Radiocommunication Study Groups

INTERNATIONAL TELECOMMUNICATION UNION

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SG 6 Rapporteur Group on future spectrum requirements for broadcasting

PRELIMINARY DRAFT NEW REPORT ITU-R BT./BS.[SPECTRUM-REQMTS]

Spectrum / frequency requirements for bands allocated to broadcasting on a primary basis

During Study Group 6's February 2015 meeting, this preliminary draft new ITU-R Report BT./BS.[SPECTRUM-REQMTs] was transferred to Working Party 6A.

Since the Study Group 6 February 2015 block meeting the Rapporteur Group has received and analysed further responses to Circular Letter 6/LCCE/90. In addition the Rapporteur Group has addressed comments received during the Rapporteur Group meetings held during the February block meeting. These changes included:

- converting the presentation of results from a percentage format to number format;
- showing broadcast bands in frequency form;
- separating administration and sector member responses;
- providng further explanation of the analysis.

Where it has been possible to identify frequency ranges used from the information provided, this frequency range is now shown in the table as opposed to LF, MF, Band III, Band IV etc. Due to the existing spectrum allocations in the different regions, to avoid error where the frequency data refers to "bands" and includes 694/698 MHz the band edge is shown as 698 MHz in the summary tables. In the text the term "694/698" MHz is used.

As part of the work of the Rapporteur Group, the analysis data for the television, sound and multimedia sections was circulated for comment, prior to the circulation of the draft report.

Following comments received from the Rapporteur Group some data is shown in text, tabular and graphical formats to aid presentation of the analysis results.

The revised and updated preliminary draft new ITU-R Report BT./BS.[SPECTRUM-REQMTs] is contained in the Attachment.

The following definition is proposed for consideration by WP6A and if agreed, potentially bringing to the attention of the CCV.

Restack (or in some countries repack). The process of clearing digital television services from a digital dividend band (e.g., 694-820 MHz) and relocating them in another broadcast band. [Based on an explanation provided in Report ITU-R BT.2140]

ATTACHMENT

[Preliminary] [Draft] ITU-R Report on spectrum / frequency requirements for bands allocated to broadcasting on a primary basis

Scope

The transition from analogue to digital television broadcasting, the introduction of digital sound broadcasting and the continued development of broadcast standards and compression techniques has created a situation where countries across the World are at different stages of digital broadcasting implementation.

In the framework of the expected implementation of new and enhanced digital broadcast services and their impact on the spectrum requirements for digital broadcasting, as Questionnaire was sent to the ITU membership. The response to this enquiry is presented in this Report.

1 Introduction

The aim of this [draft] report is to identify a list of spectrum / frequency requirements for current and new television, sound and multimedia broadcasting systems operating in the bands allocated to the broadcasting service on a primary basis ~~and indicate the current and future use of these spectrum requirements~~. This report may then assist with the identification of areas of interest suitable for new ITU-R studies.

2 Summary of findings [TBC]

From the responses to the Questionnaire the following points are noted:

– there is a migration towards UHF~~clear move away~~ from VHF Bands I, II and III for the implementation of DTTB and a significant number of countries will reduce the spectrum occupied by DTTB in the UHF Bands. As a consequence ~~in the immediate future~~ the band primarily used by DTTB after ASO (Analogue Switch-Off) and channel restacking[1] will be within the 470-694/698 MHz~~. Although it should be noted that not all countries provide full access for DTTB even within these reduced frequency limits~~;

– nearly all countries operating or planning the introduction of DTTB have indicated a desire for new and enhanced broadcast services. The most frequently referenced new service is HDTV with most countries operating or planning its implementation. UHDTV is also popular with a number of countries trialling systems and studying the requirements. Interest has also been expressed in 3DTV and a number of audio and video enhancements;

– the majority of countries share their television broadcast bands with other primary or secondary services, although the number of countries where the other primary service is allocated spectrum within DTTBs minimum and maximum operational frequency is significantly less, especially after restacking is taken into consideration;

– despite the number of countries that have just implemented or have still to implement ASO, it is interesting to note that several are already considering the future options for the further development of DTTB e.g., HDTV, UHDTV;

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[1] The process of clearing digital television services from a digital dividend band (e.g., 694-820 MHz) and relocating them in another broadcast band.

– provision of local DTTB ~~broadcasting~~ is ~~very~~ extensive in some countries;

– digital sound broadcasting is steadily being implemented in more countries and although not as widespread as DTTB, ~~it is interesting that~~ some countries have started to consider a future ASO;

– demand for more FM radio ~~also appears to be still going~~ remains strong despite there being insufficient spectrum in the areas where it is most needed in many countries.

3 Background to study

Digital terrestrial television broadcasting was first introduced in the 1990s and during the first decade of the 21st Century simulcasting of analogue and digital television was initiated in many countries of all three ITU Regions.

By 2014 a number of countries had switched off analogue television services and some were even starting to consider switching-off some analogue sound services. The prospect of analogue switch-off has allowed administrations to contemplate the implementation of a so called "digital dividend", with in the case of television broadcasting a number of administrations deciding to reduce the spectrum allocated to this service. In some cases this process has resulted in bands or parts of bands previously ~~restricted to~~used by the television broadcast service being vacated and in some other cases a band being shared with or transferred to the sound broadcast service.

~~Since the initial digital broadcast standards were agreed there has been continued development, also video compression techniques have continued to evolve and as a consequence data capacities have increased.~~

Currently multiple analogue and digital broadcast standards and digital compression techniques are in use and there is considerable interest in maximising the efficient use of the spectrum in the VHF and UHF bands, as well as introducing new applications like 3DTV, HDTV, UHDTV, multimedia, interactivity, multichannel sound, etc., with their increased capacity requirements.

4 Questionnaire aims

In view of technical developments, including decisions taken by WRC-03 and WRC-07 on the use of digital modulation in the HF bands, changes were made at WRC-97, WRC-07 and WRC-12 allocating additional services into the bands of terrestrial broadcast operations. The Questionnaire (see Annex 1) is designed to gather information on the future spectrum demand and use by sound and television broadcasting in the bands allocated to terrestrial broadcasting, ~~in view of technical developments, decisions taken by WRC-03 and WRC-07 on the use of digital modulation in the HF bands, and the changes to frequency allocations at WRC-97, WRC-07 and WRC-12,~~ as part of the work in maintaining the ITU-R's BT and BS series of Reports and Recommendations.

5 Analysis of Response to the Questionnaire

As of [July 2015] responses have been received from a total of 63 Member States including one response from each of the three language communities in Belgium. Four Member States have also updated elements of their response and this updated information is used in the analysis.

In addition responses have also been received from 5 Sector Members, of which two are regional organisations: one regional organisation representing 3 countries and the other representing 18 countries.

In the case of some countries, a response has been received from the Administration and also a Sector Member with the information provided by the Sector Member similar to or identical to the

information provided by the Administration. A summary of all responses is provided in the attached annexes.

To avoid duplication in the analysis, where both an Administration and a Sector Member have responded only the Administration's response is taken into consideration for the majority of the questions (see § 5.1 and § 5.2 below for exceptions).

To avoid any confusion over the origins of the data provided, the analysis of results relating to the data provided by Sector Members is shown separately from that provided by Administrations.

Note: not all Member States or Sector Members have responded to each section of the Questionnaire.

The following analysis is based on the responses to the questionnaire, as presented in the summary ~~Tables~~ tables in Annexes 2, 3 and 4~~[X], [Y] and [Z]~~. Note: unless otherwise stated the figures presented below are based on the broadcast operation within the respective countries at the date of submission of the response to the questionnaire. The full responses contain more detailed information and can be found at [document/website location]

[Editorial note: the ~~percentile~~ figures shown in the subsections below are based on the~~ose~~ ~~53~~ 74 responses to the Questionnaire representing ~~54~~ 71 countries that have been received up to ~~16~~29/~~02~~05/2015 and assimilated into the tables in Annexes 2, 3 and 4~~§ 5.4 – § 5.6~~. Responses received after this date will continue to be incorporated in the draft report and the information shown below updated.]

5.1 Television Broadcasting

63 Member States have provided one or more responses to the television broadcasting section of the Questionnaire. The responses show that two countries are currently not providing any off-air broadcast provision, although they have ambitions to provide digital broadcasting in the UHF band. A further two countries have only provided information on their analogue television broadcasting.

5 responses to the Questionnaire have been received from Sector Members. The responses provided by the two regional organisations contain information relating to 13 countries, although one country is included in both regional organisation responses.

In the case of four countries, a response has been received from the Administration and also a Sector Member. Noting that one country is covered by two regional organisations, this means that information provided by Sector Members relating to 8 countries has been analysed.

Two questions in the Questionnaire request views on the future, one question relating to future technology options and the other the impact of technology changes on future spectrum requirements. In both these cases the views expressed by all 5 Sector Members are taken into account and shown separately in the analysis.

A detailed summary of all responses is provided in Annex 2.

An analysis of ~~53~~ responses to the Questionnaire showed the following: ~~[Editorial note: consider conversion to country numbers rather than percentages]~~

Analogue television broadcasting status

Responses from Administrations show that in 63 countries:

– ~~48% of~~31 countries are still using analogue television.

– ~~77%~~25 of the 31 countries using analogue television have identified a potential date for analogue switch-off (ASO) before ~~2023~~2020, ~~although~~ a number of which are plannin~~ged~~ for ASO in 2015.

Responses from Sector Members report that for 8 countries:

– 8 countries are using analogue television.

– 6 of the 8 countries have identified a potential date for analogue switch-off (ASO) between 2015 and 2023.

Digital television broadcasting status

Responses from Administrations show that for 63 countries:

– ~~81% of the~~47 countries are currently operating digital television.

– ~~98% of the~~12 countries ~~have introduced or~~ are in the process of planning to introduce digital television. Further, in some countries that completed ASO several years ago the ~~DVB-T~~digital television network deployed ~~to enable ASO~~ is still being extended.

– 4 countries have not identified current plans to introduce digital television; this figure includes the two countries currently not providing off-air television broadcast provision, although one of these countries has indicated the intention to implement 6 multiplexes at UHF.

– ~~34% of the~~17 countries with existing or planned digital operation have made provision for local/ regional multiplexes.

~~– 66% of the countries that are currently operating DTTB are providing one or more HD services.~~

Responses from Sector Members report that for 8 countries:

– 8 countries are currently operating digital television.

– 1 country has made provision for local/regional multiplexes.

Development of current broadcast provision

Responses from Administrations show that for the 59 countries operating or planning the introduction of DTTB:

– 31 of the 47 countries with DTTB have a HDTV provision.

– ~~47%~~13 of the 16 countries that are currently providing DTTB with no HDTV content are planning future HDTV provision.

– ~~78%~~8 of the 12 countries planning to introduce DTTB are considering some HDTV service provision.

– 10~~25%~~ of the 59 countries ~~respondents~~ are considering or intending to migrate all SDTV provision to HDTV.

– ~~37%~~19 of the 59 countries ~~respondents~~ are considering introducing or have trialled UHDTV services. Other new or enhanced services ~~frequently~~ considered are 3DTV and interactivity with some countries already providing interactive services which include IBB.

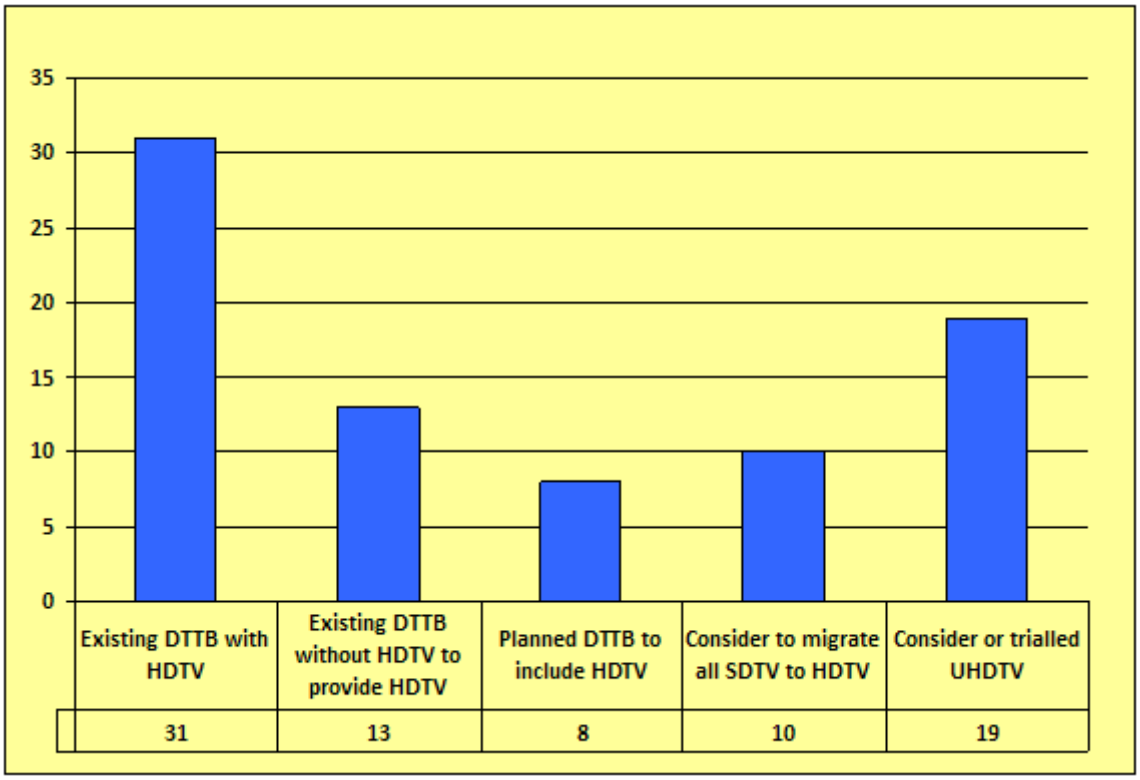
Table 1

Administration interest in new and enhanced DTTB services

Existing DTTB with HDTV	31
Existing DTTB without HDTV to provide HDTV	13
Planned DTTB to include HDTV	8
Consider to migrate all SDTV to HDTV	10
Consider or trialled UHDTV	19

Figure 1

Administration interest in new and enhanced DTTB services



Responses from the 5 Sector Members report that in the 12 countries covered in their responses:

– Broadcasters in all countries are using a broadcast system capable of providing HDTV and 5 countries have a current HDTV provision.

– One broadcaster is considering the migration of all SDTV provision to HDTV.

– Broadcasters in 4 countries are considering UHDTV provision.

One Sector Member representing a regional organisation has stated that many of its members are currently heavily engaged with achieving full conversion to digital broadcasting and have limited capacity to consider new or enhanced services at this time.

Television broadcasting use of broadcast bands

In this sub-section in a number of countries the distribution shown for digital broadcasting represents the spectrum requirements prior to ASO and/or a digital restack.

The responses from Administrations show the current and planned use of broadcast spectrum for analogue and digital television in the 63 countries:

– ~~30% of~~11 countries are using VHF Band I for analogue television; ~~6% of~~no country~~ies~~ has~~ve~~ current or planned DTTB implementation in this band.

– ~~2% of~~3 countries are using VHF Band II for analogue television; no country has current or planned DTTB implementation in this band.

– ~~44% of~~27 countries are using VHF Band III for analogue television; ~~28% of~~18 countries have current or planned DTTB implementation in this band.

– ~~43% of~~28 countries are using UHF Bands IV~~/V~~ for analogue television; ~~93% of~~58 countries have ~~for~~ current or planned DTTB implementation in this band.

– 23 countries are using UHF Bands V for analogue television; 40 countries have current or planned DTTB implementation in these bands.

These figures are shown below in table and diagram

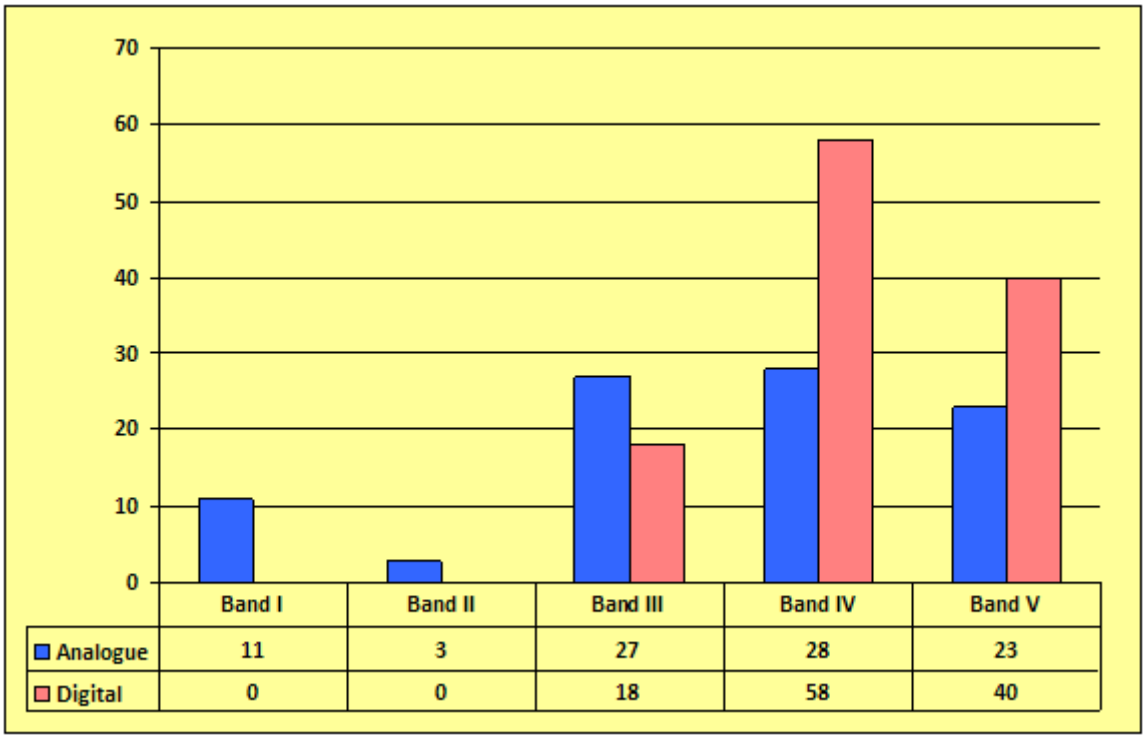
Table 2

Migration of broadcast operation in VHF and UHF for the implementation of DTTB from Administration responses

	Analogue	Digital
Band I	11	0
Band II	3	0
Band III	27	18
Band IV	28	58
Band V	23	40

Figure 2

Migration of broadcast operation in VHF and UHF for the implementation of DTTB from Administration responses



Responses from Sector Members report that for 8 countries the current and planned use of broadcast spectrum for analogue and digital television broadcasting:

– 8 countries are using VHF Band I for analogue television; 2 countries have current or planned DTTB implementation in this band.

– 8 countries are using VHF Band III for analogue television; 3 countries have current or planned DTTB implementation in this band.

– 8 countries are using UHF Bands IV for analogue television; 8 countries have current or planned DTTB implementation in these bands.

– 6 countries are using UHF Bands V for analogue television; 2 countries have current or planned DTTB implementation in these bands.

These figures are shown below in table and diagram

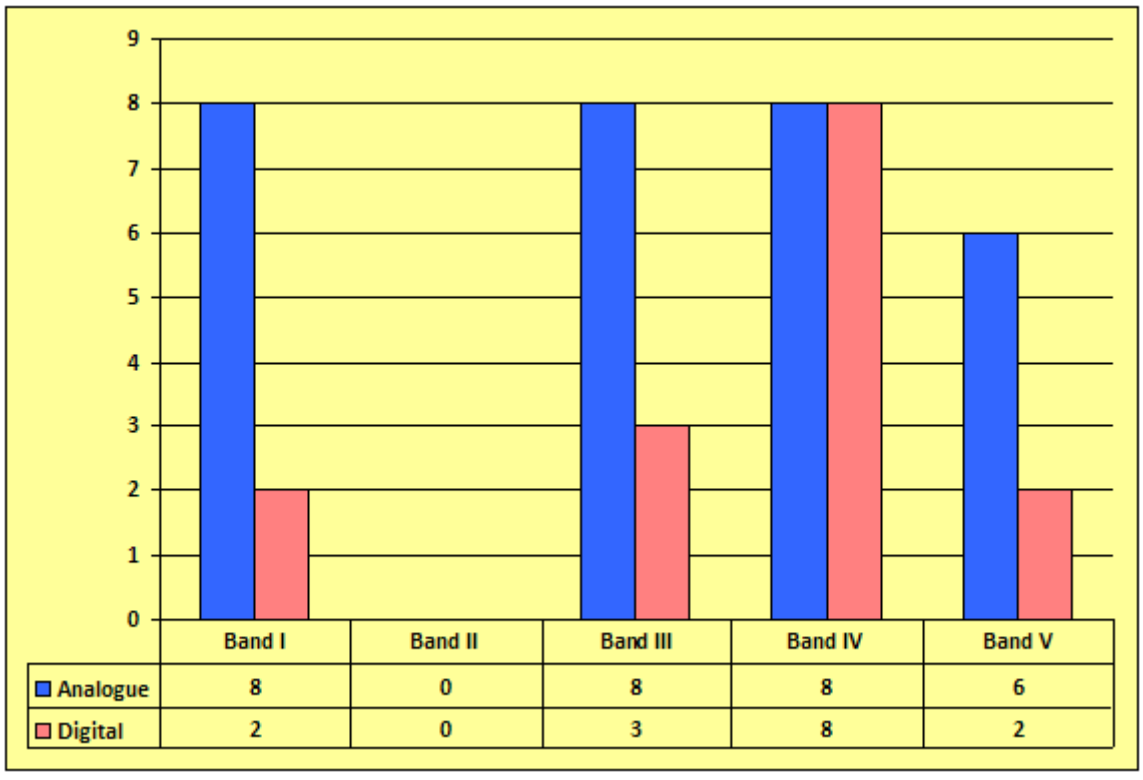
Table 3

Migration of broadcast operation in VHF and UHF for the implementation of DTTB from Sector Member responses

	Analogue	Digital
Band I	8	2
Band II	0	0
Band III	8	3
Band IV	8	8
Band V	6	2

Figure 3

Migration of broadcast operation in VHF and UHF for the implementation of DTTB from Sector Member responses



Broadcast bands shared with other services

This sub-section shows the extent that broadcast bands are used by non-television broadcasting services. For this purpose VHF Band I, VHF Band III, UHF Band IV and UHF Band V are considered television broadcast bands.

Responses from Administrations show that for the 63 countries responding to the Questionnaire:

– 32 countries ~~60% of respondents that have implemented or are planning to implement DTTB~~ share the broadcasting bands with another primary service.

– In 15 countries~~81% of these~~ the other primary service is Digital Sound Broadcasting, and in 20 countries~~41%~~ the broadcast bands are additionally or solely shared with another primary service.

– In 13 countries~~34% of cases~~ where all or part of the broadcast band is ~~allocated~~ used by ~~to~~ another primary service (including Digital Sound Broadcasting), the frequencies used by ~~allocation to~~ the other primary service partially or completely overlaps with the planned or operational frequency limits for DTTB[2].

– This figure falls to 11 countries ~~28%~~ after ASO and/or restacking are taken into account.

– 41 countries~~77% of respondents planning to implement or implementing DTTB~~ share the broadcasting bands with a secondary service. This assumes that the secondary services are allocated within the frequency limits of the planned or operational DTTB, e.g., PMSE.

Responses from Sector Members report that for 8 countries:

– 5 countries share the broadcasting bands with another primary service and that this service is not DSB

– In 3 countries where all or part of the broadcast band is allocated to another primary service the allocation to the other primary service partially or completely overlaps with the planned or operational frequency limits for DTTB[3].

– This figure falls to 2 countries after ASO and/or restacking are taken into account.

– 8 countries share the broadcasting bands with a secondary service. This assumes that the secondary services are allocated within the frequency limits of the planned or operational DTTB, e.g., PMSE.

Spectrum used or required for broadcasting at UHF

The figures below include those countries that have only provided information on their analogue television broadcast requirement and it has been assumed they will have continued need for their current spectrum.

Responses from Administrations show that in 63 countries:

– 60~~93% of~~ countries currently use or require all or part ~~or all~~ of the band 470-694/698 MHz for provision of analogue or digital television broadcasting or for the future introduction of DTTB.

– 51~~67% of~~ countries currently use or require ~~part or~~ all or part of the band 694/698-862 MHz in addition to the band 470-694/698 MHz for provision of analogue or digital television broadcasting or for the future introduction of DTTB.

– 30~~37% of~~ countries intend to reduce their current or planned UHF broadcast spectrum requirement at some point in the future, with ~~30% of~~25 countries intending to restack into the band 470-694/698 MHz after ASO or after a digital conversion (these figures include those countries that have indicated a reduction in spectrum requirement would occur soon after their response was submitted).

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[2] If the frequency allocation to the other primary service is outside the planned or operational frequency limits for DTTB it has been excluded.

[3] If the frequency allocation to the other primary service is outside the planned or operational frequency limits for DTTB it has been excluded.

– 20 of these countries intending to reduce their UHF broadcast spectrum have still to complete ASO and may require a restacking of services.

