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**Circular letter**  
**6/LCCE/78**

11 May 2012

**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 terrestrial television broadcasting in connection with WRC-15 Agenda item 1.2

**References:** Administrative Circular CA/201

1 Consistent with the directives set forth by Administrative Circular [CA/201](#) and in accordance with the outcomes of the first session of the Conference Preparatory Meeting 15-1, ITU-R Working Party 6A seeks estimates from Members States and Sector Members of current and future spectrum requirements for terrestrial television broadcasting in Region 1 and Iran.

2 One particular question that will be addressed by the JTG 4-5-6-7 is to confirm the lower edge of the allocation to the mobile service made at WRC-12 from 694-790 MHz. As a result Working Party 6A realizes the JTG 4-5-6-7 needs to be fully informed about the implications to the broadcasting service consequential to that decision.

3 The following questionnaire, which is being sent to all Administrations and Sector Members in Region 1 and Iran, is designed to gather information on spectrum use in the band 694-790 MHz for television broadcasting.

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

5 Administrations and Sector Members are requested to submit responses to [brsgd@itu.int](mailto:brsgd@itu.int) or [rsg6@itu.int](mailto:rsg6@itu.int) by 31 July 2012.

François Rancy  
Director, Radiocommunication Bureau

At the request of the Chairman of Study Group 6 the attached questionnaire is published for consideration of the Administrations of Member States, Sector Members and Associates, as appropriate. The Radiocommunication Bureau does not make any engagement nor assume any responsibility with respect to the content of the attachment or any follow-up action as may be required.

**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

## QUESTIONNAIRE ON SPECTRUM REQUIREMENTS FOR TERRESTRIAL TELEVISION BROADCASTING IN CONNECTION WITH WRC-15 AGENDA ITEM 1.2

This questionnaire can be completed online at the following web page:

<https://extranet.itu.int/rsg-meetings/sg6/wp6a/Lists/DTTB%20Questionnaire/overview.aspx>

Login as: **Username:** (your TIES username)@ties.itu.int  
**Password:** (your TIES password)

NOTE - Electronic versions of Annexes 1, 2 & 2 can be found under QUESTIONNAIRE in the WP 6A Share Folder on the WP 6A Sharepoint site.

**Name of the Administration/Sector Member:** Danish Administration (Danish Business Authority)

**For sector members please indicate the geographical area over which you operate:**

**Contact person:** Jesper Kjeldsen

**E-mail address:** [jeskje@erst.dk](mailto:jeskje@erst.dk)

**Telephone number:** +45 35 46 63 36

- 1
- a) What standards have you adopted for digital terrestrial television broadcasting?
  - b) Have you started introduction of digital terrestrial television services?
  - c) If yes, please provide further detail on the number of multiplexes in use, their technical specifications, the percentage of geographic area or population they are intended to cover and the total spectrum use to inform WP 6A.

A proposed format for detailed responses is provided in Annex 1.

**Reply:**

- a) DVB-T and DVB-T2, MPEG4/AVC.
- b) DTT started in 2006.
- c) See details in Annex 1.

- 2
- a) Have you commenced analogue television switch-off?
  - b) If you have any such plans, when do you expect to have completed the analogue switch-off process?

**Reply:**

a & b) Yes, terrestrial analogue television was terminated 31 October 2009.

- 3
- a) What is the percentage of viewer uptake of terrestrial television in your country, including those whose service provider uses terrestrial broadcast re-transmission (e.g. in cable networks)?
  - b) If possible, please also provide details of the number or proportion of users who receive television primarily by terrestrial means.

**Reply:**

- a) Approximately ~~31~~20.9 % of the Danish population receives television at their main address by terrestrial means, either as primary platform through an UHF antenna or re-transmission in cable networks or as an addition to a satellite or cable platform.
- b) 18.34 % of the Danish population receives television primarily by terrestrial means.

The Danish public service provider, DR made a survey in 2009 that showed that app. 43 % of a population of app. 6 million televisions was dependent of terrestrial services. This survey included televisions located in secondary homes such as vacation houses, boats and mobile homes as well as secondary televisions located in the kitchen, bedroom and the children's playroom.

NOTE: The numbers referred to in answer a) and b) are based on numbers from 2011 provided by TNS Gallup, Annual Survey.

- 4 a) Indicate how many analogue television transmitters use channels in the frequency sub-band 694-790 MHz (as indicated in Resolution **232 (WRC-12)**).
- b) How many are in the remaining part of the UHF band.

**Reply:**

No analogue transmitters are in use in Denmark today.

