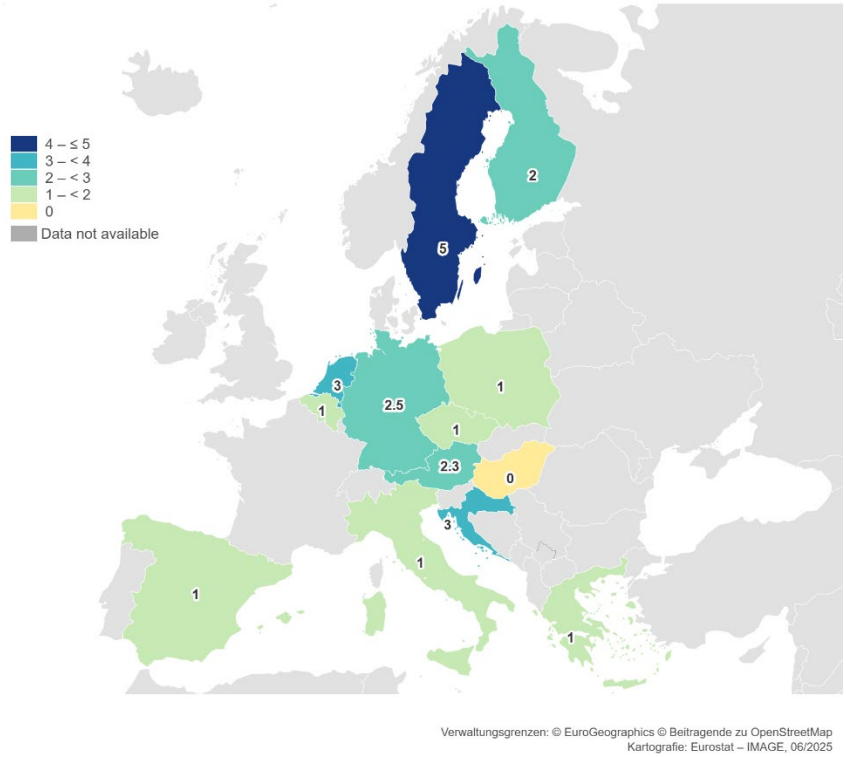
Graph 59 *Ease of migration to new receiving equipment/applications in case of DTTB switch off*



Scale: 1 (impossible) to 5 (very easy), 0 (already use various platforms/apps)

Average: 2.5, with 13 EU countries providing an answer.

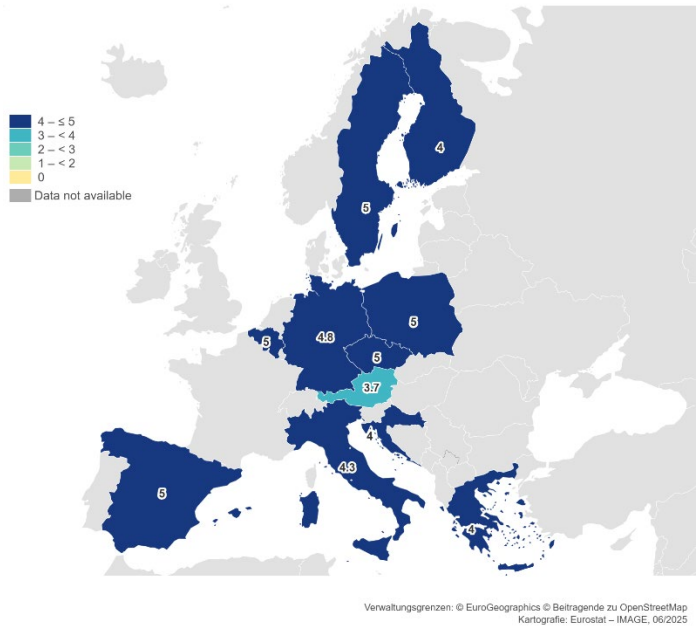
Graph 60 *Acceptance of migration to subscription-based access to audiovisual contents in case of DTTB switch off*



Scale: 1 (not acceptable) to 5 (very easy), 0 (the majority already use various subscription-based platforms/apps)

Average: 2.0, with 11 EU countries providing an answer.

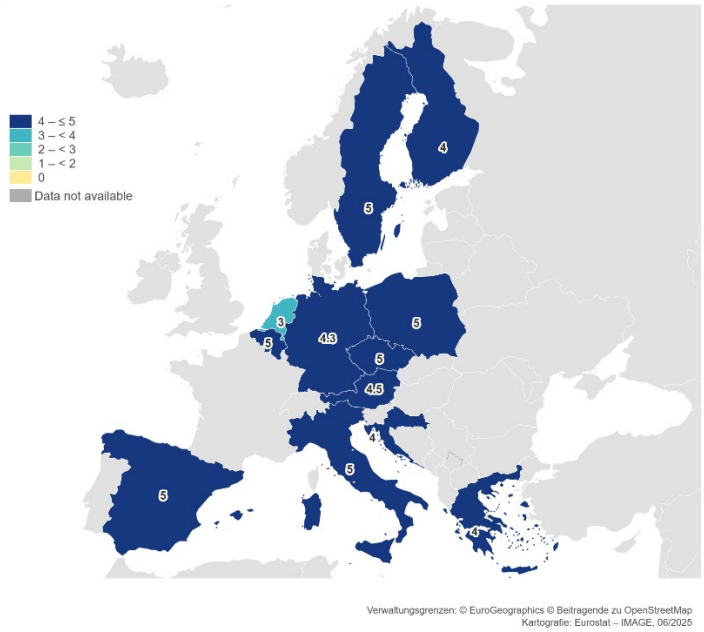
Graph 61 *Satisfaction of the consumers with respect to the quality of audiovisual services currently on DTTB*



Scale: 1 (no at all) to 5 (very high), 0 (no opinion)

Average: 4.5, with 11 EU countries providing an answer.

Graph 62 *Satisfaction of the consumers with respect to the availability of audiovisual services currently on DTTB*



Scale: 1 (no at all) to 5 (very high), 0 (no opinion)

Average: 4.5, with 12 EU countries providing an answer.

Manufacturers of TV Sets/Set Top Boxes and Multimedia User Terminals

The 470-694 MHz band is considered a cornerstone of the manufacturers' current operations by the manufacturers themselves. This frequency range is extensively utilised across a wide array of products and services within the electrical, digital, and telecommunications industries. Examples of its use include DVB-T/T2 receivers and transmitters, gap fillers, antennas, amplifiers, various types of receivers, measurement and monitoring equipment, and installation services for audio-visual systems.

It is also critical for passive equipment such as outlets, headends, multiswitches, and the distribution of terrestrial TV, HbbTV, and pay TV.

The reliance on this band is substantial. A considerable proportion of respondents' product lines are dependent on access to this frequency band. One respondent reported that "100% of sold TVs" rely on it, while others indicated a "variable but very high percentage".

Looking ahead, most respondents anticipate that demand for products operating in this range will remain stable or increase over the decade from 2030 to 2040. This positive outlook is driven by the introduction of newer technologies such as T2 (DVB-T2) and 5G Broadcast (5GBC), along with new services and general technological progress.

With regard to new technologies, while some manufacturers did not identify any new ones requiring this spectrum, others highlighted several key advancements that are likely to utilise the 470-694 MHz band. 5G Broadcast (5GBC) was the most frequently mentioned emerging technology. Other identified technologies include new coding techniques, innovations related to spectrum efficiency, advanced antennas, distribution systems, network solutions for improved communication and smart building applications. These innovations are expected to bring enhanced capabilities such as improved communication, smart building applications, enhanced user experiences, and targeted advertising within terrestrial TV services.

Despite the anticipated demand and technological advancements, manufacturers face significant technical and regulatory challenges. A central issue is the urgent need for regulatory certainty to foster innovation and investments and the development of a strategic plan for technological advancement. The issue of "lack of certainty on the spectrum usage" is repeatedly highlighted as a major problem. Other challenges include harmonising national regulations when spectrum changes occur, issues with the legal definition of a TV receiver nationally, and difficulties fulfilling 'must carry/must offer' rules if terrestrial services were removed. The importance of establishing a clear technological roadmap is also emphasised.

The potential for changes in spectrum availability within the 470-694 MHz band is a matter of significant concern. Such alterations are expected to have a profoundly negative impact on the European industry. The report includes descriptions of changes that have been categorised as a "massive disruption of European AV product development and manufacturing". The disruption has been said to hinder "technological development" and to cause "considerable harm to European design and manufacturing". The changes would have a significant impact on Europe's industry, limiting technological innovation and potentially harming local design and manufacturing. They would also lead to changes in the on-market strategy. The negative effects are not limited to hardware; changes could "stop development of technologies as HbbTV, AC-4, DVB, DVB-I," demonstrating a broader impact on the digital ecosystem. One association has expressed concerns that these changes could potentially restrict users' access to television services.

In summary, the manufacturers' responses emphasise the fundamental importance of the 470-694 MHz band to their present and future operations, with the potential for increased demand driven by new technologies like 5G Broadcast. However, this positive outlook is tempered by a critical concern: the lack of clear long-term regulatory certainty regarding the spectrum's future use. Manufacturers are concerned that changes in spectrum availability could disrupt their development, manufacturing, and market strategies, potentially harming the European industry and restricting user access to essential services. The key message is clear: there is an urgent need for a comprehensive technological roadmap and regulatory certainty.

Retailers and Installers

According to the views of a number of retailers and installers, the current market for products operating in the 470-694 MHz band is showing signs of stability and high demand. Demand for these products is

primarily driven by the Digital Terrestrial Television Broadcasting (DTTB) sector, though there is also a notable and growing demand for Professional Mobile Radio Services (PMSE) products. In addition, there is a reported demand for DTTB transmitters used in applications such as UHD and 5G Broadcast (5GBC), as well as significant demand for measurement and monitoring products needed for installing reception systems operating below 700 MHz.

Customer feedback regarding products in this category is largely positive. Users have specifically highlighted their enjoyment of the "wide offer" of DVB-T2/HEVC.265 products, and provided "very positive feedback" on the use of Free To Air (FTA) services. Installers have also reported positive experiences with the quality of the products. Overall, customers have expressed satisfaction with the product quality and the range of DTTB services available.

While the current market is described as healthy and facing challenges considered "normal", there is a significant undercurrent of concern regarding future spectrum allocation. This uncertainty is identified as a major challenge, as it directly impacts the long-term investment security that customers seek. For example, one installer/manufacturer reported that uncertainty about the spectrum makes it potentially challenging to sell or install products and solutions because it contradicts customers' long-term investment strategies, who often request "investment security (i.e. spectrum availability for 15+ years)". Furthermore, challenges have been identified regarding the availability of PMSE spectrum for live events.

There is a broad consensus among respondents that potential changes in spectrum allocation would have a significant impact. The severity of this impact would depend heavily on the nature of the change. A transition from DTTB to an alternative technology or usage is anticipated to "significantly impact business operations and customer satisfaction" and could "significantly affect the European industrial sector". Concerns have been raised over customers' potential reluctance to migrate, the potential for operational losses for businesses, and the worrying possibility that "usable equipment would become electronic waste". The replacement of DTTB with technologies such as IMT is considered to have a "high impact" due to the necessity for outdoor antennas in non-urban areas, the requirement for a higher quantity of transmitters, and the potential challenges customers might face with a new way of watching TV.

Regarding the market outlook for 2030-2040, opinions are divided. Some experts predict that there will be "no significant changes" or anticipate "ongoing high demand due to modernisation (DVB-T to DVB-T2) or transition (5GBC)". It is anticipated that demand for measurement and monitoring equipment will continue to grow in line with ongoing installations and upgrades. However, others anticipate a "slow decline" or "significant changes in case of changes to the spectrum allocation". The overall expectation is that the market will see innovations and improvements, but that regulatory decisions will significantly influence future demand.

While emerging technologies such as 5G Broadcast are relevant and could potentially affect demand depending on factors like standardisation, speed and manufacturer support, several respondents emphasised that "emerging technologies will unlikely impact demand, but regulatory decisions can influence it" to a greater extent. Factors such as enhanced picture quality and increased screen size are also identified as potential influencers.

In conclusion, the surveyed retailers and installers indicate that the current market for products in the 470-694 MHz band is healthy, primarily driven by DTTB and growing PMSE and advanced broadcasting technologies. Customer satisfaction, particularly with free-to-air services, is generally high. However, the future of this market is heavily reliant on regulatory decisions concerning spectrum allocation. The uncertainty in this area poses a considerable challenge, directly affecting customer investment confidence and giving rise to significant concerns about potential disruption to business operations, customer satisfaction, and the broader European industrial sector. It is evident that stakeholders in this sector are seeking stability and clarity regarding long-term spectrum availability.

ANNEX II – The Workshop

Along with the questionnaire and in accordance with the mandate of the work of the sub-group, a workshop entitled "The future of the 470-694 MHz band within the EU" was organized on Friday 11 April 2025 at the European Commission premises in Brussels and online. The workshop was open to representatives from RSPG Member States as well as external stakeholders. The latter, in particular, took the opportunity to reiterate their needs, provide background information and clarify their position regarding the 470-694 MHz UHF frequency band.