– 10 of these countries have planned a digital system conversion as part of the restacking of their broadcast services.

– The period identified by most administrations for achieving either ASO or a digital restacking is 2015-2020 with 10 countries still to determine the date for reducing their television broadcast spectrum requirement.

– 10~~19% of~~ countries have indicated they are studying how much broadcast spectrum they will require in the future at the time of their response.

– 2 countries ~~In this regard it is noted that 4% of respondents~~ consider the UHF broadcast spectrum allocation may reduce further~~, but 8% of respondents consider more broadcast spectrum may be required~~.

– 4 countries ~~9% of respondents~~ (including one country ~~some~~ that considers the UHF broadcast spectrum allocation may decrease further in the future) also consider more broadcast spectrum may be required for transition to new and enhanced services.

Responses from Sector Members report that for 8 countries:

– 8 countries operating analogue or digital broadcasting or planning for future digital implementation currently use or require all or part of the band 470-694/698 MHz for television broadcasting.

– 5 countries operating analogue or digital broadcasting or planning for future digital implementation currently use or require all or part of the band 694/698-806 MHz in addition to the band 470-694/698 MHz for television broadcasting.

– 6 countries intend to reduce their current UHF broadcast spectrum requirement in the future, with 5 countries intending to restack into the band 470-694/698 MHz and one country intending to restack into 470-608 MHz. One country has still to determine its future UHF spectrum requirements.

– all of the countries that intend to reduce their UHF broadcast spectrum have still to complete a full A-D conversion and restack. The period identified for achieving ASO after which a restack can commence is 2015-2023, with one country still to determine the date for reducing their television broadcast spectrum requirement,

Responses from 3 of the 5 Sector Members note a desire to maintain their current spectrum allocation. Two Sector Members note that additional spectrum may be required for the transition to new broadcast systems.

5.1.1 General notes

Analogue to Digital Television transition period

The time taken or planned for the transition from Analogue to Digital Television varies considerably - in some cases taking 10 or more years in other cases a matter of a few months. In particular it is not~~ic~~ed that for some countries there is a concerted effort to switch-off analogue services by 2015 even though they may not yet have introduced digital services.

To avoid ~~any~~ misunderstandings when comparing the information provided between countries it should be noted that within Region 1 and Iran in Region 3, the GE06 Agreement provides a formally agreed date for Analogue switch-off in VHF Band III and UHF Bands IV/V. (Note: The GE06 Agreement does not apply to VHF Bands I and II and there is no formal date for Analogue switch-off in these bands).

These GE06 Agreement provisions require that analogue transmissions in the UHF bands IV/V shall either end on 17 June 2015 at 0001 hours UTC or can only continue in operation, under the conditions that these analogue assignments:

a) were contained in the GE06 Analogue Plan and have already been brought into use, and

b) shall not cause unacceptable interference to, and shall not claim protection from, any assignments in conformity with the Agreement and its associated Plans.

It should be noted that within the GE06 Agreement for the VHF band III there are two formally agreed dates for Analogue switch-off, - 17 June 2015 for the majority of countries and 17 June 2020 for countries requesting this option at the Regional Radiocommunication Conference 2006.

In the rest of Region 3 and in Region 2, there is no formal date for Analogue switch-off in any broadcast band on a regional basis.

Digital systems

The GE06 Agreement is based on DVB-T and T-DAB. tThese systems are used for planning in all countries subject to this agreement. For Region 2 and Region 3 with the exception of Iran there is no such formal agreement and all four DTTB systemsstandards are used for planning.

5.1.2 Discussion of analysis and trends in response data

Overview

The responses show that broadcast provision is currently subject to significant change.

For those countries providing analogue television broadcasting, some are preparing for analogue to digital conversion, while others are involved in the process of digital roll out and preparation for ASO. It is noted that some countries have reported they encountered technical and/or financial constraints in the transition to digital television.

For countries providing digital television broadcasting a number are in the process of converting to a new digital broadcast system, in some cases while simultaneously involved in analogue to digital conversion. Digital to digital conversion and also the planned switch-off of analogue television services at UHF leading many countries to consider restacking their UHF digital broadcast transmissions.

Despite the number of countries that have already converted to digital television broadcasting, the responses show that many countries were still using analogue broadcasting at the date of submission of their response to the Questionnaire.

New and enhanced systems

From the responses the majority of countries (existing and planned digital television) have or plan to introduce new and enhanced broadcast services. The predominant service referenced is HDTV with some countries envisaging the need to migrate all of their current SDTV provision to HDTV. The other most frequently mentioned new service is UHDTV with some countries either having taken part in or planning trials. Less frequently mentioned options are 3DTV and HbbTV. There is also some interest in enhancements like high dynamic range, wide colour gamut and a high frame rate.

Use of television broadcast bands by other services

In several countries other services operate within broadcast spectrum. In the majority of cases the other service is a secondary service and mostly PMSE. However, in a number of countries the other service is a primary service with digital sound broadcasting in VHF Band III the most frequently identified. The figures used for the analysis only include DSB if it is involved in currently providing an operational service – as noted in § 5.2.2 the introduction of trials is not a

guarantee of the launch of an operational service. Nonetheless the number of DSB systems using VHF Band III may be expected to increase as responses indicate several countries are either planning to launch or are specifically studying the operation of DSB in that band (see § 5.2).

The other primary services identified as operating in broadcast spectrum includes ARNS, Fixed Land Mobile and Radioastronomy. The extent that some of these services use broadcast spectrum is probably under reported, as some responses only identify other primary services that occupy spectrum within the frequency limits of the operational television service. Further not all broadcast provision starts at e.g., 470 MHz or ends at e.g., 698 MHz.

Television frequency band migration

The migration of broadcast television from operation in VHF Bands I and II into VHF Band III and UHF Bands IV/V started many years ago. In part this migration was driven by the expansion and development of analogue television broadcast provision and the introduction of FM radio, and in part by the limited number of channels available in VHF Bands I & II, the level of the noise floor, the impact of anomalous propagation at those frequencies and extremely long propagation distances, especially over sea paths.

The migration of television broadcast from VHF bands to UHF bands seems to haves accelerated and broadened with the introduction of digital television broadcastingDTTB. Responses to the questionnaire indicate that only digital System A is still using low VHF frequencies (Band I). andAlso that fewer countries are using VHF Band III with many some 92% of countries either operatinge or planning to operate digital television broadcastingDTTB at UHF.

The decision to move most DTTB into the UHF bands is undoubtedly due to a number of factors. Responses to the questionnaire show a common A factor in the decision to move most or all digital television provision from VHF Band III to UHF could be the interest is that 52% ofseveral countries have expressed in the operatione or plan to operate of Digital Sound Broadcasting in all or part or all of VHF Band III. OAnother factors that from the responses is could influence the decision to use UHF that implementation of digital television broadcasting at UHF provides include the opportunity to operateimplement simulcasting without impacting some or all of the existing provision of analogue television provision and the potential impact on digital television reception from the high noise floor and potential anomalous propagation effects on multi-carrier transmissions in VHF Band I.

Television broadcast spectrum requirement

Responses to the question on future spectrum requirements are provided in a number of different formats, including but not limited to the RR Article 5 band edge limits, the spectrum range within the Article 5 band used, the bandwidth occupied by all transmissions, the bandwidth required for the broadcast provision. For the analysis, to align the responses and put them within a known and widely understood reference framework, the method used is to identify the frequency band within which the broadcast transmissions currently exist and the frequency band within which the broadcast transmissions will exist in the future. Thus the analysis shows that a country requires all or part of a specific RR Article 5 frequency band.

Many administrations have reviewed or are in the process of reviewing their digital television broadcasting spectrum requirements, with a number that have completed their review deciding to reduce the spectrum used by digital television broadcasting. The date identified by many administrations for finalising this reduction in broadcast spectrum is within the period 2015-2020, although some administrations have still to determine the date for completion.

Spectrum requirement figures therefore represent a period of time, identifying the spectrum required now and at some point in the future, e.g., when the Analogue to Digital or Digital to Digital conversion process has been finalised and broadcast transmissions restacked.

5.2 Sound Broadcasting

62 Member States have provided one or more responses to the sound broadcasting section of the Questionnaire.

4 responses to the Questionnaire have been received from Sector Members including one regional organisation. Together, these responses from Sector Members provide information relating to 6 countries.

In the case of three countries, a response has been received from the Administration and also a Sector Member, this means that information provided by Sector Members relating to 3 countries has been analysed.

Two questions in the Questionnaire request views on estimates of the spectrum required in the future for analogue and digital sound broadcasting taking into consideration changes in technology. In both these cases the views expressed by all 4 Sector Members are taken into account and again to avoid confusion are shown separately in the analysis.

A detailed summary of all responses is provided in Annex 3.

The ~~following figures provide an~~ analysis of the ~~51~~ responses[4] to the Questionnaire shows the following:

Analogue sound broadcasting status

Responses from Administrations show that in 62 countries:

– 7 countries are providing a sound broadcast service at LF

– 39 countries are providing a sound broadcast service at MF

– 22 countries are providing a sound broadcast service at HF

– 59 countries are providing a sound broadcast service within the frequency range 87-108 MHz.

Table 4

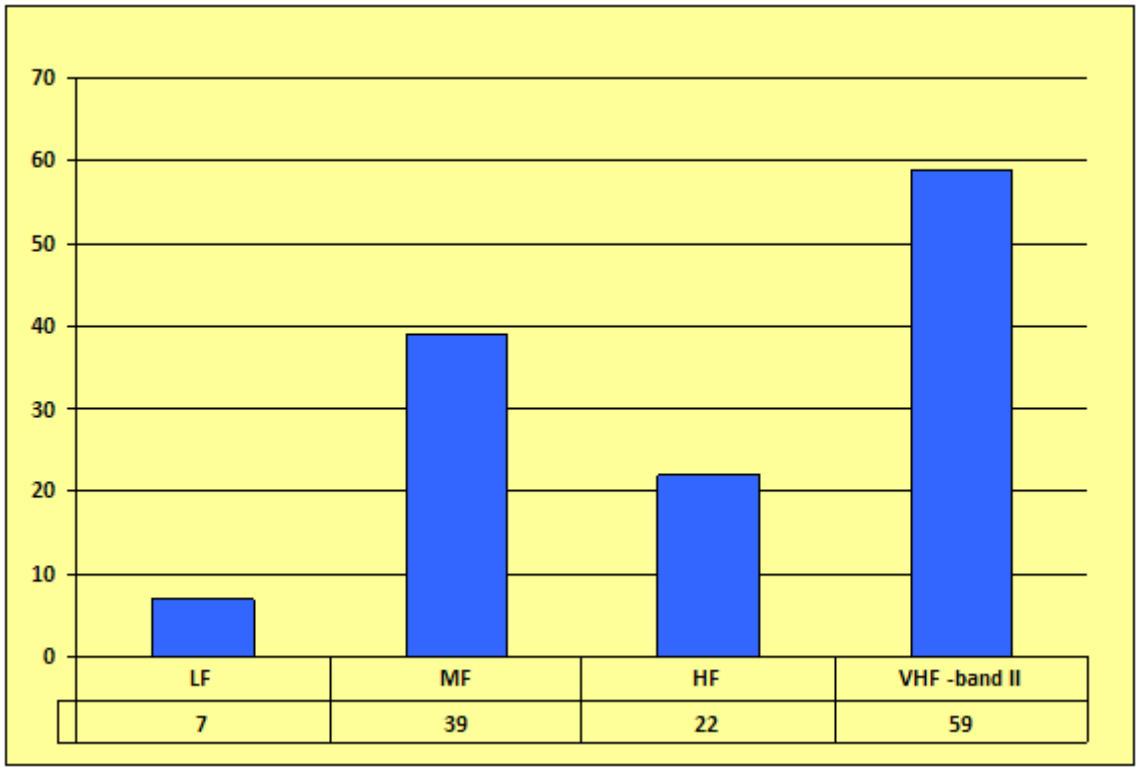
Frequency bands used by countries providing an analogue sound broadcast service

Band	LF	MF	HF	87-108 MHz
No of countries	7	39	22	59

[4] ~~See § 5 two responses provide information solely on Television Broadcasting.~~

Figure 4

Frequency bands used by countries providing an analogue sound broadcast service



Responses from Sector Members report that for 3 countries:

– 3 countries are providing a sound broadcast service at MF

– 3 countries are providing a sound broadcast service in 88-108 MHz.

Development of analogue sound broadcasting provision

Responses from Administrations show that in 62 countries:

– 3 countries state that their AM bands are effectively full

– 30 countries state that the FM band is heavily congested or full in part or all of their country.

– 19 countries indicate they would like more spectrum for FM radio

– 52 countries indicate there have no plans to allocate more spectrum to FM radio.

– 5 countries are studying their options for increasing AM/FM provision/spectrum.

– 4 countries have plans or have implemented plans to improve FM services, of which 3 countries have allocated or plan to allocate more spectrum to FM radio.

Responses from Sector Members report that in 3 countries:

– AM and FM bands are heavily congested.

Responses from 4 Sector Members identify no requirement for the allocation of more spectrum to AM or FM radio with:

– 3 Sector Members indicating the continued use of existing spectrum; and

– 1 Sector Member indicating their administration has recently extended the spectrum allocated to FM broadcasting by 5 MHz.

Digital sound broadcasting status

Responses from Administrations show that in 62 countries:

– ~~40% of~~17 countries are currently providing a ~~operating some form of~~ digital sound broadcasting service.

~~– 38% of countries are considering or planning the introduction of new or more digital sound broadcasting.~~

~~**Digital sound broadcasting use of broadcast bands**~~

– 6 countries are operating digital sound broadcasting in one or more of the MF, HF and L Bands.

– 15 ~~52% of~~ countries are operating digital sound broadcasting ~~/ planning to operate DSB~~ in the band 174-230 MHz ~~VHF Band III, with 87% of these countries party to the GE06 Agreement~~.

– 16 ~~17% of~~ countries are operating digital sound broadcasting in, or~~/~~ ~~planning to~~ considering the introduction of digital sound broadcasting in one or more of the MF, HF, FM and L bands as shown below~~operate DSB in other frequency bands~~, sometimes in addition to existing or potential operation in 174-230 MHz ~~VHF Band III~~.

– 2 countries introduced digital sound broadcasting and subsequently switched the service off due to insufficient take-up.

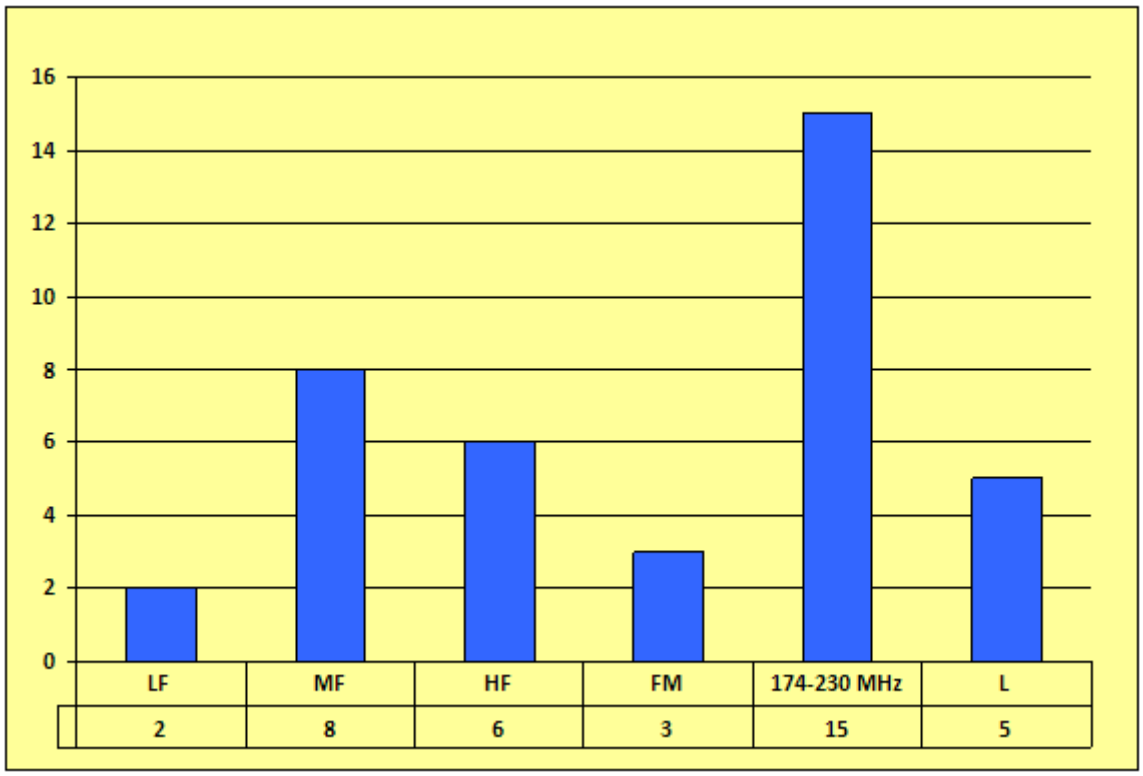
Table 5

Frequency bands used or considered by countries for digital sound broadcasting

Band	**LF**	**MF**	**HF**	**FM**	**174-230 MHz**	**L**
No of countries	2	8	6	3	15	5

Figure 5

Frequency bands used or considered by countries for digital sound broadcasting



Responses from Sector Members report that for 3 countries:

– All are currently providing a digital sound broadcasting service.

– All are operating digital sound broadcasting in, or planning to introduce digital sound broadcasting into the MF and FM bands.

Development of digital sound broadcasting provision

Responses from Administrations show that in 62 countries:

– 12 countries are planning to operate more digital sound broadcasting.

– 4 countries are planning to introduce digital sound broadcasting, with 3 of these countries planning an operational service in 174-230 MHz.

– 26 countries are studying a range of digital sound broadcasting options this figure includes those countries considering use of one or more of the MF, HF, FM and L bands as shown above.

– 17 countries are specifically studying digital sound broadcasting operation in 174-230 MHz.

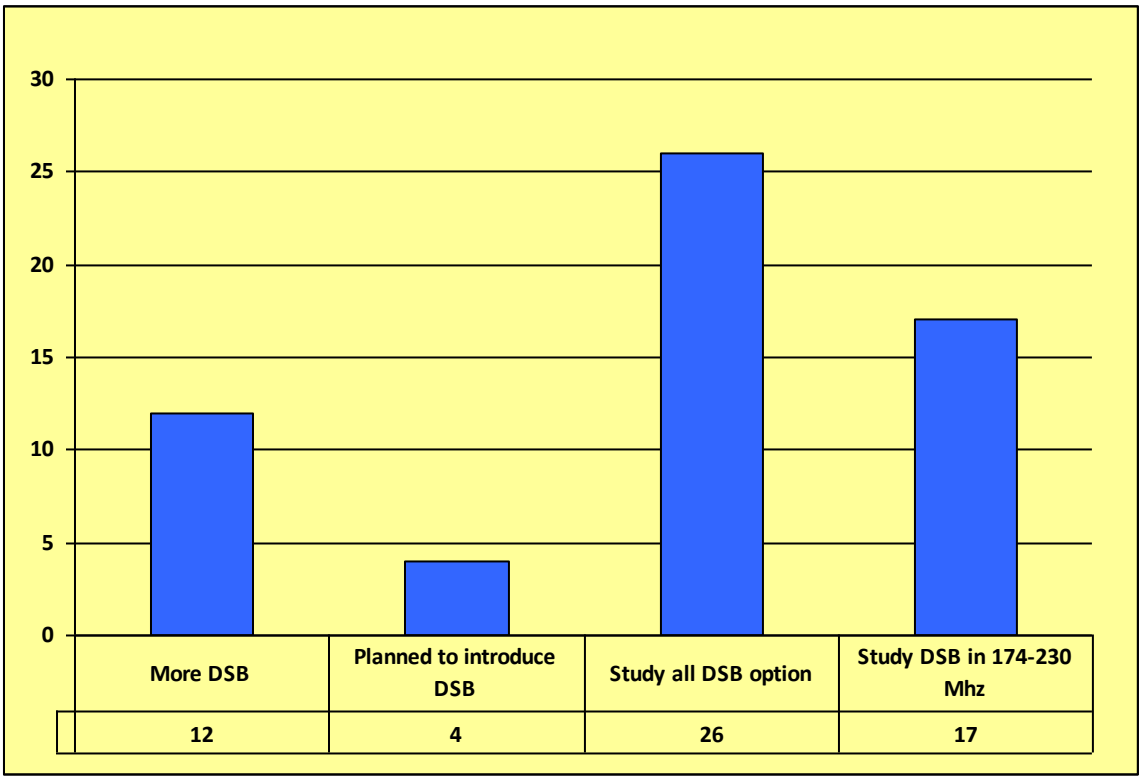
Table 6

Interest in digital sound broadcast service

Band	More DSB	Planning DSB	Studying DSB options	Studying DSB in 174-230 MHz
No of countries	12	4	26	17

Figure 6

Interest in digital sound broadcast service



Responses from Sector Members report that for 3 countries:

– 2 countries are planning to operate more digital sound broadcasting.

– 1 country is planning to introduce digital sound broadcasting.

Broadcast bands shared with other services

An aspect of this analysis is to show the extent that broadcast bands are used by non-sound broadcasting services. For this purpose LF, MF, VHF Bands I, II, III and L Band are considered sound broadcast bands.

Responses from Administrations show that in 62 countries:

– 27 countries share the sound broadcasting bands with other services.

– 17 countries share the sound broadcasting bands with another primary service, either solely or in addition to sharing with a secondary service.

– 20 countries share the sound broadcasting bands with a secondary service, either solely or in addition to sharing with another primary service.

– 11 countries share an operational band with another primary service[5], of which in 10 countries the other primary service is analogue or digital television broadcasting.

[5] If the frequency allocation to the other primary service is outside the planned or operational frequency limits for sound broadcasting provision it has been excluded.

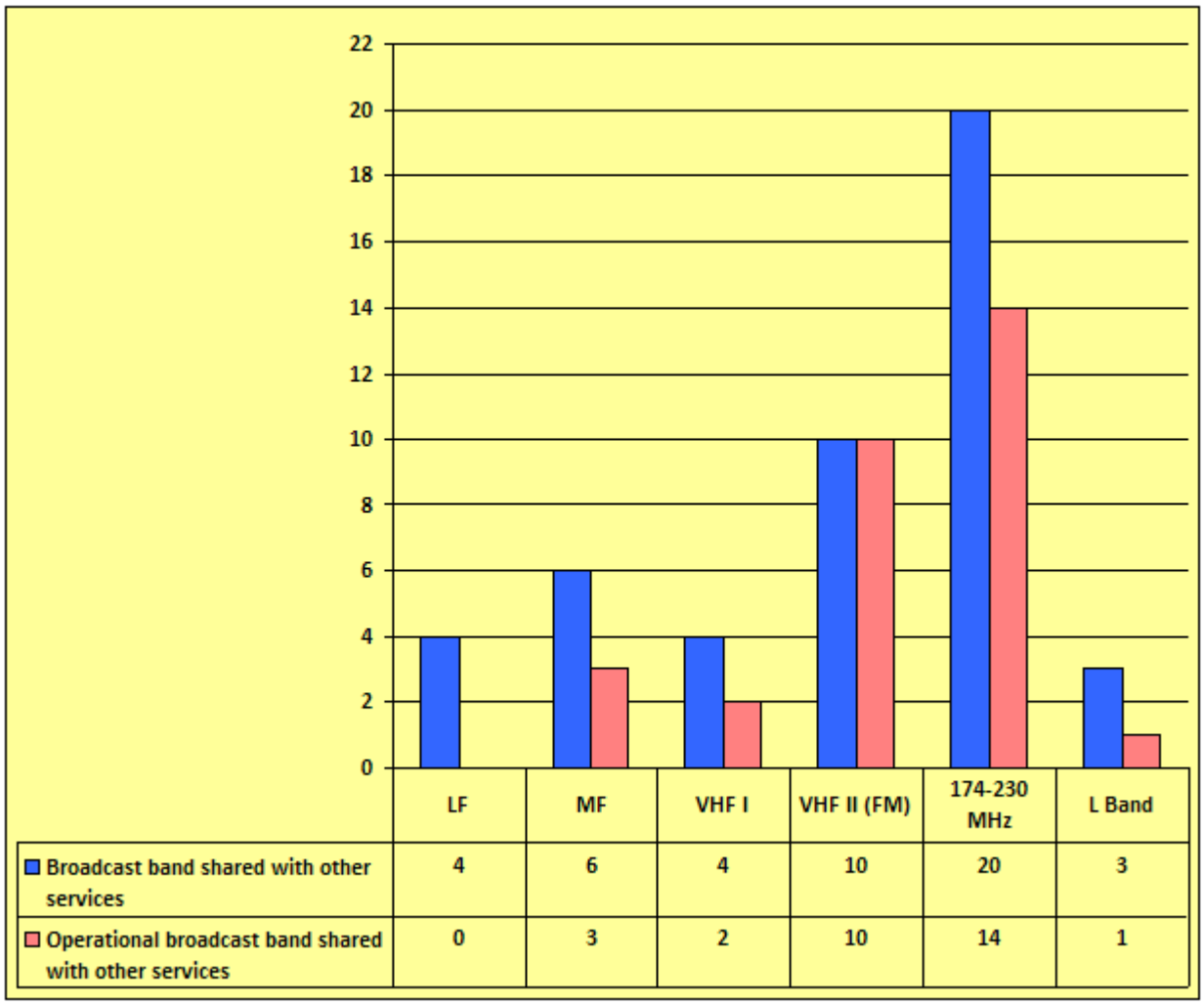
Table 7

Sound broadcast bands used by other primary and secondary services (including analogue or digital television)

	Broadcast band shared with other services	Operational broadcast band shared with other services
LF	4	0
MF	6	3
VHF I	4	2
VHF II (FM)	10	10
174-230 MHz	20	14
L Band	3	1

Figure 7

Sound broadcast bands used by other primary and secondary services (including analogue or digital television)



Note: sharing in the HF bands has not been analysed due to the nature of frequency operation under Article 12 of the Radio Regulations and the varied allocation to services in the HF bands.

