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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](mailto: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:** | **Australia** |
| **Contact person:** | **Alastair Gellatly** |
| E-mail address: | **info@acma.gov.au** |
| Telephone number: | **+61 2 6219 5555** |

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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) |  |
| **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:**

1 a) No. There are no terrestrial analog television transmissions in Australia.

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:**

2 a) Nil.

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:**

3a) >95% (based on post switchover surveys).

3b) i) Television services in Australia are planned on the assumption of fixed outdoor reception. We anticipate that most terrestrial television viewers (possibly 80-95%\*) would use a fixed outdoor antenna for the main television set.

3b) ii) Similarly use of indoor antennas is expected to be low (5-20%\*) as indoor antenna use generally gives a poor reception experience even in areas of strong signals. Indoor antenna use is likely to be higher on a household’s second or third (etc) television but we have only anecdotal evidence to support this.

\* Percentages likely to vary between different cities.

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:**

4a) DVB-T with MPEG-2 video encoding, MPEG-1 layer II or AC-3 audio encoding.

4b) 1 January 2001.

4c) 5 multiplexes are in use in most geographic areas. Spectrum has been planned to enable a sixth multiplex although it is not known if or when this will be allocated. SEE ANNEX 2.

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:**

5a) Current frequency ranges in use are 174-230 MHz and 526-820 MHz. By the end of 2014 the band 694 MHz to 820 MHz will be cleared of digital terrestrial television transmissions, at which time the frequency ranges in use will be 174-230 MHz and 526-694 MHz.

5b) By the end of 2014, it is anticipated that there will be over 2700 licensed transmitters operating in the 174-230 and 526-694 MHz bands.

5c) Channel bandwidth is 7 MHz in both 174-230 MHz and 526-820 MHz bands.

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:**

6a) No. There is no primary sharing of the broadcasting service with non-broadcasting services. However, the band 174-230 MHz is shared between digital television and digital sound broadcasting. See Section 2.

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:**

7a) Yes, there are wireless audio devices and, in certain geographic locations, there are radio astronomy services.

7b) Wireless audio devices are permitted in 174-230 MHz at a maximum eirp of 3 mW in a 330 kHz bandwidth. Analog and digital wireless audio devices are permitted.in 520-694 MHz at a maximum eirp of 100 mW also in a 330 kHz bandwidth see <http://www.comlaw.gov.au/Details/F2014C00930>. Wireless audio devices may also be licensed for up to 250 mW. Refer to ITU-R BT.1871 for further information on Australia’s SAB/SAP arrangements.

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:**

8a) Australia’s terrestrial television broadcasters have transmitted HD services since 2001. While there are no concrete plans, it is noted that 3D trial transmissions took place in 2010. UHD is being considered by industry, in particular a significant number of production houses are capable of UHD production and interchange.

8b) Each multiplex currently transmits one HD service.

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:**

9 a/b) As indicated above there is planned spectrum capacity for one additional (sixth) multiplex. It is not known if or when this capacity will be allocated.

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:**

10 a) While no final decision has been made, Australia is likely to commence a transition of DVB-T services from MPEG-2 video encoding to MPEG-4/H.264.  Consistent with such a transition, it is possible that the long term trend in the amount of spectrum required for terrestrial television broadcasting may reduce as more efficient technologies (such as DVB-T with MPEG-4 or possibly DVB-T2 with HEVC/H.265) are adopted, while taking into consideration the spectrum required for migration to DVB-T2.

**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:**

11 a) Amplitude modulation in MF and HF bands. Frequency modulation in VHF Band II.

11 b/c) See Annex 1

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:**

12 a) No. There isn’t suitable additional spectrum. Minimal growth expected in analog 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:**

13a) Digital Sound Broadcasting has already commenced in the five licence areas that include the largest cities (Adelaide, Brisbane, Melbourne, Perth and Sydney). Trial transmissions are also available in Canberra and Darwin.

13b) DAB+.

13c) DAB+ services commenced 1 July 2009.

13d) 1.536 MHz per multiplex.

13e) DAB frequency blocks 9A, 9B and 9C are in use. Future services may use any DAB frequency block between 5A and 12D (174-230 MHz), however, DAB frequency blocks 8A to 9D are more likely to be used as there will be no television services occupying these blocks in metropolitan and regional areas after 2014.

13f) The five metropolitan licence areas in which digital sound broadcasting have commenced cover 60% of the Australian population. Assuming, conservatively, that 80% of the population of these five licence areas have coverage, approximately 50% of the Australian population would have coverage.

13g) Additional spectrum requirements for a full transition to digital radio have not been determined. This is because the initial government policy and legislation governing the introduction of digital radio was based on it being a supplement to analog radio, not a replacement. The commercial radio industry, however, considers that in the long term, digital radio may replace analog radio.