The event also provided a valuable forum for dialogue, enabling an open exchange of views among the various participants

All the presentations/slides of the workshop are published on the RSPG webpage.

The workshop was divided in 4 Sessions; reflected in the next subsections.

Session 1 – The present use of the band

As an introduction, the European Commission and the RSPG subgroup co-chairs outlined the current situation regarding the usage of the 470-694 MHz frequency band.

The European Commission delivered a presentation on the EU Regulatory Framework for the sub-700 MHz band, highlighting particularly the upcoming deadlines linked to a possible revision of Decision (EU) 2017/899. The definition of the European Union's position on the relevant agenda item for the 2031 World Radiocommunication Conference (WRC-31) was also identified as a key milestone, with initial considerations already falling within the scope of agenda item 10 of WRC-27.

The RSPG subgroup co-chairs provided a brief summary of the questionnaire results, focusing especially on the responses provided by national regulatory authorities. The contrast between the widespread technical coverage of digital terrestrial television broadcasting (DTTB) across Europe and the stark differences in actual user adoption between countries was notably highlighted.

Session 2 – Cases from the four corners of the world

In this session there was an exploration of the regulatory aspects in various countries where future uses of the band are moving in different directions, also with a look at what is happening in countries outside the EU.

The first panel included representatives from Spain and France, who spoke on behalf of regulators in EU countries that foresee a continued high-level use of DTTB in the future.

Spain presented its strong reliance on Digital Terrestrial Television (DTT), or TDT, as a key pillar of universal television access:

- Around 65% of the population lives in multi-dwelling buildings where DTT connectivity is mandatory.
- With over 99% population coverage, DTT remains the most widely adopted platform, offering up to 36 HD channels via nine multiplexes. A transition to DVB-T2, aiming for full Ultra High Definition (UHD) broadcasting, was initiated through a royal decree in March 2025.
- Big screen TVs with Smart TV capabilities dominate audiovisual consumption, with DTT content being the preferred choice.
- Despite high broadband penetration (87%) and IPTV adoption (68%) consumption of non-linear audiovisual services remains limited (34%), while hybrid TV (HbbTV) is widespread.
- The DTT platform also best fulfills Spain's goals for content diversity and accessibility, particularly in regions with co-official languages.

France centered its presentation on recent and upcoming changes to the DTT platform, highlighting its significance within the broader television landscape:

- There has been a slight but steady decline in DTT usage in France since 2018. Currently, DTT is utilized by 42% of French households, compared to 71% for IPTV.
- A call for applications for the renewal of licenses on the DTT platform led to significant changes for the whole television landscape, including the definitive closure of two TV channels, even though they had the opportunity to continue distribution on other platforms.
- Following this call for applications, two brand new free-to-air (FTA) national TV channels are set to launch in 2025 (unprecedented since 2012).
- Modernization of DTT is underway with the successful launch of a DVB-T2 multiplex in 2024, coinciding with the Olympic Games. This event will also serve as a stage for a large-scale trial of 5G Broadcast technology.
- DTT retains valuable assets in terms of pluralism, cultural diversity, resilience, and sovereignty, all of which continue to hold significant relevance for French media landscape and society.

The second panel was led by representatives from Sweden and Slovenia, who spoke on behalf of regulators in EU countries that foresee either a marginal use of DTT or a complete switch-off.

Sweden has initiated a major restructuring of its terrestrial broadcasting system starting in early 2025:

- The number of multiplexes was reduced from six to two as of January 1st, retaining only four public service channels and two private ones. All pay-TV channels, which previously made up a significant part of the offering, have been completely discontinued.
- Throughout 2025, a process is underway to reallocate part of the freed-up spectrum for new broadcasting licenses, with a call for applications scheduled for August 2025, followed by a governmental decision, selection, and a new service configuration to be launched in January 2026.
- However, according to the speaker, a likely scenario is that Sweden's DTTB may eventually be reduced to a single multiplex, carrying only the two main national public channels.

Slovenia presented facts and figures on its residual use of DTT along a high broadband penetration, expressing a desire to explore innovative uses of the UHF band:

- Since February 2024, Slovenia has limited terrestrial television broadcasting to a single multiplex, MUX-A, dedicated to public channels, covering over 97% of the population.
- DTT plays however a marginal role, used by less than 1% of households, as the majority of Slovene viewers access linear television through cable or IPTV services. The shift is largely driven by the popularity of "quadruple play" offers from the country's four main telecom operators, which bundle internet, television, fixed, and mobile telephony.
- In response to this transformation, the Slovenian regulator is evaluating options to reallocate unused UHF spectrum by 2031. Preparatory work is underway for 5G Broadcast trials in the 600 MHz band, along with pilot projects exploring innovative applications such as mobile IoT (m-IoT) or PPDR.

The third and final panel of this session was dedicated as a forum for two non-EU countries which evolves towards a transition of their use of the band:

United Arab Emirates (UAE) presented the current status of terrestrial broadcasting and outlined its strategic plans for spectrum reallocation in the UHF band:

- DTT broadcasting in the UAE is currently limited to two channels, occupying just 16 MHz of the 224 MHz available in the 470–694 MHz band.

- In November 2024, the Emirati administration completed the allocation procedure for the 600 MHz band (614–694 MHz) to enable its use for 5G deployment. This decision follows the 'footnote' decision of WRC-23 regarding primary IMT allocation for 11 Arab countries.
- The country's two mobile network operators are currently in the pre-deployment phase for 5G in this spectrum. A key challenge identified is the risk of cross-border interference with broadcasting services from neighbouring countries, particularly Iran. Bilateral discussions and regional coordination within the Gulf Cooperation Council are ongoing to address this issue.
- The presentation also underlined the significant demand for PMSE services, given the UAE's role as a frequent host of major international events. In cooperation with industry stakeholders, the administration is exploring alternative spectrum bands to meet the needs of wireless audio/video production equipment.

United Kingdom (UK) provided an overview of its evolving audiovisual landscape and outlined the future scenarios under consideration for its terrestrial television platform:

- There is an ongoing decline in linear television consumption in the UK, closely correlated with the increasing availability and penetration of very high-speed broadband across the country. Despite this downward trend, around 33% of viewers still rely exclusively on Digital Terrestrial Television (DTT).
- A comprehensive report published by Ofcom in May 2024 presents three main scenarios for the future of the UK's terrestrial broadcasting platform:
    1. Modernisation of DTT, through a full transition to DVB-T2/HEVC, aiming to improve spectral efficiency while maintaining service for a significant share of users;
    2. Reduction to a "nightlight service", retaining only a limited number of public service channels, similar to the approach adopted in Sweden, potentially as a transitional phase toward full switch-off;
    3. Complete switch-off of DTT, accompanied by a support campaign to help households transition fully to IP-based television distribution.
- A governmental decision on the preferred path is expected within the next two years, with implementation envisaged within an 8 to 10-year timeframe.

The difficulty of achieving a future common harmonized way for the 470-694 MHz UHF frequency band, which should be the goal of EU frequency regulation, became here in this session very clear. It highlighted the contrast between countries with two radically different approaches, such as Spain and Sweden. Spain, along with France, emphasized the continued importance of DTT for ensuring media pluralism, cultural diversity, and resilience, while Sweden and Slovenia foresee a marginal use or complete switch-off of DTT. Examples of UK and UAE stressed furthermore the numerous factors to take into account in shaping a transition scenario.

Session 3 – The future use of the band

The focus of the third session was on the views of stakeholders, also in the light of the regulatory aspects presented in the session before (Session 2). The aim was for each community to provide a picture of its "ideal situation" in terms of band usage over the next decade. In order to get a fair view of the interests of each sector, associations represented the different stakeholders in each community which were invited:

Television (DTT): the EBU (European Broadcasting Union), representing European public service media, reaffirmed its strong commitment to the continued use of terrestrial broadcasting:

- Around 41% of EU households still rely on DTT, which the EBU considers the most suitable platform to fulfil public service media missions due to its universal accessibility, free-to-air nature, reliability, and the high level of public trust it enjoys. Its robust infrastructure is also seen

as a strategic asset in terms of resilience, especially during emergencies, and as a key pillar of national digital sovereignty.

- Regarding coexistence with mobile (IMT) services, the EBU stressed that significant geographic separation is required to prevent interference, making efficient mobile deployment in the UHF band challenging. Moreover, the flexibility provision introduced at WRC-23 confirms that broadcasting retains priority and must be protected from harmful interference.
- EBU advocated for the preservation of DTT in the UHF band beyond 2030, as a vital enabler of secure access to public audiovisual services, communication resilience, content sovereignty, and continued support for PMSE sector needs.

PMSE: the APWPT, represented by Sennheiser, reiterated the critical importance of the 470–694 MHz band as the primary spectrum resource for audio PMSE applications:

- The loss of access to the 600 MHz portion would have severe consequences for many events, with some already facing constraints due to spectrum scarcity. Such a scenario could lead to the emergence of "PMSE white zones," making certain venues unsuitable for hosting professional events.
- At a time when demand for PMSE is growing, no new frequency bands have been identified to accommodate it. Proposed alternatives, such as 5G-based solutions or fragmented national approaches, are not considered viable.
- The APWPT therefore stressed the urgent need for a harmonised and long-term access to the 470–694 MHz band, which is essential for sustaining the economic, cultural, and social value generated by the PMSE sector.

Mobile-IMT: the GSMA, consistent with its stance, advocates strongly for mobile solutions in the band highlighting the supposed irreversible decline of linear television:

- Their argument centers on the digital divide between rural and urban areas, asserting that allocating more spectrum in the UHF band, particularly the 600 MHz, could significantly improve data speeds (allegedly by up to 40%) in less-populated areas and ensure that "no one is left behind" in mobile broadband access.
- The GSMA outlined four scenarios, some of which appear technically or politically arguable:

    1. Transfer of the 600 MHz Band: DTT would remain in 470-614 MHz, a scenario already implemented in Region 2.
    2. Optimization of DTT via SFN (Single Frequency Network): This proposal was quickly questioned, with the EBU noting that SFN is already widely used and faces technical constraints that limit significant expansion.
    3. Allocation of the UHF Band Among European Countries: An idea contrary to the goal of spectrum harmonization at the European level.
    4. Complete Shutdown of DTT.

Mobile-PPDR: the TCCA (The Critical Communications Association) emphasized the increasing importance of critical communications, driven by the growing demand for broadband services, particularly for public safety forces:

- In this context, three architectural models were presented, with the preferred option for the speaker being a fully dedicated network. An example of this model is currently under consideration in Germany, which is seeking up to 60 MHz in the 600 MHz band for this purpose.
- The spectrum requirements for critical communications in this band vary significantly among stakeholders, ranging from 2x10 MHz to 60 MHz, depending on national approaches and specific use cases.

Defence: the NATO along with German Army highlighted the growing interest of defence forces in the 470–694 MHz band, particularly for mobile broadband uses tailored to military needs, similar to those expressed by public protection and disaster relief (PPDR) services:

- Some countries are already utilizing this band for military purposes, leveraging the white spaces not used by DTT. As an example, German Army ("Bundeswehr") indicated an usage of two 8 MHz channels in the 470–512 MHz band in some training camps, with a third channel to be planned soon in the 512–600 MHz band.
- In this regard, it was noted that many military radio devices are configurable up to 512 MHz, making a defence allocation in the lower part of this band immediately operational. This would help alleviate congestion in the primary defence VHF/UHF band (230–400 MHz).
- NATO considers that any future identification of the 470-694 MHz band for IMT services could jeopardize these military uses. Localized and occasional coexistence with DTT, in line with the provisions allowed by WRC-23, could be considered, although it would be technically complex. This approach appears to be the most realistic at this stage.
- German Bundeswehr presented its long-term national strategy for using the 470–694 MHz band as part of a comprehensive modernization program for its secure communication infrastructure. By 2030–2040, German Army wishes to deploy high-speed ad hoc networks and military networks based on 3GPP standards, requesting 60 MHz of spectrum for this purpose.

Radio Astronomy (RAS): the CRAF emphasizes the significant scientific importance of the 608–614 MHz band, which is currently in permanent use:

- It is noted that protective measures are already in place through specific national and international agreements.
- In the event of new primary allocations to mobile services, the RAS requests that its secondary allocation in the 608–614 MHz band be elevated to primary allocation status across Region 1, or even globally. This change in status would not entail any additional protection requirements against the existing broadcasting service.

Session 3 confirmed the difficulty of achieving a harmonized future frequency usage of the 470-694 MHz UHF band, as already highlighted in Session 2.

The discussions underscored the diverse and often conflicting interests of various stakeholders. As EBU emphasized the continued importance of DTT for broadcasting and APWPT highlighted the need for maintaining this full current spectrum allocation - crucial in PMSE for live events and productions- , the following stakeholders advocates for introduction of a specific mobile allocation: GSMA pushed for reallocating parts of the UHF band to mobile services to bridge the digital divide and enhance mobile broadband, proposing scenarios that included the potential shutdown of DTT; TCCA stressed the necessity for dedicated spectrum for public safety communications; Defence representatives, including NATO and Germany, underscored the band's strategic importance for secure military communication.

These varied perspectives illustrate the challenges in reaching a consensus on the future use of the 470-694 MHz band.