- 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) If allotments/SFNs are in use, a sketch map of frequency allocations could be included, with an accompanying table of allocations, as shown in Annex 2. Otherwise, it might be possible to show main transmitters and channels, grouped in layers, in a table.
- c) Please indicate how many digital television assignments/allotments use channels in the frequency sub-band 694-790 MHz (as indicated in Resolution **232 (WRC-12)**, and
- d) How many are in the remaining part of the UHF band.

**Reply:**

- a) Denmark has allocated six UHF MUX for DTT services. Two MUX are currently used for public service free-to-air DTT services. Three MUX are currently used for commercial DTT services. One UHF MUX was licensed to the pay TV operator Boxer-TV for DVB-H services, but not currently in use. Boxer has just been released from their DVB-H obligation in this MUX by the Radio/TV authorities but is still obliged to promote and distribute mobile television. However the obligation has been postponed for three years and Boxer has been permitted to use this MUX for HD television in this period. The frequencies assigned to each MUX are found in annex 2.
- b) See annex 2.
- c) 27 allotments are using channels in the frequency sub-band 694-790 MHz. These are marked with bold text in annex 2.
- d) 51 allotments are using channels in the frequency sub-band 470-694 MHz.

- 6 a) Are those frequency bands also shared with other primary services?  
b) If yes, please give details of those systems and their spectrum use.

**Reply:**

- a) No, DTT services are the only primary service in the 470-790 MHz band.

- 7 a) Are those frequency bands also shared with secondary services such as PMSE (Programme Making and Special Events), radio astronomy or wind-profile radar?  
b) If yes, please give details of those systems and their spectrum use.

**Reply:**

- a) & b) Radio frequencies in the band 470-790 MHz may be used for PMSE services such as wireless microphone systems and in-ear monitoring as interleaved spectrum in the band 470-790 MHz.

It is possible to apply for a frequency license for wind-profile radar in the frequency sub-band 470-494 MHz. However, no wind-profile radar is in use in this frequency sub-band today. There are no radio astronomy services in operation in Denmark.

- 8 a) Do you foresee the adoption or expansion of television services broadcast using second-generation systems such as DVB-T2?  
b) If yes, please give indicative details of the planned transition, including any simulcast period.

**Reply:**

- a) & b) Boxer TV A/S launched a DVB-T2 service in one nationwide MUX on 1 April 2012. Boxer TV A/S delivers four HD programs and six SD programs in this MUX. The four HD programs are simulcasted.

Boxer-TV plan to move completely from SD to HD as Boxer expects broadcasters to follow this path. In a 4-5 year timeframe Boxer expect to be predominantly a HD-provider (all 29 channels in HD). During a longer time frame there will be a need for simulcasting. Thus in order to accommodate Boxers future plans Boxer expects a further transition to DVB-T2 in the next 4-5 years for all their available MUX'es.

DR also expects a transition to DVB-T2, but do not have any details on the transition.

- 9 a) Do you foresee a requirement for new and enhanced services, including HD and 3D 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) There are already now 7 HD services on air (3 free-to-air and 4 pay channels). It is expected that more and eventually almost all services will be HD. It is Boxers plan to move completely from SD to HD as Boxer expects broadcasters to follow this path. Also DR expects a further migration to HD but has no plans for 3D.

- b) In a 4-5 year timeframe Boxer expect to be predominantly a HD-provider. During this transition it will be necessary to simulcast several channels in both SD and HD. Boxer is committed to distribute at least 29 TV-channels until 2020. DR has no detailed plan for the further transition to HD yet.

It is evident, that the broadcast platform will have to adopt new technologies as the demand for services as 3D, UHD TV etc. increases and therefore the need for capacity will continue to increase during the next years.

- 10** 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) & b) As mentioned in the answer to question 5a the pay TV operator Boxer TV holds the distribution license for an additional UHF MUX.

- 11** a) What is the amount of spectrum you foresee that will be required for terrestrial television broadcasting, if plans in Questions 8, 9 and 10 are to be supported, and services identified in Questions 6 and 7 are to be taken into account? Please indicate the modes of transmission that will be used, and timeframes.  
If appropriate, a suggested form to express these requirements is shown in Annex 3.

**Reply:**

Considering that:

- The same number of programmes as of today will also be transmitted in the future
- Most or all programmes will be HD (i.e. up to 45 HD programmes)
- All video and audio coding will be MPEG4/AVC, and eventually HEVC
- All multiplexes will use DVB-T2
- Regional SFNs will be used (requirements for regional programmes)

Then the required number of multiplexes will be 6 as today.