Responses from Sector Members report that for 3 countries:

– all share the FM band with unlicensed wireless microphones.

~~**FM radio status**~~

~~– 50% of countries state that VHF Band II is full in part or all of their country.~~

~~– 69% of countries indicate there have no plans to allocate more spectrum to FM radio but 31% indicate they would like more spectrum for FM radio. [Editorial note: these values are coincidental.]~~

~~– 6% of countries have allocated or plan to allocate more spectrum to FM radio broadcasting.~~

~~[Editorial note: extend to include results for LF to HF]~~

5.2.1 General notes

To avoid ~~any~~ misunderstandings when comparing the information provided between countries it should be noted that within Region 1 and Iran in Region 3 the GE06 Regional Agreement includes provision for the introduction of T-DAB in VHF Band III. This is a factor in the number of countries that are either operating or planning to operate Digital Sound Broadcasting in VHF Band III using T-DAB.

5.2.2 Discussion of analysis and trends in response data

Analogue sound broadcasting

The responses appear to indicate that sound broadcast provision could be on the threshold of significant change. Analogue broadcast spectrum is congested and ~~A~~a number of administrations note ~~that~~ there is a ~~remains~~ high demand for more FM services but there are difficulties in providing more spectrum, or ~~with~~ compliance between the required additional spectrum and the existing receiver base. Hence, the majority of countries either have no plans to extend analogue broadcast spectrum or they are considering their options.

For those countries that use or used VHF Band II for analogue television there is an option at the ASO of their television service of re-allocating this spectrum to FM radio or Digital Sound Broadcasting. ~~So far t~~Two countries have indicated they plan to use this spectrum for more FM radio. Another option is to extend the FM band below 88 MHz into the top end of Band I and a few countries in Region 1 and 3 have indicated they use either VHF Band I extended to 74 MHz and/or 76-87/87.5 MHz. ~~o~~One country in Region 2 has indicated they are also considering ~~this~~ extending FM into the band 76-88 MHz.

Digital sound broadcasting

From some responses it appears that the introduction of digital sound broadcasting may be considered as a solution for congestion in analogue sound broadcast spectrum. A number of countries have introduced digital sound broadcasting either in existing sound broadcast bands, or in a new band for sound broadcasting. In the case of IBOC or DRM, existing bands are used e.g., MF, FM, HF. In the case of T-DAB, as all responses indicate that the existing sound broadcasting bands are congested or subject to strong demand for existing analogue services, this inevitably requires the provision of an additional frequency band, such as 174-230 MHz or 1452-1492 MHz with 174-230 MHz the band of choice.

The number of sound broadcast standards and range of frequency bands in which they may be deployed provides countries with considerable options and much to study. Issues for study include not just the technical issues but as indicated in some responses the market readiness for digital sound

broadcasting. Two countries have introduced DSB and subsequently withdrawn the service due to limited uptake, others have initiated trials but there has either been no decision on implementation of a service or no identified commercial interest.

For those countries that have successfully deployed digital sound broadcasting, ~~O~~one ~~country~~ has a planned switch-off date for analogue sound broadcasting and some others are studying the matter. However, ~~but~~ the majority of countries have no current plans to switch-off analogue sound broadcasting.

Use of sound broadcast bands by other services

The responses indicate that compared to television broadcasting fewer countries have other services operating within sound broadcast spectrum. In the majority of cases, the other service is a secondary service (reference is most frequently made to short range devices that have an array of different applications) and the band may be additionally shared with another primary service.

In terms of primary services operating within broadcast spectrum a number of services are referenced including ARNS, Fixed and Mobile. For those countries where the other primary service is operating within the frequency limits of an operational sound broadcast service, the other service is almost exclusively analogue television broadcasting in VHF Bands I and II or analogue/digital television broadcasting in VHF Band III. Note: some administrations indicate that a decision has still to be taken on the use of digital broadcast operation in VHF Band III (i.e., DSB or DTTB, or DSB and DTTB).

Sound broadcast spectrum requirement

The general view on the spectrum required for sound broadcasting therefore either refers to the continued use of existing bands or the addition of 174-230 MHz depending on the broadcast standard considered for the introduction of digital sound broadcasting. Sector Members universally indicate the continued use of existing sound broadcast bands, which includes 174-230 MHz for those currently providing DSB in that band.

5.3 Multimedia Broadcasting **For Handheld Devices**

60 Member States have provided one or more responses to the multimedia broadcasting for handheld devices section of the Questionnaire.

4 responses to the Questionnaire have been received from Sector Members, including one regional organisation. For this section the views expressed by all 4 Sector Members are taken into account and shown separately in the analysis.

The multimedia standards referenced include ATSC 2.0, DVB-T2, DVB-T2 Lite, ISDB-T, and T-DMB. It is noted that not all of these standards may be available within the ITU.

A detailed summary of all responses is provided in Annex 4.

The following figures provide a simple analysis of the responses from 60 countries to the Questionnaire:

– 27 countries ~~50% of respondents~~ are considering or operating multimedia broadcasting in existing broadcast bands with 16 countries identifying the bands as shown in the following table.

Table 8

Frequency bands considered or used for multimedia broadcasting

VHF Band II	**VHF Band III**	**UHF**

1	10	7

The following figures provide show the responses from 4 Sector Members to the Questionnaire:

– 2 Sector Members are currently providing multimedia services within existing broadcast bands.

– 1 Sector Member (a regional organisation representing 3 countries) indicates the broadcast standard used in two countries is capable of providing multimedia services and does not require additional spectrum for implementation.

– 1 Sector Member has no plans to provide multimedia services.

5.3.1 Discussion of analysis and trends in response data

Some 27 countries are considering or currently providing multimedia broadcasting. The frequency bands identified by 16 of the countries for multimedia broadcasting are primarily VHF Band III and UHF. No response identified a need for spectrum outside the existing broadcast bands.

The responses indicate that a range of multimedia standards are in use or under consideration but that not all of these standards may be available as ITU publications.

5.4 Summary Table – Television broadcasting [Initial analysis] [Editorial note: table revised and shown without revision marking]

Key:

[1] Bold equates to a Primary Service. Normal font equates to a Secondary Service/ application in a Secondary Service

UHF IV – Due to WRC-15 Agenda Items 1.1 and 1.2 which include discussions on the UHF broadcast bands and specifically the band edge at 694/698 MHz, for the purposes of the questionnaire the designation "UHF IV" has been used to refer to the frequency range 470-694 MHz.

Abbreviations ARNS = Aeronautical Radionavigation Service, CRD = Cognitive Radio Devices, DSB = Digital Sound Broadcasting, HA = Hearing Aids, RA = Radioastronomy, SRD = Short Range Devices, PMSE = Services Ancillary to Broadcasting / Services Ancillary to Programme making / Wireless Audio, WP = Wind Profile Radar, WSD = White Space Devices, UWB = Ultra Wide Band

5.5 Summary Table – Sound broadcasting [Initial analysis] [Editorial note: table revised and shown without revision marking]

Key:

[1] Frequency Range 2.3 MHz – 26.1 MHz – Due to **No. 5.113**, which refers to tropical broadcasting, the band 2 300-2 498 kHz has for the purposes of the questionnaire been included within the HF bands. This description does not align with the frequency band nomenclature listed in **No. 2.1**.

[2] Bold equates to a Primary Service. Normal font equates to Secondary Service / application in a Secondary Service

Abbreviations HA = Hearing Aids, MT = Medical Telemetry, OT = Overseas Territory, RN= Radionavigation Service, RFID = Radio Frequency Identification Device, SRD = Short Range Devices, PMSE = Services Ancillary to Broadcasting / Services Ancillary to Programme making / Wireless Audio, WSD = White Space Devices, UWB = Ultra Wide Band

5.6 Summary Table – Multimedia broadcasting [Initial analysis] [Editorial note: table revised and shown without revision marking]

[6 ITU-R BT & BS Reports and Recommendations assessment against the questionnaire analysis [TBD]

6.1 New and enhanced service requirement and expected timeframe for introduction

A number of countries have indicated an interest in moving providing new and enhanced broadcasting services. However, the list of Reports and Recommendations (see Annex 1) does not appear to contain all the relevant information required for some of these identified new and enhanced broadcasting services e.g., Recommendation ITU-R BT.1306 does not appear to have an equivalent Recommendation for UHD TV. Equally in the case of UHD TV there does not appear to be an overarching ITU-R Question that can be used to guide development and act as an indicator of progress on the development of the other various elements necessary for an overall UHD TV system.

6.2 Expansion of broadcast services and transition to new standards

In the past broadcasting has generally managed to migrate from one standard to another either by moving to a new frequency band or utilising the interleaved channels in the band. A number of countries have noted that in the future the amount of spectrum available for television broadcasting in the UHF band may be reduced, dependent upon requirements for the transition to new technologies. Others have noted that additional services may or will depend on improvements in compression technology. If the future development of broadcasting becomes dependent on improvements in compression technology there does not appear to be the relevant information in the list of ITU-R BT. or BS. Reports and Recommendations to provide guidance on how the transition process between broadcast standards should be managed and its limitations.

~~7 Areas of interest to members that do not appear to be covered by existing ITU-R documentation~~

~~Noting the Questionnaire responses identify changes in the operation of sound and television broadcasting in the broadcasting bands, as well as spectrum congestion in some bands and identify new broadcast applications that new broadcast systems and application as identified above. It would be appropriate to review the ITU-R BS, BT and BR Reports and Recommendations for revision/suppression and additions.]~~

ANNEX 1 TO [DRAFT] ITU-R REPORT

The Study Group 6 Questionnaire

Radiocommunication Bureau (BR)

Circular Letter
6/LCCE/90

3 December 2014

To Administrations of Member States of the ITU, Radiocommunication Sector Members, ITU-R Associates participating in the work of Radiocommunication Study Group 6 and ITU-R Academia

Subject: **Questionnaire on the future spectrum demands and use of the broadcasting service**

During its November 2014 meeting, ITU-R Study Group 6 agreed the questionnaire[6] in Attachment 1 on the future spectrum demands and use of the broadcasting service, and further agreed it should be sent to all Member States and Sector Members.

The questionnaire is designed to gather information on the future spectrum demand and use by sound and television broadcasting in the bands allocated to terrestrial broadcasting in view of technical developments, decisions taken by WRC-03 and WRC-07 on the use of digital modulation in the HF bands, and the changes to frequency allocations at WRC-97, WRC-07 and WRC-12, as part of the work in maintaining ITU-R Study Group 6's catalogue of Reports and Recommendations.

One of the questions that need to be addressed by Study Group 6 includes how broadcast requirements are changing with the move to digital broadcast systems, and the introduction of new and enhanced broadcast services.

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[6] The questionnaire agreed by ITU-R Study Group 6 is a revision of the questionnaire previously circulated by the ITU-R Secretariat in July 2014 on behalf of the Study Group 6 Rapporteur Group on the future spectrum requirements for the broadcasting service, with the following amendments to assist in the development of responses to the questionnaire:

– a modification of the questionnaire title to better reflect its purpose;
– an addition to the questionnaire's section 3 title to clarify that the section refers to handheld devices;
– the addition of Annex 3 providing a range of indicative emission bit rates for different video formats and compression schemes to assist with responses to questions 8 and 10.

Member States and Sector Members that have responded to the earlier questionnaire (see footnote 1 and Attachment 2) are not requested to respond to this Circular Letter, although Study Group 6 would be pleased to receive any update to their original responses.

Member States and Sector Members are requested to submit responses to brsgd@itu.int by 22nd May 2015.

François Rancy
Director

Distribution:

- Administrations of Member States of the ITU and Radiocommunication Sector Members participating in the work of Radiocommunication Study Group 6
- ITU-R Associates participating in the work of Radiocommunication Study Group 6
- ITU-R Academia
- Chairman and Vice-Chairmen of Radiocommunication Study Group 6
- Secretary General of the ITU, Director of the Telecommunication Standardization Bureau, Director of the Telecommunication Development Bureau

Attachment 1 to Questionnaire

Questionnaire on the future spectrum demands and use of the broadcasting service

Name of the Administration:	
Contact person:	
E-mail address:	
Telephone number:	

Name of the Sector Member:	
Contact person:	
E-mail address:	
Telephone number:	
What best describes your organisation? Commercial broadcaster/Public service broadcaster/ Service provider/ Other (please describe)	
The geographical area over which you operate:	

SECTION ONE – Television broadcasting

1) a) Is your country still using analogue television?

b) If yes, has analogue television switch-off commenced?

c) If your country has any plans to switch-off analogue television:

i) When is the analogue switch-off process expected to be completed?

ii) How much extra spectrum will be required during the transition phase to digital terrestrial television broadcasting?

Reply:

2) a) Please indicate how many analogue television transmitters are in operation in your country and in which bands.

b) What channel bandwidths are used for analogue television?

c) What is the spectrum requirement for analogue television in your country?

A proposed format for responses to questions 2a) and 2b) is provided in Annex 1.

Reply:

3) a) What is the percentage of viewer uptake of terrestrial television in your country?

b) If possible, please also provide details of the number or proportion of users who receive television primarily by terrestrial means by:

i) Fixed roof top antenna, or

ii) Portable indoor antenna.

Reply:

4) If your country has switched or is considering switching to digital terrestrial television broadcasting:

a) What system standard is your country using or considering adopting (as specified in Recommendations ITU-R BT.1306 and BT.1877)?

b) When did your country start or when is it proposing to start the introduction of digital terrestrial television services?

c) Please provide further detail on the number of multiplexes in use, their technical specifications, the percentage of geographic area or population they cover or are intended to cover and the total spectrum use.

A proposed format for detailed responses is provided in Annex 2.

Reply:

5) a) What frequencies/channels are currently used or intended to be used by digital terrestrial television broadcasting in your country? Please distinguish between those in use and those intended to be used.

b) Please indicate how many digital terrestrial television transmitters are currently used or intended to be used and in which bands.

c) What channel bandwidth is used or intended to be used for digital terrestrial television in your country?

A proposed format for responses to questions 5b) and 5c) is provided in Annex 1.

Reply:

6) a) Are the terrestrial television frequency bands also shared with other primary services in your country?

b) If yes, please give details of those systems and their spectrum use.

Reply:

7) a) Are the terrestrial television frequency bands also shared with secondary services used for the support of broadcasting such as SAB/SAP (services ancillary to broadcasting/production), or other types of services such as radio astronomy or wind-profile radar?

b) If yes, please give details of those systems and their spectrum use.

Reply:

8) a) Does your country foresee a requirement for new and enhanced services, including multimedia and data applications, HD, 3D, and UHD television, on the terrestrial television platform?

b) If yes, please give indicative details of the number and nature of services planned, and if known, the expected timeframe for their introduction.

Annex 3 provides an approximate guide to the video bit rate required for HD and UHD television.

Reply:

9) a) Are there plans in your country to launch more multiplexes in the future?

b) If yes, how many more and when? Please also indicate the expected timeframe for their introduction.

Reply:

10) a) What is the amount of spectrum your country foresees will be required for terrestrial television broadcasting, taking into consideration the responses to questions 5, 6, 7, 8 and 9? Please indicate the modes of transmission that will be used, and timeframes.

Reply:

SECTION TWO – Sound broadcasting

11) a) What analogue sound broadcasting standards are used in your country and what bands are they operating in?

b) Please indicate how many analogue radio transmitters are in operation in your country and in which bands.

c) What channel bandwidths do they use?

A proposed format for responses to questions 11b) and 11c) is provided in Annex 1

Reply:

12) a) Is additional spectrum required for growth in the analogue sound broadcasting platform in your country?

b) If yes, how much additional spectrum is required?

Reply:

13) a) Is your country considering introducing, or has it already introduced digital sound broadcasting?

b) If yes, which system standards are used or are being considered for adoption (as specified in Recommendations ITU-R BS.1114, BS.1514, BS.1615)?

c) When did your country start or when does it propose to start digital sound broadcasting?

d) What channel bandwidths is your country using or considering using?

e) What frequencies are currently used or intended to be used by digital sound broadcasting in your country? Please distinguish between those in use and those intended to be used.

f) What is the percentage of the population that is covered by digital sound broadcasting by direct reception in your country?

g) What additional spectrum was required or is considered to be required for the transition to digital sound broadcasting?

h) Please indicate how many digital radio transmitters are currently used or intended to be used and in which bands.

i) What is the spectrum requirement for digital sound broadcasting in your country?

j) If your country has introduced digital sound broadcasting, how long will it continue to use analogue sound broadcasting?

A proposed format for responses to question 13d) and 13h) is provided in Annex 1.

Reply:

14) a) Are the terrestrial sound broadcasting bands also shared with other primary services in your country?

b) If yes, please give details of those systems and their spectrum use.

Reply:

15) a) Are the terrestrial sound broadcasting bands also shared with secondary services e.g., used for the support of broadcasting such as SAB/SAP (services ancillary to broadcasting/production), or other types of services such as radio astronomy or wind-profile radar?

b) If yes, please give details of those systems and their spectrum use.

Reply:

16) a) What is the amount of spectrum your country foresees will be required for terrestrial sound broadcasting, taking into consideration the responses to the previous questions? Please indicate the modes of transmission that will be used, and timeframes.

Reply:

SECTION THREE – Multimedia broadcasting for handheld devices

17) a) Is your country considering introducing or has already introduced multimedia broadcasting?

b) If yes, which system standards is your country using or considering using (as specified in Recommendations ITU-R BT.1833 and BT.2016)?

c) In which bands?

d) When did your country start or when does it propose to start digital multimedia broadcasting?

e) What are the current and proposed population coverages for digital multimedia broadcasting in your country?

f) What is the spectrum requirement for multimedia broadcasting in your country?

g) If your country has introduced digital multimedia broadcasting, please provide further information to describe the system, its implementation and any limitations on its operation.

Reply:

Annex 1 to Attachment 1 of the Questionnaire

Suggested form of presentation of reply to questions 2, 5, 11 and 13:

A sample response is shown in *Italics* for guidance only.

Country	**Band**		**Number of Transmitting Stations***			
			Analogue Radio (Q11b & Q11c)	**Digital Radio** (Q13d & Q13h)	**Analogue TV** (Q2a & Q2b)	**Digital TV** (Q5b & Q5c)
	Channel bandwidth (MHz)		*VHF I 180 kHz* *VHF II 300 kHz*		*7 MHz*	*7 MHz*
XX	**LF**	148.5-283.5 kHz				
	MF	525-526.5 kHz				
	MF	526.5-1 606.5 kHz				
	MF	1 606.5-1 705 kHz				
	HF	2.3-26.1 MHz**				
	VHF I	47-50 MHz				
		50-54 MHz				
		54-68 MHz	*35*			
		68-72 MHz				
		76-87.5 MHz				
	VHF II	87.5-108 MHz	*215*			
	VHF III	174-216 MHz			*250*	*5 (221)*
	VHF III	216-230 MHz			*35*	*(7)*
	UHF IV	470-694 MHz			*5 683*	*137 (4 387)*
	UHF V	694-790 MHz			*3 940*	*(2 768)*
	UHF V	790-890 MHz				
	UHF V	890-960 MHz				
		1 452-1 492 MHz				
		11.7-12.5 GHz				
		12.5-12.7 GHz				
		40.5-42.5 GHz				
		74-76 GHz				

* Transmitting stations please include “main stations” and “relay stations”. Please use parenthesis to indicate stations that have still to be brought into use

** The bands 3 900-3 950^{D}, 3 950-4 000^{D} kHz; the bands for tropical broadcasting: 2 300-2 498, 3 200-3 400^{D}, 4 750-4 995^{D}, 5 005-5 060^{D} kHz and the Article **12** bands 5 900-5 950^{D}, 5 950-6 200, 7 200-7 300, 7 300-7 400^{D}, 7 400-7 450, 9 400-9 500^{D}, 9 500-9 900, 11 600-11 650^{D}, 11 650-12 050, 12 050-12 100^{D}, 13 570-13 600^{D}, 13 600-13 800, 13 800-13 870^{D}, 15 100-15 600, 15 600-15 800^{D}, 17 480-17 550^{D}, 17 550-17 900, 18 900-19 020^{D}, 21 450-21 850, 25 670-26 100.

^{D} Resolution **517 (Rev.WRC-07)** applies. In the HF bands subject to Article **12** see also No. **5.134**.

Annex 2 to Attachment 1 of the Questionnaire

Suggested form of presentation of reply to question 4: *If your country has switched or is considering switching to digital terrestrial television broadcasting, what system standard is it using or considering adopting? When did your country start, or when is it proposing to start the introduction of digital terrestrial television services? Please provide further detail on the number of multiplexes in use, their technical specifications, the percentage of geographic area or population they cover or are intended to cover and the total spectrum use.*

A sample response is shown in *italics* for guidance only.

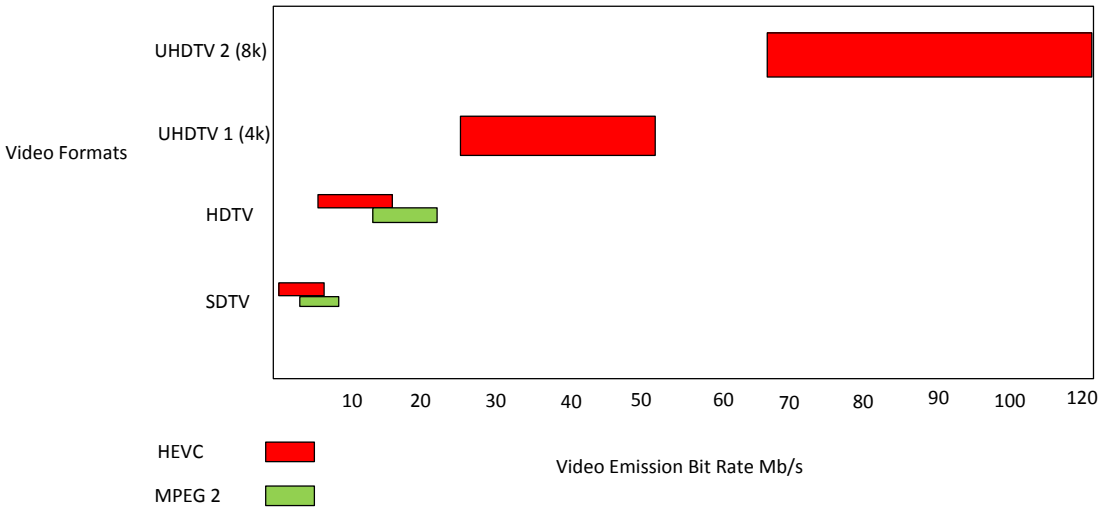
Country	No of multi-plexes	System & modulation	FEC	GI	Reception mode[7]	Capacity per multiplex (Mb/s)	Current percentage population coverage	Intended percentage population coverage	Content per multiplex	Total capacity (Mb/s)	Total spectrum bandwidth used or intended for implementation (MHz)	Any additional comments (e.g. duration of licences)
ZZ	*3*	*DVB-T, 64-QAM*	*2/3*	*1/32*	*Fixed*	*24.10*	*98.0%*	*99.2%*	*9 SD MPEG2*	*153.6*	*256*	*Public service multiplexes licensed until 2025*
	3	*DVB-T, 64-QAM*	*3/4*	*1/32*	*Fixed*	*27.10*	*75.0%*	*90.0%*	*11 SD MPEG2*			*Licensed until 2030*
	1	*DVB-T2, 64-QAM*	*2/3*	*1/4*	*Portable indoor*	*22.6*	*–*	*60%*	*3 HD MPEG4*	*22.6*		*From 2017*

[7] E.g. fixed, portable outdoor/mobile, portable indoor.

Annex 3 to Attachment 1 of the Questionnaire

Video emission bit rates

The following chart indicates an approximate range for the video bit rate that may be used in the delivery of the video format for SDTV, HDTV and UHDTV. This video bit rate would then need to be encoded into 6 MHz, 7 MHz or 8 MHz channels, as appropriate:



The numbers in this chart should only be used as a guide line. The range of bit rates reflects compression settings of-

- Pixel Matrix
- Bit depth
- Sampling strategy
- Permitted frame rate
- Desired quality
- Compression Engine Eg HEVC,MPEG 2

It should be noted that these numbers do NOT include Audio, Closed Captioning, System Information, and Emission Error Correction. In some cases these additional services could add approximately 15% to the video bit rate

Attachment 2 of the Questionnaire

Responses received by November 2014

The following Member States and Sector Members have submitted a response to the questionnaire on the future spectrum requirements for the broadcasting service.