Session 4 – Round table: "What if…"

Last but not least a round table offered a more open debate. If Session 3 allowed each sector to present its ideal vision, the Round Table asked the speakers to consider the concrete problems of coexistence and balancing different needs that might arise in the next decade, aiming to discuss potential solutions and trade-offs. In this context, in according with the mandate, lessons learnt from early initiatives from Member States introducing other usages than towards new spectrum efficient technologies were discussed. The following representatives discussed in this round table for:

- Networks: Nokia
- Services: BNE
- Regulators: Italy and Sweden
- PPDR: BDBOS Germany
- PMSE: Shure
- Public Broadcasters: ORS and YLE

Following positions expressed by this panel in response to the moderator's questions highlighted once again the diverse and often conflicting interests and approaches:

- When asked how much spectrum they would want in the 470-694 MHz band if ITU-R and regulatory authorities could allocate it:
    - Nokia, acknowledged the temptation to use the entire band for IMT services but emphasized the importance of considering other services' needs, proposing to explore spectrum sharing opportunities, particularly in the lower part of the band (470-614 MHz).
    - The BNE, representing broadcasters, insisted that broadcasters do not seek additional spectrum but aim to maintain current services that meet essential needs, stressing the importance of terrestrial broadcasting and realistic spectrum sharing.
    - Shure, representing PMSE, underscored the dependence on current DTT allocations and the need for priority spectrum access for national interest events, advocating for flexible spectrum sharing.
- When discussing how to ensure the same service as DTT with same characteristics (free to use, accessibility, non-profiling, sovereignty...):
    - The Italian regulator deemed it unrealistic to replace DTT with technologies like IPTV due to high costs and necessary infrastructure, emphasizing that DTT remains essential for reaching a broad audience, particularly in Italy where up to 21 million people watch television simultaneously in the evening.
    - ORS (Austria) highlighted innovation in terrestrial broadcasting, particularly with 5G Broadcast technology, which could play a significant role in the IP ecosystem, enabling European broadcasters to strengthen their sovereignty against dominant global players and ensuring the dissemination of reliable content across Europe.
    - Yle (Finland) presented a more radical dissenting position, suggesting that DTT could be completely phased out, at least in urban areas where IP networks are sufficiently capable of meeting the needs traditionally served by terrestrial broadcasting while offering interactivity. The speaker advocated that a large portion of the 470-694 MHz band for mobile unicast to ensure a minimum bitrate of 5 Mbit/s for all individuals, thereby guaranteeing universal access to television services, especially in rural areas.
- When asked on elaborating a scenario where IPTV and DTT platforms increasingly integrate:
    - The Italian regulator highlighted economic challenges, including declining advertising revenues for commercial channels and the concentration of digital revenues among tech giants, emphasizing the need to regulate this transition towards IPTV/DTT convergence while experimenting with technical solutions like 5G Broadcast to optimize spectrum use.
    - BNE stressed the importance of allowing citizens to choose their content access method, whether through IPTV or DTT, underscoring the security and reliability of broadcasting, especially in crises, and advocating for maintaining a reliable DTT infrastructure before considering full convergence with IPTV.

- Nokia agreed with the BNE on consumer choice but argued that with near-perfect broadband access, there would be no need to maintain a redundant network for content distribution to fixed locations. The speaker called for spectrum policy flexibility to support consumer choices and encourage innovation in broadcasting technologies, in particular 5G Broadcast.
- ORS (Austria) emphasized the political aspect beyond the "let the consumer decide" doctrine, advocating for public service media and commercial channels to retain some control over their distribution to fulfill their democratic mission within a robust and resilient network such as DTTB. Convergence is already underway through 5G Broadcast, aligning with mobile network technical needs and offering significant opportunities for the European market.
- Yle (Finland) maintained a provocative and pro-IPTV stance, arguing that DTT is not effective for physical resilience as it depends on electrical power, unlike FM radio, and asserting that the most resilient infrastructure is decentralized broadband, which is easier to rebuild or replace during war or after disasters compared to the "High-power High-Tower" infrastructure typical of DTT networks.
- Swedish regulator recalled the potential scenario where there might be no demand for terrestrial television spectrum in Sweden by 2026, rendering the spectrum vacant and the idea of convergence obsolete, emphasizing the need to consider how to create value in this spectrum beyond maintaining a traditional service.

- When invited to debate on the need for the sub-700 MHz band for non-DTT usage and potential alternative technologies/bands:
  - Nokia emphasized that increasing traffic capacity in mobile networks is primarily achieved by adding spectrum. In rural areas, lower bands like the sub-700 MHz are crucial for enhancing capacity and reducing the digital divide.
  - Shure, representing PMSE, highlighted the innovation in the PMSE industry, noting that current technologies like Wideband Audio Systems (WMAS) offer greater efficiency and reiterating that 5G technologies cannot meet PMSE requirements. However, they acknowledged that the industry cannot meet growing demand without access to additional channels and advocated for greater harmonization of the PMSE spectrum to improve efficiency.

Conclusion

It was very important to facilitate this direct exchange among various stakeholders and regulators during this workshop. However, it was not possible to give the floor to/hear all in the workshop which contributed to the questionnaire, meaning the workshop did not capture the full picture of perspectives from all interested parties.

It became clear that further discussions are necessary regarding the future of the 470-694 MHz UHF frequency band. Only if all stakeholder and regulators are willing to cooperate, reconsider their spectrum demands, and remain open for new technologies, can an efficient and shared spectrum use become, even across country borders. This collaborative approach is essential to balance the diverse needs of broadcasting, mobile services, public safety, defence, and scientific research, ensuring that the spectrum serves the broadest range of societal and technological interests.

APPENDIX I – The public consultation

In this Appendix, a synthesis is presented of the diverse views expressed by stakeholders in response to the Radio Spectrum Policy Group's (RSPG) public consultation on the Draft version of the present Report.

The public consultation was open from 23 June to 31 August 2025. Fifty stakeholders, from various groups (DTV networks & DTV Content Providers/Broadcasters – DTTB, Mobile Network Operators – MNO, Public Protection and Disaster Relief – PPDR, Programme Making and Special Events – PMSE, Regulators, Industry Associations) participated in the public consultation providing their views, often highlighting conflicting interests and priorities for this valuable spectrum resource.

The subgroup processed and edited a text generated by prompting specific topics in the stakeholders' responses to an artificial intelligence tool.

These are the prompts proposed to the AI tool and then reviewed by the subgroup:

1) Continued use of terrestrial TV (DTTB) beyond 2030 and/or 2040
2) Present and future use of the sub-700 MHz band per service
3) Respondents' views on the reasons that make terrestrial TV useful and appealing
4) DTTB Coverage vs Usage
5) Future Use of the 470-694 MHz Band in Countries with Low DTTB Usage or Unused Spectrum
6) Respondents' views on the reasons not to continue using the band solely for terrestrial TV
7) Objections on giving part or the whole of the band to IMT
8) Regulatory Framework & Harmonisation Challenges
9) Technological Evolution & Innovation
10) Socio-economic & Cultural Impact
11) Coexistence, Interference & Spectrum Sharing
12) Objections to the draft RSPG report

1) Continued use of terrestrial TV (DTTB) beyond 2030 and/or 2040

A significant number of public service broadcasters, commercial broadcasters, broadcast network operators, and content/digital industry associations unequivocally advocate for the continuation of DTTB well beyond 2030, with many explicitly requesting access until at least 2040, and in some cases, beyond. This is often linked to existing license renewals and necessary long-term investments. Spain, for example, renewed most broadcasting licenses in 2025 for 15 years, extending to 2040, with demand for legal certainty beyond this date.

Conversely, MNOs responded supporting the phasing out of DTTB by 2030 in their respective markets due to steadily declining viewer bases. TCCA (International, PPDR association) notes that DTTB spectrum reduction is technically feasible in countries where DTTB is not heavily used. O_2 Telefonica (Germany, MNO) concludes that, while some member states with high DTTB usage rates will most likely continue some kind of use of the band for DTTB after 2030, it would be economically and societally harmful if those member states with only a low degree of DTTB use would be hindered to use this valuable spectrum otherwise. KommAustria (Austria, Regulator) recognizes the wish of countries not needing the entire band for broadcasting services to use it for other purposes.

2) Present and future use of the sub-700 MHz band per service

Each stakeholder's group has its own views on what part of the band is needed in order to provide their services.

Broadcasters and PMSE stakeholders overwhelmingly state that the entire 470-694 MHz band is crucial and indispensable for their operations. They emphasize it is the only harmonized spectrum for DTTB and wireless audio PMSE across Europe, with no viable alternatives identified. Any reduction is seen as severely damaging cultural production and the media ecosystem. Many broadcasters are exploring or planning 5G Broadcast as an evolution of DTTB, especially for mobile viewing, interactive services (HbbTV), UHD and emergency alerts. Trials for 5G Broadcast in the 600 MHz band are reported across Europe.

PMSE Coexistence/Sharing: While PMSE stakeholders insist on the 470-694 MHz band as indispensable, BDBOS (Germany, PPDR) suggests that spectrum sharing between PMSE and mobile services is feasible using techniques like beamforming for IMT downlink. BTG (The Netherlands, Users interest association) also sees potential for shared PMSE usage with PPDR and Defence (primary) and IMT (secondary) using geolocation databases and dynamic spectrum sharing.

Mobile operators advocate for significant portions or the entire 470-694 MHz band for IMT services, especially around 600 MHz, citing its efficiency for rural and indoor coverage. Many MNOs and industry associations propose or demand the identification of the band, or significant parts of it, for IMT (5G and 6G) to increase capacity, enhance rural broadband, and improve deep indoor coverage. Deutsche Telekom (Germany, MNO) explicitly encourages RSPG to support a primary mobile allocation for 470-694 MHz at WRC-31. Moreover, mobile stakeholders remain largely sceptical about the economic viability and relevance of 5G Broadcasting, particularly if deployed via a Low-Power Low-Tower (LPLT) network.

PPDR stakeholders express strong interest in parts of the band for secure, mission-critical communications. BDBOS (Germany, PPDR) explicitly states a frequency requirement of 60 MHz in the UHF band for a broadband mobile radio network requesting access to 470-512 MHz or DTTB white spaces. TCCA (International, PPDR association) indicates national PPDR spectrum needs range from 2x10 MHz up to 60 MHz (FDD) for mission-critical broadband communications. EUTC (European, Industry association) reserving 2x10 MHz of the 470-694 MHz band for mission-critical applications (including utilities) if it becomes available from approximately 2035. Deutsche Telekom (Germany, MNO) and Qualcomm (USA, MNO supplier) suggest modern commercial mobile networks can support these applications through 5G network slicing and QoS differentiation.

Radio Astronomy (RAS): various stakeholders highlight in their responses that RAS and wind profilers is using a fraction of the band, and migration to other spectrum is precluded by physics.

Defence: a significant number of stakeholders refer in their texts to defence and military systems, by acknowledging that there is an expressed interest in using parts of the band. Some of them though point that they already have sufficient alternative spectrum resources at their disposal. O_2 Telefonica (Germany, MNO) mentions that Defence needs could be covered in the lower part of the band up to 512 MHz where currently available military devices are configurable. BTG (The Netherlands, Users interest association) advocates for careful balancing between PMSE and national security aspects, as well as further research and field testing on dynamic spectrum sharing. Confindustria Radio Televisioni (Italy, DTTB) is of the view that the band is strategically vital not only for PMSE, but also for other applications, including Defence. Vodafone (International, MNO) indicates that adoption of the 3GPP band n71/71[20] channel arrangement would enable various mobile applications, including Defence applications.

O_2 Telefonica (Germany, MNO) proposes to reduce DTTB to three multiplexers, introduce Defence systems, if required, in lower part of the band up to 512MHz, IMT in the upper part (80MHz in an FDD pattern), PMSE in TV white spaces in the 510-606MHz band and IMT duplex gap, PPDR in a shared

[20] n71 is a 5G NR band, defined as the frequency ranges 663–698 MHz (uplink) and 617–652 MHz (downlink) with a bandwidth of 2×35 MHz in FDD mode.

basis through prioritised service provision in the IMT range and keeping RAS and Wind profiler in their current band position, increasing that way the efficient use of the spectrum and maximise benefits for society.

3) Respondents' views on the reasons that make terrestrial TV useful and appealing

Public Service, Social Cohesion, and Cultural Diversity: DTTB is widely regarded as essential for delivering public service content (news, education, culture, entertainment) universally and free-of-charge. It fosters media pluralism, cultural diversity, and democratic discourse. It provides inclusive access, especially for vulnerable households and rural areas, with low entry costs.

Resilience and Emergency Communications: DTTB is considered a critical, resilient, and cyber-resistant infrastructure, serving as the "last refuge" and most reliable channel for informing citizens during crises, natural disasters, and power outages. The Spain/Portugal blackout in April 2025 is cited as recent evidence.

Free-to-Air Access: Its free, anonymous, and non-discriminatory access to information is highlighted as a central pillar of democratic societies.

Energy and Cost Efficiency: DTTB is recognized as an energy-efficient distribution technology for linear TV, with minimal carbon impact. It also has low entry costs for users.

National Sovereignty and Independence: DTTB is important for maintaining national sovereignty over media content distribution, combating disinformation, and strengthening Europe's independence from large, commercially driven platforms.

