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| **Radiocommunication Study Groups** |  |
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| 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 spectrum requirements for the future of sound and television broadcasting

**References**: Documents [6/ 93](http://www.itu.int/md/R12-SG06-C-0093/en) and [6/249](http://www.itu.int/md/R12-SG06-C-0249/en)

1 Study Group 6 (SG 6) is the ITU-R Study Group assigned to the Broadcasting service. Its scope covers radiocommunication broadcasting, including vision, sound, multimedia and data services principally intended for delivery to the general public.

2 SG 6 created a Rapporteur Group to look at the future spectrum requirements for the Broadcasting service in light 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 its catalogue of Reports and Recommendations.

3 One of the questions that needs to be addressed by SG 6 include how broadcast requirements are changing with the move to digital broadcast systems, and the introduction of new and enhanced broadcast services.

4 The following questionnaire, which is being sent to all Administrations and Sector Members, is designed to gather information on spectrum use by sound and television broadcasting in the bands allocated on a Regional[[1]](#footnote-1) or global basis to terrestrial broadcasting (see Annex 1).

5 Administrations and Sector Members are also invited to make more detailed inputs addressing the matter of current and future spectrum requirements for radio and television broadcasting to the next meeting of WP 6A and SG 6.

6 Administrations and Sector Members are requested to submit responses to brsgd@itu.int by 17 October 2014.

David Barrett

Chairman SG6 Rapporteur Group on spectrum requirements
for the future of the broadcasting Service

QUESTIONNAIRE ON SPECTRUM REQUIREMENTS FOR THE FUTURE OF SOUND AND TELEVISION BROADCASTING

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| **Name of the Administration:** | **Norwegian Post- and Telecommunications Authority** |
| **Contact person:** | **Pia Braadland** |
|  E-mail address: | **pia@npt.no** |
|  Telephone number: | **+47 22 82 47 27** |

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| **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) | **Other (Autonomous agency of the Ministry of Transport and communications)** |
| **The geographical area over which you operate:** | Norway |

**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:**

1*) a) No*

 *b) Not applicable*

 *c) The analogue switch-off was completed December 2009.*

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 question 2a) and 2b) is provided in Annex 1

**Reply:**

*There are no analogue television transmitters in operation in Norway*

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:**

1. *The percentage of viewer uptake of terrestrial television in Norway:*
* *14% use DTT as a primary platform*
* *16% use DTT as a secondary platform (either in TV nr 2 etc., at home or in cottages, caravans boats etc.)*

 *b) The network is planned for fixed roof top antenna reception. There is no information on proportion of used antennas.*

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:**

1. *The DTT network in Norway is based on DVB-T and MPEG4 (H.264 video +
HE-AAC audio) coding technology. System standard B*
2. *The DTT network was launched in the first region (of total 11 regions) during the autumn of 2007 and the last region was launched during the autumn of 2008.*
3. *The DTT platform in Norway has 5 national DTT multiplexes in operation plus one local DTT multiplex in the Oslo area. The coverage of the National multiplexes is approximately 98 % of all permanent households and approx. 87 % of all cottages and leisure homes. Approximately 6000 of the permanent households (approx. 14 000 people) are located in rural areas outside DTT and DTH coverage (satellite shadow areas). These households are covered by a “satellite shadow network”, and have only one multiplex, with 550 low power transmitters. Only the programs from the Norwegian public broadcaster (NRK)are transmitted in this multiplex. All transmitters in the Norwegian DTT platform, including the 550 transmitters in the “satellite shadow network”, use frequencies in the range 470–790 MHz.*

*In addition to the 5 national DTT multiplexes already in operation, Norges televisjon AS (NTV) (the license holder) also has frequencies allocated for a 6th multiplex with the same coverage as the multiplexes 1-5 (i.e. nationwide coverage). Additionally, according to the GE06 plan, Norway has allocated one DTT layer in the VHF band, this layer has not yet been assigned.*

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 question 5b) and 5c) is provided in Annex 1

**Reply:**

1. *Currently in use: 5 multiplexes within the frequencies 470-790 MHz
Intended to be used: The 6th multiplex within the frequencies 470-790 MHz*
2. *Transmitters in use in the band 470 - 790 MHz: 2753*
3. *8 MHz*

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:**

1. *DTT is the only primary service in the frequency band 470-790 MHz*
2. *Not applicable*

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:**

1. *Yes*
2. *SAB/SAP as a secondary use may utilize white spots in the frequency range 470-510MHz (License needed). Cognitive radio has also been up for discussion, but so far not much interest*

*SAB/SAP (Wireless microphones) as a secondary use can utilize white spots in the frequency range 510–790MHz (License exempt). Max. radiated power is 50mW e.r.p.*

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.