Member States

Australia, Austria, Belgium[8], Belize, Brazil (Federative Republic of), Colombia (Republic of), Côte d'Ivoire (Republic of), Croatia (Republic of), Cyprus (Republic of), Czech Republic, Finland, France, Georgia, Germany (Federal Republic of), Hungary, Iran (Islamic Republic of), Italy, Jamaica, Japan, Korea (Republic of), Latvia (Republic of), Lesotho (Kingdom of), Madagascar (Republic of), Monaco (Principality of), Myanmar (Union of), Netherlands (Kingdom of the), New Zealand, Norway, Palestine (State of)[**], Papua New Guinea, Portugal, Romania, Rwanda (Republic of), Serbia (Republic of), Seychelles (Republic of), Sierra Leone, Slovak Republic, Slovenia (Republic of), Spain, Suriname (Republic of), Sweden, Switzerland (Confederation of), Syrian Arab Republic, United Arab Emirates, United Kingdom of Great Britain and Northern Ireland, Vatican City State.

Sector Members

Abertis Telecom Terrestre, Nippon Hoso Kyokai, North American Broadcasters Association, and Rai Way.

The responses received can be accessed at http://www.itu.int/md/R12-SURVEY.SG6-SP/en.

[EDITORIAL NOTE: The following annexes are from sections 5.4, 5.5 and 5.6. The tables have been revised and are shown without revision marking]

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[8] Three responses have been received from the Flemish, French and German communities.

[**] See Resolution 99 (PP-14).

ANNEX 2 TO [DRAFT] ITU-R REPORT

Summary Table – Television broadcasting

Note: references to frequency allocations within the tables reflect the different frequency allocations in RR Article 5 for the three Regions.

ANNEX 2A

Responses from Member States

ITU Region	Member name	Analogue TV in operation	ASO not started: N (Planned date) ASO started: S – (Planned date) ASO Finished: F – (ASO date)	Analogue TV transmitters in use (still to be implemented) and RR Article 5 bands[1]	Analogue channel bandwidth in MHz	Current analogue spectrum requirement in MHz/ Extra spectrum required for transition to DTTB in MHz	Viewer uptake of terrestrial television (%)	Users that receive television primarily by terrestrial means (%)	DTT system standard in use (considered for adoption)	DTT started: S – (date) DTT planned: P – (date) DTT trials: T – (date)	Number of multiplexes in use (still to be implemented) / total spectrum use.	Geographic or population coverage (intended coverage) %	Range of frequencies / channels used (intended to be used) for DTT.	DTT transmitters in use (still to be brought into use) and RR Article 5 bands[1]	DTT Channel bandwidth (intended bandwidth) MHz	Television bands shared with other services (Bold - primary services, normal font - secondary services) [2]	New and enhanced service requirement and expected timeframe for introduction	Additional planned multiplexes and timeframe	Spectrum required given responses to Q5, 6, 7, 8, and 9 including transmission mode and timeframes.
1	Algeria	Yes	N (6.2015) UHF (6.2020) VHF	527 in 174-230 MHz 14 in 470-862 MHz	7	- / -	95%	-	DVB-T SD MPEG2 (DVB-T2 SD & HD MPEG4)	S (2010)	1 (5) /320 MHz	1 @ 80 (95) 5 @ (95)	470-790 MHz	130 (~600) in 470-790 MHz	8	No	Yes, HD	5 more, 3 within 2017/18 2 within 2020	8 MHz by 40 channels 320 MHz
3	Australia	No	F	N/A	N/A	- / -	>95%	100%	DVB-T SD & HD MPEG2	S (1.2001)	5 (1) / 224 MHz	> 98	174-230 MHz 526-820 MHz to 1.2015 (174-230- MHz 526-694 MHz) from 1.2015	284 in 174-230 MHz 2450 in 470-698 MHz	7	**BC (D)**, PMSE in 174-230 MHz: RA, PMSE in 526-698 MHz	Potentially DVB-T2, 3DTV trials in 2010. UHDTVTV under consideration, no plans on implementation	1 planned, no decision on implementation	Noting potential transition to DVB-T2 and MPEG4 long term trend for spectrum required may reduce, noting spectrum will be required for migration
1	Austria	No	F	N/A	N/A	- / -	11%	5%	DVB-T SD MPEG2 DVB-T2 SD & HD MPEG4	S (10.2006)	7 in 1 layer 2 in 1 layer 16 in 1 layer 3 in 3 layers / 320 MHz	96 88 32 (70) 85 (88)	470-790 MHz	554 in 470-790 MHz	8	SRD, RFIDs 174-230 MHz **Mobile** in 790-862 MHz PMSE, RA, Radiolocation (WP 470-494 MHz) in 470-790 MHz	All DVB-T2 from 2018 9 HDTV at present, all HDTV after 2017 UHDTVTV not foreseen before 2019	More desirable but insufficient spectrum	320 MHz
1	Bahrain	Yes	N (2019)	3 in 470-790 MHz	8	40 / 32 MHz	15%	15%	DVB-T2 SD & HD	S	1 (3) /	1 @ - (90) 3 @ (90)	470-662 MHz (470-694 MHz)	14 in 470-698 MHz	8	No	Yes, 3D & UHD	3 more (no timeframe)	64 MHz

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1	Belgium (Flemish Community)	No	F (2008)	N/A	N/A	- / -	5.1%	95%	DVB-T SD including radio MPEG2 DVB-T2 SD MPEG4	S (8.2001)	4 /120 MHz	> 95	478-734 MHz (209-216 MHz 478-782 MHz)	(20) in 174-230 MHz 48 (26) in 470-790 MHz	8	**BC (D)**, PMSE 174-230 MHz RA PMSE in 470-790 MHz:	Transfer to HDTV and possibly UHDTVTV (Timeframe TBD)	2 planned (Timeframe TBD)	144 MHz for the Flemish Community
1	Belgium (French Community)	No	F (2010)	N/A	N/A	- / -	5%		DVB-T SD including radio MPEG2 (DVB-T2)	S (11.2007)	1 + 1 local /56 MHz	96.7 (98)	638-766 MHz (526-790 MHz)	13 in 470-790 MHz	8	**BC (D)** 216-230 MHz RA PMSE in 470-790 MHz:	Transfer to HDTV and possibly UHDTVTV TBD	Not at present	64 - 224 MHz for DVB-T & DVB-T2 at UHF
1	Belgium (German Community)	No	F	N/A	N/A	- / -	33%		DVB-T SD including radio MPEG2 (DVB-T2)	S (5.2009)	1 (3) / 32 MHz	80 (95)	470-694 MHz	1 (10) in 470-698 MHz	8	**BC (D)** (174-216 MHz) RA PMSE in 470-698 MHz	Transfer current services to HDTV / UHDTV	3 planneds	32 MHz in DVB-T2 at UHF
2	Belize	Yes	N (N/A)	13 in VHF I, VHF III & 470-530 MHz of the band 470-608 MHz	6	- / -	< 10%		-	-	-	-	-	-		No	No	No-	Not at present
2	Brazil	Yes	N (11.2018)	2091 (189) in 54-72 MHz & 76-88 MHz 4304 (254) in 174-216 MHz 3714 (773) in 470-608 MHz & 614-806 MHz	6	342 / 60	91%	91%	ISDB-T SD & HD MPEG4	S (12.2007)	518 (276) / 264 MHz	62 (93)	174-216 MHz 470-608 MHz 614-806 MHz to 11.2018 (174-216 MHz 470-608 MHz 614-698 MHz) after 2018 and restack	1 (45) in 174-216 MHz 3580 (7199) in 470-608 MHz, 614-806 MHz	6	**Mobile** after restack in 698-806 MHz PMSE in all television bands	TBD Trials conducted on 3D, 4K & 8K UHDTV, 22.2 Audio, HDR, WCG & HFR	Currently only those corresponding to analogue (276) not available on DTT	264 MHz minimum after 2018 TBR 54-72 MHz 76-88 MHz & 698-806 MHz More may be needed for transition to next DTT generation
1	Bulgaria	No	F (9.2013)	N/A	N/A	N/A	18%	-	DVB-T SD & HD MPEG4	S (2004)	1 local + 3 (4) national / 680 MHz	1 local 3 @ 96.2% 4 @ (≥85%)	478-822 MHz (470-822 MHz)	670 in 470-862 MHz	8	Reserved for Government use 478-494 MHz 502-510 MHz 590-614 MHz **ARNS** in 646-686 MHz, 726-758 MHz, 766-814 MHz & 822-862 MHz **Mobile except aero mobile** in 790-862 MHz but not used for this service. PMSE in 470-789 MHz 823-832 MHz	No existing restrictions or obligations for further HDTV or introduction of 3DTV & UHDTV	4 more multiplexes to be launched as indicated in Question 5	See responses to Questions 5, 6, 7, 8 & 9.

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1	Burkina Faso	Yes	N (12.2015)	30 in 174-230 MHz 27 in 470-862 MHz	8	- / -	-	-	DVB-T2 SD MPEG4	P (2016)	1 / 280 MHz	1 @ (99.2)	470-638 MHz	(35) in 470-698 MHz	8	**Fixed, Land Mobile** in 790-862 MHz PMSE in 470-862 MHz	HDTV, VoD	3 more multiplexes (no timeframe)	-
3	Cambodia	Yes	N (2020-2022)	20 in 174-230 MHz 143 in 470-806 MHz of the band 470-890 MHz	VHF 7 UHF 8	413 / -	-	-	DVB-T/DVB-T2 SD MPEG4 DTMB T-DMB	S (2010) T (2010) T-DMB	27 / 216 MHz	9 @ 20 5 @ 75 (90) 4 @ 3 (10) 5 @ 50 (85) 4 @ 20 (80)	209-216 MHz 470-774 MHz	NA in 214-222 MHz 110 in 470-790 MHz	8	No	Multimedia, HD	Yes in 2016-2020	480 MHz SFN & MFN
2	Columbia	Yes	N (12.2019)	274 in VHF I 404 in VHF III 507 in UHF IV/V	6	246 / 48 MHz plus additional guard channels (12-42 MHz)	DTT – DVB-T2 49.88% (100)	Cities planned to indoor, rural to rooftop	DVB-T to be switched off 8.2015 DVB-T2 SD & HD	S (2012)	7 / 96 MHz until 8.2015 (4 / 78 MHz) including local TV from 9.2015	50	470-608 MHz, 614-764 MHz (494-596 MHz)	60 in 470-608 MHz & 614-806 MHz (39 in 470-608 MHz)	6	Low power unlicensed devices (e.g., alarms, remote control)	Finish conversion to DVB-T2 in 8.2015 More HD	2 nationwide muxes planned 1 prior to ASO 1 after ASO Also 2 local muxes planned in each city	~ 126 MHz after ASO
1	Côte d'Ivoire (Republic of)	Yes	N (2015)	30 in 174-230 MHz	8	56 / TBD	96%		DVB-T2 MPEG4	P (2015)	TBD / TBD	-	(470-702 MHz)	TBD		No	Yes (Under study)	Yes (Under study)	470-702 MHz
1	Croatia	No	F	N/A	N/A	- / -	54%		DVB-T SD MPEG2 DVB-T2 SD & HD MPEG4	T (2002) S (2007)	5 / 40 MHz	98.5 96 90 2 @ 85	470-790 MHz	390 in 470-790 MHz	8	**Mobile** in 790-862 MHz SRD, PMSE in 470-862 MHz	Yes (Under study)	Yes (Under study)	Under study
1	Cyprus	No	F	N/A	N/A	- / -	> 90%		DVB-T SD & HD MPEG4	S	4 (2) / 96 MHz	1@ 100 3 @ 95 (2 @ 75)	510-742 MHz (510-782 MHz)	170 in 470-790 MHz	8	470-790 MHz shared with secondary service	Yes (none planned at present)o	No	Information not available but is not expected to decrease-
1	Czech Republic	No	F	N/A	N/A	- / -	52%		DVB-T SD MPEG2 SD/HD MPEG2/MPEG4	S	4 national 14 regional	4 @ > 95 14 @ 1-70	470-790 MHz	355 in 470-790 MHz	8	**BC (D)**, PMSE 174-230 MHz PMSE in 470-790 MHz	N/A	N/A	N/A
1	Egypt	Yes	N (TBD)	74 in 174-223 MHz 153 in 470-798 MHz of the band 470-862 MHz	VHF 7 UHF 8	- / 154 MHz	5%	-	DVB-T SD MPEG2 (DVB-T2 SD MPEG2)	S (2010)	2 / 144 MHz	-	518-646 MHz (470-614 MHz) (174-230 MHz)	(16) in 174-230 MHz 9 (46) in 470-698 MHz	VHF 7 UHF 8	**Land Mobile** in 698-790 MHz PMSE in 470-790 MHz	Yes, HD	2 DVB-T2	144 MHz
1	Estonia	No	F (7.2010)	N/A	N/A	- / -	27.8	100%	DVB-T SD MPEG4 DVB-T2 HD MPEG4	S (7.2010)	5 / 320 MHz 1 / 224 MHz	3 @ 100 3 @ 90 (95)	470-790 MHz to 6.2017 (470-694 MHz) from 7.2017	132 in 470-790 MHz	8	PMSE, WP in 470-790 MHz	DVB-T2 can provide platform for HD, UHDTVTV & 3D	6 multiplexes currently, increasing to 7 after 2017.	After 2017 the amount of spectrum is given in Annex 2

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1	Ethiopia	Yes	N (2017)	48 in 174-230 MHz 74 in 470-790 MHz	-	- / -	80%		(DVB-T2)	P (2015)	1 / -	-	(470-694 MHz)	(100) in 470-698 MHz	8	No	Yes (TBD)	Yes (TBD)	Only UHF band 470-698 MHz
1	Finland	No	F	N/A	N/A	- / -	47%		DVB-T SD MPEG2 DVB-T2 SD & HD MPEG4	S (8.2001)	9 / -	2 @ 99.9 90.4 95 80 60 3 @ 85	174-230 MHz 470-790 MHz to 2017 (174-230 MHz 470-694 MHz) from 2017	34 in 174-230 MHz 193 in 470-790 MHz	VHF 7 UHF 8	Mobile and PMSE in 174-230 MHz Sound links in channels 21 & 23 Mobile/CRD and PMSE in 470-790 MHz	DVB-T2 only by 2026	Not in current license period. Next license period 6 nationwide and 3 part nationwide	From 2017 174-230 MHz 478-694 MHz TV spectrum expected to decrease as AV media shifts to broadband
1	France	No	F (11.2011)	N/A	N/A	- / -	57.9%	-	DVB-T SD MPEG2 SD & HD MPEG4 Hbb for interactivity (DVB-T2 HEVC)	S (3.2005) Mainland S (11.2010) Overseas Territories	8 national Mainland 1 regional Mainland / 320 MHz 1 Overseas Territories / 320 MHz	97.3% Mainland 95% Overseas Territories	470-790 MHz now (470-694 MHz) in future	1940 broadcast sites in 470-790 MHz	8	**BC (D)** 174-225 MHz PMSE in 470-790 MHz Radioastronomy 608-614 MHz WSD under consideration	Migrate all SD to HD Hbb TV (2011) UHDTVTV trial 2 services available in Paris from 5.2014 Mobile delivery trial in Brittany	Allocation of 700 MHz band to mobile likely to reduce current 8 muxes to 6 in future.	224 MHz is minimum requirement
1	Georgia	Yes	N (6.2015)	Some in VHF 93 in UHF	8	- / -			(DVB-T2 SD & HD)	P (3.2015)	(7) / 224 MHz VHF III for local services		(174-230 MHz) (470-694 MHz)	(294 + gap fillers in 174-230 MHz 470-698 MHz)	8	PMSE in 174-230 MHz and 470-698 MHz	-	Tender foreseen after launch of the current planned provision	-
1	Germany	No	F (2012)	N/A	N/A	- / -	10%		DVB-T SD (DVB-T2 HEVC) from 2016	S	9 / 320 MHz	90-100 (95-100); 55-66 (75-80); 14 (15-20); 6 (10-15)	470-790 MHz (470-694 MHz after conversion to DVB-T2)	~610 in 470-790 MHz	8	**BC (D)**, PMSE, HA 174-230 MHz PMSE in 470-790 MHz Radiolocation (WP) in 470-494 MHz RA in 608-614 MHz	HDTV expected to start in 2016	No	Now 320 MHz 224 MHz after 2016 following conversion to DVB-T2/HEVC
1	Hungary	No	F (10.2013)	N/A	N/A	- / -	22%	19%	DVB-T SD & HD MPEG4	S (2008)	5 /320 MHz	4 @ 96 1 @ 70 (96)	470-790 MHz	433 (487) in 470-790 MHz	8	**BC (D)**, Fixed and Mobile 174-230 MHz PMSE in 470-790 MHz RA in 608-614 MHz	More HbbTV & HD	No	320 MHz

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3	Iran (Islamic Republic of)	Yes	S (TBD)	26 in VHF I 5286 in 174-230 MHz 20,315 in 470-862 MHz	VHF 7 UHF 8	469 MHz/ All of VHF III & UHF IV/V	99.9%	99.9%	DVB-T SD & HD (DVB-T2 HD)	S (10.2009)	3 (7) / 392 MHz	2 @ 83 (99.9) 1 @ 24 (99.9) 7 @ (90)	470-862 MHz (174-230 MHz) (470-862 MHz Under study to release above 790 MHz)	1547 in 470-862 MHz	8	**Fixed** and **Mobile** in 174-230 MHz and 470-862 MHz but broadcasting dominates	More HD	7 by 2020	All available TV spectrum in UHF and VHF bands.
1	Italy	No	F (2008)	N/A	N/A	- / -	99%	91%	DVB-T SD + Radio MPEG2 HD + Radio MPEG4 DVB-T2 HD MPEG4 MHP for interactivity	S (2003)	19 (3) national and regional >15 in 30 local areas / >120 MHz	2 @ > 99 4 @ > 90 1 trial (> 80) 4 @ 94 3 @ 95 2 @ 92 1 @ 91 2 @ > 80 450 local > 80	174-223 MHz 470-790 MHz	1285 in 174-230 MHz 19402 in 470-790 MHz	VHF 7 UHF 8	**BC (D)** 174-230 MHz PMSE in 174-223 MHz and 470-790 MHz	No national plan but it is foreseen to move all SD to HDTV with some in 3DTV & UHDTV	3 (1 assigned 2 planned)	TBD after WRC-15
2	Jamaica	Yes	N (2020)	7 in VHF I 26 in 174-216 MHz	6	60 / TBD	43%		(ATSC SD & HD)	P (2018)	TBD / TBD	TBD	(482-608 MHz 614-698 MHz)	TBD in 470-608 MHz, 614-698 MHz	6	**Fixed** and **Mobile** in 470-482 MHz PMSE in 174-216 MHz and 482-698 MHz	Yes it is foreseen but at present the details are TBD	TBD	-
3	Japan	No	F	N/A	N/A	- / -	40%	23 million households	ISDB-T HD MPEG2 SD MPEG4 AVC (Portable)	S (12.2003)	2 / 240 MHz	98	470-710 MHz	12100 in 470-790 MHz	6	PMSE in 470-710 MHz Fixed distribution	UHDTVTV (No details available)	No plans for current network	N/A
1	Kenya	Yes	S (6.2015)	1 remaining in 174-230 MHz 13 remaining in 470-862 MHz	VHF 7 UHF 8	392 / -	60%	-	DVB-T2 SD MPEG4	T (2007) S (12.2009)	6 / 224 MHz	3 @ 58 (98) 3 @ 50 (98)	470-694 MHz (174-230 MHz)	(31) in 174-230 MHz 99 (272) in 470-698 MHz	VHF 7 UHF 8	No	HDTV within 3 years Yes for 3DTV, UHDTV, multimedia	Yes for 3 operators after ASO	470-694 MHz and possibly 174-230 MHz More spectrum may be required for introduction of HDTV, 3DTV and UHDTV
3	Korea (Republic of)	No	F (12.2012)	N/A	N/A	- / -	6.8 – 12.9%	-	ATSC 8VSB HD MPEG2	S (2001)	32 / 228 MHz	96.21 (97)	470-698 MHz	1344 in 470-698 MHz	6	PMSE in 470-698 MHz	3DTV started 11.2013 4K-UHDTVTV trial started 2012	No	Under study
1	Kyrgyz Republic	Yes	N (TBD)	450 in 174-230 MHz 345 in 470-790 MHz	8	320 / -	99.4%	-	DVB-T SD MPEG2 DVB-T2 SD MPEG4	S	12 / 320 MHz 4 / 320 MHz	12 @ 7.99 4 @ 58.9 (93.2)	470-790 MHz	41 in 470-790 MHz	8	**BC(A)** in 47-74 MHz	HDTV & 3DTV	4 more multiplexes to be launched	320 MHz in 470 -790 MHz with DVB-T2/MPEG4

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1	Latvia	No	F (6.2010)	N/A	N/A	- / -	25%		DVB-T SD & HD MPEG4 (DVB-T/T2 TBD)	S	7 national (1 local) /320 UHF (1 national) /56 VHF	99.9 (100) 5 @ 98 (99) 55 (99) (90) (98)	470-862 MHz (174-216 MHz 470-790 MHz)	0 (10) in 174-230 MHz 66 (113) in 470-862 MHz (113 in 470-790 MHz)	VHF 7 UHF 8	PMSE, SRD in 174-230 MHz PMSE in 470-862 MHz	More HDTV and possibly move all SD to HD	1 in VHF III 2 (1 pay TV and 1 local mux) in UHF IV/V	56 MHz in VHF (shared) 320 MHz in UHF
1	Lesotho (Kingdom of)	Yes	N (6.2015)	13 in 470-790 MHz	8	- / 24	-	-	(DVB-T2)	P (4.2015)	(1) / 160 MHz	(87)	(470-694 MHz)	(20) in 470-698 MHz	8	No	HD	1 (as required)	-
1	Liechtenstein	No	-	N/A	N/A		0	-	-	-	-	-	-	None	8	**Land Mobile** in 47-68 MHz & 790-862 MHz UWB, PMSE in 470-790 MHz PMR in 470-518 MHz	No HDTV planned	No	Due to small size of country needs for DTT limited but ongoing
1	Lithuania	No	F (10.2012)	-	-	-	50%	-	DVB-T SD & HD MPEG4 (DVB-T2)	S	19 (3) / 360 MHz	1 @ 98 3 @ 80-95 1 @ 22 (local) 14 Regional 1 @ (99) 2 @ (80-90)	470-790 MHz (470-694 MHz) after 2022	107 in 470-790 MHz	8	Band available to DTTB limited by primary services in other countries PMSE in 470-790 MHz	One HDTV provided by each major national broadcaster. Expect simulcast of 5 HDTV within a few years	One national multiplex to be launched 2016 Launch of two more national multiplexes suspended due to uncertainty on 2nd digital dividend.	Currently 320 MHz until 2022 Afterwards expect DVB-T2 would fit 224 MHz.
1	Madagascar	Yes	N (6.2015)	200 in 174-230 MHz & 470-960 MHz	-	- / -	-	-	(DVB-T2 MPEG4)	P (6.2015)	No studies-	No studies	(470-862 MHz)	TBD in 470-862 MHz	-	No	Yes	Minimum 2	392 MHz
3	Malaysia	Yes	N (2017/2018)	175 in 174-230 MHz 317 in 470-790 MHz	VHF 7 UHF 8	- / -	97.7%	-	DVB-T2 SD & HD	T P (2016)	3 (5) / 1440 MHz	3 @ 85 (98) 5 @ (90) after ASO	662-678 MHz now (542-742 MHz) from 2016 (470-694 MHz) after ASO	157 (923) in 470-790 MHz	8	**ARNS** in 223-230 MHz & 585-610 MHz **Mobile** in 477-498 MHz PMSE in 174-230 MHz 498-790 MHz	Yes after ASO	5 more multiplexes planned after ASO	-
1	Mauritius	Yes	N (6.2015)	1 in 54-68 MHz 7 in 174-230 MHz 30 in 470-862 MHz	VHF 7 UHF 8	- /-	~ 100%	-	DVB-T SD MPEG2	S (2005)	3 / 96 MHz	3 @ ~ 100 (100)	470-790 MHz (470-694 MHz)	28 in 470-790 MHz	8	**Mobile** in 827-832 MHz PMSE in 470-790 MHz	Yes	2 more after ASO	96 MHz (470-694 MHz)
1	Monaco	No	F	N/A	N/A	- / -	100% HFC network		DVB-T2	P (TBD)	(6) / 48 MHz	(100)	(6 channels in 470-694 MHz)	(6) in 470-698 MHz	8	**BC (D)** in 174-216 MHz PMSE in 470-790 MHz	No	6 GE06 channels (no timeframe)	48 MHz