Modernization and Evolution: Broadcasters are investing in modernization (DVB-T2, HEVC, UHD, HbbTV, 5G Broadcast) to enhance appeal and maintain relevance.

4) DTTB Coverage vs Usage

The distinction between the Coverage and Usage (acceptance) of DTTB in the 470-694 MHz band reveals a highly fragmented landscape across the EU, influencing debates regarding future spectrum allocation.

DTTB networks are generally designed and deployed to achieve near-universal technical coverage, fulfilling obligations related to universal access and resilience.

Specific examples of high DTTB coverage include:

- **Austria** (KommAustria): Technical terrestrial coverage is notably high, ranging from approximately 98% for MUX A to about 90% for MUX B, D, E and F, providing full coverage of the Austrian population. However, the actual usage of terrestrial TV is low. Only 11% of households use it as a primary or at least as a secondary source, though this percentage has remained stable over the last decade.
- **Spain** (Televes, Ametic, Television Abierta): Public multiplexes provide 98% coverage and private multiplexes achieve 96% coverage. With complementary plans, coverage reaches more than 99% of the population. The average total daily TV consumption is 222 minutes per person, with 169 minutes dedicated to traditional broadcasting. DTT is a strong service even where fixed broadband coverage (VHCN) is high (over 95%).
- **Czech Republic** (CDG, CRA): DTTB networks ensure nationwide coverage. DTTB services are consumed by more than 50% of households in populated and remote locations across the country
- **Finland** (Digita Oy): DTTB network covers 99.96% of the population, whereas DTTB is the second most popular mode of TV reception (40%) after cable (52%). Regardless of the platform, linear television remains the most popular form of TV consumption across all age groups.

- **The Netherlands** (KPN-Digitenne, Odido): According to KPN-Digitenne (MNO and DTTB), the DTTB customer base has been steadily declining. Both Odido (MNO) and KPN are supporting phasing out/switching off DTT.
- **General views** (Television Abierta, BNE, Digita Oy): Terrestrial broadcasting services are used by 80% of Europeans weekly, reaching over 100 million households (more than 42% of European homes).

Proponents of DTTB emphasize that this comprehensive coverage is essential for retaining national sovereignty over media content distribution and plays a significant role in emergency situations due to its resilience and unmediated nature.

While coverage is often near 100%, the actual usage or acceptance rate of DTTB services varies dramatically across Member States.

This divergence in usage—set against a backdrop of universally high coverage—seems to be in the core of the regulatory debate regarding the UHF band beyond 2030. MNOs argue that the DTT model is unsustainable in many EU countries because it is designed for universal coverage but increasingly serves a shrinking minority of usersleading to the inefficient use of a valuable and scarce spectrum resource. Repurposing this spectrum for mobile services would maximize its value. Broadcasters on the other hand argue that DTT's importance transcends mere usage statistics; it fulfills a public utility function or general interest service. It provides free, anonymous, and non-discriminatory access to content, supports media pluralism, and acts as a critical, resilient channel for information during crises. Proponents note that most countries currently have no plans to refarm the UHF band.

The diverse national demands arising from this disparity make a unified approach unlikely in the near term, necessitating a flexible regulatory framework.

5) Future Use of the 470-694 MHz Band in Countries with Low DTTB Usage or Unused Spectrum

Repurposing the band for alternative services, notably mobile broadband (IMT) and critical communications (PPDR/Defence).
MNOs like Odido (The Netherlands, MNO) and KPN-Digitenne (The Netherlands, MNO and DTTB) explicitly state that repurposing this spectrum for mobile services as early as 2030 would allow a significantly more efficient use of this valuable and scarce resource. Deutsche Telekom (Germany, MNO) encourages a phased approach enabling countries not requiring DTT anymore to start with mobile deployments. O_2 Telefonica (Germany, MNO) states that introduction of IMT in the upper part of the 470-694 MHz band - offering coverage indoor and outdoor in a cost effective and environmentally friendly way – will be in a common technical ecosystem with other world regions where IMT services have been already deployed. Others call for a European harmonized decision on repurposing the sub-700 MHz band, or a significant portion of it (e.g., the 600 MHz band) for mobile services. Elisa (Finland, MNO) similarly believes the band (or part of it) should be utilized for low-band spectrum for 6G services from the beginning of 6G rollouts. Qualcomm (USA, MNO supplier) suggests that national discretion should be encouraged, especially in countries where DTTB usage is low to tailor spectrum policies to local connectivity needs, including enabling 6G and expanding rural coverage. O_2 Telefonica (Germany, MNO) suggests as possible scenario the additional introduction of IMT SDL in countries which do not have any need for DTTB after 2030.

- **Addressing the Digital Divide and Rural Connectivity:** Mobile stakeholders, including Associations like GSA (International, Mobile suppliers association) and GSMA/Connect Europe (International, Mobile sector association), emphasize the need for additional UHF spectrum resources to cost- and energy-efficiently upgrade the existing rural mobile network

grids and improve 5G/6G performance in hard-to-reach areas, thus avoiding a widening digital divide.

- **Shared Usage Models:** BTG (The Netherlands, Users interest association) specifically proposes that in countries with minimal or absent DTTB usage, there is an opportunity for limited IMT usage of the spectrum in a shared usage model with PPDR, Defence and PMSE through close coordination, prioritization for PPDR and Defence when needed, and leveraging geolocation databases.
- **PPDR:** BDBOS (Germany, PPDR), TCCA (International, PPDR association), and EUTC (European, Industry association) advocate for parts of the band to be allocated for PPDR, citing a growing need for mission-critical broadband communications. TCCA states that DTT spectrum reduction has been demonstrated to be technically feasible in countries where DTT is not heavily used.
- **Flexibility and National Autonomy:** Several responses, including those from KommAustria (Austria, Regulator) and Bitkom (Germany, Association), acknowledge the wish of countries not needing the entire band for broadcasting to use this valuable spectrum for "other purposes". GSA (International, Mobile suppliers association) highlights that nations with minimal DTT penetration should have the autonomy to transition their spectrum to IMT if no common EU position is reached.

Sufficiency of the Existing Regulatory Framework for Reuse

The existing regulatory framework, comprising Decision (EU) 2017/899 (particularly Article 4), the GE06 Agreement, and RR 5.295A (WRC-23), is subject to divergent views regarding its sufficiency for reusing the band in countries with low DTTB usage:

- *Some stakeholders believe the existing framework is sufficient and provides flexibility.* Broadcasters and certain network operators argue that the framework provides sufficient space for the development of DTTB and PMSE services while also offering an appropriate degree of flexibility at the national level for alternative services like PPDR, Military, and even innovative mobile services on a secondary basis, provided they do not cause harmful interference to broadcasting in neighbouring countries. They emphasize that Article 4 of Decision 2017/899 already permits alternative uses. Digita Oy (Finland, DTTB) notes that "WRC23 and Art. 4 of the UHF Decision already allow the introduction of other services on the band under certain conditions".
- *A significant number of stakeholders, primarily from the mobile industry, argue the existing framework is **not** sufficient or effective enough, and call for further regulatory changes.*
    - Lack of Deployment Due to Regulatory Uncertainty: A key point echoed is that despite the flexibility offered by Article 4 of Decision (EU) 2017/899, there has been a lack of concrete deployments of other uses, particularly IMT services, in EU Member States. This is attributed to "regulatory uncertainty about long-term technical conditions and usage terms".
    - Need for Primary Allocation for Mobile: Some stakeholders advocate for further considerations of an additional primary allocation in the band 470-694 MHz or parts thereof for the mobile service to create a more sustainable regulatory framework. They suggest the current secondary mobile allocation (RR 5.295A from WRC-23) is insufficient for robust IMT deployments.
    - Demand for Harmonization and Specific Band Plans: ECTA (European, MNO) states that the current approach is at odds with Europe's Digital Decade infrastructure targets and calls for a European harmonized decision on repurposing a portion of sub-700 MHz band. MNOs like Deutsche Telekom (Germany, MNO), GSA (International, Mobile suppliers association), GSMA/Connect Europe (International, Mobile sector association), Elisa (Finland, MNO), and Vodafone (International, MNO) advocate for a timely development of harmonized usage conditions for IMT or adoption of a

harmonized 600 MHz band plan (e.g., 3GPP band n71) to provide regulatory certainty and ease those member states in introducing mobile services.

- Cross-Border Coordination Challenges: The existing framework is seen as inadequate for addressing complex cross-border coordination issues between DTTB and IMT, which currently hinder mobile deployment in countries willing to repurpose the band. Vodafone (International, MNO) encourages revisiting interference protection rights and obligations in border regions. O_2 Telefonica (Germany, MNO) proposes as a possible solution to cross border coordination to designate a "core spectrum" for DTTB across all EU member states and provides some examples.
- Too much flexibility is detrimental: TCCA (International, PPDR association) argues that too much flexibility has shown to be detrimental for PPDR and other critical communication sectors in the past, leading to insufficient harmonized allocations. They encourage defining personalized migration plans for each country to enable harmonised use of mobile service.

In conclusion, while the existing regulatory framework nominally offers flexibility for alternative uses under specific conditions, stakeholders in favour of mobile deployment often perceive it as insufficient due to a lack of regulatory certainty, the secondary status of mobile services, and unresolved cross-border coordination issues. This leads to calls for a more proactive, harmonized, and perhaps primary allocation for mobile services in these specific countries.

6) Respondents' views on the reasons not to continue using the band solely for terrestrial TV

Declining DTTB Usage and Shifting Consumer Behaviour

Several MNOs highlight a steady decline in DTTB subscriber numbers and customer acceptance, which is closely linked to evolving consumer preferences. Consumers are increasingly opting for non-linear, on-demand, and mobile content, rather than traditional linear television. DTTB currently serves only a small fraction of households in some countries, sometimes as low as 3%. The GSA (International, Mobile suppliers association) suggests that as audiences shrink, DTTB's distribution cost and energy demand may no longer be justified.

The limitations of DTTB to linear, scheduled content make it less suited to satisfy modern customer expectations.

Inefficient Spectrum Use and Economic Unsustainability

MNOs argue that DTTB uses large swathes of valuable UHF frequencies for a service with declining reach and relevance, which is an inefficient use of a scarce resource that could be redeployed for greater public value. Deutsche Telekom (Germany, MNO) states that DTTB's technical and economic model is unsustainable in many EU countries, as it serves a shrinking minority of users while incurring high operational and infrastructure costs for little social benefit. Maintaining legacy broadcast infrastructure contributes to unnecessary energy consumption and climate emissions related to the decreasing number of customers served.

The BDBOS (Germany, PPDR) indicates that the spectrum needs of the DTTB service are shrinking in Germany, with studies showing that 56-112 MHz could be released.

Availability of Alternative and Superior Platforms for Content Delivery

The extensive availability of fibre, cable, IPTV, satellite, and streaming services makes the justification for maintaining DTTB infrastructure increasingly weak and its distribution in UHF potentially redundant.

Broadband delivery can replicate DTTB's public service role and enhance it with interactive services, accessibility options, and content personalization.

Local broadcast content is already increasingly available through online platforms in the EU.

Critical Need for Spectrum for Mobile Broadband and Other Services
The UHF band (470-694 MHz) is considered strategically important and critical by MNOs for expanding broadband connectivity, improving 5G, and introducing 6G (especially as a low-band spectrum).

Lower frequencies are essential for cost- and energy-efficient coverage in remote areas and for bridging the "digital divide". Without additional sub-700 MHz spectrum, bridging the digital divide will require expensive and less sustainable network densification.

There is a growing demand for spectrum for PPDR and Defence services, as current allocations are often insufficient for secure, mission-critical broadband.

BTG (The Netherlands, Users interest association) suggests that other alternatives like Non-Terrestrial Networks (NTN) or further densification of existing low-band 5G networks might be more effective for rural coverage than reallocating DTTB spectrum.

O_2 Telefonica (Germany, MNO) believes that in the long run Europe should definitely strive for a full switch-off of DTTB and any scenarios sketched for the 2030-2035 period should only considered as transitory. Moreover, O_2 Telefonica pointed that as more and more EU households have access to internet via fibre to the home (the target is 100%), they will be able to reach linear TV through an internet connection. The undoubted democratic and cultural value of linear TV will not be at risk in case a DTTB reduction in MUXs in the UHF band.

Limitations and Challenges of 5G Broadcast as a DTTB Successor
While some broadcasters explore 5G Broadcast, mobile industry stakeholders express scepticism about its economic viability, especially if it is a closed system limited to linear content, which may not meet audience expectations for non-linear content.

Challenges include device compatibility, high investment costs, and untested business models. The GSA (International, Mobile suppliers association)notes that HPHT DTTB infrastructure is often not sufficient for mobile reception (e.g., handheld devices in urban street canyons) and would require costly densification or deployment on macro-cellular mobile infrastructure.

ARD (Germany, DTTB) believes that the 5G Broadcast ecosystem, e.g. in terms of available 5G broadcast enabled devices, for the time being, is still premature and needs some time to develop. ARD therefore will continue to observe the market in order to identify potential supporters and will reconsider the introduction of 5G Broadcast in the 470 - 694 MHz band at a later stage.

