

Annex 1: Questionnaire

Member State Response details (please complete):

<i>Member State</i>	<i>Name</i>	<i>Organisation</i>	<i>Date</i>
<u>Germany</u>	<u>Jochen Mezger, IRT</u> <u>mezger@irt.de</u>	<u>ARD/ZDF</u>	<u>26.09.2012</u>

Question 1 (consider section 1 of Annex 1 to help you with your answer):

(See Annex 2 for example answers for your assistance)

i) Please describe the DTT platform in your country, currently on-air, in following terms (please use the following format for your answers):

Member State	No. of Multiplexes	Reception availability	Reception mode¹	Number of TV program services and content format	DTT System and modulation	Intended coverage reach²	Coverage obligation (Y/N)³	Coverage (as a percentage of population)	Spectrum band used (UHF IV/V or VHF Band III)
D	1	Free-to-air	Fixed / Portable outdoor / Portable Indoor/ Mobile	4 SD	DVB-T 16QAM-2/3	National; 95%-100% population	Y	90%-100%	UHF IV/V
D	2	Free-to-air	Fixed / Portable outdoor / Portable Indoor/	8 SD	DVB-T 16QAM-2/3 ⁴	Regional; 95%-100% population	Y	90%-100%	UHF IV/V

¹ E.g., fixed (roof-top), portable indoor, portable outdoor, mobile.

² E.g., national, regional, local.

³ Is there a legislative coverage obligation, e.g., a Public Service Broadcaster.

⁴ Some regional providers also use 64QAM-1/2 and 64-QAM 2/3

			Mobile						
D	3	Free-to-air	Fixed / Portable outdoor / Portable Indoor/ Mobile	12 SD	DVB-T 16QAM-2/3	Regional; 75%-80% population	Y	55%-66%	UHF IV/V
D	1	Free-to-air	Fixed / Portable outdoor / Portable Indoor/ Mobile	8 SD	DVB-T 16QAM-2/3	Local; 15%-20% population	Y	15%	UHF IV/V
D	2	Free-to-air	Fixed / Portable outdoor / Portable indoor Mobile	4 SD	DVB-T 16QAM-2/3	Local; 10%-15% population	Y	6%	UHF IV/V

ii) Are there plans to deploy (a) additional DTT multiplexes and/or (b) foresee the launch of new services **in the short term (1 – 5 years)**?

(a) additional DTT multiplexes (please use the following format for your answers)

No additional multiplexes for PSB; three additional multiplexes for Commercial Broadcasters and further extension of coverage for existing multiplexes. In some densely populated areas a few transmitters may be added by Commercial Broadcasters. To increase capacity 64QAM is used in some areas and may be used in some other areas as well. The coverage area of the existing multiplexes may be increased. This could be done either by increasing the area of SFNs or by moving frequencies from rural areas to urban and metropolitan areas.

Member State	additional Multiplexes (Y/N)	No. of additional Multiplexes	Reception availability	Reception mode⁵	Expected content format (SD and or HD)	Expected DTT system and modulation (if known)	Intended coverage reach⁶	Intended Coverage (as a percentage of population)	Spectrum band used (UHF IV/V or VHF Band III)
D	Y	1	Free-to-air	Fixed / Portable outdoor	8 SD	DVB-T 16QAM-2/3	local	5% population	UHF IV/V
D	Y	1	Free-to-air	Fixed/ Portable outdoor	6 SD	DVB-T 64QAM	regional	15%-20% population	UHF IV/V

(b) foresee the launch of new services (please use the following format for your answers)

[It is understood that the new services mentioned below should relate to the terrestrial broadcast platform, since all of the mentioned services (apart from UHDTV) already exist to some extent on other platforms (cable, satellite, ADSL)]

Member State	Additional Services (Y/N)	Expected content format (SD and or HD)	Reception availability	Expected content format (SD and or HD)	Interactive services (Y/N)	VoD (Y/N)	Ultra High Definition on TV (Y/N)	Other (Y/N)	If answer Yes to Other, please specify
D	Y	HD	Free-to-air	HD	Y	Y	N	N	

iii) When do the existing DTT licenses in your country expire?

Answer: End of 2025

⁵ E.g., fixed (roof-top), portable indoor, portable outdoor, mobile.

⁶ E.g., national, regional, local.

Question 2

How do you foresee different means of reception (DTT, ADSL, Cable, satellite, etc) complementing each other?

Answer:

DTT, ADSL, Cable, Satellite, Wireless Broadband are considered complementary with regard to the provision of future broadcast content which comprises linear and non-linear components.

Cable, Satellite and ADSL provide linear programme content to the home (wired, or portable indoor via WIFI); additionally, ADSL provides nonlinear broadcast content to the home.