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3	Myanmar	Yes	N (2020)	257 in 174-230 MHz & 470-698 MHz	6	60 / 228	92.7%		DVB-T2 SD MPEG4	S (10.2013)	4 / 228 MHz	66.23 (99.9)	470-698 MHz	228 (346) in 470-698 MHz	8	No	Planning to launch interactive service, HD, 3D, UHDTV, Mobile TV and handheld. Expect within 5 years	100 + Channels (3-4 years) depending on demand	104 MHz
1	Netherlands	No	F (12.2006)	N/A	N/A	- / -	7%		DVB-T SD MPEG2 (DVB-T2 HD MPEG4)	S (2003)	5 / 320 MHz until 2017 5 /224 MHz from 2017	80 indoor 98 rooftop (80)	470-790 MHz to 2017 (470-694 MHz) from 2017	272 in 470-790 MHz	8	**BC (D)**, PMSE in 174-230 MHz PMSE in 470-790 MHz **RA** 608-614 MHz	Following introduction of DVB-T2 most programs will launch in HD	None	Due to the introduction of HD TV and expected loss of 700 MHz band, transition to DVB-T2 is expected. To allow for 5 multiplexes of DVB-T2 in the frequency band 470-694 MHz allotment size needs to increase
3	New Zealand	No	F (12.2013)	N/A	N/A	- / -	54%		DVB-T SD & HD MPEG4 DVB-T2 SD MPEG4	S (2008)	5 / 176 MHz	86	510-686 MHz	158 (30) in 470-698 MHz	8	PMSE in 502-606 MHz and 622-698 MHz Considering a WSD trial in 510-606 MHz	Yes. Data applications, radio and HDTV deployed since 2008	4 Potential (TBD)	510-698 MHz, although this does not preclude sharing
1	Norway	No	F (12.2009)	N/A	N/A	- / -	14%	30%	DVB-T SD & HD MPEG4	S (2007)	5 (1) national 1 local at UHF (1 national) at VHF 1 satellite shadow area / 320 MHz	98	470-790 MHz (174-230 MHz)	2753 (170) in 470-790 MHz	8	**BC (D)**, ground and wall probing radar in 174-230 MHz PMSE in 470-790 MHz (both licensed and license exempt)	DVB-T2, more HD Increasing demand for HD. UHDTVTV part of future services. Consumers will expect HDTV to be standard resolution and maybe even UHDTVTV in the future. Marginal increase in existing No. of services	No, dependent on new services, economy and market situation. If 700 MHz band not available for DTT then it would be difficult to launch more multiplexes	320 MHz now 6 national frequency layers (plus the local Oslo multiplex) are believed to fulfill the requirements from 2021 If 700 MHz band is assigned to mobile, extensive re-planning is necessary to try to secure capacity requirements for DTTB.
1	Palestine	Yes	N (2015)	4 in VHF III 16 in UHF IV/V	8	160 / -	28%	3%	DVB-T2 MPEG 4	P (6.2015)	-	-	(470-686 MHz)	TBD in 470-698 MHz	8	None	HDTV and data	Yes	-

ITU Region	Member name	Analogue TV in operation	ASO not started: N (Planned date) ASO started: S – (Planned date) ASO Finished: F – (ASO date)	Analogue TV transmitters in use (still to be implemented) and RR Article 5 bands[1]	Analogue channel bandwidth in MHz	Current analogue spectrum requirement in MHz/ Extra spectrum required for transition to DTTB in MHz	Viewer uptake of terrestrial television (%)	Users that receive television primarily by terrestrial means (%)	DTT system standard in use (considered for adoption)	DTT started: S – (date) DTT planned: P – (date) DTT trials: T – (date)	Number of multiplexes in use (still to be implemented) / total spectrum use.	Geographic or population coverage (intended coverage) %	Range of frequencies / channels used (intended to be used) for DTT.	DTT transmitters in use (still to be brought into use) and RR Article 5 bands[1]	DTT Channel bandwidth (intended bandwidth) MHz	Television bands shared with other services (Bold - primary services, normal font - secondary services) [2]	New and enhanced service requirement and expected timeframe for introduction	Additional planned multiplexes and timeframe	Spectrum required given responses to Q5, 6, 7, 8, and 9 including transmission mode and timeframes.
3	Papua New Guinea	Yes	N (2016/17)	60 in VHF III	7	Sufficient available in VHF III & UHF IV/V	-	90%	DVB-T2 SD & HD	T (2014) P (11.2014)	1 (1) / 56 MHz	70 (90)	174-230 MHz	1 (TBD) in 174-230 MHz	7	None	Yes	One	-
1	Portugal	No	F (4.2012)	N/A	N/A	- / -	21.8%	-	DVB-T SD MPEG4	S (4.2009)	1 (7) / 56 MHz (320 MHz) SD	92.5 (87.3)	622-758 MHz now (470-790 MHz)	261 in 470-790 MHz now (TBD. Converting from SFN to MFN of SFNs + other GE06 Networks)	8	PMSE, HA in 174-230 MHz PMSE in 470-790 MHz	HDTV is under consideration	7 more planned in GE06 of which 1 is under consideration for implementation	320 MHz now Noting 2nd DD 694-790 MHz is under consideration.
1	Romania	Yes	N (6.2015)	349 in 174-230 MHz 496 in 470-790 MHz	8	- / No transition phase	10-12%	-	(DVB-T2 SD + HD MPEG4)	P (6.2015)	(3)	(90)	(174-214 MHz) (470-694 MHz)	Test transmissions only-	VHF 7 UHF 8	PMSE in 470-698 MHz	No	2 national and some regional and local muxes after 6.2015	264 MHz
1	Russian Federation	Yes	S (2019)	3683 in 47-74 MHz, 76-87.5 MHz, & 87.5-100 MHz of the band 87.5-108 MHz 10825 in 174-230 MHz 17178 in 470-790 MHz	8	- / -	82%	-	DVB-T SD MPEG4 (DVB-T2 SD MPEG4)	S (2006)	2 / 320 MHz	1 @ 31.5 (97.6) 1 @ NA (97.6)	470-790 MHz (174-230 MHz)	5599 in 470-790 MHz	8	**BC (A)** in 47-74 MHz **ARNS, Fixed, BSS,** PMSE in 470-790 MHz	Yes, HDTV in 2021. 3DTV & UHDTV are under study	Up to 5 more	376 MHz
1	Rwanda (Republic of)	No	F (7.2014)	N/A	8	- / -	75%		DVB-T SD MPEG4 (DVB-T2 MPEG4 – Time frame not specified)	S (2008)	7 / 224 MHz	2 @75 (90) 1 @ 37 (40) 4 @ 35 (60)	470-806 MHz (470-694 MHz)	28 in 470-862 MHz (53 in 470-698 MHz)	8	None	Yes but not limited to HD, 3DTV and UHDTV. DVB-T2 VoD, IPTV Texts, Graphics Data, Audio	No	400 MHz for DVB-T2
1	Serbia (Republic of)	Yes	N (6.2015)	85 in 174-230 MHz 657 in 470-862 MHz	VHF 7 UHF 8	448 /	38%		DVB-T2 SD & HD	S (3.2012)	1 / 216 MHz (until 4.2015) 3 / 224 (from 6.2015)	94.7 (>95)	478-846 MHz to 3.2015 (478-750 MHz) from 4.2015 (478-694 MHz) from TBD after WRC-15	79 in 470-862 MHz currently (386 in 470-790 MHz) from 4.2015 (386 in 470-698 MHz) from TBD	8	**Fixed and Mobile (except Aero Mobile)** until 2015 in 790-862 MHz PMSE, Radiolocation (WP), ARNS in 470-790 MHz	More HDTV and data Pay TV, e-banking, e-shopping	1 at start of ASO 1 at end of ASO	See answers to Questions 5, 6. 7. 8 & 9

ITU Region	Member name	Analogue TV in operation	ASO not started: N (Planned date) ASO started: S – (Planned date) ASO Finished: F – (ASO date)	Analogue TV transmitters in use (still to be implemented) and RR Article 5 bands[1]	Analogue channel bandwidth in MHz	Current analogue spectrum requirement in MHz/ Extra spectrum required for transition to DTTB in MHz	Viewer uptake of terrestrial television (%)	Users that receive television primarily by terrestrial means (%)	DTT system standard in use (considered for adoption)	DTT started: S – (date) DTT planned: P – (date) DTT trials: T – (date)	Number of multiplexes in use (still to be implemented) / total spectrum use.	Geographic or population coverage (intended coverage) %	Range of frequencies / channels used (intended to be used) for DTT.	DTT transmitters in use (still to be brought into use) and RR Article 5 bands[1]	DTT Channel bandwidth (intended bandwidth) MHz	Television bands shared with other services (Bold - primary services, normal font - secondary services) [2]	New and enhanced service requirement and expected timeframe for introduction	Additional planned multiplexes and timeframe	Spectrum required given responses to Q5, 6, 7, 8, and 9 including transmission mode and timeframes.
1	Seychelles (Republic of)	Yes	N (12.2015)	21 in 174-230 MHz 10 in 510-790 MHz of the band 470-790 MHz	VHF 7 UHF 8	- / 56	80%		DVB-T2 MPEG-4	T (2011) P (9.2015)	TBD / TBD	TBD	582-590 MHz (526-686 MHz) after 9.2015	18 in 470-698 MHz	8	**RA** in 608-614 MHz	Not at present	No plans developed yet as all efforts directed towards digital conversion	526-686 MHz
1	Sierra Leone Broadcasting Corporation	Yes	N (TBD)	7 in 470-698 MHz		224 / TBD	45%		-	-	-	-	-	-		No	No	Yes	-
1	Slovak Republic	No	F (2012)	N/A	N/A	- / -	55.7%		DVB-T /DVB-T2 SD & HD MPEG2/MPEG4 (DVB-H)	S	4 (3) National (62 local) / 320 MHz	90.4 2 @ 99.2 94.9	470-790 MHz	216 (18) in 470-790 MHz	8	**Mobile** in 47-48.5, 67-68 MHz **Mobile (except Aero Mobile)** in 790-862 MHz Mobile in 48.5-67 MHz PMSE in 470-790 MHz	More HDTV with DVB-T2	2 or 3 national	Now 320 MHz if existing services, coverage and new services are to be supported and PMSE taken into account. If 700 MHz is released it will result in loss of 2 GE06 layers. Future depends on compression technology and transmission systems
1	Slovenia	No	F	N/A	N/A	- / -	19%		DVB-T SD & HD MPEG4	S (2006)	9 / 24 MHz (see 10 a)	1 @ 98 2 @ 96 6 @ 5	478-766 MHz (470-766 MHz)	264 (>100) in 470-790 MHz	8	**Mobile** in 223-230 MHz PMSE in 470-790 MHz RA in 608-614 MHz	Not at present	1 after 2015	Channels for at least 3 national and up to 10 local / regional networks
1	Spain	No	F (4.2010)	N/A	N/A	- / -	98%	89%	DVB-T SD MPEG 2 HD MPEG4	S (1999)	7 (1) 1 local / 320 MHz	1 @ 99 1 @98 5 @ 96 1 @ 50 (80)	470-862 MHz now (470-790 MHz) from 1.2015	22726 in 470-862 MHz	8	**BC (D), Land Mobile** in 174-230 MHz **Fixed and Mobile (except Aero Mobile)** in 790-862 MHz PMSE in 470-790 MHz & 823-832 MHz GP/WP Radar 790-862 MHz	HD	No	Under study

ITU Region	Member name	Analogue TV in operation	ASO not started: N (Planned date) ASO started: S – (Planned date) ASO Finished: F – (ASO date)	Analogue TV transmitters in use (still to be implemented) and RR Article 5 bands[1]	Analogue channel bandwidth in MHz	Current analogue spectrum requirement in MHz/ Extra spectrum required for transition to DTTB in MHz	Viewer uptake of terrestrial television (%)	Users that receive television primarily by terrestrial means (%)	DTT system standard in use (considered for adoption)	DTT started: S – (date) DTT planned: P – (date) DTT trials: T – (date)	Number of multiplexes in use (still to be implemented) / total spectrum use.	Geographic or population coverage (intended coverage) %	Range of frequencies / channels used (intended to be used) for DTT.	DTT transmitters in use (still to be brought into use) and RR Article 5 bands[1]	DTT Channel bandwidth (intended bandwidth) MHz	Television bands shared with other services (Bold - primary services, normal font - secondary services) [2]	New and enhanced service requirement and expected timeframe for introduction	Additional planned multiplexes and timeframe	Spectrum required given responses to Q5, 6, 7, 8, and 9 including transmission mode and timeframes.
2	Suriname	Yes	S (6.2015)	21 in 54-72 MHz, 76-88 MHz, 174-216 MHz, 470-608 MHz, 614-698 MHz	6	≤ 240 MHz	-	-	ATSC &DVB-T2	T (2012) S (2014)	1 / 6 MHz (2) / 8 MHz	-	174-216 MHz 470-608 MHz 614-698 MHz	2 in 174-216 MHz 7 in 470-608 & 614-698 MHz (31 not specified)	ATSC 6 DVB-T2 8	No	Yes	2 using DVB-T2 within 1 year	240 MHz
1	Sweden	No	F (11.2007)	N/A	N/A	- / -	21.8%	27.8%	DVB-T SD MPEG2/MPEG4 DVB-T2 SD & HD/ MPEG 4	S	7 / 388.5 MHz	1 @ 99.8 6 @ 98	174-230 MHz 470-790 MHz to 3.2017 (174-230 MHz 470-694 MHz) from 4.2017	65 in 174-230 MHz 1490 in 470-790 MHz	VHF 7 UHF 8	**BC (D)**, PMSE in 174 -230 MHz PMSE in 470- 790 MHz	Another 7 national HDTV services from 4.2015 to 4.2017	No	56 MHz in VHF 320 MHz in UHF to 3.2017 56 MHz in VHF 224 MHz in UHF from 4.2017
1	Switzerland	No	F	N/A	N/A	- / -	< 5%		DVB-T SD MPEG2	S (7.2003)	1 national 2 regional/local / 128 MHz	1 @ 80 portable outdoor 98 fixed 2 @ 70	494-774 MHz	332 in 470-790 MHz	8	**BC (D)**, UWB, PMSE, HA, MT in 174-230 MHz PMSE, RA, UWB, Mobile Radiolocation (WP), in 470-790 MHz **Mobile** in VHF I and 790-862 MHz	No	No	TBD
1	Tanzania	Yes	S (3.2015)	4 remaining in 470-862 MHz Formerly 28 channels in 174-214 MHz of the band 174-230 MHz & 470-862 MHz	8	224 / -	25%	-	DVB-T/DVB-T2	S (2010)	3-5 / 474-694 MHz	3-5 @ 30 (60 DTT, 100 DTH)	470-686 MHz	87 (> 200) in 470-694 MHz	8	No	Yes, HD & UHD	Yes	260 MHz 224 MHz SDTV 40 MHz HDTV
3	Thailand	Yes	N (2020)	22 in 47-68 MHz 131 in 174-230 MHz 96 in 510-790 MHz of the band 470-790 MHz	VHF 7 UHF 8	336/ 280 within existing UHF band	46%	-	DVB-T2 SD & HD MPEG4	T (2012) S (2014)	5 (1) / 280 MHz	50 (95)	510-790 MHz	225 (845) in 470-790 MHz	8	PMSE in 510-790 MHz	Possibly migrate SD to HD, and introduce UHDTV, and interactivity Multimedia under study	1 after ASO	280 MHz to serve required muxes and prepare for advanced broadcasting technologies
1	United Arab Emirates	No	F (6.2014)	N/A	N/A	- / -	-	-	DVB-T2 SD & HD	S (7.2014)	2 (4) / 16 (224) MHz	(100)	470-478 MHz, 518-526 MHz now (470-694 MHz) in future	2 (75) in 470-698 MHz	8	PMSE in 470-698 MHz	Yes	At least 6 are required	470-694 MHz (224 MHz)

ITU Region	Member name	Analogue TV in operation	ASO not started: N (Planned date) ASO started: S – (Planned date) ASO Finished: F – (ASO date)	Analogue TV transmitters in use (still to be implemented) and RR Article 5 bands[1]	Analogue channel bandwidth in MHz	Current analogue spectrum requirement in MHz/ Extra spectrum required for transition to DTTB in MHz	Viewer uptake of terrestrial television (%)	Users that receive television primarily by terrestrial means (%)	DTT system standard in use (considered for adoption)	DTT started: S – (date) DTT planned: P – (date) DTT trials: T – (date)	Number of multiplexes in use (still to be implemented) / total spectrum use.	Geographic or population coverage (intended coverage) %	Range of frequencies / channels used (intended to be used) for DTT.	DTT transmitters in use (still to be brought into use) and RR Article 5 bands[1]	DTT Channel bandwidth (intended bandwidth) MHz	Television bands shared with other services (Bold - primary services, normal font - secondary services) [2]	New and enhanced service requirement and expected timeframe for introduction	Additional planned multiplexes and timeframe	Spectrum required given responses to Q5, 6, 7, 8, and 9 including transmission mode and timeframes.
1	United Kingdom	No	F	N/A	N/A	- / -	75%	36% DTT only	DVB-T SD MPEG2 DVB-T2 SD & HD MPEG4	S (1998)	7 national 1 sub national 1 regional / 304 MHz	3 @ 98.5 3 @ 90 1 @ 70 1 @ 40 (50) 1 (Regional)	470-574 MHz 614-790 MHz (470-590 MHz 598-606 MHz 614-790 MHz)	3775 (50) in 470-790 MHz	8	**BC (D)** in 174-230 MHz PMSE in 470-790 MHz Ch 38 PMSE exclusive	Future demand unclear UHDTVTV trials have been made	2 DVB-T2 muxes licensed (1 no launch date)	304 MHz at UHF now Ofcom currently considering a possible future clearance of 694 MHz to 790 MHz
1	Uzbekistan	Yes	N (TBD)	27 in 47-74 MHz 15 in 76-87.5 MHz 18 in 87.5-108 MHz 143 in 174-230 MHz 397 in 698-790 MHz	8	- / -	-	-	DVB-T/DVB-T2 SD & HD MPEG4	S (2008)	4 / 192 MHz	1 @ 70 (99.9) 3 @ 10 (70)	510-686 MHz (478-694 MHz)	23 (80) in 470-694 MHz	8	No	Yes HD started 2014	3 more end of 2017	192 MHz at 256 QAM
1	Vatican City	No	F	N/A	N/A	- / -	99%	100%	DVB-T SD & HD MPEG2 (DVB-T2)	S (2012)	2 VHF / 14 MHz 3 UHF / 24 MHz	2 @ 40 (> 99) 3 @ 50 (> 99)	181-188 MHz 216-223 MHz 470-478 MHz 662-670 MHz 758-766 MHz 1 452-1 492 MHz	2 in 174-230 MHz 3 in 470-790 MHz 2 in 1452-1492 MHz		**BC (D)** 174-230 MHz PMSE in 174-223 and 470-790 MHz	Migrate to HD Introduce UHDTVTV & 3D In the future all programmes will be HDTV with some in 3DTV & UHDTV	Under study	110 MHz now 200 MHz for transition to T2 180 MHz for future (taking into account possible improvements in coding)

Key:

[1] Frequency band allocation in accordance with Article 5 of the Radio Regulations (2012) and its footnotes.

[2] Bold equates to a Primary Service. Normal font equates to a Secondary Service/ application in a Secondary Service

UHF IV – Due to WRC-15 Agenda Items 1.1 and 1.2 which include discussions on the UHF broadcast bands and specifically the band edge at 694/698 MHz, for the purposes of the questionnaire the designation "UHF IV" has been used to refer to the frequency range 470-694 MHz and aligns with Annex 1 to Attachment 1 of the Questionnaire.

Abbreviations ARNS = Aeronautical Radionavigation Service, BC (A) = Analogue Sound Broadcasting, BC (D) = Digital Sound Broadcasting, CRD = Cognitive Radio Devices, HA = Hearing Aids, HDR= High Dynamic Range, HFR= High Frame Rate, GP= Ground Profile Radar, PMSE = Services Ancillary to Broadcasting / Services Ancillary to Programme making / Wireless Audio, NA= Information not available/provided, RA = Radioastronomy, SRD = Short Range Devices, TBR= To Be Released, WCG= Wide Colour Gamut, WP = Wind Profile Radar, WSD = White Space Devices, UWB = Ultra Wide Band

ANNEX 2B

Responses from Sector Members

ITU Region	Member name	Analogue TV in operation	ASO not started: N (Planned date) ASO started: S – (Planned date) ASO Finished: F – (ASO date)	Analogue TV transmitters in use (still to be implemented) and RR Article 5 bands[1]	Analogue channel bandwidth in MHz	Current analogue spectrum requirement in MHz/ Extra spectrum required for transition to DTTB in MHz	Viewer uptake of terrestrial television (%)	Users that receive television primarily by terrestrial means (%)	DTT system standard in use (considered for adoption)	DTT started: S – (date) DTT planned: P – (date) DTT trials: T – (date)	Number of multiplexes in use (still to be implemented) / total spectrum use.	Geographic or population coverage (intended coverage) %	Range of frequencies / channels used (intended to be used) for DTT.	DTT transmitters in use (still to be brought into use) and RR Article 5 bands[1]	DTT Channel bandwidth (intended bandwidth) MHz	Television bands shared with other services (Bold - primary services, normal font - secondary services) [2]	New and enhanced service requirement and expected timeframe for introduction	Additional planned multiplexes and timeframe	Spectrum required given responses to Q5, 6, 7, 8, and 9 including transmission mode and timeframes.
2	International Association of Broadcasters (CLM)	Yes	N (12.2019)	274 in 54-72 MHz, 76-88 MHz 404 in 174-216 MHz 507 in 512-608MHz of the band 470-608 MHz, & 614-692 MHz	6	246 / 42 MHz	DTT 49.88%	-	DVB-T & DVB-T2	S (12.2010) DVB-T S (4.2012) DVB-T2	51 /	50%	470-608 MHz, 614-692 MHz (470-608 MHz) After ASO and restack	796 in 470-608 MHz & 614-698 MHz	6	PMSE in all TV bands	TBD, still preparing for ASO. Current system permits HD	2 nationwide muxes planned 1 prior to ASO, 1 after ASO Also 2 local muxes planned in each city	138 MHz after ASO, the minimum requirement More spectrum may be needed for future transition
2	International Association of Broadcasters (CTR)	Yes	N (12.2017)	54-72 MHz 76-88-MHz 174-216 MHz 470-608 MHz 614-806 MHz	6	402 / -	50%	50%	ISDB-T	S (2014)	- /	-	470-608 MHz, 614-806 MHz (470-608 MHz, 614-698 MHz) after ASO and restack	-	6	PMSE in all TV bands, Mobile in 698-806 MHz primary after ASO and restack	TBD, analogue to digital conversion to be completed. Current system permits HD	Yes, all analogue stns. should move to digital	222 MHz after ASO, the minimum requirement More spectrum may be needed for future transition
2	International Association of Broadcasters (GTM)	Yes	N (TBD)	5 in 54-72 MHz 76-88-MHz 8 in 174-216 MHz 49 in 500-608 MHz of the band 470-608 MHz, & 614-734 MHz of the band 614-806 MHz	6	[330] / -	-	-	ISDB-T	S (2015)	- /	-	500-608 MHz, 614-734 MHz (500-608 MHz, 614-698 MHz) after ASO and restack	-	6	PMSE in all TV bands	TBD, have still to complete digital roll-out. Current system permits HD	Yes, all analogue stns. should move to digital	Min. of [222] MHz after ASO and restack. More spectrum may be needed for future transition
2	International Association of Broadcasters (PRG)	Yes	N (12.2023)	25 in 54-72 MHz 76-88-MHz 34 in 174-216 MHz 30 in 470-608 MHz 614-806 MHz	6	402 /	-	-	ISDB-T	S (1.2015)	- /	-	470-608 MHz, 614-698 MHz	-	6	PMSE in all TV bands	TBD, have still to complete digital roll-out. Current system permits HD	All analogue stations should be available in digital	Min. of 222 MHz after ASO More spectrum may be needed for future transition