Questionable DTTB Resilience and Environmental Arguments
While DTTB is cited as energy-efficient by broadcasters, some mobile stakeholders argue that maintaining a legacy, energy-consuming infrastructure for a shrinking user base is inefficient and contributes to climate change.

Regulatory Uncertainty and Need for Harmonization/Flexibility
The lack of clear long-term technical conditions under Article 4 of EU Decision 2017/899 has hindered early adoption of alternative uses in Member States.

MNOs advocate for a phased or multi-speed approach to harmonization, allowing countries with declining DTTB usage to transition earlier to mobile services. This implies that in countries where DTTB is no longer needed, its use should not be continued to allow for more efficient spectrum utilization.

7) Objections on giving part or the whole of the band to IMT

Indispensability of the Band for Digital Terrestrial Television Broadcasting

Many broadcasters, particularly public service ones, and the EBU (European, DTTB Association), state that the UHF band is crucial for them to fulfill its public mission to deliver freely accessible, high-quality content to all, inform, educate, and entertain. They emphasize the essential value for social cohesion, fostering cultural and linguistic diversity as well as supporting media freedom and pluralism in Europe. DTTB is vital as a robust, cyber-resilient, internet-independent, and energy-sustainable infrastructure for national sovereignty, security, and democracy, ensuring access to information during crises, natural disasters, and power outages.

The EBU (European, DTTB Association) and CRTV (Italy, DTTB) state that no alternative spectrum has been identified for these services.

KommAustria (Austria, Regulator) states a national terrestrial broadcasting infrastructure is essential in emergency situations to inform the affected people via an additional information channel.

Many DTTB stakeholders are of the view that DTTB ensures universal, free, and open access service to content, especially important for vulnerable households and underserved populations. It remains the primary and most inclusive channel for content of general interest. Many content providers believe DTTB has no alternative given its advantages.

Many countries have renewed DTTB licenses until 2040 or beyond, requiring additional certainty for DTT and audio PMSE beyond 2030, to justify further developments and long-term investments. Some of the DTTB respondents made reference to the present RSPG report, where it states that the majority of EU countries currently have no plans to refarm the UHF band.

Indispensability of the Band for PMSE

PMSE manufacturers and associations consistently emphasize that the 470-694 MHz band is of critical importance and uniquely suited for audio PMSE applications (wireless microphones, in-ear monitoring, audio links). It is the only harmonized UHF spectrum across Europe, offering favourable propagation, device efficiency, and interference resilience.

PMSE stakeholders repeatedly state that there is currently no obvious candidate band as a substitute for the band 470 - 694 MHz for audio PMSE. Other identified bands are considered complementary, not substitutes. Fragmented or 5G-based solutions are not considered viable.

Demand for wireless production tools is increasing, while previous spectrum reallocations (700/800 MHz) have severely reduced available spectrum, leading to severe spectrum congestion, interference, transmission failures, reduced audio quality, and “increased costs.

PMSE operations are typically mobile, ad-hoc, and location-intensive, making them incompatible with shared spectrum models that depend on rigid infrastructure or exclusive licensing. Shure (International, PMSE) warns that even a partial co-primary mobile allocation would undermine the reliability and usability of the band for PMSE, eliminate white space availability crucial to current coordination models, and threaten the long-term viability of the creative sector’s production infrastructure. Any additional mobile service would reduce spectrum for PMSE.

IMT Already Has Sufficient Spectrum and Alternatives

Many DTTB stakeholders argue that mobile operators already hold significant spectrum allocations in other low-frequency bands (e.g., 700 MHz, 800 MHz, 900 MHz), which are specifically suited for wide-area and deep indoor coverage. AIIP (Italy, Internet providers association) specifically notes that claiming the lower UHF band would amount to a further entrenchment of mobile dominance.

For increasing mobile network capacity, higher frequency bands are much better suited and already available.

The issue for rural mobile coverage is often cited as a lack of infrastructure investments, not a lack of spectrum. Improved rural connectivity can and should be achieved through: strategic densification of mobile networks using existing bands; maximising the efficiency of current holdings through advanced technologies; targeted public support for infrastructure deployment.

Some stakeholders explicitly state that the mobile sector (IMT) has access to sufficient alternative bands. BTG (The Netherlands, Users interest association) questions the view that access to the spectrum for IMT is essential to the future provision of IMT services, either for expansion of rural connectivity or low band 6G connectivity. They suggest extension and densification of the current 5G low band networks in rural areas would provide a better utilization of the already assigned spectrum. Shure (International, PMSE) notes studies showing that growth of cellular data traffic has slowed considerably over the past few years and that this trend will continue.

Interference Concerns and Coexistence Challenges

Sharing a frequency band between wide-area bidirectional communication services (uplink and downlink) on the one hand, and the unidirectional television broadcasting service mostly combined with the PMSE audio service as well as other secondary services on the other, is technically challenging.

Previous experiences with LTE700/800 have shown that compatibility between those services is difficult to achieve and needs to be addressed carefully to avoid interference cases that occurred in DTT reception in the past. Mobile services would need to accept or manage interference from DTTB and adopt mitigation techniques.

Any additional mobile service would reduce spectrum for PMSE, potentially leading to heavy congestion at larger events. Mobile IMT applications restrict access to spectrum and disrupt PMSE operations.

Introducing IMT would necessitate major coordination efforts at borders to ensure protection of mobile like IMT uplink from DTTB. Some responses indicate that no agreements currently address cross-border coordination between DTTB and IMT. EBU (European, DTTB Association) stressed that significant geographic separation is required to prevent interference, making efficient mobile deployment in the UHF band challenging.

Threat to Media Pluralism, Cultural Value, and National Sovereignty

Any regulatory reform reducing DTTB's economic viability or reach risks undermining media pluralism, national information sovereignty, and the long-term sustainability of European broadcasting. It also jeopardizes Europe’s cultural and democratic infrastructure.

Policies driving a forced migration to online distribution concentrate power in global, often non-EU, platforms, erode user choice, and weaken national control over media access and standards. AIIP (Italy, Internet providers association) warns against a further entrenchment of mobile dominance, to the detriment of pluralism, service diversity and collective safety.

Any further loss of radio spectrum would damage the sector’s ability to deliver the events and productions that are the backbone of social cohesion and well-being along with economic and cultural value. PMSE reallocation risks degraded audio quality, reduced reliability, and increased costs for users.

White Spaces

The concept of IMT deployment eliminating crucial white spaces is a key concern raised by PMSE stakeholders. Shure (International, PMSE) cautions that even a partial co-primary mobile allocation would eliminate white space availability, crucial to current coordination models for PMSE. Conversely, AMETIC (Spain, Digital sector association) suggests that proper planning and management of white spaces could enable coexistence among DTTB, PMSE, PPDR, and Defence services. This technical solution is pertinent as stakeholders state demands for spectrum for military communications in specific areas. The potential elimination of these coordination tools due to IMT deployment threatens future flexibility and viability for other crucial sectors.

Protection of Radio Astronomy

Stakeholders widely recognize Radio Astronomy Service (RAS) as a current user of the 470–694 MHz band, often categorized alongside PMSE and wind profile radars. BNE (European, DTTB Association) notes that RAS either currently shares or intends to use the band in the future. Bitkom (Germany, Association) supports finding sustainable solutions for the continued operation of RAS. The BTG (The

Netherlands, Users interest association) uniquely highlights that RAS utilizes only a fraction of the available spectrum and, due to the laws of physics precluding migration to other frequencies, prioritizing RAS is deemed a necessary approach for applicable geographies. The nature of the shared use by DTT/PMSE/RAS is considered efficient because these PMSE services are generally local and/or temporary and there are only a few RAS sites using only one 8MHz channel (606-614MHz).

Insufficient Evidence and Need for Further Studies
Many administrations and stakeholders express a general consensus that further studies are needed to assess the consequences of primary mobile service co-allocation or spectrum sharing, including technical feasibility and economic viability. These studies should consider spectrum requirements by service, cross-border coordination, technological developments, and socio-economic benefits.
The lack of concrete deployments of IMT under the existing flexibility of Article 4 of Decision (EU) 2017/899 means there are insufficient lessons to draw conclusions. This implies that the asserted benefits of IMT in this band are not yet proven in the EU context.

In summary, the opposition to allocating the 470-694 MHz band to IMT is multifaceted, stemming from the perceived critical and irreplaceable role of the band for broadcasting and PMSE, the technical challenges of coexistence, existing mobile spectrum, and the broader socio-economic and cultural impacts on European societies.

8) Regulatory Framework & Harmonisation Challenges

Divergent National Approaches vs. Harmonization
Stakeholders acknowledge the diverse national use cases and policy priorities in the 470-694 MHz band, making a unified EU-wide approach challenging. While some mobile stakeholders advocate for harmonization to drive innovation, reduce coordination, and enable IMT deployments (e.g., of 3GPP band n71/71), broadcasters and PMSE stakeholders generally emphasize the need for national sovereignty and flexibility to accommodate existing services.

Demand for Clarity & Predictability
There is a growing demand across various sectors for regulatory clarity and predictability beyond 2030 to justify long-term investments in service upgrades and infrastructure.

Flexibility of Article 4 (Decision EU 2017/899)
The consultation documents indicate that the lack of concrete deployments in Member States under the flexibility provisions of Article 4 has prevented sufficient lessons from being drawn on its implementation. Some mobile stakeholders suggest that regulatory uncertainty about long-term technical conditions is a key reason for this lack of adoption.

Cross-Border Coordination
This is highlighted as a crucial aspect, particularly for IMT deployments near DTTB-heavy countries, often requiring bilateral or multilateral agreements. TCCA (International, PPDR association) highlights that too much flexibility has been detrimental for PPDR in the past, leading to insufficient harmonized allocations.
O_2 Telefonica (Germany, MNO) supports the idea of a flexible, forward-looking framework across the EU which addresses the needs for different users, such as mobile and broadband, during a transition period, following the sufficient decline of DTTB all over Europe (which O_2 expects by 2035).

9) Technological Evolution & Innovation

DTTB Modernization
Broadcasters are investing in or planning to adopt new transmission standards (DVB-T2), updated video compression (HEVC, VVC), image/sound improvements (UHD, 4K, HDR), and hybrid services (HbbTV) to maintain DTTB's relevance.

5G Broadcast
Many broadcasters see 5G Broadcast as a promising technology for delivering content to mobile devices, acting as a complement or potential successor to DTTB, especially for mobile viewing and emergency alerts. Qualcomm (USA, MNO supplier) supports its development. However, mobile industry stakeholders remain largely skeptical about its economic viability and the current lack of device compatibility and established business models.

IMT Advancements (5G/6G)
Mobile industry stakeholders highlight the need for spectrum to support the evolution to 5G and future 6G networks, particularly the sub-700 MHz band for cost- and energy-efficient coverage in rural areas and deep indoor penetration.

PMSE Innovation
PMSE stakeholders mention innovations like Wireless Multichannel Audio Systems (WMAS) for increased efficiency but stress that these do not reduce the need for their core spectrum and that 3GPP or cognitive PMSE technologies do not meet their real-world production requirements.

10) Socio-economic & Cultural Impact

The socio-economic and cultural impact of the 470–694 MHz band allocation is characterized by a conflict between retaining public utility services and pursuing digital economic growth, reflecting how Europe manages its digital leadership ambitions versus its longstanding commitments to public service and cultural resilience.

Impact of DTTB and PMSE Preservation
Democratic and Cultural Value: DTTB stakeholders believe that retaining the band for DTTB and PMSE is considered essential for media pluralism, media freedom, and cultural and linguistic diversity. DTT ensures universal, free, and equitable access to trusted audiovisual content, particularly important for low-income households and vulnerable populations. It acts as a vital tool for countering disinformation.
Economic and Cultural Infrastructure: DTTB & PMSE stakeholders believe that the spectrum is deemed the vital backbone of Europe's cultural and media infrastructure. PMSE is fundamental to Europe's creative industries. The wider content ecosystem generates €100 billion value added yearly and 2.5 million jobs in Europe. Reallocating the band risks making many cultural productions technically or financially unfeasible.
Resilience and Sovereignty: DTTB stakeholders believe that terrestrial networks are seen as a strategic asset and critical, resilient infrastructure, playing the most reliable role in emergency situations and crises (e.g., blackouts). They help retain national sovereignty over media content distribution.
Environmental Efficiency: DTTB stakeholders believe that DTTB is often cited as the most energy-efficient distribution technology for linear television.

Impact of Reallocation to Mobile (IMT)
Digital Inclusion and Economic Growth: Mobile stakeholders argue that reallocation to IMT is the most efficient use of the scarce spectrum. The low-band spectrum is a critical driver in fostering digital equality by addressing rural coverage deficiencies. Low-band 5G is projected to contribute approximately $130 billion to global GDP in 2030.

Infrastructure Efficiency: Mobile stakeholders believe that using the UHF band for mobile services could lead to significant infrastructure efficiencies, potentially reducing mobile base station requirements by up to 33%, which aligns with EU environmental sustainability goals.
Critical Communications Support: Additional spectrum in the 470–694 MHz band allocated for mobile broadband would significantly strengthen Public PPDR capabilities. Modern mobile networks are seen as capable of supporting specialized users like PPDR and Defence via technologies like 5G network slicing.