Regarding spectrum requirements the national requirements of Denmark cannot be seen in isolation. If neighbouring countries are requiring a similar number of multiplexes, the required amount of spectrum to accommodate 6 multiplexes will be the same as today, i.e. the whole of the spectrum from 470 to 790 MHz. Changes to the network infrastructure may reduce the amount of spectrum needed to establish 6 multiplexes. However such changes will not be relevant in a foreseeable future.

## ANNEX 1

Suggested form of presentation of reply to Question 1: *What standards have you adopted for digital terrestrial television broadcasting? Have you started introduction of digital terrestrial television services? If yes, provide further detail on the number of multiplexes in use, their technical specifications, the percentage of geographic area or population they are intended to cover and the total spectrum use.*

A sample response is shown for guidance only.

Country	No of multiplexes	System & modulation	FEC	GI	Reception mode <sup>1</sup>	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) <sup>2</sup>	Any additional comments (e.g. duration of licences)
Denmark, Boxer-TV	2	DVB-T, 64-QAM	3/4	1/4	Fixed	22.39	>99,2		MUX 3: 13 SD MUX 4: 13 SD	121,13 <sup>3</sup>	MUX 1-6: 312 MHz	Pay TV service multiplexes Licensed until 2020
	1	DVB-T2, 256-QAM	2/3 (64k LDPC)	1/16	Fixed	36.55	>99,2		MUX 5: 4HD+6SD			Pay TV service multiplex Licensed until 2020. See answer 5a for further detail about this service.
	1	[DVB-T2, tbc] Note: Was DVB-H	[-]	[-]	Fixed for the next 3 years, hereafter portable indoor	[-]	[-]		[-]			Public service multiplexes (DIGI-TV)
Denmark, DIGI-TV	2	DVB-T, 64-QAM	2/3	1/4	Fixed	19.9	99,7 %	99,7 %	6SD + 3HD MPEG4			

<sup>1</sup> E.g. fixed, portable outdoor/mobile, portable indoor.

<sup>2</sup> Refer Sections 2 and 3 on page 1 of this circular.

<sup>3</sup> The added capacity from the new DVB-T2 multiplex, which formerly was allocated for a DVB-H service, is not included in this figure.

## ANNEX 2

Suggested presentation of reply to Question 5: *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.*

If allotments/SFNs are in use, a sketch map of frequency allocations could be included, with an accompanying table of allocations, as shown in Annex 2.

Otherwise, it might be possible to show main transmitters and channels, grouped in layers, in a table.

Please indicate how many digital television assignments/allotments use channels in the frequency sub-band 694-790 MHz (as indicated in Resolution **232 (WRC-12)**), and how many are in the remaining part of the UHF band.





Area	MUX 1	MUX 2	MUX 3	MUX 4	MUX 5	MUX 6
VHF/UHF	UHF	UHF	UHF	UHF	UHF	UHF
In use/not in use	In use	In use	In use	In use	In use	Not in use
<b>Tolne-Nibe</b>	29	<b>57</b>	<b>50</b>	37	35	39
<b>Thisted</b>	31	42	21	43	22	<b>49</b>
<b>Videbæk</b>	40	<b>59</b>	34	48	<b>52</b>	28
<b>Viborg</b>	40	<b>59</b>	21	<b>56</b>	<b>52</b>	45
<b>Hadsten-Århus</b>	26	44	24	<b>56</b>	<b>55</b>	36
<b>Hedensted</b>	30	44	46	33	<b>55</b>	36
<b>Varde</b>	30	<b>54</b>	46	33	<b>53</b>	28
<b>Aabenraa</b>	37	50	32	22	<b>49</b>	41
<b>Tommerup-Svendborg</b>	25	43	27	22	<b>49</b>	41
<b>Vordingborg-Nakskov</b>	<b>58</b>	34	42	38	<b>60</b>	48
<b>Jyderup</b>	<b>58</b>	<b>51</b>	42	31	<b>60</b>	23
<b>København</b>	<b>53</b>	<b>51</b>	<b>54</b>	31	<b>59</b>	23
<b>Roe</b>	<b>59</b>	<b>56</b>	31	39	<b>51</b>	32
	Free-to-air (DVB-T)	Free-to-air (DVB-T)	Commercial TV (DVB-T)	Commercial TV (DVB-T)	Commercial TV (DVB-T2)	Commercial TV (DVB-T2)

**Note:** Channels in bold are located in the frequency sub-band 694-790 MHz.