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2	International Association of Broadcasters (CHL)	Yes	N (2020)	205 in 54-72 MHz 76-88-MHz 634 in 174-216 MHz 19 in 512-608 MHz of the band 470-608 MHz, & 614-806 MHz	6	360 / -	92%	92%	ISDB-T	S (2015)	7 experimental /	36%	512-608 MHz, 614-698 MHz	-	6	**Mobile** in 698-806 MHz after ASO and restack PMSE in all TV bands	TBD, have still to complete digital roll-out. Current system permits HD	All analogue stns. should move to digital	Min. of 180 MHz after ASO More spectrum may be needed for future transition
2	International Association of Broadcasters (ARG)	Yes	N (12.2019)	35 in 54-72 MHz 76-88-MHz 3 in 174-216 MHz 766 in 512-608 MHz of the band 470-608 MHz, & 614-806 MHz	6	360 / -	-	-	ISDB-T (free to air) & DVB-T (pay TV)	S (10.1998) ATSC S (4.2010) ISDB-T	4 (state owned) and there are additional muxes for pay TV /	82% (free to air) 40% (pay TV)	512-608 MHz, 614-698 MHz (470-608 MHz, 614-698 MHz)	329 in 512-608 MHz (TBD in 470-608 MHz) state owned, 10 private in 614-698 MHz	6	PMSE in all TV bands	TBD, focus is on completing ASO. Current system permits HD	All analogue stns. should move to digital State owned network to be expanded to cover 7 or more new locations, each with 4 channels.	222 MHz including 470-512 MHz to support new multiplexes More spectrum may be needed for future transition
1	Rai Way	No	F	N/A	N/A	- / -	99%	91%	DVB-T SD + Radio MPEG2 HD + Radio MPEG4 DVB-T2 HD MPEG4 MHP for interactivity	S (2003)	19 (3) national and regional >15 in 30 local areas / >120 MHz	2 @ > 99 4 @ > 90 1 trial (> 80) 4 @ 94 3 @ 95 2 @ 92 1 @ 91 2 @ > 80 450 local > 80	174-223 MHz 470-790 MHz	1285 in 174-230 MHz 19402 in 470-790 MHz	VHF 7 UHF 8	**BC (D)** in 174-230 MHz PMSE in 174-223 MHz and 470-790 MHz	Migration to new HbbTV 2.0 standard and new programmes in UHD More HD with eventually all programmes at least HD and introduce UHD	3 (1 assigned 2 planned)	Requirement for > 370 MHz despite coding improvements due to new services with higher data demands. There will also be a need for spectrum to transition between technologies
3	NHK	No	F	N/A	N/A	- / -	40%	23 million households	ISDB-T HD MPEG2 SD MPEG4 AVC (Portable)	S (12.2003)	2 / 240 MHz	98	470-710 MHz	12100 in 470-790 MHz	6	PMSE in 470-710 MHz Fixed distribution	UHD (No details available)	No plans for current network	N/A

ITU Region	Member name	Analogue TV in operation	ASO not started: N (Planned date) ASO started: S – (Planned date) ASO Finished: F – (ASO date)	Analogue TV transmitters in use (still to be implemented) and RR Article 5 bands[1]	Analogue channel bandwidth in MHz	Current analogue spectrum requirement in MHz/ Extra spectrum required for transition to DTTB in MHz	Viewer uptake of terrestrial television (%)	Users that receive television primarily by terrestrial means (%)	DTT system standard in use (considered for adoption)	DTT started: S – (date) DTT planned: P – (date) DTT trials: T – (date)	Number of multiplexes in use (still to be implemented) / total spectrum use.	Geographic or population coverage (intended coverage) %	Range of frequencies / channels used (intended to be used) for DTT.	DTT transmitters in use (still to be brought into use) and RR Article 5 bands[1]	DTT Channel bandwidth (intended bandwidth) MHz	Television bands shared with other services (Bold - primary services, normal font - secondary services) [2]	New and enhanced service requirement and expected timeframe for introduction	Additional planned multiplexes and timeframe	Spectrum required given responses to Q5, 6, 7, 8, and 9 including transmission mode and timeframes.
2	NABA (CAN)	Yes	F (2012) in 28 mandatory markets N (TBD) in small non-mandatory markets	220 in 54-72 MHz, 76-88 MHz 462 in 174-216 MHz 183 in 470-608 MHz	6	Analogue spectrum required to end of transition / 1 Channel	5-10%	-	ATSC A/53 SD & HD MPEG2 Mobile MPEG4	S ( )	Multiple programmes in a 6 MHz channel	SD/HD > 90 Mobile ~ 50	54-72 MHz 76-88 MHz 174-216 MHz 470-608 MHz	8 in 54-72 MHz 76-88 MHz 55 in 174-216 MHz 171 in 470-608 MHz	6	**Fixed, Mobile** in 470-608 MHz **Radioastronomy** and Mobile Satellite in 608-614 MHz **Fixed, Mobile** in 614-698 MHz **Fixed** in 698-806 MHz PMSE in all TV bands	HD is available, 3D standardised in A/104 standard. UHD is a requirement in ATSC 3. UHD-1 (3840-2160) is currently of greatest interest Implementation of 3D, UHD is voluntary by broadcasters and currently not scheduled Mobile TV service standardised and implementation is voluntary New services also include HDR, WCG and HFR (120 fps) Some of these new services have been or are provided in Canada	Stations are allowed to transmit more than one programme in a 6 MHz channel	ATSC 3 likely not to be compatible with current DTV, transition will be challenging as it will occupy same spectrum. Minimum requirement for broadcasters to develop and apply new technologies is the spectrum represented by channels 2 to 51

ITU Region	Member name	Analogue TV in operation	ASO not started: N (Planned date) ASO started: S – (Planned date) ASO Finished: F – (ASO date)	Analogue TV transmitters in use (still to be implemented) and RR Article 5 bands[1]	Analogue channel bandwidth in MHz	Current analogue spectrum requirement in MHz/ Extra spectrum required for transition to DTTB in MHz	Viewer uptake of terrestrial television (%)	Users that receive television primarily by terrestrial means (%)	DTT system standard in use (considered for adoption)	DTT started: S – (date) DTT planned: P – (date) DTT trials: T – (date)	Number of multiplexes in use (still to be implemented) / total spectrum use.	Geographic or population coverage (intended coverage) %	Range of frequencies / channels used (intended to be used) for DTT.	DTT transmitters in use (still to be brought into use) and RR Article 5 bands[1]	DTT Channel bandwidth (intended bandwidth) MHz	Television bands shared with other services (Bold - primary services, normal font - secondary services) [2]	New and enhanced service requirement and expected timeframe for introduction	Additional planned multiplexes and timeframe	Spectrum required given responses to Q5, 6, 7, 8, and 9 including transmission mode and timeframes.
2	NABA (MEX)	Yes	S (12.2015)	226 in 54-72 MHz, 76-88 MHz 325 in 174-216 MHz 157 in 470-608 MHz, 614-806 MHz	6	Analogue spectrum required to end of transition / 1 Channel	98%	63%	ATSC A/53 SD & HD MPEG2 Mobile MPEG4	T (1997) S (2004)	Multiple programmes in a 6 MHz channel	SD/HD > 90 Mobile ~ 50	174-216 MHz 470-608 MHz 614-698 MHz (54-72 MHz 76-88 MHz 174-216 MHz 470-608 MHz 614-698 MHz) after ASO and restack	1 in 174-216 MHz 342 in 470-608 MHz, 614-698 MHz	6	**Fixed, Mobile** in 470-608 MHz **Radioastronomy** and Mobile Satellite in 608-614 MHz **Fixed, Mobile** in 614-698 MHz **Fixed** in 698-806 MHz PMSE in all TV bands	HD is available, 3D standardised in A/104 standard. UHD is a requirement in ATSC 3. UHD-1 (3840-2160) is currently of greatest interest Implementation of 3D, UHD is voluntary by broadcasters and currently not scheduled Mobile TV service standardised and implementation is voluntary New services also include HDR, WCG and HFR (120 fps) Some of these new services have been or are provided in Mexico	2 more national DTTB networks considered for 2015. Stations are allowed to transmit more than one programme in a 6 MHz channel	ATSC 3 likely not to be compatible with current DTV, transition will be challenging as it will occupy same spectrum. Minimum requirement for broadcasters to develop and apply new technologies is the spectrum represented by channels 2 to 51
2	International Association of Broadcasters (MEX)	Yes	S (12.2015) but may be delayed.	227 in 54-72 MHz, 76-88 MHz 323 in 174-216 MHz 157 in 470-608 MHz, 614-806 MHz	6	402 / -	98%	-	ATSC	T (1997) S (2004)	- /	-	174-216 MHz 470-608 MHz, 614-698 MHz (174-216 MHz 470-608 MHz) after ASO and restack	1 in 174-216 MHz 355 in 470-608 MHz, 614-698 MHz	6	**Fixed** and **Mobile** in 470-512 MHz only until ASO. **Land Mobile** in 698-806 MHz, usage depending on ASO PMSE in all TV bands	TBD, still to complete ASO. Current system permits HD. UHD under evaluation.	2 DTV networks to be auctioned in 2015	Min. of 180 MHz after ASO. More spectrum may be needed for future transition

ITU Region	Member name	Analogue TV in operation	ASO not started: N (Planned date) ASO started: S – (Planned date) ASO Finished: F – (ASO date)	Analogue TV transmitters in use (still to be implemented) and RR Article 5 bands[1]	Analogue channel bandwidth in MHz	Current analogue spectrum requirement in MHz/ Extra spectrum required for transition to DTTB in MHz	Viewer uptake of terrestrial television (%)	Users that receive television primarily by terrestrial means (%)	DTT system standard in use (considered for adoption)	DTT started: S – (date) DTT planned: P – (date) DTT trials: T – (date)	Number of multiplexes in use (still to be implemented) / total spectrum use.	Geographic or population coverage (intended coverage) %	Range of frequencies / channels used (intended to be used) for DTT.	DTT transmitters in use (still to be brought into use) and RR Article 5 bands[1]	DTT Channel bandwidth (intended bandwidth) MHz	Television bands shared with other services (Bold - primary services, normal font - secondary services) [2]	New and enhanced service requirement and expected timeframe for introduction	Additional planned multiplexes and timeframe	Spectrum required given responses to Q5, 6, 7, 8, and 9 including transmission mode and timeframes.
2	NABA (US)	Yes	F (2009) for high power stations. N (9.2015) for low power stations	270 in 54-72 MHz, 76-88 MHz 508 in 174-216 MHz 1195 in 470-608 MHz, 614-698 MHz	6	Analogue spectrum required to end of transition / 1 Channel	14% + 80% of cable headends fed by off-air		ATSC A/53 SD & HD MPEG2 Mobile MPEG4	S ( )	Multiple programmes in a 6 MHz channel	SD/HD > 90 Mobile ~ 50	54-72 MHz 76-88 MHz 174-216 MHz 470-608 MHz 614-698 MHz to full ASO and restack (54-72 MHz 76-88 MHz 174-216 MHz 470-TBD MHz) after auction, ASO and restack	39 in 54-72 MHz 76-88 MHz 423 in 174-216 MHz 1323 in 470-608 MHz 614-698 MHz	6	**Fixed, Mobile** in 470-608 MHz **Radioastronomy** and Mobile Satellite in 608-614 MHz **Fixed, Mobile** in 614-698 MHz **Fixed** in 698-806 MHz PMSE in all TV bands	HD is available, 3D standardised in A/104 standard. UHD is a requirement in ATSC 3. UHD-1 (3840-2160) is currently of greatest interest Implementation of 3D, UHD is voluntary by broadcasters and currently not scheduled Mobile TV service standardised and implementation is voluntary New services also include HDR, WCG and HFR (120 fps) Some of these new services have been or are provided in the US	Stations are allowed to transmit more than one programme in a 6 MHz channel	ATSC 3 likely not to be compatible with current DTV, transition will be challenging as it will occupy same spectrum. Minimum requirement for broadcasters to develop and apply new technologies is the spectrum represented by channels 2 to 51
1	Abertis	No	F (2010)	N/A	N/A	- / -	> 98.5%	95%+	DVB-T SD MPEG2 HD MPEG4 Hbb for interactivity	S (1999)	7 national, 1-2 in 17 regions, 1-2 in 256 local areas / 320 MHz	≥ 98.5	470-790 MHz from 1.2015	~40000 in 470-790 MHz	8	**BC (D)** in 174-223 MHz PMSE in 470-790 MHz	More HD expected UHD tests in 2013, new UHD services expected. Foresee requirement for HD, UHD, 3D, multimedia & data	1 DVB-T2 expected 2016	470-790 MHz

Key:

[1] Frequency band allocation in accordance with Article 5 of the Radio Regulations (2012) and its footnotes.

[2] Bold equates to a Primary Service. Normal font equates to a Secondary Service/ application in a Secondary Service

UHF IV – Due to WRC-15 Agenda Items 1.1 and 1.2 which include discussions on the UHF broadcast bands and specifically the band edge at 694/698 MHz, for the purposes of the questionnaire the designation "UHF IV" has been used to refer to the frequency range 470-694 MHz and aligns with Annex 1 to Attachment 1 of the Questionnaire.

Abbreviations ARNS = Aeronautical Radionavigation Service, BC (A) = Analogue Sound Broadcasting, BC (D) = Digital Sound Broadcasting, CRD = Cognitive Radio Devices, HA = Hearing Aids, HDR= High Dynamic Range, HFR= High Frame Rate, GP= Ground Profile Radar, PMSE = Services Ancillary to Broadcasting / Services Ancillary to Programme making / Wireless Audio, NA= Information not available/provided, RA = Radioastronomy, SRD = Short Range Devices, TBR= To Be Released, WCG= Wide Colour Gamut, WP = Wind Profile Radar, WSD = White Space Devices, UWB = Ultra Wide Band

ANNEX 3 TO [DRAFT] ITU-R REPORT

Summary Table – Sound broadcasting

Note: references to frequency allocations within the tables reflect the different frequency allocations in RR Article 5 for the three Regions.

ANNEX 3A

Responses from Member States

ITU Region	Member name	Analogue sound broadcasting standards in use and band	Analogue radio transmitters in operation and RR Article 5 band (still to be brought into use). [1,2]	Analogue Bandwidth [3]	Spectrum required for growth in the analogue platform and amount required	Digital sound broadcasting (DSB) operation DSB planned: P (date) DSB started: S (date)	System standards in use (considered for use) See ITU-R Recs. BS.1114, BS.1514, BS.1615)	DSB channel bandwidths in use (considered for use)	Frequencies in use (intended to be brought into use). [1]	DSB direct reception population coverage (%)	Additional spectrum required for transition to DSB (considered to be required)	Digital radio transmitters in use (still to be brought into use) and RR Article 5 bands [1]	DSB spectrum requirement	Analogue sound switch off (ASO): ASO not considered: N, ASO under consideration P(date)	Terrestrial sound bands shared with other services [4]	Spectrum required for sound broadcasting (MHz) based on responses to previous questions (inc. transmission mode and timeframes).
1	Algeria	AM LF AM MF FM VHF II	3 in 148.5-283.5 kHz 23 (17) in 526.5-1605.5 kHz (2) in 2.3-26.1 MHz 500 (1900) in 87.5-108 MHz	LF, MF 9 kHz FM 0.2 MHz	Up to 4 FM frequencies	P (TBD) Trials within next year	(DAB+) (DRM)	(DRM 9 kHz) (DAB 1.5 MHz)	(148.5-283.5 kHz) (526.5-1605.5 kHz) (2.3-26.1 MHz) (174-230 MHz) (1452-1492 MHz)	(75%) Covered by 2MW & 1LW tx that are DRM ready but not on air	-	(1) in 148.5-283.5 kHz (2) in 526.5-1605.5 kHz	Under study	N	No	Under study
3	Australia	AM MF AM HF FM VHF II	292 in 526.5 – 1606.5 kHz 24 transmissions at 17 sites in 2.3 - 26 MHz 5092 in 87 – 108 MHz	MF 18 kHz HF 10kHz FM 0.3 MHz	No suitable additional spectrum. Minimal growth expected in analogue broadcasting.	S (7.2009)	DAB+	1.5 MHz	174-216 MHz Ch. 9A, 9B & 9C (Future services may use 174-230 MHz and any DAB block from 5A to 12D but blocks 8A to 9D most likely)	~50%	Govt. policy and legislation based on digital radio as supplement not replacement for analogue radio. However, commercial radio industry considers digital radio may replace analogue.	47 (TBD) in 174-230 MHz	14 MHz	N	MF No HF No 87-108 MHz Underground Tx (10 µW) Wireless Audio 88-108 MHz (10 µW in 180 kHz) 174-230 MHz **BT (D),** PMSE	1080 kHz AM 20.5 MHz FM 14 MHz DAB+ within 174-230 MHz
1	Austria	System 4 and System 1	4 in 2.3-26 MHz 1289 in 87.5-108 MHz	FM 0.3 MHz	VHF Band II is more or less fully exploited. No noteworthy unused spectrum available.	P (4.2015)	(DAB In some cases System G could be option for local operators)	(System A1.5 MHz) (System G 100 kHz)	(174-230 MHz)	No transmitters in operation	N/A	(~400) in 174-230 MHz	(174-230 MHz)	N/A	174-230 MHz SRD and RFIDs	87.5-108 MHz 174-230 MHz

ITU Region	Member name	Analogue sound broadcasting standards in use and band	Analogue radio transmitters in operation and RR Article 5 band (still to be brought into use). [1,2]	Analogue Bandwidth [3]	Spectrum required for growth in the analogue platform and amount required	Digital sound broadcasting (DSB) operation DSB planned: P (date) DSB started: S (date)	System standards in use (considered for use) See ITU-R Recs. BS.1114, BS.1514, BS.1615)	DSB channel bandwidths in use (considered for use)	Frequencies in use (intended to be brought into use). [1]	DSB direct reception population coverage (%)	Additional spectrum required for transition to DSB (considered to be required)	Digital radio transmitters in use (still to be brought into use) and RR Article 5 bands [1]	DSB spectrum requirement	Analogue sound switch off (ASO): ASO not considered: N, ASO under consideration P(date)	Terrestrial sound bands shared with other services [4]	Spectrum required for sound broadcasting (MHz) based on responses to previous questions (inc. transmission mode and timeframes).
1	Bahrain	AM MF AM HF FM VHF II	5 in 526.5-1605.5 kHz 2 in 2.3-26.1 MHz 1 in 76-87.5 MHz 20 in 87.5-108 MHz	MF 9 kHz HF 5 kHz FM 0.3 MHz	Yes, 6 MHz	P (TBD) Trials in operation	(DAB/DAB+) (DRM/DRM+)	(DRM 9 kHz) (DAB 1.5 MHz)	(216-230 MHz)	0	15 MHz	(7) in 174-230 MHz	DAB 12 MHz DAB+ 10 MHz DRM 300 kHz	N	No	TBD
1	Belgium (Flemish Community)	FM VHF II	~ 400 in 87.5-108 MHz	0.3 MHz	FM band is in principle saturated.	S (4.1997)	DAB/DAB+	1.5 MHz	216-230 MHz DAB block. 12A (174-230 MHz) (DAB blocks. 5A, 5D, 10, 11A)	>95%	TBD	20 (60 or more) in 174-230 MHz	174-230 MHz	N	174-230 MHz **BT (D)**	87.5-108 MHz 174-230 MHz
1	Belgium (French Community)	FM VHF II	~ 400 in 87.5-108 MHz	0.3 MHz	FM band is in principle saturated.	S (1997)	DAB/DAB+	1.5 MHz	216-230 MHz DAB block 12B (174-230 MHz DAB blocks 5B, 5C, 6A-6D, 8D, 11B, 11D)	>95%	TBD	20 (TBD) in 174-230 MHz	174-230 MHz	N	No	87.5-108 MHz 174-230 MHz
1	Belgium (German Community)	FM VHF II	22 (20) in 87.5-108 MHz	0.3 MHz	Yes, if possible depending on planning	P (~2022)	(DAB/DAB+)	(1.5 MHz)	(174-216 MHz)	85% (covered from outside community)	(1.5 MHz)	(10) in 174-230 MHz	3.0 MHz	N	No	3.0 MHz
2	Belize	FM VHF II	85 in 88-108 MHz	0.2 MHz	No	No	-		-	-	-	-	-	-	No	N/A
2	Brazil	AM MF AM HF FM VHF II	1786 (381) in 525-1 705 kHz 140 (556) in 2.3-17.9 MHz 6801 (5191) 88-108 MHz	MF HF < 5.9 MHz 10 kHz HF ≥ 5.9 MHz 5 kHz FM 0.2 MHz	There will be a need for VHF spectrum for FM stations, as some MF AM stations migrate to VHF FM. 12 MHz required (76-88 MHz) from spectrum released after TV ASO and restacking.	Under study	(IBOC AM IBOC FM DRM 30 DRM+)	TBD	TBD	N/A	TBD-	None	N/A	N/A	No	25 MHz currently 37 MHz after TV ASO

ITU Region	Member name	Analogue sound broadcasting standards in use and band	Analogue radio transmitters in operation and RR Article 5 band (still to be brought into use). [1,2]	Analogue Bandwidth [3]	Spectrum required for growth in the analogue platform and amount required	Digital sound broadcasting (DSB) operation DSB planned: P (date) DSB started: S (date)	System standards in use (considered for use) See ITU-R Recs. BS.1114, BS.1514, BS.1615)	DSB channel bandwidths in use (considered for use)	Frequencies in use (intended to be brought into use). [1]	DSB direct reception population coverage (%)	Additional spectrum required for transition to DSB (considered to be required)	Digital radio transmitters in use (still to be brought into use) and RR Article 5 bands [1]	DSB spectrum requirement	Analogue sound switch off (ASO): ASO not considered: N, ASO under consideration P(date)	Terrestrial sound bands shared with other services [4]	Spectrum required for sound broadcasting (MHz) based on responses to previous questions (inc. transmission mode and timeframes).
1	Bulgaria	AM MF AM HF FM VHF II	1 in 525-1 606.5 kHz 1 in 2.3 - 26 MHz 527 in 87.5-108 MHz	MF 9 kHz HF 10 kHz FM 0.3 MHz	Need for additional spectrum for AM sound not foreseen, except in bands currently used	S	DRM	10kHz	3.95-26.1 MHz	-	-	1 in 2.3 - 26 MHz	Public consultation for DSB in MF and VHF III showed no business interest.	N/A	255 - 283.5 kHz **ARNS** 3.95 – 4.0 MHz **Fixed** 9 kHz-30 MHz inductive use 9 - 600 kHz & 12.5 - 20 MHz medical use 984 - 7484 kHz & 7.3 - 23.0 MHz railway use 174-216 MHz PMSE and HA.	N/A
1	Burkina Faso	FM VHF II	184 in 87.5-108 MHz	0.3 MHz	-	Under study	(T-DAB)		(174-230 MHz)	-	-	-	-	No	Not in 87.5-108 MHz	-
3	Cambodia	AM MF FM VHF II	1 in 526.5-1605.5 kHz 412 in 87.5-108 MHz	MF 25 kHz FM 0.15 MHz	-	Trial since 2010	(T-DMB) (DAB)	-	(209-216 MHz)	-		-	-	N	-	-
2	Columbia	-	-		-	-	-	-	-	-	-	-	-	-	-	-
1	Côte d'Ivoire (Republic of)	FM VHF II	60 in 87.5-108 MHz	0.3 MHz	Yes Under study	Under study	Under study	Under study	Under study	Not yet operational	Under study	None	TBD	N	No	TBD
1	Croatia	FM VHF II	594 in 87.5-108 MHz	0.3 MHz	Yes in large cities 0.5-1 MHz	P (TBD)	(DAB/DAB+)	(1.5 MHz)	(174-230 MHz)	-	TBD	None	3 National layers	-	No	87.5-108 MHz 174-230 MHz TBD & no timeframe
1	Cyprus	AM MF FM VHF II	11 in 525-1 606.5 kHz 148 in 87.5-108 MHz	MF 9 kHz 20 kHz FM 0.15 MHz	-	Under study	-		-	-	-	-	-	-	No	MF and 87.5-108 MHz
1	Czech Republic	AM LF AM MF FM VHF II	1 in 148.5-283.5 kHz 13 in 526.5-1 606.5 kHz >700 in 87.5-108 MHz	-	No	S (1990s)	DAB+	1.5 MHz	174-230 MHz 1 452-1 492 MHz	> 50%	Not expected	11 in 174-230 MHz 11 in 1452-1492 MHz	N/A	N	174-230 MHz PMSE	N/A
1	Egypt	AM MF AM HF FM VHF II	46 in 526.5-1605.5 kHz 7 in 2.3-26.1 MHz 152 in 87.5-108 MHz	FM 0.18 MHz 0.3 MHz	High demand for FM services, but more spectrum is a problem with existing receiver base which cannot operate outside existing bands	Under study	(DAB) (DRM 30)	(DRM 5 kHz) (DAB 1.75 MHz)	(181-223 MHz)		-	-	-	N	No	Existing spectrum

