UNDERSTANDING THE UHF BAND ISSUES

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CONTENT

1. EVERYONE IS USEFUL, NO BODY IS NECESSARY
2. ONE SIZE DOESN'T FIT ALL
3. YOU CAN'T CLAP WITH ONE HAND ALONE
4. LOOKING FORWARD

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DTT usage of the UHF band is effective and answering a real need in many countries. The use and need however vary between countries. If we look to the northern part of Region 1, the majority of European countries have implemented DTT networks in UHF and they use quite intensively the resources.

Half of the European countries operate 4 or more multiplexes in the UHF band, with up to 21 multiplexes in one country. DTT platform offers between 3 and 70 national Free to Air linear TV programmes and between 1 and around 300 local and regional linear TV programmes depending on the countries.

I will not discuss the reasons that explain the DTT success in most European countries, as this is not the main subject here.

Anyway, this strong implementation of DTT, amongst other distribution means, as a major distribution platform of linear TV in Europe has led to the 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. Article 4 says: "*Member States shall ensure availability at least until 2030 of the 470-694 MHz ('sub-700 MHz') frequency band for the terrestrial provision of broadcasting services, including free television, and for use by wireless audio PMSE on the basis of national needs, while taking into account the principle of technological neutrality. Member States shall ensure that any other use of the sub-700 MHz frequency band on their territory is compatible with the national broadcasting needs in the relevant Member State and does not cause harmful interference to, or claim protection from, the terrestrial*

provision of broadcasting services in a neighbouring Member State. …". The same decision states that the 700 MHz band should be made available for Mobile by 30 June 2020 (2022 in some countries).

Looking to other parts of Region 1, In Sub-Saharan Africa, the need for DTT as a suitable and useful means of linear TV distribution for sub-saharan African counrtries has been proven in several countries: Ghana, Kenya, Uganda, Tanzania and South-Africa are only few examples of successful and best practice. However, lack of public funding in many countrie, political, legal and organisational issues in some countries are slowing down the process. The implementation of DTT in Sub-saharan Africa needs more time than elswhere. The African countries that succeeded the process had to find suitable business models, with a noticeable role given to Pay-TV and to local content programming on DTT. The ongoing projects as well as the established DTT networks require certainty in the access to spectrum. I went to the recent ITU-ATU event in Nairobi dedicated to DSO review on 6 and 7 March followed by the Annual spectrum Management forum dedicated to the 5G stroy in Sub-Saharan Africa on 8 and 9 March. Despite the difficulties reported by several countries in carrying-out their DSO, I haven't noted any proposal to withdraw the use of DTT as a distribution means or to consider reducing the remaining UHF portion allocated to broadcasting in Region 1. I also went to the AUB workshop on DTT held in Kigali on 12 and 13 March and noted a general commitment from the African broadcasters to benefit from the many advantages offered by digital terrestrial television.

Looking to the MENA countries, the situation is quite different. In some countries, mainly in the Maghreb region, DTT still has a place and a role inside a landscape dominated by free-to-air Direct to home satellite broadcasting. In the remaining parts of the MENA area, especially in Middle-East and Gulf Region, DTT strugles to find its place. I can note the case of Saudi Arabia, where DTT has been implemented quite early (in 2006) compared to many parts of Region 1, including Europe. However, the little information I have on the market share of DTT in the distribution landscape seems to be low. On a positive note, Oman has recently started regular DTT transmissions with the advanced DVB-T2 / HEVC technology. I do wish all success to Oman in this project.

As I already said to several colleagues from Arab regulators, a possible business case that Arab countries may investigate is a mixed free-to-Air and Pay-TV model on DTT, that could be attractive to both Audience and investors. However, quite often legislative changes need to be made to allow for such a model to exist.

I will not extend the analysis beyond Region 1 because of time limitation.

The first learning to take away is that DTT is useful for many countries. It is implemented or being implemented in all parts of Region 1 but at different speeds and with different levels of spectrum requirements.