**Reply:**

*a and b)*

 *The DTT platform broadcasts 7 HDTV services and 36 SD services. With the limited available capacity in the current multiplexes, the number of HD channels is low compared to other broadcast platforms (Cable, DTH etc.).*

 *In terms of HD, there is certainly an increasing demand. Gradually, the consumers will expect HD to be the standard resolution and maybe even Ultra HDTV in the future. This will obviously increase the demand for bandwidth per service and challenge the competitiveness of the DVB-T network if the number of HD services is limited. There is an increased interest/demand and use of the service “TV on demand” via internet. The interest for 3DTV seems to be rather modest.*

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:**

*a and b)
There are no plans to launch more multiplexes in the near future. This is however highly dependent on up-coming services, the economy- and the market situation. Of course if the 700 MHz band is not going to be available for the DTT platform, then it will be difficult, if not impossible, to launch more multiplexes.*

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:**

*The current DTT license expires in June 2021, and there are no indications that changes will be done within this license period. The amount of used spectrum at the moment is 320 MHz. The spectrum requirement in next license period is being reconsidered based on new technologies that are available and services that are expected by the users in future. The way it looks today, the dominating broadcasting standards in 2021 will be DVB-T2 with HEVC coding. New video requirements, like UHDTV will be a part of future services. These new demands for video and audio delivery assume technology development to keep “status quo” in spectrum/content requirements.

The number of TV services in the network is considered to increase marginally, but supplementary services could increase, e.g. HbbTV, services for visual/hearing impaired people etc.*

*Based on the above demands, 6 national frequency layers (plus the local Oslo multiplex) are believed to fulfill the requirements from 2021.*

*If the 700 MHz band is assigned to mobile services an extensive re-planning of the channel allocations is necessary to try to secure the capacity requirements for terrestrial television broadcasting.*

**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 question 11b) and 11c) is provided in Annex 1

**Reply:**

1. *The standard FM radio is used in the band 87.5-108 MHz*
2. *There are approximately 2900 FM transmitters in the band 87.5-108 MHz*
3. *They use the Funchal masque, which means a bandwidth of 0.3 MHz*

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:**

1. *Yes and No. Yes additional spectrum is required for growth in the biggest cities, but the Norwegian government has made a plan for analogue switch-off, and digital sound broadcasting will replace the analogue sound broadcasting.*

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:**

1. *Norway has already introduced digital sound broadcasting. Note: in the answers below only DAB/DAB+ is taken into consideration. Other platforms like radio via internet or DTT is not taken into account.*
2. *Both DAB and DAB + are in use at the moment, but we are moving towards DAB + and all transmitters are planned to use DAB+ by 2017.*
3. *The digital sound broadcasting started in 1995*
4. *Channel bandwidth is 1.536 MHz*
5. *In use: two layers in band 174-240 MHz*

*A third layer is* partly in use.

*Intended to be in use: one layer in band 174-240 MHz, the licence is granted but not in use.*

1. *The broadcasters have reported that the DAB/DAB+ coverage is approximately 99.5%.*
2. *No additional spectrum is needed as they operate in different frequency bands.*
3. *Approximately 1000 digital radio transmitters are in operation.*
4. *There are available 4 muxes in the band 174-240 MHz for digital sound broadcasting which is considered to be sufficient.*
5. *Analogue sound broadcasting will end January 2017 as long as these criteria are fulfilled before 2015:*
6. *The public broadcaster (NRK) must achieve population coverage of 99.5 %.*
7. *The commercial broadcasters need to achieve 90 % population coverage.*
8. *The digital radio offer must represent added value to the listeners.*
9. *Affordable and technically satisfactory solutions for in-car radio reception must be available.*
10. *At least 50 % of the daily radio-listeners employ digital platforms (which also includes listening via internet and digital TV –network)*

*Provided that the criteria 1 to 3 are fulfilled in 2015, switch-off may nevertheless take place in 2019, even if criteria 4 and 5 are not fulfilled.*

*After 2017 community radios may continue to broadcast on FM. The criteria for which community radio that will have this opportunity will be specified by 2015.*

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:**

1. *No*

*(There are 4 muxes (bandwidth 1.536 MHz) available for digital sound broadcasting, and 1 mux (bandwidth 7 MHz) available for digital video broadcasting (not in use).)*

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:**

1. *and b) Secondary services allowed in the frequency range 174-230 MHz range are ground-and wall-probing radars (max permitted mean e.i.r.p. spectral density for undesired emission is – 65 dBm/MHz).*