The Australian administration has canvassed in the past, and has not ruled out, the possibility of using L-Band spectrum for DAB+ digital radio but there is no current intention to use this band. The Australian administration has also canvassed in the past, and has not ruled out, adoption of other digital radio technologies, including DRM30 and DRM+, but there is likewise no current intention to introduce these technologies.

13h) Currently the number of transmitters = 13 main transmitters across 5 transmission sites plus 34 SFN/on-channel transmitters across 12 sites in VHF band. Further infill transmitters are anticipated.

13i) 14 MHz of VHF Band III spectrum has been left free of television services so that it is available for DAB+ digital radio Australia wide (in metropolitan and regional areas this corresponds to Australian television channels 9 and 9A).

13j) Analog broadcasting will continue for the foreseeable future.

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:**

14a) No, analog sound broadcasting bands are not shared on a primary basis with other services. However, the band 174-230 MHz is shared between digital television and digital sound broadcasting.

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:**

15a) Not in the analog sound broadcasting bands, however, there is shared use of the spectrum (174-230 MHz) used for digital sound broadcasting see response to question 7(b).

15b) See response to question 7(b). Additionally, while not considered to fall into the SAB/SAP category, some very low power use of wireless audio devices is permitted in 88-108 MHz at a maximum eirp of 10 uW in a 180 kHz bandwidth. Transmitters used for underground communications with a maximum eirp of 10 uW are also permitted in 87.5-108 MHz band

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:**

16 a) 1080 kHz (526.5-1606.5 kHz) – mode: AM (in service)

20.5 MHz (87.5-108 MHz) – mode: FM (in service)

14 MHz (within the 174-230 MHz band) – mode: digital (DAB+)

**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:**

17 a) At this time Australia has no definitive plans for migration to multimedia broadcasting as defined in Recommendations ITU-R BT.1833 and BT.2016.

ANNEX 1

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

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Country** | **Band** | | **Number of Transmitting Stations\*** | | | |
| **Analog Radio** (Q11b & Q11c) | **Digital Radio** (Q13d & Q13h) | **Analog TV** (Q2a & Q2)b | **Digital TV** (Q5b & Q5c) |
| **Channel bandwidth (MHz)** | | HF 10 kHz  MF 18 kHz  VHF II 300 kHz | 1.536 MHz | 7 MHz | 7 MHz |
| **AUS** | **LF** | 148.5-283.5 kHz | - | - | - | - |
| **MF** | 525-526.5 kHz | - | - | - | - |
| **MF** | 526.5-1606.5 kHz | 292 |  |  |  |
| **MF** | 1606.5-1705 kHz |  |  |  |  |
| **HF** | 2.3-26.1 MHz\*\* | 24 transmissions at 17 sites |  |  |  |
| **VHF I** | 47-50 MHz |  |  | 0 |  |
|  | 50-54 MHz |  |  | 0 |  |
|  | 54-68 MHz |  |  | 0 |  |
|  | 68-72 MHz |  |  | 0 |  |
|  | 76-87.5 MHz |  |  | 0 |  |
| **VHF II** | 87.5-88.0 MHz | 2141 |  | 0 |  |
| **VHF II** | 88.1-108 MHz | 2951 |  | 0 |  |
| **VHF III** | 174-216 MHz |  | 13+ 34 on-channel repeaters | 0 | 207 |
| **VHF III** | 216-230 MHz |  |  | 0 | 77 |
| **UHF IV/V** | 470-694 MHz |  |  | 0 | 2450 |
| **UHF V** | 694-790 MHz |  |  | 0 | 0 |
| **UHF V** | 790-890 MHz |  |  | 0 | 0 |
| **UHF V** | 890-960 MHz |  |  |  |  |
|  | 1452-1492 MHz |  |  |  |  |
|  | ~~11.7-12.5 GHz~~ | Not a terrestrial broadcasting band. Used for satellite delivery of TV and radio Australia wide. | | | |
|  | ~~12.5-12.75 GHz~~ | Not a terrestrial broadcasting band. Used for satellite delivery of TV and radio Australia wide. | | | |
|  | ~~40.5-42.5 GHz~~ | Not a terrestrial broadcasting band | | | |
|  | ~~74-76 GHz~~ | Not a terrestrial broadcasting band | | | |
| NOTE: Expected numbers shown as at end 2014, based on total licensing/planning data.  \* 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)** |
| **Australia** | 6 planned 5 operational | DVB-T, 64-QAM | 3/4 | 1/16 | Fixed | 23.0 | >98.0% | >98.0% | 1 HD & 4 SD MPEG2  (Typical) | 115 (operational) | 224 |  |

*\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

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)