This brings us to the second issue to understand about the UHF band, which is the disparity in the amount of spectrum ressources needed. In terms of multiplexes (or layers), which define somehow the extent of spectrum required, the effective need in the different parts of Region 1 goes from only 1 multiplex in some countries up to 21 multiplexes. In terms of median numbers (which is the number of multiplexes in 50% of countries), the figure at present is

- 4 multiplexes in Europe with a maximum of 21 (statistics available from 43 countries out of 51)
- 3 multiplexes in Sub-Saharan Africa with a maximum of 9 (statistics available from 23 countries out of 44)
- For MENA data is available only from 5 countries out of 22. Statistics need further investigation.

This disparity in the need for spectrum resources for DTT creates a conviction at the National Regulators that a considerable piece of this high value spectrum is somehow waisted, sitting there without usage. Several ASMG colleagues talked to me about the need for flexibility in using the UHF band and that each country should have the choice to use their unused UHF spectrum as they wish.

I note that this disparity in the need for spectrum resources is present also in the Mobile service. The need for higher capacities and higher speeds are not the same between nordic countries, Southern European countries and African countries for example. Also the speed of implementation varies considerably between countries and Regions. While the 800 MHz band is being used extensively for Mobile Data communications with LTE in

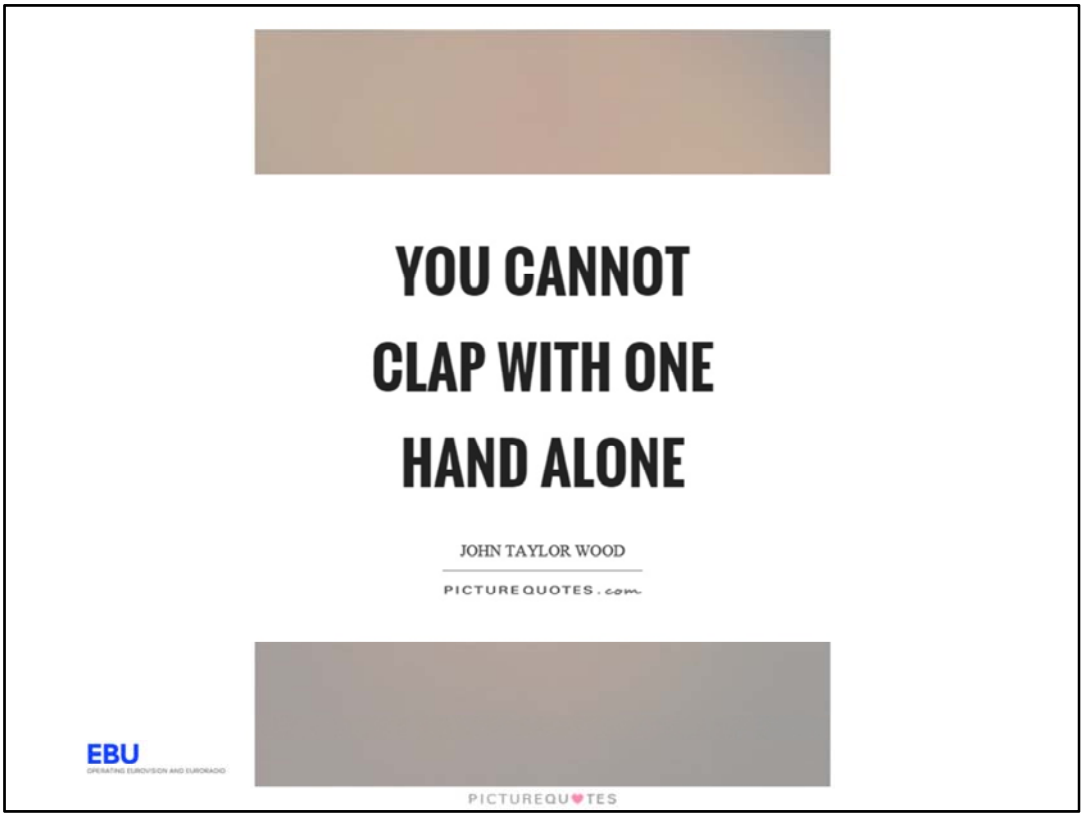
Europe, we see that it is still marginally used in African countries, and the 700 MHz band is not used at all at present in Africa.