11) Coexistence, Interference & Spectrum Sharing

Challenges with DTTB & IMT
Broadcasters stress that sharing between DTTB and mobile services (IMT) is technically challenging and often requires significant geographic separation to avoid harmful interference, particularly from DTTB to mobile uplink. They argue that a "mixed use" of the spectrum with IMT is not practical and that existing IMT in 700/800 MHz has already caused issues requiring harmonized release.

PMSE Vulnerabilities
PMSE stakeholders maintain that any additional mobile service would reduce spectrum available for PMSE, leading to congestion, degraded audio quality, reduced reliability, and increased costs. They generally oppose sharing with IMT due to the mobile, ad-hoc, and location-intensive nature of their operations.

Proposed Sharing Solutions
BDBOS (Germany, PPDR) and BTG (The Netherlands, Users interest association) suggest that spectrum sharing between PMSE and mobile services is feasible using techniques like beamforming for IMT downlink or through dynamic spectrum sharing and geolocation databases, with prioritization for PPDR/Defence.
Some mobile stakeholders propose a harmonized 600 MHz band plan (3GPP n71) with specific technical conditions to allow new mobile use while protecting incumbent services as needed, potentially involving bilateral agreements for cross-border coordination or a redistribution of DTTB channels along borders.

Need for Further Studies
There is a general consensus that further studies are needed to assess the consequences of primary mobile service co-allocation or spectrum sharing, including technical feasibility, economic viability, spectrum requirements by service, and DTTB evolution prospects.

12) Objections to the draft RSPG report

General Appreciation
Many stakeholders welcome the draft report, commending its comprehensive assessment, balanced summary, and recognition of DTT/PMSE importance.

Specific Criticisms/Proposals for Amendment

- Methodology/Accuracy: KommAustria (Austria, Regulator) believes the methodology for "Viewers and consumer representatives" (Annex I, Section 5, Part c) might be flawed, potentially leading to a falsification of results due to ambiguity in addressing respondents or including non-expert/conflicted answers (e.g., network operators responding as consumers). The subgroup took care of any comments concerning accuracy in the data presented in the Report.
- Lack of Ambition/Bias: ECTA (European, MNO) criticizes the report for a "lack of ambition" and "conservative approach," arguing it is "totally at odds with the EU 2030 Digital Decade targets" and that it seems aimed at maintaining the status quo. They contend the report

erroneously searches for a unique substitute band for PMSE. Deutsche Telekom (Germany, MNO) notes the RSPG maintains its 2023 position without further development.

- Scope/Missing Elements: The Wider Spectrum Group (European, DTTB and PMSE) proposes adding language to the Executive Summary about digital leadership/cultural resilience, including "Trade unions and employer organizations" as an interested party, and highlighting "democracy" and "employment" in the main text. Qualcomm (USA, MNO supplier) believes the final report should provide a clearer roadmap for band evolution and specific scenarios for 2030-2040.
- Interpretation of Data: GSA (International, Mobile suppliers association) questions the strong link between Public Service Broadcasters' content relevance and DTT as a distribution path. BNE (European, DTTB Association) states that the claim that DTTB can be matched or surpassed by broadband "remains to be proved".
- Specific Text Amendments: GSA (International, Mobile suppliers association) proposes specific text amendments to the report to include harmonization of 3GPP band 71/n71 and flexible implementation under Article 4.

13) List of respondents to the public consultation

N.	Entity	Country	Type of entity or sector of interest	Filename
1	KommAustria	Austria	Regulator	01-RTR-UHF.pdf
2	ZDF	Germany	DTTB	02-ZDF-UHF.pdf
3	Odido	The Netherlands	MNO	03-ODIDO-UHF.pdf
4	ZVEI	Germany	Industry association	04-ZVEI-UHF.pdf
5	VAUNET	Germany	Media and broadcast association	05-VAUNET-UHF.pdf
6	BDKV	Germany	PMSE	06-BDKV-UHF.pdf
7	VDVO	Germany	PMSE	07-VDVO-UHF.pdf
8	Forum Veranstaltungswirtschaft	Germany	PMSE	08-Forum Veranstaltungswirtschaft-UHF.pdf
9	Hutchison Drei Austria	Austria	MNO	*CONFIDENTIAL*
10	Deutsche Telekom	Germany	MNO	10-DEUTSCHE_TELEKOM-UHF.pdf
11	Bitkom	Germany	Digital sector association	11-BITKOM-UHF.pdf
12	BTG	The Netherlands	ICT and telecom Users interest association	12-BTG-UHF.pdf
13	TCCA	International	PPDR association	13-TCCA-UHF.pdf
14	Confindustria Radio TV	Italy	Media and broadcast association	14-CRTV-UHF.pdf
15	AIIP	Italy	Internet providers association	15-AIIP-UHF.pdf
16	TRedess 2010	Spain	DTTB	16-TELEVES-TRedess 2010-UHF.pdf
17	AMETIC	Spain	Digital sector association	17-AMETIC-UHF.pdf
18	APWPT	International	PMSE	18-APWPT-UHF.pdf
19	ARD	Germany	DTTB	19-ARD-UHF.pdf
20	Czech Digital Group	Czechia	DTTB	20-CDG-UHF.pdf

N.	Entity	Country	Type of entity or sector of interest	Filename
21	České Radiokomunikace	Czechia	DTTB	21-CRA-UHF.pdf
22	ECTA	European	MNO	22-ECTA-UHF.pdf
23	European Utilities Telecom Council	European	Industry association	23-EUTC-UHF.pdf
24	Fastweb	Italy	MNO	*CONFIDENTIAL*
25	GSA	International	Mobile suppliers association	25-GSA-UHF.pdf
26	GSMA and Connect Europe	International	Mobile sector association	26-GSMA-CONNECT_EUROPE-UHF.pdf
27	BDBOS	Germany	PPDR	27-BDBOS-UHF.pdf
28	KPN/Digitenne	The Netherlands	MNO and DTTB	28-KPN-DIGITENNE-UHF.pdf
29	LiveKomm	Germany	PMSE	29-LIVEKOMM-UHF.pdf
30	ORS	Austria	DTTB	30-ORS-UHF.pdf
31	TDF	France	DTTB	31-TDF-UHF.pdf
32	SHURE	International	PMSE	32-SHURE-UHF.pdf
33	FTTH Council Europe	European	Association	33-FTTH-UHF&U6GHz.pdf
34	O_2 Telefonica Germany	Germany	MNO	34-TELEFONICA-UHF.pdf
35	SENNHEISER	Germany	PMSE	35-SENNHEISER-UHF.pdf
36	SOS - Save our spectrum	European	PMSE	36-SOS-UHF.pdf
37	Vodafone	International	MNO	37-VODAFONE-UHF.pdf
38	ELISA	Finland	MNO	38-ELISA-UHF.msg.pdf
39	Media Broadcast	Germany	DTTB	39-MEDIA BROADCAST-UHF.pdf
40	EBU	European	DTTB association	40-EBU-UHF.pdf
41	RTÉ	Ireland	DTTB	41-RTÉ-UHF.pdf
42	AER	European	Radio association	42-AER-UHF.pdf
43	Wider Spectrum Group	European	DTTB and PMSE	43-WIDER SPECTRUM GROUP-UHF.pdf
44	RAI	Italy	DTTB	*CONFIDENTIAL*
45	QUALCOMM	USA	MNO supplier	45-QUALCOMM-UHF.pdf
46	EVVC	Germany	PMSE	46-EVVC-UHF.pdf
47	Televisión abierta	Spain	DTTB association	47-TELEVISION ABIERTA.pdf
48	Broadcast Networks Europe	European	DTTB association	48-BROADCAST NETWORKS EUROPE-UHF.pdf
49	Digita Oy	Finland	DTTB	49-DIGITA OY-UHF.pdf
50	LIVEDMA	France	PMSE	50-LIVEDMA-UHF.pdf

APPENDIX II - The questionnaire

0. Responding entity

Responding entity name	
Country *(write the name of the country if not in the list)*	
Point of contact (name)	
Point of contact (email)	

Q0	Please identify yourself as belonging to **one or more** of the following categories *Select 'x' for each category or subcategory you belong to; leave the categories or subcategories you are not interested in blank; in "Other" cases, you can fill in free text*		
	1. Regulator / Administration / Government		
	Please specify:		
	2. Network provider		
	a. DTTB		
	b. IMT		
	c. Other (specify)		
	3. Content provider		
	a. Audio-visual Service Provider		
	b. Original Content Provider and/or Broker		
	c. Other (specify)		
	4. End-User of Spectrum		
	a. Defence		
	b. IMT		
	c. PMSE		
	d. PPDR		
	e. Radio Astronomy		
	f. Radio Location		
	g. Other (specify)		
	5. Other interested parties		
	a. Representative of audience/consumers		
	b. Manufacturer of TV Sets and Multimedia User Terminals		
	c. Retailer or Installer		
	d. Other (specify)		

1. Regulators

Q1 What applications and users are already authorized to use all or part of the 470-694 MHz band? Do you have plans in the near (until 2030) and far future (after 2030) to dedicate part of the said band to other applications and users?

Fill the table with current values and forecasts for the future

	Current use [MHz]	Near future [MHz]	Far future [MHz]
DTTB			
PMSE			
IMT			
PPDR			
Defence			
Radioastronomy			
Radiolocation			
Other (specify)			

Q2 What potential impact on any of the existing incumbent services do you foresee in the case of either partial or full co-allocation of the band to mobile broadband networks? *(please give details)*

Partial co-allocation:	
Full co-allocation:	

Q3 How many television broadcasting 8 MHz channels in 470-694 MHz are in use?

Provide the maximum number of 8 MHz channels received per coverage area

How many multiplexes in 470-694 MHz are in use in your country and when each of them expires?

Please fill out the table

	Number of 8 MHz channels used	Expiration year of the licence (latest)	Is there a plan to renew the license and for how long?
National			
Regional			
Local			
other			

How many MUXes are implemented by SFN approach and how many MUXes are implemented with an MFN approach?
Please give numbers

SFN		MFN	

Q4	Do you have DTTB in frequency bands other than the UHF band?	
	Yes/No	
	*If **yes**, in which bands?*	
Q5	Would you consider migrating DTTB to another band in order to free the 470-694 MHz band for other services?	
	Rate your answer from 1 (not intended) to 5 (definitely), 0 (not yet investigated)	
Q6	What is the **coverage** of DTTB in your country (geography and/or population based)? How is that regulated?	
	What percentage of households actually use only DTTB for accessing linear TV?	
	What percentage of households do not have access to DTTB coverage?	
	Are they offered any alternative?	
	Provide details if desired:	
Q7	Is the **topology** of the providers network regulated/imposed or can the provider build and expand the network at its will in order to fulfil coverage requirements?	
	a) Topology regulated b) Topology decided by the provider c) Other (please explain)	
	If answer c) please provide details:	
Q8	Is it in your country's plans to upgrade/modify the DTTB network in the near future (before 2030) in any way? *(more than one answer is allowed)*	
	a) Number of layers	
	b) Technologically (e.g. through adoption of DVB T2 , HEVC, etc)	
	c) Topologically (coverage %)	
	d) Number / amount of content	
	e) Other (please specify)	
Q9	Do the audiovisual media content providers own their own network, or is the network provider an independent company?	
	a) All the content providers own their network. b) All the network providers are independent from the content providers. c) Both situations exist (some content providers own the network, some others not)	
Q10	What percentage of households are dependent only on DTTB in your Country?	
	How has this figure been evolving over the last decade?	
Q11	What percentage of programme (content) providers operate on a free-to-air basis / subscription (Pay TV) in National/Regional/Local/other DTTB coverage?	
	Provide the numbers :	

	Free-to-air (%)	Subscription (Pay TV) (%)
National		
Regional		
Local		
other		

Q12	Has your country made additional bi/multi-lateral agreements on top of GE06 agreement for television broadcast in the 470-694 MHz band? Or agreements for other type of networks concerning television broadcasting?	
	a) Only GE06 agreement b) Bi/multilateral agreements with some or all of the neighbouring countries, in force c) Negotiations did not lead to any agreement	
	If answer c) please provide details:	
Q13	What platforms other than DTT are used to access audiovisual content, both linear and non-linear, in your country?	
	Please provide information about the national market share (in subscribers and revenues) regarding:	
	a) DDTB	
	b) Internet based TV	
	c) cable TV	
	d) satellite	
	e) other *(please specify)*	
Q14	Free linear television broadcast is regulated for reasons of general interest objectives, such as freedom of expression, media pluralism, impartiality, cultural and linguistic diversity, social inclusion, consumer protection and the protection of minors.	
	Does your regulation allow the same objectives to be achieved on other media distribution platforms?	
	If yes, please explain briefly how	
	Are you actively studying the possibility of achieving the same goals even if the DTT platform is discontinued?	
	If yes, please explain briefly how	