ITU Region	Member name	Analogue sound broadcasting standards in use and band	Analogue radio transmitters in operation and RR Article 5 band (still to be brought into use). [1,2]	Analogue Bandwidth [3]	Spectrum required for growth in the analogue platform and amount required	Digital sound broadcasting (DSB) operation DSB planned: P (date) DSB started: S (date)	System standards in use (considered for use) See ITU-R Recs. BS.1114, BS.1514, BS.1615)	DSB channel bandwidths in use (considered for use)	Frequencies in use (intended to be brought into use). [1]	DSB direct reception population coverage (%)	Additional spectrum required for transition to DSB (considered to be required)	Digital radio transmitters in use (still to be brought into use) and RR Article 5 bands [1]	DSB spectrum requirement	Analogue sound switch off (ASO): ASO not considered: N, ASO under consideration P(date)	Terrestrial sound bands shared with other services [4]	Spectrum required for sound broadcasting (MHz) based on responses to previous questions (inc. transmission mode and timeframes).
1	Estonia	AM MF FM VHF II	1 in 526.5-1 606.5 kHz 174 in 87.5-108 MHz	MF 16 kHz FM 0.3 MHz	No	No plan for DSB	-	-	-	-	-	-	-	-	526.5 - 600 kHz medical use 526.5-1 606.5 kHz SRDs 984 – 1-606.5 kHz railway use	526.5-1 606.5 kHz 87.5-108 MHz 174-240 MHz Total ~88 MHz
1	Ethiopia	-	-		TBD	TBD after TV transition starts	-	-	-	-	-	-	-	-	No	TBD
1	Finland	FM VHF II	776 in 87.5-108 MHz	0.3 MHz	Band full. Additional spectrum has not been considered	No DSB via LTE considered possible option	-		-	-	-	-	-	-	No	87.5-108 MHz
1	France	AM LF AM MF AM VHF I FM VHF II	9675 in 87.5-108 MHz	LF 9 kHz FM 0.3 MHz	High demand, no plans for more spectrum given introduction of digital sound broadcasting but FM operators want to increase coverage TBD	S (6.2014)	DAB+ T-DMB	1.75 MHz	174-225 MHz 1452-1467 MHz	Under study	Under study	14 in 174-230 MHz 1 in 1452-1492 MHz	174-230 MHz and part of L band	N	1452-1492 MHz **Fixed** 47-68 MHz, 174-230 MHz and 1452-1492 Event Broadcasting	Under study
1	Georgia	FM VHF II	60 mainly in 100-108 MHz also 92-100 MHz in some areas, of the band 87.5-108 MHz	0.3 MHz	Demand in big cities After TV ASO release of 88-100 MHz will provide another 12 MHz	No Consider in the future									92-100 MHz **BT (A)**	20 MHz for FM after ASO
1	Germany	AM LF AM MF AM HF FM VHF II	5 in 148.5-283.5 kHz 45 in 526.5-1 606.5 kHz 25 from 530 frequencies at any one time in 2.3-26.1 MHz ~ 2800 in 87.5-108 MHz	LF MF HF 9 kHz FM 0.3 MHz	No plans	S (1999) DAB S (2011) DAB+	DAB+	1.75 MHz	174-230 MHz	-	174-230 MHz used since TV ASO	355 in 174-230 MHz	56 MHz	N	174-230 MHz PMSE, HA	87.5-108 MHz 174-230 MHz
1	Hungary	AM MF System D FM VHF II System 4	10 in 526.5-1 606.5 kHz 340 in 87.5-108 MHz	MF 9 kHz FM 0.3 MHz	No	S (2009)	DAB +	1.5 MHz	222 MHz DAB block 11D (216-230 MHz)	~30%	None	3 (44) in 174-230 MHz	21 MHz	N	MF RN 87.5-108 MHz PMSE 223-230 MHz Fixed and Mobile	42.6 MHz
3	Iran (Islamic Republic of)	AM MF AM HF FM VHF II	117 in 526.5-1 606.5 kHz 32 in 2.3-26.1 MHz 6055 in 87-108 MHz	MF 9 kHz HF 5 kHz FM 0.3 MHz	AM and FM bands are full but there is requirement for more stations. Additional spectrum needs further study.	No	-		-	-	-	-	-	-	No	Under study

ITU Region	Member name	Analogue sound broadcasting standards in use and band	Analogue radio transmitters in operation and RR Article 5 band (still to be brought into use). [1,2]	Analogue Bandwidth [3]	Spectrum required for growth in the analogue platform and amount required	Digital sound broadcasting (DSB) operation DSB planned: P (date) DSB started: S (date)	System standards in use (considered for use) See ITU-R Recs. BS.1114, BS.1514, BS.1615)	DSB channel bandwidths in use (considered for use)	Frequencies in use (intended to be brought into use). [1]	DSB direct reception population coverage (%)	Additional spectrum required for transition to DSB (considered to be required)	Digital radio transmitters in use (still to be brought into use) and RR Article 5 bands [1]	DSB spectrum requirement	Analogue sound switch off (ASO): ASO not considered: N, ASO under consideration P(date)	Terrestrial sound bands shared with other services [4]	Spectrum required for sound broadcasting (MHz) based on responses to previous questions (inc. transmission mode and timeframes).
1	Italy	AM MF FM VHF II	12 in 526.5-1 606.5 kHz 16645 in 87.5-108 MHz	MF 9 kHz FM 0.3 MHz	No	S DAB P (TBD) DRM	DAB & (DRM)	MF 9-18 kHz VHF 1.5 MHz	(DRM 526.5-1 606.5 kHz) DAB 174-230 MHz Ch. 12 National Ch. 7 & 10 Regional	65%	None	(7) in 526.5-1 606.5 kHz 117 in in 174-230 MHz	~28 MHz ≥ 3 DAB blocks for national & up to 11 DAB blocks for regional	AM MF P (TBD) FM VHF II N	174-223 MHz **BT (D)**, PMSE	~ 28 MHz for DRM30 T-DAB T-DMB
2	Jamaica	FM VHF II	179 in 88-108 MHz	0.2 MHz	No	No	-		-	-	-	-	-	-	No	Expect less to be required for digital
3	Japan	AM MF AM HF FM VHF IIz	650 in 531-1 602 kHz of the band 526.5-1606.5 kHz 2 in 2.3-26.1 MHz 2000 in 76-95 MHz of the bands 76-87 MHz 87-100 MHz	MF 15 kHz HF 10 kHz FM 0.2 MHz	Yes 5 MHz (90-95 MHz) recently assigned	No	-		-	-	-	-	-	-	No	N/A
1	Kenya	AM MF FM VHF II	11 in 526.5-1605.5 kHz 578 in 87.5-108 MHz	MF 9 kHz FM 0.18-0.2 MHz	High demand for FM that cannot be satisfied by available spectrum. Under study	Under study, possibly within 5 years	(DRM) (DAB)	-	(526.5-1605.5 kHz) (174-230 MHz)	-	TBD	-	Replace MF and VHF III bands with DSB	No	No	TBD
3	Korea (Republic of)	FM VHF II	171 (395) in 87-108 MHz	0.2 MHz	No	Under study	N/A	N/A	N/A	N/A	Additional spectrum may be required at VHF	N/A	Under study	N/A	No	Under study
1	Kyrgyz Republic	AM MF FM VHF I FM VHF II	23 in 526.5-1606.5 kHz 25 in 47-74 MHz of the bands 47-68 MHz 68-74 MHz, and in 76-87.5 MHz 343 in 87.5-108 MHz	VHF I 0.18 MHz VHF II 0.3 MHz	No	No	-	-	-	-	-	-	-	-	No	22 MHz
1	Latvia	AM MF FM VHF II	1 (31) in 526.5-1 606.5 kHz 217 (50) in 87.5-108 MHz	MF 16kHz FM 0.3 MHz	No but in areas of high population density demand cannot be satisfied	Under study	DAB used for planning DAB+ probably preferred for implementation	(1.5 MHz)	(174-230 MHz)				DSB under consideration but no timescale defined		174-230 MHz PMSE, SRD	87.5-108 MHz 174-240 MHz
1	Lesotho (Kingdom of)	FM VHF II	41 in 87.5-108 MHz	0.3 MHz	Yes	No	-		-	-	-	-	-	-	No	-

ITU Region	Member name	Analogue sound broadcasting standards in use and band	Analogue radio transmitters in operation and RR Article 5 band (still to be brought into use). [1,2]	Analogue Bandwidth [3]	Spectrum required for growth in the analogue platform and amount required	Digital sound broadcasting (DSB) operation DSB planned: P (date) DSB started: S (date)	System standards in use (considered for use) See ITU-R Recs. BS.1114, BS.1514, BS.1615)	DSB channel bandwidths in use (considered for use)	Frequencies in use (intended to be brought into use). [1]	DSB direct reception population coverage (%)	Additional spectrum required for transition to DSB (considered to be required)	Digital radio transmitters in use (still to be brought into use) and RR Article 5 bands [1]	DSB spectrum requirement	Analogue sound switch off (ASO): ASO not considered: N, ASO under consideration P(date)	Terrestrial sound bands shared with other services [4]	Spectrum required for sound broadcasting (MHz) based on responses to previous questions (inc. transmission mode and timeframes).
1	Liechtenstein	FM VHF II	4 in 87.5-108 MHz	0.1 MHz	No	Under study	(DAB/DAB+)	(1.75 MHz)	(GE06 frequencies)	100% by neighbouring countries		TBD	TBD in planning	-	9 kHz -23 MHz SRDs in multiple bands 255-283.5 kHz **ARNS** 47-68 MHz **Mobile, Land Mobile,** WP, UWB, Amateur.	GE06 Agreement frequencies
1	Lithuania	AM MF AM HF FM VHF II	3 in 526.5-1606.5 kHz 5 in 2.3-26.1 MHz 2 in 68-73 MHz 266 in 87.5-108 MHz	MF 9 kHz HF 5 kHz FM 0.3 MHz	High demand for FM services, but more spectrum is a problem with existing receiver base which cannot operate outside existing bands	S (2001) DAB network shut down 2009	DAB	1.5 MHz	230.0 - 231.6 MHz DAB block 13A	< 20% Service shut down 2009	-	-	No plans	N	87.5-108 MHz audio PMSE 174-223 MHz	No additional requirements to current allocations
1	Madagascar	AM MW AM HF FM VHF II	2 in 526.5-1 606.5 kHz 3 in 3.2-7.3 MHz > 200 in 87.5-108 MHz	-	No	No	Not decided		-	-	-	-	-	-	No	-
3	Malaysia	AM MF AM HF FM VHF II	48 in 526.5-1606.5 kHz 85 in 2.3-26.1 MHz 1163 in 87-108 MHz	MF 20 kHz HF 9 kHz, 16 kHz, 20 kHz FM 0.2 MHz	No	Trials only	(DAB/DAB+)	(1.5 MHz)	(216-223 MHz)	-	-	7 in 174-223 MHz	-	N	87 -108 MHz PMSE 174-230 MHz **BT (A)** 223-230 MHz **ARNS**	-
1	Mauritius	FM VHF II	7 in 87.5-108 MHz	FM 0.2 MHz	No	No plans	-	-	-	-	-	-	-	N	No	Under study
1	Monaco	AM LF AM MF FM VHF II	1 in 148.5-283.5 kHz 2 in 526.5-1 606.5 kHz 31 in 87.5-108 MHz	LF & MF 9kHz FM 0.3 MHz	No for AM but more FM stations to be introduced	S (4.2014)	DAB+	1.5 MHz	181-188 MHz DAB block. 8A (181-230 MHz DAB blocks. 6A-6D, 12B, 12C)	100%	GE06 provision seems sufficient	1 (5) in 174-230 MHz	TBD	N	No	Activate all GE06 channels
3	Myanmar	AM MF AM HF FM VHF II	3 in 526.5-1 606.5 kHz 3 in 2.3-26.1 MHz 67 in 87-108 MHz	-	No	No	TBD		-	-	-	-	-	-	No	-

ITU Region	Member name	Analogue sound broadcasting standards in use and band	Analogue radio transmitters in operation and RR Article 5 band (still to be brought into use). [1,2]	Analogue Bandwidth [3]	Spectrum required for growth in the analogue platform and amount required	Digital sound broadcasting (DSB) operation DSB planned: P (date) DSB started: S (date)	System standards in use (considered for use) See ITU-R Recs. BS.1114, BS.1514, BS.1615)	DSB channel bandwidths in use (considered for use)	Frequencies in use (intended to be brought into use). [1]	DSB direct reception population coverage (%)	Additional spectrum required for transition to DSB (considered to be required)	Digital radio transmitters in use (still to be brought into use) and RR Article 5 bands [1]	DSB spectrum requirement	Analogue sound switch off (ASO): ASO not considered: N, ASO under consideration P(date)	Terrestrial sound bands shared with other services [4]	Spectrum required for sound broadcasting (MHz) based on responses to previous questions (inc. transmission mode and timeframes).
1	Netherlands	AM MF FM VHF II	13 in 526.5 – 1606.5 kHz 790 in 87.5 - 108 MHz	MF 9kHz FM 0.3 MHz	Govt. policy aimed at promoting DAB. FM band full but incumbents still seek more	S (2.2004)	DAB+/HE-ACC	1.75 MHz	174-230 MHz DAB blocks 11C, 12C (DAB blocks 6B, 7A, 8A, 9D)	90% indoor	-	62 in 174-230 MHz Another 12 sites planned	174-230 MHz	Policy not determined, depends on take up of DAB P (~2025)	174-230 MHz PMSE	Existing sufficient
3	New Zealand	AM MF FM VHF II	145 (56) 521 – 1612 kHz 767 (452) in 87.5 - 108 MHz	MF 20 kHz FM 0.3 MHz	No	Trials on DAB+ in 174-230 MHz, but no policy decision on DSB implementation	-		-	-	-	-	-	-	No	521-1612 kHz and 87.5-108 MHz retained for foreseeable future-
1	Norway	FM VHF II	2900 in 87.5-108 MHz	0.3 MHz	Yes more spectrum required in biggest cities but decision made by Govt. to switch to digital sound broadcasting	S (1995)	DAB/DAB+ with DAB+ only by 2017	1.5 MHz	216-240 MHz (174-240 MHz)	~99.5%	None (operation in different bands)	~933 (TBD) in 174-230 MHz & 230-240 MHz of the band 230--267 MHz	4 Muxes in 174-240 MHz considered sufficient	P (2017) dependent on meeting set criteria by 2015. FM community radio may continue dependent on criteria to be specified in 2015	174-230 MHz **BT (D)**, ground and wall probing radar	Existing spectrum sufficient
1	Palestine	FM VHF II	120 in 87.5-108 MHz	0.2 MHz	Yes 50 channels	Under study	(DAB)		-	-	-	-	-	-	No	-
3	Papua New Guinea	AM MF FM VHF II	> 50 in 526.5-1 606.5 kHz 750 in 87-108 MHz	FM 0.2 MHz	No	No	-		-	-	-	-	No plans for DSB	-	No	-
1	Portugal	AM MF FM VHF II	~ 50 in 526.5-1 606.5 kHz 740 in 87.5-108 MHz	MF 9 kHz FM 0.18 MHz 0.256 MHz 0.264 MHz	FM spectrum heavily congested in city areas	S (1999) DAB network shut down 5.2011	DAB	176 kHz	224.8-226.4 MHz DAB block 12B	< 5% Service shut down 2011					174-223 MHz PMSE and HA	Under study
1	Romania	AM LF AM MF AM HF FM VHF II	1 in 148.5-283.5 kHz 52 in 526.5-1 606.5 kHz 5 in 2.3-26.1 MHz 935 in 87.5-108 MHz	FM 0.3 MHz	No	No	-	-	-	-	-	-	-	-	No	TBD

ITU Region	Member name	Analogue sound broadcasting standards in use and band	Analogue radio transmitters in operation and RR Article 5 band (still to be brought into use). [1,2]	Analogue Bandwidth [3]	Spectrum required for growth in the analogue platform and amount required	Digital sound broadcasting (DSB) operation DSB planned: P (date) DSB started: S (date)	System standards in use (considered for use) See ITU-R Recs. BS.1114, BS.1514, BS.1615)	DSB channel bandwidths in use (considered for use)	Frequencies in use (intended to be brought into use). [1]	DSB direct reception population coverage (%)	Additional spectrum required for transition to DSB (considered to be required)	Digital radio transmitters in use (still to be brought into use) and RR Article 5 bands [1]	DSB spectrum requirement	Analogue sound switch off (ASO): ASO not considered: N, ASO under consideration P(date)	Terrestrial sound bands shared with other services [4]	Spectrum required for sound broadcasting (MHz) based on responses to previous questions (inc. transmission mode and timeframes).
1	Russian Federation	AM LF AM MF AM HF FM VHF I FM VHF II	5 in 148.5-283.5 kHz 109 in 526.5-1606.5 kHz 65 in 2.3-26.1 MHz 1580 in 65.9-74 MHz of the bands 47-68 MHz 68-74 MHz 8003 in 87.5-108 MHz	LF MF ≤ 20 kHz HF ≤ 20 kHz domestic ≤ 9 kHz to other countries VHF I 0.13 MHz mono 0.18 MHz stereo VHF II 0.18 MHz mono 0.3 MHz stereo	-	P (TBD) Trials in operation	(DRM for LF, MF, HF) (DRM+ for 66-74 MHz, 87.5 MHz) (RAVIS for 65.8-74 MHz) (DAB+ for 223-230 MHz)	(DRM 4.5, 9, 18 kHz for LF, MF) (DRM 5, 10, 20 kHz for HF) (DRM+ 96 kHz) (RAVIS 0.1, 0.2, 0.25 MHz) (DAB+ 1.54 MHz)	-	-	-	-	-	N	47-74 MHz, 87.5-108 MHz **BT (A)**	-
1	Rwanda (Republic of)	AM HF FM VHF II	1 at 6 MHz 56 in 87.5-108 MHz	FM 0.3 MHz	Additional FM spectrum required. 15 MHz	No but to be studied	-		(170-230 MHz)	-	-	-	~60 MHz	N/A	No	60 MHz
1	Serbia (Republic of)	AM MF FM VHF II	11 in 525-1 605 kHz 483 in 87.5-108 MHz	MF 9 kHz FM 0.3 MHz	No	Under study	Existing standards are obsolete, awaiting new standards		-	-	-	-	-	-	No	-
1	Seychelles (Republic of)	AM MF FM VHF II	1 using 560-1 602 kHz of the band 526.5-1605 kHz 13 in 87.5-108 MHz		Not at present	Not at present	-		-	-	-	-	-	-	No	Too early to estimate-
1	Sierra Leone	FM VHF II	85 in 87.5-108 MHz		No	Under study	-		-	-	-	-	-	-	No	Not available

ITU Region	Member name	Analogue sound broadcasting standards in use and band	Analogue radio transmitters in operation and RR Article 5 band (still to be brought into use). [1,2]	Analogue Bandwidth [3]	Spectrum required for growth in the analogue platform and amount required	Digital sound broadcasting (DSB) operation DSB planned: P (date) DSB started: S (date)	System standards in use (considered for use) See ITU-R Recs. BS.1114, BS.1514, BS.1615)	DSB channel bandwidths in use (considered for use)	Frequencies in use (intended to be brought into use). [1]	DSB direct reception population coverage (%)	Additional spectrum required for transition to DSB (considered to be required)	Digital radio transmitters in use (still to be brought into use) and RR Article 5 bands [1]	DSB spectrum requirement	Analogue sound switch off (ASO): ASO not considered: N, ASO under consideration P(date)	Terrestrial sound bands shared with other services [4]	Spectrum required for sound broadcasting (MHz) based on responses to previous questions (inc. transmission mode and timeframes).
1	Slovak Republic	AM MF FM VHF II	2 in 531-1 602 kHz of the band 526.5-1605 kHz 386 in 87.5-108 MHz	MF 9 kHz FM 0.3 MHz	Interest in more FM spectrum but band is saturated	DRM+ Trial (2011) P (~2015)	(DAB +) System G using Robustness Mode E	VHF II 96 kHz VHF III 1.5 MHz	DRM+ 98.9 MHz (DAB 174-230 MHz)	9%	Transition not required – separate band	1 in 87.5-108 MHz (174-230 MHz)	174-230 MHz	N	148.5-283.5 kHz **ARNS,** SRDs 526.5-1606.5 kHz ARNS, SRDs 2.3-3.4 MHz **Fixed, Mobile except aero mobile** 3.95-4.0 MHz Fixed 4.75-4.85 MHz **Aero. mobile (OR)**, Fixed, Land mobile 4.85-4.995 MHz **Fixed, Land mobile** 5.005-5.06 MHz **Fixed**, Mobile 5.95-6.2 MHz **Fixed, Mobile** 2.3-26.1 MHz SRDs in multiple bands 87.5-108 MHz SRDs 1452-1492 MHz **Fixed, Mobile except aero. Mobile**	Too early to estimate-
1	Slovenia	AM MF FM VHF II	4 in 526.5-1 606.5 kHz 342 (> 50) in 87.5-108 MHz	MF 9 kHz FM 0.15 MHz	Yes but FM band is full	P (2015)	(DAB+/HE-ACCv2)	1.5 MHz	(174-230 MHz)		Transition not required – separate band	-	Too soon to say	N	223-230 MHz **Fixed, Mobile**	Too early to estimate-
1	Spain	AM MF FM VHF II	231 in 526.5-1 606.5 kHz 3835 in 87.5-108 MHz	MF 9 kHz FM 0.256 MHz	No	S (1.2000)	DAB System A	1.5 MHz	195-223 MHz (1 452-1 492 MHz)	20%	None	976 in 174-223 MHz (1 452-1 492 MHz)	195-223 MHz (1 452-1 492 MHz)	N	174-223 MHz **Land Mobile** 1452-1492 MHz **Satellite Broadcasting**	Under study
2	Suriname	FM VHF II	42 in 88-108 MHz	0.2 MHz	Yes	No	-		-	-	-	-	-	-	No	N/A

ITU Region	Member name	Analogue sound broadcasting standards in use and band	Analogue radio transmitters in operation and RR Article 5 band (still to be brought into use). [1,2]	Analogue Bandwidth [3]	Spectrum required for growth in the analogue platform and amount required	Digital sound broadcasting (DSB) operation DSB planned: P (date) DSB started: S (date)	System standards in use (considered for use) See ITU-R Recs. BS.1114, BS.1514, BS.1615)	DSB channel bandwidths in use (considered for use)	Frequencies in use (intended to be brought into use). [1]	DSB direct reception population coverage (%)	Additional spectrum required for transition to DSB (considered to be required)	Digital radio transmitters in use (still to be brought into use) and RR Article 5 bands [1]	DSB spectrum requirement	Analogue sound switch off (ASO): ASO not considered: N, ASO under consideration P(date)	Terrestrial sound bands shared with other services [4]	Spectrum required for sound broadcasting (MHz) based on responses to previous questions (inc. transmission mode and timeframes).
1	Sweden	FM VHF II	1112 in 87.5-108 MHz	0.3 MHz	No request for more spectrum but there is interest to provide more analogue sound broadcasting which may be solved by re-planning existing sound broadcasting platform	S (1995)	DAB System A	1.5 MHz	216-230 MHz 1 multiplex for use in 4 cities (2 more 10.2015)	35%	None	14 in 216-230 MHz (TBD in 174-230 MHz & 230-240 MHz of the band 230--267 MHz)	Estimate not made but Government decision on 3 DAB multiplexes	Under study expect report November 2014	87.5-108 MHz, 230-240 MHz Not shared 174-230 MHz **BT (D)**, PMSE	No estimate available but note current usage 87.5-108 MHz 174-240 MHz
1	Switzerland	FM VHF II	1286 in 87.5-108 MHz	0.3 MHz	No	S (12.2005)	DAB/DAB+ System A	1.5 MHz	174-230 MHz 1 national, 2 regional and 1 local multiplex DAB blocks 7A, 7D, 8B, 9A, 10D, 12A, 12C, 12D (DAB blocks 5D, 7B, 8C, 8D, 10A, 10C, 11C, 11D)	95-99%	None in separate band	255 in 174-230 MHz	GE06 plan entries in VHF III considered sufficient	N	148.5-283.5 kHz SRDs 255-283.5 kHz **ARNS** 526.5-1606.5 kHz SRDs 3.95-26.1 MHz Fixed, Mobile, SRDa in multiple bands 47-68 MHz **Mobile, Land mobile,** Amateur, WP, UWB, 87.5-108 MHz UWB, PMSE, Wireless Audio 174-230 MHz UWB, PMSE, HA, MT	56 MHz DAB+
1	Tanzania	AM MF FM VHF II	5 in 526.5-1605.5 kHz 300 in 87.5-108 MHz	FM 0.4 MHz	Yes demand for at least 80 stations	Under study	-	-	(174-230 MHz)	-	-	-	-	N	No	Under study
3	Thailand	AM MF AM HF FM VHF II	221 in 526.5-1 606.5 kHz 12 (2 sites) in 5.9-26.1 MHz 314 in 87-108 MHz (authorised + 6000-8000 low power under trial)	MF 9 kHz FM 0.25 MHz	Yes but amount of additional spectrum not yet assessed. Demand for low power FM is high with currently 6000-8000 applications submitted	Under study field trial on DAB+ starting 2014 No date for commercial service	Not yet specified	TBD	(174-230 MHz)	0	(174-230 MHz)	Not decided	Considering 174-230 MHz for DSB but no decision taken	N/A	88-108 MHz PMSE	526.5-1606.5 kHz 87-108 MHz 174-230 MHz
1	United Arab Emirates	AM MF AM HF FM VHF II	5 (8) in 526.5-1 606.5 kHz 1 (1) in 2.3-26.1 MHz 26 (50) in 87.5-108 MHz	LF, MF, HF 9 kHz FM 0.3 MHz	Yes in both FM and AM (LF/MF) bands	P (TBD) and trials started No commercial service	(DAB+)	(LF, MF 9-18 kHz) (VHF III 1.5 MHz)	(526.5-1 606.5 kHz) (174-230 MHz)	0	(174-230 MHz)	0 (8) in 526.5-1 606.5 kHz 1 (75) in 174-230 MHz	174-230 MHz	-	No	Exact amount not determined but approximately 400 kHz LF/MF 20 MHz VHF II 42 MHz VHF III

ITU Region	Member name	Analogue sound broadcasting standards in use and band	Analogue radio transmitters in operation and RR Article 5 band (still to be brought into use). [1,2]	Analogue Bandwidth [3]	Spectrum required for growth in the analogue platform and amount required	Digital sound broadcasting (DSB) operation DSB planned: P (date) DSB started: S (date)	System standards in use (considered for use) See ITU-R Recs. BS.1114, BS.1514, BS.1615)	DSB channel bandwidths in use (considered for use)	Frequencies in use (intended to be brought into use). [1]	DSB direct reception population coverage (%)	Additional spectrum required for transition to DSB (considered to be required)	Digital radio transmitters in use (still to be brought into use) and RR Article 5 bands [1]	DSB spectrum requirement	Analogue sound switch off (ASO): ASO not considered: N, ASO under consideration P(date)	Terrestrial sound bands shared with other services [4]	Spectrum required for sound broadcasting (MHz) based on responses to previous questions (inc. transmission mode and timeframes).
1	United Kingdom	AM LF AM MF AM HF FM VHF II	3 in 148.5-283.5 kHz 314 in 526.5-1 606.5 kHz 2 OT in 526.5-1 606.5 kHz 1 in 2.3-26.1 MHz 2 (OT) in 2.3-26.1 MHz 1901 (50) in 87.5-108 MHz	FM 0.3 MHz	Still high demand for FM services, especially in urban area, but more spectrum is a problem with existing receiver base which cannot operate outside existing bands	S (1995)	DAB DRM-30 used for some HF	HF 5 kHz VHF 1.5 MHz	DRM-30 2.3-26.1 MHz DAB 210-230 MHz DAB Blocks 10B-12D	~95% can receive at least one multiplex	None at present	1 HF 1 HF OT 652 (~100) in 174-230 MHz	~20 MHz	N	No	No change to existing requirement
1	Uzbekistan	AM HF FM VHF II	9 in 2.3-26.1 MHz 430 in 87.5-108 MHz	HF 9 kHz FM 0.25 MHz	No	S	DRM	DRM 9 kHz	3.9-26.1 MHz	Broadcast to other countries	None	1 in 2.3-26.1 MHz	Low	N	87.5-108 MHz **BT (A)**	-
1	Vatican City	AM MF AM HF FM VHF II	2 in 526.5-1 606.5 kHz 1 (9 freqs) in 2.3-26.1 MHz 1 in 87.5-108 MHz	MF 9 kHz HF 10 kHz FM 0.3 MHz	No	S (2004) DRM in MF & HF S (2008) DAB in VHF III	DAB DRM (DRM+)	MF 9 kHz HF 10/20 kHz VHF 1.5 MHz	DRM30 526.5-1 605 kHz DRM30 2.3-26.1 MHz (DRM+ 87.5-108 MHz) DAB 174-230 MHz DAB blocks 7B & 12D DAB 1 452-1 492 MHz DAB blocks LI, LJ	99.9%	Not assessed	1 in 526.5-1 605 kHz 1 (1) in 2.3-26.1MHz 6 in 174-230 MHz	TBD	N	174-223 MHz **BT (D)**, PMSE	No estimate available

Key:

[1] Frequency band allocation in accordance with Article 5 of the Radio Regulations (2012) and its footnotes.