I also note that forecasts for Mobile data traffic are continuously revised downword (latest Sisco data).

About this disparity in the needs for Mobile data services between regions, the 600 MHz band usage foreseen in North America is designed for their needs, which are not the same for other countries and Regions. The 600 MHz band in the USA represents their second digital dividend, somehow equivalent to the 700 MHz band in Region 1. Even in the USA, the need for the 600 MHz band is still to be proven. Recently, AT&T have sold their 600 MHz band allocations that they have won in the incentive auction early 2017 (See Policy Tracker article: "*US telco AT&T has agreed to sell all of its remaining 600 MHz band holdings, leaving T-Mobile as the only operator to roll out mobile broadband in the frequencies. Jan 25, 2018 by Toby Youell Research Analyst*".) Moreover, in the USA, the 700 MHz band is not effeciently used for mobile data communications, unlike the 800 and 700 MHz bands which were planned in the rest of the world. This is why the USA need the 600 MHz more than others. Furthermore, the US broadcasters have been given the possibility to retune their frequencies from the 600 MHz to lower UHF or VHF (Band III) or even lower VHF (Band I). However, Band III and Band I are not equally available in Region 1 for DTT. Therefore, the US 600 MHz repurposing operation can hardly be generalizable to all countries in the world.

The second learning to take away is that one size doesn't fit all, neither for DTT nor for IMT.

So a sensible question is: What are the sharing possibilities in the UHF spectrum?



In arabic this reads "اليد الواحدة لا تصفق".

Sharing requires efforts from both parties, not from one of them alone. This is the third UHF issue to understand.

Let's see if and how DTT allows for sharing in the UHF band:

First possibility: DTT does share the UHF spectrum with PMSE (Programme making and Special Events) applications. This consists mainly in Radiomicrophones used to produce broadcasting content inside studios or in production events outdoors. Another use of these Radiomicrophones is to produce real time events (concerts, theaters) by the artistic and creative industry. This sharing situation has happily existed for decades and is still there. The PMSE users have already lost a great part of this resource with the re-allocation of the 800 and the 700 MHz bands to Mobile and are quite concerned with the perspective of any further reduction.

Second possibility: DTT can share the UHF spectrum with White space devices using cognitive technologies. This sharing possibility has been technically demonstrated with the use of geolocation database to automatically assign suitable UHF TV channels to the devices depending on their location. Some countries, like USA and UK have implemented the regulatory mechanism to allow for such sharing. Trials in Africa and some Arab countries (I saw a presentation on such trials in Oman) have been carried out successfully. However, the unlicensed nature of this use cannot compete with the

lucrative perspective of licensing this high value spectrum to users like Mobile operators.

Third possibility: DTT can share the UHF band with any donwlink system that meets the GE06 envelope concept requirements. This flexibility has been included by design in the GE06 Agreement, precisely to allow Administrations to use their GE06 allocations with other broadcasting technologies than the DVB familiy or to use them for Radiocommunication services other than broadcasting.

All this is fine, but still some countries would like to see "usual" IMT applications sharing the UHF band with broadcasting. But does IMT allow for sharing the same band with other services?

The answer to this question at present is that IMT doesn't allow for sharing the band that it uses with any other Radiocommunication service, and this is due to IMT itself. By their design and by the nature of their usage, IMT applications present serious obstacles to sharing:

The first obstacle is technical: The FDD band plan, largely used and preferred by MNOs, in particular in bands below 1 GHz, has equal allocation to uplink and to downlink. It is technically proven that uplink cannot tolerate the kind of co-channel interference that can be received from High Power High Tower DTT transmitters in neighbouring countries. This constraint makes almost half of the IMT band plan (the uplink part) unuseable in large areas near the border with a country that uses DTT.