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:**

1. *We consider the amount of spectrum used and reserved for terrestrial sound broadcasting to be sufficient:*

*4 nationwide muxes (bandwidth 1.536 MHz) in the band 174-240 MHz.*

*DAB+, Mode 1.*

*All muxes are granted, but at the moment only two of them are fully implemented, one is not in use and one is partly in use.*

*Details of the 4 nationwide muxes:*

1. *Riksblokk 1, nationwide, granted to Norkring, in use, expires 2031*
2. *Riksblokk 2, nationwide, granted to Norkring, NOT in use, expires 2031*
3. *Regionsblokka, nationwide, granted to our public broadcaster (NRK), in use, expires 2031*
4. *Lokalradioblokka, nationwide but divided into 37 areas, 16 of them granted to community radios, 4 areas are in use at the moment, expires 31.12.2016.*

**SECTION THREE –Multimedia broadcasting**

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:**

1. *Yes we have a test of DMB services going on in the Oslo area.*
2. *DMB\in combination with DAB+ (various services may reside on the same mux)*
3. *In the band 174-230 MHz*
4. *The 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. The big game changer may be smartphones with built in DAB/DMB.*
5. *The test covers approximately one million people. Do note that in Norway there is now close to 99.5% indoor coverage of DAB+ with radio and additional multimedia services. The DMB coverage may be increased, if commercial licenses are offered.*
6. *We do not have a survey that covers this question.*
7. *Not introduced permanently, only a test case*

ANNEX 1

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

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| **Country** | **Band** | **Number of Transmitting Stations\*** |
| **Analogue Radio**)(Q11b & Q11c) | **Digital Radio**(Q13d & Q13h) | **Analogue TV**(Q2a & Q2)b | **Digital TV**(Q5b & Q5c) |
| **Channel bandwidth (MHz)** | *0.3 MHz* | *1.536 MHz* |  | *8 MHz* |
| **NOR** | **LF** | 148.5-283.5 kHz |  |  |  |  |
| **MF** | 525-526.5 kHz |  |  |  |  |
| **MF** | 526.5-1606.5 kHz |  |  |  |  |
| **MF** | 1606.5-1705 kHz |  |  |  |  |
| **HF** | 2.3-26.1 MHz\*\* |  |  |  |  |
| **VHF I** | 47-50 MHz |  |  |  |  |
|  | 50-54 MHz |  |  |  |  |
|  | 54-68 MHz |  |  |  |  |
|  | 68-72 MHz |  |  |  |  |
|  | 76-87.5 MHz |  |  |  |  |
| **VHF II** | 87.5-108 MHz | *2900* |  |  |  |
| **VHF III** | 174-216 MHz |  | *0 (not decided)* |  |  |
| **VHF III** | 216-230 MHz |  | *506(not decided)**230-240 MHz has 427 Tx stations* |  |  |
| **UHF IV** | 470-694 MHz |  |  |  | *1947 (103)* |
| **UHF V** | 694-790 MHz |  |  |  | *806 (67)* |
| **UHF V** | 790-890 MHz |  |  |  |  |
| **UHF V** | 890-960 MHz |  |  |  |  |
|  | 1452-1492 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 3900-3950D, 3950-4000D kHz; the bands for tropical broadcasting: 2300-2498, 3200-3400D, 4750-4995 D, 5005-5060D kHz and the Article 12 Bands 5 900-5 950D, 5 950-6 200, 7 200-7 300, 7 300-7 400D, 7 400-7 450, 9 400-9 500D, 9 500-9 900, 11 600-11 650D, 11 650-12 050, 12 050-12 100D, 13 570-13 600D, 13 600-13 800, 13 800-13 870D, 15 100-15 600, 15 600-15 800D, 17 480-17 550D, 17 550-17 900, 18 900-19 020D, 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**

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 standards is it using or considering adopting? When did your country start, or when is it proposed 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.*

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| **Country** | **No of multi-plexes** | **System & modulation** | **FEC** | **GI** | **Reception mode[[2]](#footnote-2)** | **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)** |
| **NOR** | *5* | *DVB-T, 64-QAM* | *2/3* | *1/8* | *Fixed* | *22* | *98.0%* | *95%* | *In total 36 SD MPEG-4 and 7 HD MPEG-4*  | *110* | *320* | *Licenced until 2.6.2021* |
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1. Regions 1, 2 or 3 as defined in Nos. **5.3** to **5.9** of the Radio Regulations. [↑](#footnote-ref-1)
2. E.g. fixed, portable outdoor/mobile, portable indoor. [↑](#footnote-ref-2)