Q15	What regulatory options are preferred or needed, if a reframing of the 470-694 MHz band is necessary?	
	a) National government decision	
	b) Bilateral/multilateral agreements between interested and affected countries	
	c) Decision at EU level	
	d) Decision at CEPT level	
	e) ITU Regional Agreement in Region 1	
	Please explain the rationale	
Q16	Connectivity policy, especially Digital Decade connectivity targets, envisages all European households having access to high-speed Internet coverage by 2025 and gigabit connectivity by 2030. What is the current status and goal of the plan in your country?	
	Please give details	
	Do you perceive a relationship between the above-mentioned objective and the potential migration of free linear TV from DTTB to IPTV?	
	Rate your answer from 1 (no relation at all) to 5 (highly related), 0 (no opinion)	
Q17	Do you think that the 470-694 MHz frequency band, or part of it, could be a key element in solving the digital divide / further enhancing access to information and communications technologies (ICT), especially in rural areas after 2030?	
	Yes/No	
	If desired, provide a brief explanation	
Q18	What are your plans for the 470-694 MHz band after the current DTTB licences expire? (more than one answer is allowed)	
	a) Maintain the current use (primary DTTB, secondary PMSE) and number of DTTB layers, renewing licenses until year Y *(specify expiration year, if possible)*	
	b) Reduce the use for DTTB from M to N layers, renewing licenses until year Y *(specify number of layers and expiration year, if possible)*	
	c) Introduce other services in the band *(specify which services, the amount of spectrum, and specific spectrum range)*	
	d) Cease DTTB operation within the band	
	e) Other / Not yet considered *(if desired, provide*	
Q19	Do you expect to switch off DTTB in your country?	
	Yes/No	
	If yes, please explain what your reasoning on a national level might be	
	If yes, what means (technical and possible subsidies) would you foresee to deliver audiovisual content to homes considering technical and economic aspects?	
Q20	Are there specific plans to refarm [part of] the UHF band?	
	Yes/No	
	If yes, describe the (intended) schedule of these plans	
	What part of the band will be affected / which services will be the beneficiaries of such refarming?	
Q21	Do you consider the migration of linear free to air viewers from DTTB to any other platform a process that can run smoothly in your country?	
	Already done or rate your answer from 1 (really easy) to 5 (very difficult), 0 (not yet investigated)	
Q22	Under which regime are PMSE authorized?	
	a) licence free b) individual license c) light licensing d) other	
	(Please specify)	

Q23	Does your administration have plans and strategies for the potential evolution and deployment of 5G Broadcast for future delivery of audiovisual media content, including the regulatory framework, the allocation of spectrum resources, and the integration with existing television broadcasting and mobile networks?		
	a) no plans,		
	b) initial evaluation		
	c) some trials took place		*(please give info about their outcome)*
	d) discussion with stakeholders ongoing		
	e) exploring other approaches		
	f) this is the way forward,		
	g) already well-defined plans		
Q24	Are there possibilities for alternative frequency bands for audio PMSE?		
	Yes/No		
	If yes, where?		
Q25	Are there PMS (Public Media Service) coverage obligations in your country?		
	Yes/No		
	How these obligations may be met after a potential refarming of the 470-694 MHz band?		
	Do you foresee the migration of PMS to a specific platform?		
Q26	Is your administration considering the possibility of introducing mobile services (other than PMSE) in the 470-694 MHz band, or part of it, in particular in the light of the changes introduced by WRC-23 and in accordance with Article 4 of EU		
	Yes/No		
	if yes, please explain the approach		
Q27	Has your administration engaged in cross-border coordination with neighbouring countries in view/anticipation of implementing mobile applications in accordance with the flexibility provided by Article 4 of EU Decision 2017/899?		
	Yes/No		
	if yes, please explain the approach		
	Provide information on outcome and challenges		
Q28	Considering the various uses of DTTB across the EU countries, the common market aspects and other relevant elements, how do you see the harmonisation of the 470-694 MHz band usage in the forthcoming 10 to 20 years period?		
	Please explain		
Q29	If you are a Regulator of some kind, please provide us with any other comments or information that you consider significant and not covered by this questionnaire.		
	(preferably no more than 500 words)		

2. Networks

Q30	How much of the following is contributing to the financing of your network (DTTB, SAT, other)? *(Express in percentage)*		
	a) the program broadcasters,		
	b) advertising,		
	c) viewers subscription,		
	d) tv tax (requirement in law for persons to pay a fee for TV.)		
	e) other (please specify)		
Q31	Do you, as a network provider/operator, have any obligations on transmitting/broadcasting a defined number of programmes or certain program		
	Yes/No	N	
	If yes, how is this defined?		
Q32	Could you provide information on the evolution of the share of DTTB in the linear TV market of your country, compared to other reception modes such as: a) IPTV b) cable TV c) satellite TV d) other		
	open-ended question		
Q33	Are there any fees households need to pay in order to have access to linear TV?		
	Yes/No		
	If yes, identify the typical amount paid depending on the distribution network		

Q34	Do you have any plans or initiatives in place to modernise the DTTB platform by adopting new video coding standards (such as HEVC and VVC), broadcasting transmission standards (such as DVB-T2), image formats (such as HDR and UHD),	
	Please give details	
	Are these modernizations imposed by the government?	
	Yes/No	
	Please explain	
Q35	Do you believe that such technology evolutions/modernisations will maintain or increase the current attractiveness of DTTB in your country?	
	Rate your answer from 1 (not at all) to 5 (totally yes), 0 (not considered it yet)	
Q36	Do you expect OTT (i.e. TV over Internet), Cable TV and IPTV to have an impact on linear content distribution over TV-specific (DTTB, Satellite) networks?	
	Rate your answer from 1 (not at all) to 5 (totally), 0 (not considered it yet)	
Q37	How do changing audience behaviours and expectations impact your strategic plan regarding business models for your broadcasting delivery network (DTTB, SAT, other),	
	Rate your answer from 1 (not at all) to 5 (totally), (0: not considered it yet)	
	and briefly explain	
Q38	What are the key technical and/or market developments you anticipate in the next five years for the broadcast platform/network operators?	
	Please explain:	
	Which of them do you expect will most affect the current role of the 470-694 MHz band going forward?	
	Please explain:	
Q39	Given the EU broadband connectivity targets aimed at allowing delivery of non-linear as well as linear TV content to any European home, how do you foresee the future use of dedicated terrestrial (or not) broadcast networks for fixed reception?	
	Rate your answer from 1 (extinct) to 5 (widely used), 0 (not considered it yet)	
	and briefly explain	
Q40	Do you foresee, as a network operator, the provision of a DTTB-like, free-to-air model for PBS (Public Broadcasting Service) over other distribution paths?	
	Please explain:	
Q41	Do you envisage the use of 5G Broadcast for delivery of TV content in your country?	
	Rate your answer from 1 (not at all) to 5 (definitely, 0 (not considered it yet)	
Q42	Have you been involved in trials of 5G Broadcast for delivery of TV?	
	Yes/No	
	If yes, what are your views?	
Q43	Do you consider a 5G Broadcast system, which is limited to linear content delivery, to be financially viable considering the increasing use of non-linear content?	
	Rate your answer from 1 (not at all) to 5 (certainly), 0 (not considered it yet)	
Q44	Do you consider the current topology of DTTB networks sufficient for delivery of TV content via 5G Broadcast in most cases (e.g. handheld device usage in public transport in a street canyon) or do you see a need to complement that with a macro-cellular	
	Rate your answer from 1 (not at all) to 5 (certainly), 0 (not considered it yet)	
Q45	Do you consider cooperative models between broadcast and mobile networks to commonly leverage spectrum and site infrastructure assets?	
	Rate your answer from 1 (not at all) to 5 (definitely), 0 (not considered it yet)	2
Q46	Given current annual mobile data growth rates,	
	o Do you think this growing trend will persist in the coming years?	
	Rate your answer from 1 (not at all) to 5 (certainly), 0 (no opinion)	3
	o Will it be more in urban or in rural areas?	
	Rate your answer from 1 (rural) to 5 (urban), 0 (no opinion)	3
	o How could coverage be achieved in rural areas considering the constraints in identifying and building new mobile base station sites and the limited range of higher	
	Please explain:	It could be only achieved by deploying new low band spectrum.
	o Could additional spectrum in 470-694 MHz address future needs?	
	Please explain:	Yes
Q47	Do you see potential synergies of 5G Broadcast and additional mobile DL resources in the 470-694 MHz band in your country?	
	Rate your answer from 1 (not at all) to 5 (definitely), 0 (no opinion)	3
Q48	What other uses (after 2030) of the 470-694 MHz range, could arise in your country?	
	Please explain:	
Q49	Can you see, at present, any regulatory obstacles (e.g regarding spectrum usage, technology, licensing) that do not allow for the expansion/modernisation of your network (DTTB, IMT, other) in the 470-694 MHz band and what regulation measures should be taken to overcome them?	
	Please explain:	Potentially currently defined EMF limits would need to be adjusted as low band spectrum generally influnces more on EMF

Q50	If you are a Network provider of some kind, please provide us with any other comments or information that you consider significant and not covered by this questionnaire.	
	(preferably no more than 500 words)	

3. Contents

ROLE: AUDIO-VISUAL SERVICE PROVIDER (i.e. DTT Broadcasters)		
Q51	Describe your current situation as a media service provider. *For each aspect listed in a,b,c,d, specify the relevant options (one or more) that best describe your service offering.*	
	a) linear / on demand	
	b) free to air / subscription / tv tax,	
	c) terrestrial over the air/ fiber / cable / sat tv / other	
	d) national / regional / local	
	other relevant information	
Q52	Is your service/operation subject to obligations relating to specific content? *Check one or more options*	
	a) Entertainment	
	b) Information (News / Political)	
	c) Education	
	d) European works	
	e) Other (please specify)	
	f) None	
Q53	Do you think the standards outlined below will increase or maintain your content distribution share on the DTT network?	
	a) Transmission standards (DVB-T / DVB-T2 / 5G Broadcast ...)	
	b) TV resolution standards (e.g. HD / UHD / HDR / 3D...)	
	c) Advanced/ alternative services (e.g. Hybrid / HbbTv)	
Q54	Could you provide information on the evolution of the share of DTTB in the linear TV market of your country, compared to other reception modes such as:	
	a) IPTV,	
	b) cable TV,	
	c) satellite	
	d) other	
Q55	Do you consider to supplement 5G Broadcast coverage with mobile broadband capacity in places not reached by the 5G Broadcast signal?	
	Rate your answer from 1 (not at all) to 5 (certainly), 0 (not considered it yet)	
Q56	What are your views on the role public policies and regulations should play in the evolution of content distribution to the public (e.g. in relation to support and promotion, cooperation, balance with other stakeholders, etc)?	
	Please explain:	
Q57	Do you think it is important to maintain access to subscription-free media content?	
	Rate your answer from 1 (not at all) to 5 (only in DTT), 0 (N/A)	
	Which platforms do you consider usable for this purpose as an alternative to DTTB?	
	Please explain:	

Q58	The consumption of audiovisual content is gradually shifting from a "traditional" model (linear, free, via TV set) to a plurality of different approaches (mobile devices, nonlinear content, subscriptions, streaming). Can you provide a current estimate of the contribution of the DTT platform to your business (e.g., in % of revenues), and a	
	Present:	
	In 5 years:	
	In 10 years:	
	In 15 years:	
	What measures have you already taken or do you plan to take to follow this change?	
Q59	To what extent do you expect this trend to be impacted by a significant change in your country's approach to DTTB offer (e.g. through a possible reduction or increase of the number of channels/multiplexes, migration to new standards such as DVB-T2 or UHD, etc.)?	
	Rate your answer from 1 (no impact) to 5 (fully impacted), 0 (no opinion)	
Q60	Do you, as an Audio-Visual Service Provider, perform programme creation activities, either directly or via any associated or dependent company?	
	Yes/No	
	If that is the case, identify types of specific programmes you produce / distribute *Check one or more*	
	a) News & live events	
	b) European works / programmes of general or high interests	
	c) Advertising	
	d) Educational/ documentaries /for specific audiences	
	e) Audiences with special needs	
	f) Other (describe)	

ROLE: ORIGINAL CONTENT PROVIDERS & BROKERS (i.e. producers & distributors of content)

Q61	Describe the weight of DTTB (e.g. as % of business) for the distribution of programmes you produce (overall relevance, per programme type). In what other media do you distribute your content in percentage? (i.e. streaming, sat tv, etc)	
	Please explain:	
Q62	Describe the evolution / expected trend in the weight of DTTB (i.e. as % of business) for the distribution of programmes (overall relevance, per programme type) and the underlying assumptions and factors that infer these projections.	
	In 5 years:	
	In 10 years:	
	In 15 years:	
Q63	Identify the types of specific programmes you produce / distribute *Check one or more options*	
	a) Programmes mainly intended for linear provision (e.g. news & live events)	
	b) European works / programmes of general or high interest	
	c) Advertising	
	d) Educational/ documentaries /for specific audiences	
	e) Audiences with special needs	
	f) Other (describe)	
Q64	To what extent do you believe that audiovisual content regarding national/European culture can be enabled and supported by any combination of the following types of media distribution?	
	Rate your answer from 1 (not at all) to 5 (fully) per type, 0 (no opinion)	
	Free TV:	
	Linear TV:	
	Subscription TV:	
	Streaming:	
	Social media distribution:	
Q65	To what extent do you believe that the existence of linear TV is important for your business?	
	Rate your answer from 1 (not at all) to 5 (fully), 0 (no opinion)	
Q66	How much do each of the content types below rely on free-to-air linear tv?	
	Rate your answer from 1 (not at all) to 5 (fully) per type, 0 (no opinion)	
	News:	
	Political debates:	
	Live events:	
	European works / Culture contents:	
	Focused / Educational Content:	
Q67	Most of free-to-air programme service providers base their business model on advertising and also the advertising industry is based to a great extent on TV promotion. Advertising may also play a role in audiovisual services provided over other subscription-based networks (IPTV/OTT/Satellite...) both for linear TV and non-linear contents. What do you expect to be the role of advertising in the future of Audio-Visual Service?	
	Please explain:	
Q68	How important do you think it is for audio video content to be available on the move?	
	Rate your answer from 1 (not important) to 5 (indispensable), 0 (no opinion)	