This fact has been confirmed by a major Mobile manufacturer (Huwaei), based on their own studies (see Huwaei presentations made at CIS spectrum Management conference in Rome, February 2017 and Arab Spectrum Management Conference in Muscat, December 2017).

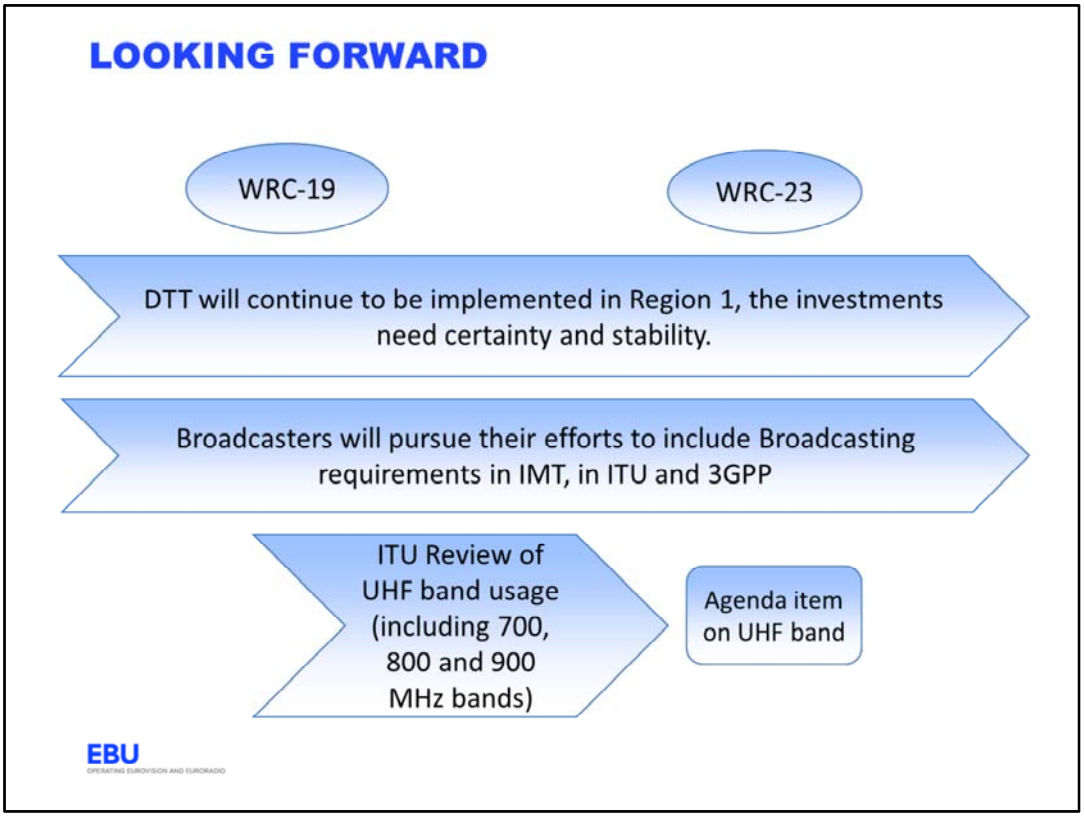
The second obstacle is also technical: the IMT channel bandwidth has several possible values (1.4, 3, 5, 10, 15 and 20 MHz). None of them is chosen to facilitate sharing with DTT (which has 8, 7 and 6 MHz bandwidth variants) or with any other radiocommunication system. Having overlapped channels with different bandwidths makes sharing quite complicated to achieve.

The third obstacle is not technical, it is related to the business model of IMT usage: Auctioning a spectrum that is shared with other systems in neighbouring countries imposes significant effort of cross border coordination prior to the Auction and undoubtedly generates less income compared to an exclusive spectrum on a global or regional basis. Therefore, both MNOs and Administrations prefer the easy way that consists in allocating exclusive bands to IMT and evacuating all other systems from the concerned bands.