[2] Frequency Range 2.3 MHz – 26.1 MHz – Due to **No. 5.113**, which refers to tropical broadcasting, the band 2 300-2 498 kHz has for the purposes of the questionnaire been included within the HF bands. This description does not align with the frequency band nomenclature listed in **No. 2.1**.

[3] To assist the presentation of data within this table some figures have been rounded. See response for full information on bandwidths.

[4] Bold equates to a Primary Service. Normal font equates to a Secondary Service/ application in a Secondary Service

Abbreviations ARNS = Aeronautical Radionavigation Service, BT (A) = Analogue Television Broadcasting, BT (D) = Digital Television Broadcasting, HA = Hearing Aids, PMSE = Services Ancillary to Broadcasting / Services Ancillary to Programme making / Wireless Audio, RN= Radionavigation Service, RFID = Radio Frequency Identification Device, SRD = Short Range Devices, WP = Wind Profile Radar, WSD = White Space Devices, UWB = Ultra Wide Band MT = Medical Telemetry, OT = Overseas Territory.

ANNEX 3B

Responses from Sector Members

ITU Region	Member name	Analogue sound broadcasting standards in use and band	Analogue radio transmitters in operation and RR Article 5 band (still to be brought into use). [1,2]	Analogue Bandwidth [3]	Spectrum required for growth in the analogue platform and amount required	Digital sound broadcasting (DSB) operation DSB planned: P (date) DSB started: S (date)	System standards in use (considered for use) See ITU-R Recs. BS.1114, BS.1514, BS.1615)	DSB channel bandwidths in use (considered for use)	Frequencies in use (intended to be brought into use). [1]	DSB direct reception population coverage (%)	Additional spectrum required for transition to DSB (considered to be required)	Digital radio transmitters in use (still to be brought into use) and RR Article 5 bands [1,2]	DSB spectrum requirement	Analogue sound switch off (ASO): ASO not considered: N; ASO under consideration P(date)	Terrestrial sound bands shared with other services [4]	Spectrum required for sound broadcasting (MHz) based on responses to previous questions (inc. transmission mode and timeframes).
1	Albertis (Spain)	AM MF FM VHF II	231 in 526.5-1 606.5 kHz 4093 in 87.5-108 MHz	MF 9 kHz FM 0.256 MHz	Current spectrum fully used. For FM more requests received than can be allocated in most areas. No data available to identify spectrum requirement	S (1999) but without success	DAB EN 300 401	1.5 MHz	195-223 MHz (1 452-1 479.5 MHz)	20%	No	6 in 174-223 MHz	No demand	N	No	Current spectrum
2	NABA (CAN)	AM MF FM VHF II	1145 in 540-1 700 kHz of the band 525-1 705 kHz 2680 in 88-108 MHz	MF 10 kHz FM 0.2 MHz	AM and FM bands are congested, so significant growth would require additional spectrum. No additional spectrum is currently considered.	(Trials in 88-108 MHz)	IBOC DSB in Annex 2 of ITU-R BS.1514 for 540-1 700 kHz System C in ITU-R BS.1114 for 88-108 MHz	MF 10 kHz VHF II 200 kHz	(540-1 700 kHz) 88-108 MHz	Not known	N/A existing bands used with transmission within existing analogue emission mask	2 in 88-108 MHz	540-1 700 kHz 88-108 MHz	N	540-1 700 kHz Travel information stations 88-108 MHz wireless microphones	540-1 700 kHz 88-108 MHz
2	NABA (MEX)	AM MF FM VHF II	681 in 540-1 700 kHz of the band 525-1 705 kHz 1254 in 88-108 MHz	MF 10 kHz FM 0.2 MHz	AM and FM bands are congested, so significant growth would require additional spectrum. There is a 800 kHz guard band between FM services. No additional spectrum is currently considered.	MEX (9.2011)	IBOC DSB in Annex 2 of ITU-R BS.1514 for 540-1 700 kHz System C in ITU-R BS.1114 for 88-108 MHz	MF 10 kHz VHF II 200 kHz	(540-1 700 kHz) 87-108 MHz	Not known	N/A existing bands used with transmission within existing analogue emission mask	51 in 88-108 MHz	540-1 700 kHz 88-108 MHz	N	VHF II Travel information stations and wireless microphones	540-1 700 kHz 88-108 MHz
2	NABA (US)	AM MF FM VHF II	4799 in 540-1 700 kHz of the band 525-1 705 kHz 10760 in 88-108 MHz	MF 10 kHz FM 0.2 MHz	AM and FM bands are congested, so significant growth would require additional spectrum. No additional spectrum is currently considered.	US (10.2002)	IBOC DSB in Annex 2 of ITU-R BS.1514 for 540-1 700 kHz System C in ITU-R BS.1114 for 88-108 MHz	MF 10 kHz VHF II 200 kHz	540-1 700 kHz 88-108 MHz	Not known	N/A existing bands used with transmission within existing analogue emission mask	301 in 540-1 700 kHz 1799 in 88-108 MHz	540-1 700 kHz 88-108 MHz	N	VHF II Travel information stations and wireless microphones	540-1 700 kHz 88-108 MHz

ITU Region	Member name	Analogue sound broadcasting standards in use and band	Analogue radio transmitters in operation and RR Article 5 band (still to be brought into use). [1,2]	Analogue Bandwidth [3]	Spectrum required for growth in the analogue platform and amount required	Digital sound broadcasting (DSB) operation DSB planned: P (date) DSB started: S (date)	System standards in use (considered for use) See ITU-R Recs. BS.1114, BS.1514, BS.1615)	DSB channel bandwidths in use (considered for use)	Frequencies in use (intended to be brought into use). [1]	DSB direct reception population coverage (%)	Additional spectrum required for transition to DSB (considered to be required)	Digital radio transmitters in use (still to be brought into use) and RR Article 5 bands [1,2]	DSB spectrum requirement	Analogue sound switch off (ASO): ASO not considered: N, ASO under consideration P(date)	Terrestrial sound bands shared with other services [4]	Spectrum required for sound broadcasting (MHz) based on responses to previous questions (inc. transmission mode and timeframes).
3	NHK (Japan)	AM MF AM HF FM VHF IIz	650 in 531-1 602 kHz of the band 526.5-1606.5 kHz 2 in 2.3-26.1 MHz 2000 in 76-95 MHz of the bands 76-87 MHz 87-100 MHz	MF 15 kHz HF 10 kHz FM 0.2 MHz	Yes 5 MHz (90-95 MHz) recently assigned	No	-		-	-	-	-	-	-	No	N/A
1	Rai Way	AM MF FM VHF II	12 in 526.5-1 606.5 kHz 16645 in 87.5-108 MHz	MF 9kHz FM 0.3 MHz	No	S	DAB & (DRM)	MF 9-18 kHz VHF 1.5 MHz	(DRM 526.5-1 606.5 kHz) DAB 174-230 MHz Ch. 12 National Ch. 7 & 10 Regional (1452-1492 MHz)	65%	Ch 13 required for transition	(7) in 526.5-1 606.5 kHz 117 in 174-230 MHz	~28 MHz ≥ 3 DAB blocks and up to 11 DAB blocks for regional	AM MF P (TBD) FM VHF II N	174-223 MHz **BT (D)**, PMSE	~ 28 MHz, DRM30 T-DAB T-DMB

Key:

[1] Frequency band allocation in accordance with Article 5 of the Radio Regulations (2012) and its footnotes.

[2] Frequency Range 2.3 MHz – 26.1 MHz – Due to **No. 5.113**, which refers to tropical broadcasting, the band 2 300-2 498 kHz has for the purposes of the questionnaire been included within the HF bands. This description does not align with the frequency band nomenclature listed in **No. 2.1**.

[3] To assist the presentation of data within this table some figures have been rounded. See response for full information on bandwidths.

[4] Bold equates to a Primary Service. Normal font equates to a Secondary Service/ application in a Secondary Service

Abbreviations ARNS = Aeronautical Radionavigation Service, BT (A) = Analogue Television Broadcasting, BT (D) = Digital Television Broadcasting, HA = Hearing Aids, PMSE = Services Ancillary to Broadcasting / Services Ancillary to Programme making / Wireless Audio, RN= Radionavigation Service, RFID = Radio Frequency Identification Device, SRD = Short Range Devices, WP = Wind Profile Radar, WSD = White Space Devices, UWB = Ultra Wide Band MT = Medical Telemetry, OT = Overseas Territory.

ANNEX 4 TO [DRAFT] ITU-R REPORT

Summary Table – Multimedia broadcasting

ANNEX 4A

Responses from Member States

ITU Region	Member name	Multimedia broadcasting in use or planned	Which system standards are used or are considered for use (as specified in Rec. ITU-R BT.1833 and BT.2016)	Bands in use or proposed	When did multimedia broadcasting start or when is it proposed to start	What are the current and proposed population coverages for digital multimedia broadcasting	What is the spectrum requirement for multimedia broadcasting	If digital multimedia broadcasting has been introduced, please provide further information to describe the system, its implementation and any limitations on its operation
1	Algeria	Under study	Under study	Under study	Under study	-	Under study	-
3	Australia	At this time Australia has no definitive plans for migration to multimedia broadcasting as defined in Recommendations ITU-R BT.1833 and BT.2016.	-	-	-	-	-	-
1	Austria	Not used and currently not planned.	-	-	-	-	-	-
1	Bahrain	We have a future plan for this service.	Under study	470-698 MHz	Not decided yet	-	Not decided yet	-
1	Belgium (Flemish Community)	Yes. The DVB-T2 standard can be seen as a technology for transmitting this content towards portable, handheld and mobile devices. The current DVB-T2 parameters allow reception by portable and mobile devices. Multimedia broadcasting is part of the standard digital terrestrial offer.	Multimedia system T2 (DVB-T2 Lite). However, other DVB-T2 modes seem capable for multimedia broadcast, not only DVB-T2 Lite	Covered by the answers in Section 1	-	-	-	-
1	Belgium (French Community)	Not yet decided	-	-	-	-	-	-
1	Belgium (German Community)	Not yet decided	-	-	-	-	-	-
2	Belize	No	-	-	-	-	-	-
2	Brazil	No plans at this time.	-	-	-	-	-	-
1	Bulgaria	No plans at this time.	-	-	-	-	-	-
3	Cambodia	Yes	T-DMB	209-216 MHz	2010 in a trial in the capital city	-	Envisaged in Band III	-
2	Columbia	Yes. Colombian broadcasters have made some testing which includes transmission of signals for portable reception on handheld devices	Depends on broadcasters business model	470-698 MHz	2014 in a test controlled environment	See response to question 3	Under study	Currently in testing phase and no decision on implementation but it will also depend on broadcasters business model and industry trends
1	Côte d'Ivoire (Republic of)	Yes	Outside the scope of the RTI	Under study	Under study	Under study	Finance, frequency management and awareness of population	To be studied
1	Croatia	No	-	-	-	-	-	-
1	Cyprus	No	-	-	-	-	-	-
1	Czech Republic	Existing conditions related to use of broadcasting frequencies allow technology neutrality. Therefore, MM broadcasting is not matter of frequency use regulation	Comply with T-DAB mask	VHF III or L Band	N/A	No obligation for multimedia adopted	N/A	N/A
1	Egypt	No	-	-	-	-	-	-
1	Estonia	No information	-	-	-	-	-	-
1	Ethiopia	Not decided yet	-	-	-	-	-	-
1	Finland	Not under consideration	-	-	-	-	-	-

ITU Region	Member name	Multimedia broadcasting in use or planned	Which system standards are used or are considered for use (as specified in Rec. ITU-R BT.1833 and BT.2016)	Bands in use or proposed	When did multimedia broadcasting start or when is it proposed to start	What are the current and proposed population coverages for digital multimedia broadcasting	What is the spectrum requirement for multimedia broadcasting	If digital multimedia broadcasting has been introduced, please provide further information to describe the system, its implementation and any limitations on its operation
1	France	Current DTT platform delivers multimedia services, as audio-visual broadcasting, choice of subtitle and audio track, also, associated data (time table, program's topic…). Furthermore, services as HbbTV authorized enhanced experience with introducing interactive possibilities. At the same time, the platform delivers non-audiovisual data as traffic information or time table for bus stops. A new development for delivery of digital content to mobile receivers (smartphones/tablets) through a new broadcast type of network in order to help in responding to the explosive demand for digital media consumption is under test (the so-called B2M project). In this scenario, a DTT multiplex is not capable to address simultaneously both traditional fixed / rooftop receivers and mobile receivers under the current and foreseeable technology status; the signal level specifications of these two situations being very different, a network aiming at both would be quite over-specified and costly for fixed reception, leading to an inefficient network deployment and spectrum usage. Therefore, it assumes that one multiplex would be dedicated to this mobile delivery platform. The associated model is the one of Mobile Multimedia Broadcast or of NotTV operated under the lead of NTT DoCoMo in Japan, were the mobile broadcast network is operated as a versatile and flexible platform for delivering any type of digital content (in Broadcast mode) to mobile receivers; this will include live and non-live TV / video content, the same for radio programing, electronic press content (magazines and dailies), etc. These contents are then broadcast, stored on mobile devices (with some filtering to be applied based on issue date, existence of access rights, etc...) and are then available for the end-user to play them, in live or in on-demand model. Such model, which is an adaptation of the broadcast platform to the new usage patterns for digital media, is integrating the major trends which are mobile, non-linear viewing and tablets as the versatile preferred device for all kind of medias, and ultimately, the convergence of media (e.g.; a newspaper will more and more integrate video content, while a TV program/service will –and already is – integrating text news content). This versatile mobile delivery platform would be used under a combination of different business models; – for a certain part, it could be used by media players who would be able to buy certain chunks of capacity, live or non-live, enabling them to push their content towards their audience – for other parts, the capacity could be used by service providers (e.g. ; mobile operators) who would decide to off-load on the broadcast network the contents which are demanded by a high number of their users, thus savings scarce capacity on the mobile network thanks to the broadcast network.	DVB-T2 under study	UHF	HbbTV and datacasting 2011 Those services are expected to keep growing.	-	N/A	N/A
1	Georgia	In Georgia multimedia broadcasting is being introduced. For the time being, we intend to regulate terrestrial digital multimedia broadcasting (T-DMB) systems' operation in accordance with standards specified in ITU Recommendations ITU-R BT.1833 and BT.2016.	-	-	-	-	-	-
1	Germany	No	-	-	-	-	-	-
1	Hungary	Introduced the DVB-H in 2008 but the operation was finished in 2011.	-	-	-	-	-	-
3	Iran (Islamic Republic of)	Not yet	T2 Lite is under study	UHF IV/V-	-	-	-	-

ITU Region	Member name	Multimedia broadcasting in use or planned	Which system standards are used or are considered for use (as specified in Rec. ITU-R BT.1833 and BT.2016)	Bands in use or proposed	When did multimedia broadcasting start or when is it proposed to start	What are the current and proposed population coverages for digital multimedia broadcasting	What is the spectrum requirement for multimedia broadcasting	If digital multimedia broadcasting has been introduced, please provide further information to describe the system, its implementation and any limitations on its operation
1	Italy	Yes	T-DMB and T2Lite	VHF and UHF	T-DMB is already stared. T2Lite is in trial	T-DMB the current coverage is 65%.	The regulation sets for digital radio broadcasted in EUREKA 147 (T-DAB/DMB), that the sound can be enriched with multimedia contents. So the spectrum requirement is the same of digital sound (answer 13.i)	The regulation sets the limits of usable capacity by each content provider (72 Capacity Units), that includes sound and multimedia contents
2	Jamaica	Some broadcasters have introduced multimedia broadcasting. However, very little information is readily available on this topic at this time.	-	-	-	-	-	-
3	Japan	Yes.	Multimedia System F (ISDB-T multimedia broadcasting)	99-108 MHz and 207.5-222 MHz	Apr. 2012 (207.5-222 MHz). Not yet in service (99-108 MHz)	Approx. 88% at the coverage rate for households.	N/A	N/A
3	Korea (Republic of)	Yes	T-DMB	174-216 MHz	Dec 2012	80.7% Feb. 2014	N/A	See BT.1833 & BT.2016
1	Kyrgyz Republic	Introduction of multimedia broadcasting considered in the future	-	-	-	-	-	-
1	Latvia	Currently not under consideration	-	-	-	-	-	-
1	Lesotho (Kingdom of)	Not yet introduced	-	-	-	-	-	-
1	Liechtenstein	No current plans to introduce multimedia broadcasting	-	-	-	-	-	-
1	Lithuania	Introduction of multimedia broadcasting for handheld devices has not been considered yet						
1	Madagascar	Yes.	-	-	-	-	-	-
1	Mauritius	Multimedia broadcasting not yet planned	-	-	-	-	-	-
1	Monaco	For now, our country has no plan for digital multimedia broadcasting	-	-	-	-	-	-
3	Myanmar	Provision of digital multimedia broadcasting is planned namely "TV Browser" Service. Scribers are able to access 2000 + pages of electronic multimedia Information in daily up-date. Later on we will use IPTV , Internet Streaming , interactive on line library .Later on we will provide the audience the new services such as OTT, VOD, HbTV.	-	-	-	-	-	-
1	Netherlands	Yes. The PSB has added HBB services in one of their DTT transport streams using the UHF band. Interactive services are provided through cable, fiber or IP networks as their penetration in households is around 98%.	-	VHF III block frequencies 5B, 8C, 9C, 11A, 12B.	As there are limited number of “connected” DTT set top boxes, it is of an experimental nature which started in 2011	Coverage is around 30%	Not yet known	-
3	New Zealand	Not under consideration	-	-	-	-	-	-
1	Norway	A test of DMB services is taking place in the Oslo area.	DMB\in combination with DAB+ (various services may reside on the same mux)	174-230 MHz	Test started in 2009. No official plan to build a national coverage. However, the owner of the licence is awaiting governmental approval to go from test transmissions to commercial transmissions.	Test covers approx. one million people. Norway is close to 99.5% indoor coverage of DAB+ with radio and additional multimedia services. DMB coverage may be increased, if commercial licenses are offered	We do not have a survey that covers this question	Not permanent, only a test case
1	Palestine	Under consideration	-	-	-	-	-	-
3	Papua New Guinea	No plans at this time.	-	-	-	-	-	-
1	Portugal	Under consideration	-	-	-	-	-	-
1	Romania	No	-	-	-	-	-	-

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1	Rwanda (Republic of)	Under consideration	No decision	No decision	No specific timeframe	Proposed coverage is 90% of the country population	Not yet decided	Not applicable
1	Serbia (Republic of)	Under consideration	-	Digital Dividend 1 band, and Digital Dividend 2 band, after decision of the WRC-15	-	-	-	-
1	Seychelles (Republic of)	No plans at this time.	-	-	-	-	-	-
1	Sierra Leone Broadcasting Corporation	Yes	-	-	-	-	-	-
1	Slovak Republic	The conditions for introduction of multimedia broadcasting via terrestrial broadcasting platform have been prepared. However, there is no interest in providing terrestrial multimedia broadcasting for mobile reception at present. Authority is prepared to undertake all necessary steps in case that demand for providing multimedia broadcasting arises.	-	-	-	-	-	-
1	Slovenia	No.	-	-	-	-	-	-
1	Spain	Under consideration	-	-	-	-	-	-
2	Suriname	No	-	-	-	-	-	-
1	Sweden	There are currently no plans to introduce multimedia broadcasting for mobile reception, as specified in Recommendations ITU-R BT.1833 and BT.2016, in Sweden.	-	-	-	-	-	-
1	Switzerland	No plans at this time.	-	-	-	-	-	-
1	Tanzania	Still considering and now working on standards. The details not yet agreed	Not yet decided	-	-	-	-	-
3	Thailand	Under consideration	Not yet decided	Not yet decided	Not yet decided	Not yet decided	Not yet decided	-
1	United Arab Emirates	Currently no Multimedia Broadcasting however there are plans for the future.	Multimedia System T2	470-698 MHz Bands (if using terrestrial broadcasting network)	Not decided yet	N/A	Not clear yet	N/A
1	United Kingdom	No	-	-	-	-	-	-
1	Uzbekistan	For the present time multimedia broadcasting isn`t considered	-	-	-	-	-	-
1	Vatican City	Yes	T-DMB in use; T2Lite under study	VHF III, UHF, L band	T-DMB deployed in 2010	99%	Not yet determined	-

ANNEX 4B

Responses from Sector Members

ITU Region	Member name	Multimedia broadcasting in use or planned	Which system standards are used or are considered for use (as specified in Rec. ITU-R BT.1833 and BT.2016)	Bands in use or proposed	When did multimedia broadcasting start or when is it proposed to start	What are the current and proposed population coverages for digital multimedia broadcasting	What is the spectrum requirement for multimedia broadcasting	If digital multimedia broadcasting has been introduced, please provide further information to describe the system, its implementation and any limitations on its operation
1	Albertis	No plans for introducing DMB in Spain	-	-	-	-	-	-
2	NABA	The ATSC "2.0" standard (Candidate Standard A/107) has been developed for multimedia and interactive broadcasting. ATSC "2.0" adds new services in a backwards compatible manner to the existing DTV standard: i.e., new services will not be receivable on legacy sets but conventional services will still be receivable on those sets. New sets will be required to receive the new services. Multimedia service is also a requirement in the ATSC "3.0" standard development effort.	ATSC "2.0" not specified in ITU. It is available at http://atsc.org/cms/standards/cs_documents/S13-550r17-CS-ATSC-2.0.pdf and incorporates several other ATSC standards and candidate standards	ATSC "2.0" may be implemented in all TV bands	No planned start date	Multimedia broadcasting will be an individual choice for stations; it is not practical to calculate coverage	ATSC "2.0" is compatible with the current DTV standard in Canada and the U.S. and does not require additional spectrum for implementation	N/A
3	NHK	Yes.	Multimedia System F (ISDB-T multimedia broadcasting)	99-108 MHz and 207.5-222 MHz	Apr. 2012 (207.5-222 MHz). Not yet in service (99-108 MHz)	Approx. 88% at the coverage rate for households.	N/A	N/A
1	Rai Way	Yes	T-DMB and T2Lite	VHF and UHF	T-DMB is already stared. T2Lite is in trial	T-DMB the current coverage is 65%.	The regulation sets for digital radio broadcasted in EUREKA 147 (T-DAB/DMB), that the sound can be enriched with multimedia contents. So the spectrum requirement is the same of digital sound (answer 13.i)	The regulation sets the limits of usable capacity by each content provider (72 Capacity Units), that includes sound and multimedia contents