REGARDLESS OF THE ROLE		
Q69	If you are a Content provider of some kind, please provide us with any other comments or information that you consider significant and not covered by this questionnaire.	
	(preferably no more than 500 words)	

4. End Users of Spectrum

Q70	Are there any applications, operations, or equipment that currently use the 470-694 MHz band in your activities?	
	Yes/No	
	If yes, quantify the bandwidth used and describe use cases of interest and specific band used	
Q71	What is your expectation for your use of the 470-694 MHz band in the coming years and in the next decade (i.e from 2030 to 2040)?	
	Quantify how much bandwidth you would like to be using in the coming years (up to 2030)	
	Quantify how much bandwidth you would like to be using in the next decade (2030-2040)	
Q72	Are you aware of any emerging technologies or planned developments within your area of operation that might justify the future allocation of part of the band in the 470-694 MHz range?	
	Yes/No	
	If yes, describe briefly	
Q73	How do you imagine the hypothetical coexistence of mobile (IMT, PPDR or ad hoc) and DTTB services in the 470-694 MHz band?	
	Will this affect your operations?	
	Could the result be different from the previous digital dividends (e.g. in the 700 and 800 MHz bands)?	
	Describe possible scenarios for improved coexistence	
Q74	If you are a user of spectrum other than a DTT network provider, operating in the DTTB white spaces, could you continue to operate if the 470-694 MHz band were assigned to mobile networks? Could you migrate to other bands or should part of the band be allocated exclusively to your systems?	
	Please explain:	
Q75	If you are a **Defence End-User** of the spectrum, please answer the following questions:	
	i. What are the primary challenges you face with the current spectrum allocation for Defence purposes?	
	ii. How would changes in spectrum regulation affect your Defence needs (e.g. transferring the band from DTTB to IMT, allocating part of the band to other users)? What spectrum regulation changes would be favourable for	
Q76	If you are an **IMT End-User** of the spectrum, please answer the following questi	
	i. How would the 470-694MHz band be integrated into your mobile telecommunications infrastructure?	
	ii. Do you see needs for additional UL/DL performance and capacity in rural areas in your country at present or in the future? Could additional spectrum in 470-694 MHz address such needs?	
	iii. What are the significant obstacles you face in accessing and utilising this spectrum?	
	iv. How would modifications in spectrum allocation affect your service delivery and technological deployment?	
	v. Do you see potential synergies of 5G Broadcast and additional mobile DL resources in 470-694 MHz in your country?	
	vi. What would be your views if the 470-694 MHz band was to remain solely for DTTB until 2030 and even beyond 2040?	

Q77	If you are a **PMSE End-User** of the spectrum, please answer the following questi	
	i. What are the critical PMSE use-cases is the band 470-694 MHz? (e.g. live events, program production, presentation, conferencing etc.)	
	ii. How critical is this band to your production activities? *Rate your answer from 1 (not at all) to 5 (fully), 0 (no opinion)*	
	iii. What are the primary challenges you encounter with the current allocation of the 470-694 MHz band?	
	iv. Are you planning to move to new technologies in order to facilitate your work as an audio PMSE user? *Rate the following technologies from 1(not preferred) to 5 (mostly preferred), 0 (not aware)*	
	a. PMSE in 5G	
	b. PMSE with a wide tuning range	
	c. Cognitive PMSE	
	d. Audio PMSE in another frequency band	
	e. Other (specify)	
	v. How does the PMSE community react to possible additional services, which also wish to use this frequency range in the future?	
	vi. How would changes in spectrum policy, such as the possible transfer of the band from DTTB to IMT, or allocation of part of the band to other users, affect your ability to produce high-quality content? What spectrum regulation changes would be favourable for the PMSE community?	
Q78	If you are a **PPDR End-User** of the spectrum, please answer the following questi	
	i. What factors or trends do you anticipate will shape the decision of a possible allocation of the 470-694 MHz band for PPDR communications?	
	ii. What challenges do you face with the current spectrum available for PPDR purposes?	
	iii. How would changes in the 470-694 MHz band spectrum availability impact your operational efficiency?	
	iv. Is the use of PPDR in the 470-694 MHz band the best option?	
	Rate your answer from 1 (not at all) to 5 (fully), 0 (no opinion)	
	Please explain	
	v. How do you plan the demand and a possible utilisation of the 470-694 MHz band by PPDR?	
	vi. How would changes in spectrum regulation, such as transfer the band from DTTB to IMT or allocate part of the band to other users, affect the efficiency of PPDR? What spectrum regulation changes would be	
Q79	If you are a **Radio Astronomy End-User** of the spectrum, please answer the following questions:	
	i. How important is it for radio astronomy to have certain frequencies in the 470-694 MHz band free from any other transmissions? *Rate your answer from 1 (not at all) to 5 (fully), 0 (no opinion)*	
	ii. What are the main challenges you face with the current spectrum allocation for radio astronomy?	
	iii. How would changes in spectrum regulation, such as transfer the band from DTTB to IMT or allocate part of the band to other users, affect your research capabilities and outcomes? What spectrum regulation changes would be favourable for the Radio Astronomy community?	
Q80	If you are a **Radiolocation End-User** of the spectrum, please answer the following questions:	
	i. How important is it for radio location to have certain frequencies in the 470-694 MHz band free from any other transmissions? *Rate your answer from 1 (not at all) to 5 (fully), 0 (no opinion)*	
	ii. What are the main challenges you face with the current spectrum allocation for radio location?	
	iii. How would changes in spectrum regulation, such as transfer the band from DTTB to IMT or allocate part of the band to other users, will impact radio location services? What spectrum regulation changes would be favourable for the Radio Location community?	
Q81	If you are an End User of Spectrum of some kind, please provide us with any other comments or information that you consider significant and not covered	
	(preferably no more than 500 words)	

5. Other interested parties

Q82	Do you consider the migration of linear free to air viewers from DTTB to any other platform a process that can run smoothly in your country?	
	Already done; or rate your answer from 1 (really easy) to 5 (very difficult), 0 (not yet investigated)	
Q83	What would be the consequences in your country if in the period 2030-2040, linear TV were to move to a platform other than DTTB?	
	Rate your answer from 1 (no consequence) to 5 (strong consequences), 0 (depends on how abrupt or costly the transition will be)	
Q84	Do you think that future linear TV programme services will decrease in number compared to today in your country?	
	Rate your answer from 1 (no reduction) to 5 (huge reduction), 0 (no opinion)	
Q85	How important do you think it is for audio video content to be available on the move?	
	Rate your answer from 1 (not important) to 5 (indispensable), 0 (no opinion)	
Q86	If you are a **viewer/consumer** please answer the following questions:	
	i. How important is it for the audience/consumers in your country to continue receiving...	
	Rate your answer from 1 (not important) to 5 (highly desirable), 0 (no	
	Linear TV	
	Free to air TV	
	portable/mobile devices...	
	Rate your answer from 1 (not important) to 5 (highly desirable), 0 (no	
	Linear TV	
	Free to air TV	
	iii. How important is it for the audience/consumers in your country to have the capability to receive free-to-air linear TV in every settlement across the country (no unserved areas)?	
	Rate your answer from 1 (not important) to 5 (highly desirable), 0 (no opinion)	
	iv. What alternatives to the DTT network are used in order to provide access to programme service in areas not served by DTT?	
	Check one or more options.	
	a) Free access to satellite TV	
	b) Gap fillers by the network provider	
	c) Gap fillers installed by local authorities/local private sector	
	d) Free access to certain Audio-Visual content accessed using broadband networks	
	e) Other (specify)	
	f) No obligation for free linear TV everywhere	
	v. How easy will it be for the audience/consumers to migrate to new receiving equipment/applications if DTTB is switched off all together?	
	Rate your answer from 1 (impossible) to 5 (very easy), 0 (already use various platforms/apps)	
	vi. How acceptable will be for the audience/consumers to migrate to subscription-based audiovisual content if free to air DTTB is to be switched off all together?	
	Rate your answer from 1 (not acceptable) to 5 (very easy), 0 (the majority already use various subscription-based platforms/apps)	
	vii. How satisfied are the audience/consumers with the quality or availability of audiovisual services currently on DTTB?	
	Quality: rate your answer from 1 (no at all) to 5 (very), 0 (no opinion)	
	Availability: rate your answer from 1 (no at all) to 5 (very), 0 (no opinion)	
Q87	If you are a **Manufacturer of TV Sets/Set Top Boxes and Multimedia User Terminals** please answer the following questions:	
	i. How do your current products utilise the 470-694 MHz band?	
	ii. What percentage of your product line depends on access to this frequency band?	
	iii. How do you anticipate the demand for products operating in this band evolving in the decade 2030-2040?	
	iv. Are there any new technologies or product features you plan to introduce that will require this spectrum?	
	v. What technical or regulatory challenges do you face in utilising the 470-694 MHz band?	
	vi. How would changes in spectrum availability impact your product development and market strategy?	
	vii. What new technologies or product features are likely to be introduced in devices for the consumption of audio video content and which of these will rely on the 470-694 MHz band?	

Q88	If you are a Retailer or Installer please answer the following questions:	
	i. What is the current demand for products that utilise the 470-694 MHz band among your customers?	
	ii. What feedback do you receive from customers regarding these products?	
	iii. How do you foresee the market for these products changing in the decade 2030-2040?	
	iv. Are there emerging technologies that will affect the demand for products in this band?	
	v. What challenges do you face in selling and installing products that use this frequency band?	
	vi. How would changes in spectrum allocation, such as from DDTB to another technology or use, impact your business operations and customer satisfaction?	
Q81	If you are an other interested party of some kind, please provide us with any other comments or information that you consider significant and not covered by	
	(preferably no more than 500 words)	

APPENDIX III – Abbreviations

3GPP	3rd Generation Partnership Project
5GBC	5G Broadcasting
AC-4	audio compression standard
APWPT	Association of Professional Wireless Production Technologies
BNE	Broadcast network Europe
Bw	Bandwidth
BWA	
CCI	Cultural and Creative Industries
CDN	Contents Delivery Network
CEPT	European Conference of Postal and Telecommunications Administrations
Country Codes	
AT	Austria
BE	Belgium
CY	Cyprus
CZ	Czech Republic
DE	Germany
EE	Estonia
EL	Greece
ES	Spain
FI	Finland
FR	France
HR	Croatia
HU	Hungary
IE	Ireland
IT	Italy
LT	Lithuania
LU	Luxembourg
LV	Latvia
ME	Montenegro
MT	Malta
NL	Netherlands
NO	Norway
PL	Poland
PT	Portugal
SE	Sweden
SI	Slovenia
TK	Türkiye
GB	United Kingdom of Great Britain and Northern Ireland
D2D	Device to Device
DAB	Digital Audio Broadcasting

DL	Down Link
DTTB	Digital Terrestrial Television Broadcasting
DVB-I	Digital Video Broadcasting - Internet centric
DVB-T	Digital Video Broadcasting - Terrestrial
EBU	European Broadcasting Union
EU	European Union
EU DEC	EU Decision
EUoS	End Users of Spectrum
FDD	Frequency Division Duplex
FM (radio)	Frequency Modulation (radio)
FTA	Free to Air TV
FTTH	Fibre to the Home
GE06	Geneva Agreement of 2006
GSMA	GSM (Global System for Mobile Communications) Association
HbbTV	Hybrid broadcast broadband TV
HD	High Definition
HDR	High Dynamic Range
HEVC	High Efficiency Video Coding
HPHT	High Power High Tower
ICT	information and communications technologies
IMT	International Mobile Telecommunications
IP TV	Internet protocol TV
ITU	International Telecommunications Union
LPLT	Low Power Low Tower
LTE	Long Term Evolution (mobile communications standard)
MFCN	Mobile/Fixed Communication Networks
MFN	Multiple Frequency Network
MMDS	Multichannel multipoint distribution service
MNO	Mobile Network Operator
MS	Mobile Services
MUX	Multiplexer
NTN	Non-Terrestrial Networks
OTT	Over The Top
PBS	Public Broadcasting Services
PMSE	Programme Making and Special Events
PPDR	Public Protection and Disaster Relief
PSM	Public Service Media
RR	Radio Regulations
RSPG	Radio Spectrum Policy Group
SDL	Supplementary Downlink
SFN	Single Frequency Network
UHD	Ultra High Definition

UK	United Kingdom of Great Britain and Northern Ireland,
UL	Up Link
VOD	Video on Demand
VVC	Versatile Video Coding
WMAS	Wireless Multi-Audio Systems
WRC	World radio Conference