Having said this, public service broadcasters, in collaboration with some Mobile manufacturers, are deploying considerable efforts to include broadcasters requirements in the IMT specifications. The concrete outcome of this effort is the eMBMS system specification in 3GPP release 14. Work on this subject is still ongoing and several trials are

being carried out in Europe to test this system for broadcasting purpose. A similar but more long term effort is also made to include broadcasters requirements in the IMT-2020 (5G) specifications. This work is being done in WP5D, in 3GPP and in European funded projects in which EBU and EBU members currently participate. Broadcasters engagement in 3GPP aims to ensure that they can deliver their services, including linear radio and TV, to mobile devices in a sustainable way and with predictable Quality of Service. This might bring about new business opportunities to both the broadcast and the mobile sectors and may lead to a better use of the spectrum. However, broadcast distribution over 4G and 5G will be complementary to DTT and other dedicated broadcast networks, which also continue to evolve. No major transition from DTT to eMBMS or 5G is anticipated in the foreseeable future.

The third and last learning to take away is that IMT systems need to be designed in a way to share spectrum with other systems. Regulators and stakeholders should perhaps facilitate co-existence between 3GPP and DVB networks, rather than chose one over the other.

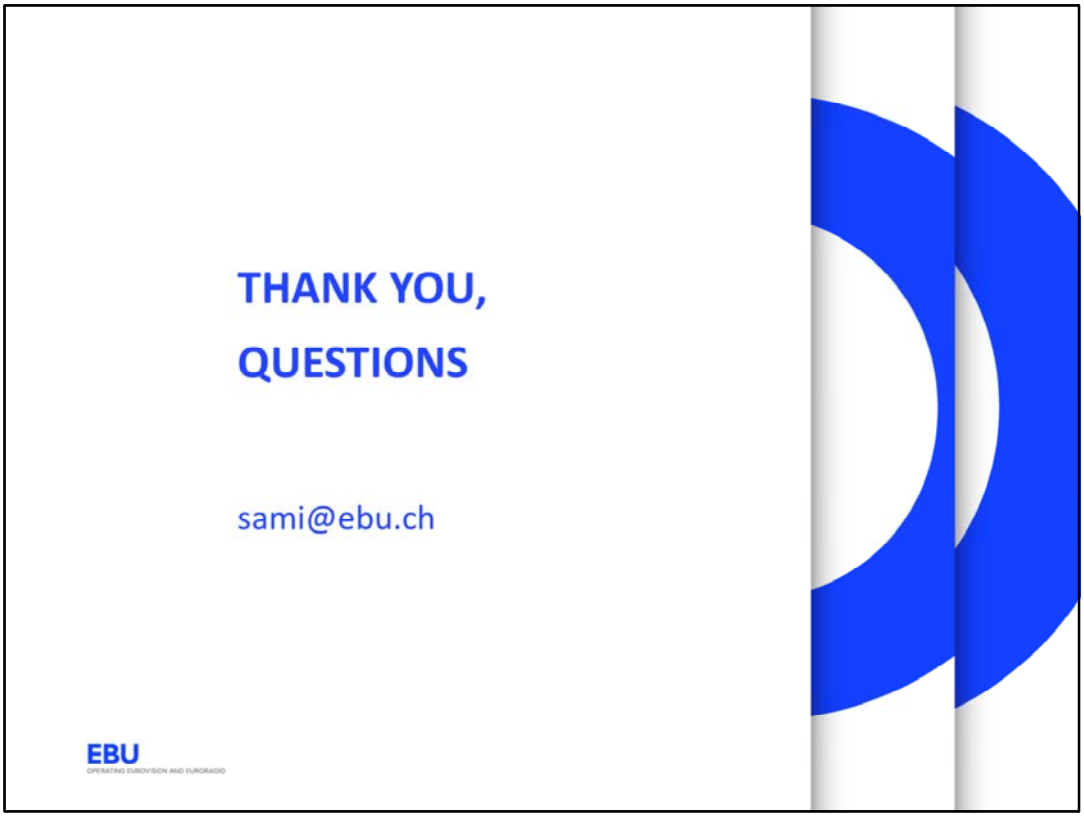


Let's look forward to the upcoming events related to the UHF band.

The effective discussion on the UHF band (not only the lower UHF but also the bands currently allocated to Mobile, i.e. the 700, 800 and 900 MHz bands) will take place between WRC-19 and WRC-23 in the framework of the ITU review of the band 470-960 MHz as decided in WRC-15. Then the results of this review and any regulatory action in the band 470-694 MHz in Region 1 will take place at WRC-23 (subject to outcome of WRC-19 regarding the preliminary agenda of WRC-23).

In the meantime, DTT implementation will continue in the band 470-694 MHz in the different countries of the world, including in Region 1. This implementation represents considerable investment from national Governments and industry sector. It consequently needs certainty and stability in the spectrum resource allocation to ensure its profit return. We at EBU have an ongoing monitoring activity jointly with other broadcasting stakeholders that provides us with a continuously updated picture about DTT implementation in the world.

Broadcasters will also pursue their efforts, in cooperation with Mobile manufacturers and any Mobile stakeholder that accepts to cooperate with us, to include our requirements in the future releases of IMT and IMT2020 (5G). This should help distributing our linear and non-linear content to all devices that are IMT compliant.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QUESTIONS
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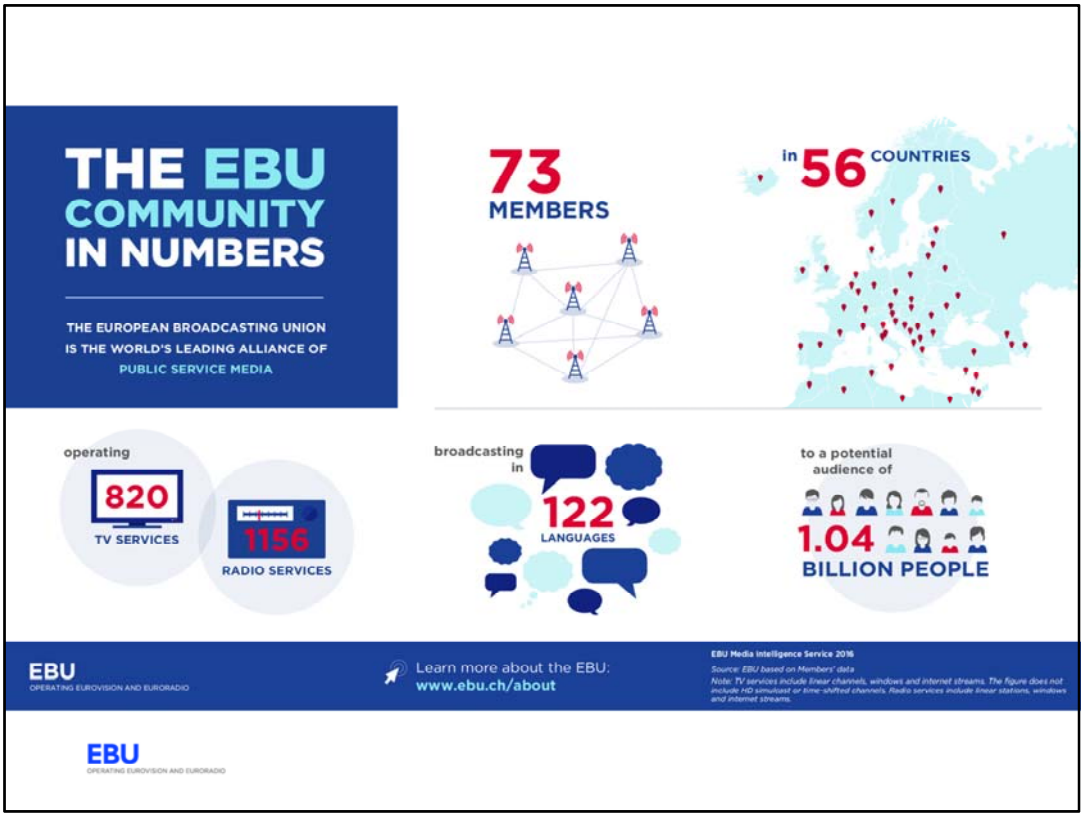
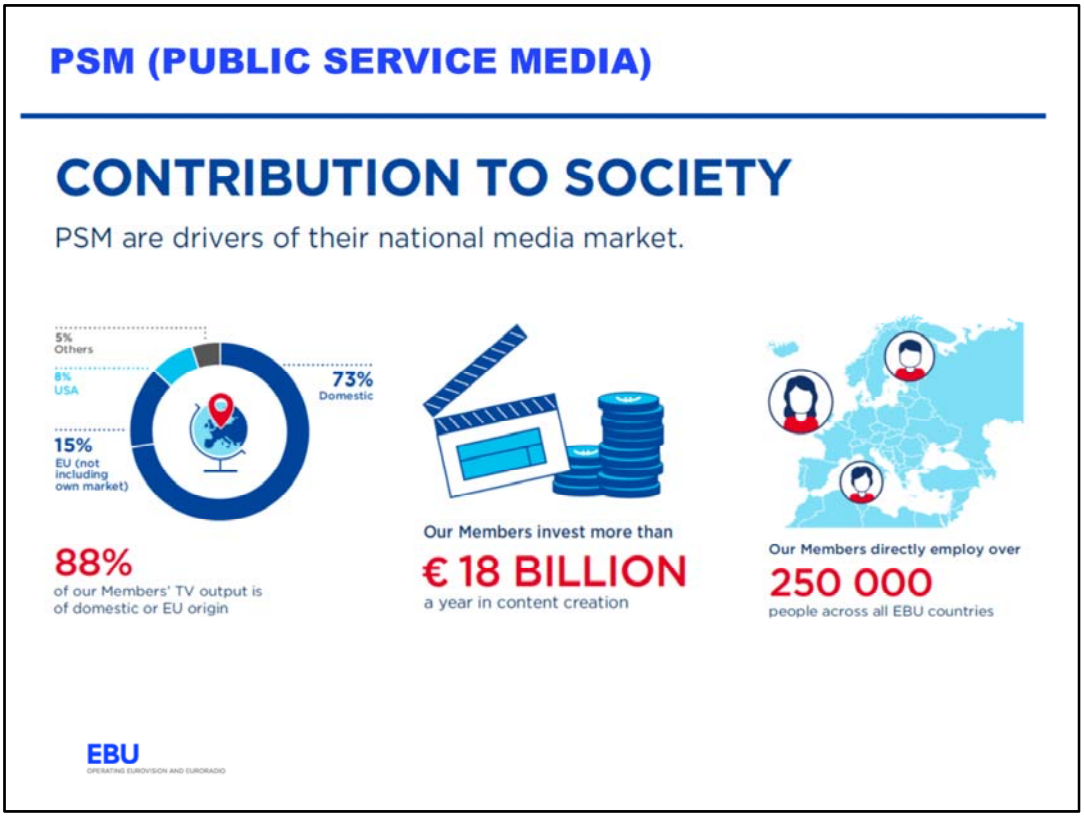


We are a Member-led organization with 73 Members in 56 countries. Between them, our Members operate 820 TV services, 1156 radio services and numerous online platforms (*all our Members stream at least one of their TV channels and 97% have a free catch-up video service*). They broadcast in more than 120 languages to a potential audience of over 1 billion people.
We have members outside the geographical Europe. Arabic broadcasters in North Africa as well as in some middle-east countries are members of the EBU.



Our members invest a significant amount of their funding in the domestic or European content production industry, create high-qualified jobs, and provide diverse, trustworthy and quality free-to-air programmes for all their countries' citizens.