DTT provides coverage for mobile and portable linear broadcast content. Wireless broadband complements the former by providing linear and nonlinear content to mobile and portable devices.

Beyond the purely technical aspect of content provision, for PSB it is crucial that political, cultural and social aspects of the PSB mission are fully taken into account, such as free-to-air provision of content, full population coverage, discrimination-free access to platforms, possibility to operate networks, etc. For PSB, a national technical master plan of delivering future BC content will reflect these requirements.

Question 3:

i) Do you think that the DTT platform in your country will evolve to being capable of delivering audio-visual services also to mobile terminals?

Answer:

In Germany, at present, the DTT platform already provides portable and mobile reception for more than 90% of the population. It is the intention to complete this coverage in the future to about 95+%.

DTT is hardly available in Germany for smartphones and tablets without using additional devices because no receive unit is integrated into the mobile devices (few exceptions). This shortcoming is not due to a principal technical problem but to business policy. In South Korea for example, a major part of the Smartphones is suited to receive TV via the DMB standard. Technically, this could be realized easily for the DVB-T standard in Germany and some DVB-T-mobile phones have been available on the market for a long time. In this sense, the European Commission should support the market.

- ii) If yes, what is the required evolution of the DTT network platform architecture? Please give details in relation to: -
- the DTT network topology (whether there will be a need to migrate from high- power/ high- tower to low- power/ low- tower type of networks);
 - to the use of MFN versus SFN networks to achieve the evolution, and
 - a possible migration to a new DTT system(e.g. to facilitate interactive services) and transmitting technologies (e.g., DVB-T2, DVB-T2 Lite, etc.).

Answer:

- In Germany, the DTT platform already delivers linear BC content to portable and mobile terminals to a large extent, based on an economically viable high-power/high-tower network concept. Therefore, currently no change in concept is regarded as required.
Nonlinear BC content to portable and mobile terminals will be provided in the future to a greater extent by wireless broadband networks which will reside on low-power/low-tower networks. Beyond these technical aspects it is still to be assessed how the non-technical requirements described in Reply/Question 2 can be fulfilled.
- In Germany, nearly all DTT networks utilize the SFN approach in order to best fit to service area requirements and to achieve a high spectral efficiency.
- Migration to DVB-T2 possibly in connection with HEVC to provide for a higher picture quality and/or an increased number of channels [using the same spectrum] is envisaged and under discussion. This includes the possible usage of DVB-T2-Lite/DVB-NGH. The existing DTT networks allow providing portable and mobile coverage already at present. The migration will require additional spectrum in the UHF band for the transition period.
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- iii) Do you believe that a DTT platform evolving towards delivering audio-visual services also to mobile terminals may also be used by mobile operators to cope with:
- a. the data traffic required to deliver linear video content (i.e., with mobile terminals including broadcasting tuners), and
 - b. certain non-linear content that could be pushed (and stored)?

Answer:

- a) At least for a short and medium term mobile operators would need to use a DTT platform for the delivery of linear public broadcast content to the general public since mobile networks are not capable to provide this functionality at present. This holds true for the required data capacity as well as for the required coverage.
- b) Cooperation of the DTT and the mobile platforms with respect to push and store of non-linear content is an interesting approach. This should be investigated in more detail.

- iv) What evolutions do you expect would be required for mobile networks to be capable of delivering linear video content ubiquitously to both fixed and mobile terminals?

Answer:

For PSB it is crucial to have very high population coverage as well as high area coverage for portable and mobile reception. Therefore, mobile networks to be capable of delivering linear public broadcast content would have to be available virtually everywhere in the country. In addition, the mobile networks would have to provide a data capacity which allows for the supply of at least the same programme offer as provided by DTT networks at present with state-of-the-art quality. This would require a country-wide capacity between 100 and 150 MBit/s in broadcast mode depending on the number of multiplexes available. In densely populated areas an even higher data rate of up to 225 Mbit/s is possible. At the moment, mobile network operators are far from being able to facilitate this.

- v) Of a possible convergence between terrestrial mobile and (evolved) DTT platforms, what do you consider will be the consequences of mobile networks being capable of delivering linear video content to mobile terminals?

Answer:

It has been proposed to distribute linear video content via LTE mobile radio networks. This idea raises two important questions:

- a) What would be the frequency spectrum requirements of such a system?
- b) What would be the costs?

The answer to question a) is not clear yet. Mobile operators sometimes claim that mobile radio would require much less frequency spectrum for the television distribution than broadcasting. A single channel could be used for a mobile radio network of any size whereas several channels would be required for the similar coverage of a larger area (e. g. a federal state like Bavaria) by a broadcast network. However, both, mobile radio and broadcasting, are appropriate for running large single frequency networks. Certainly it is true that dense mobile radio networks of many small and low antennas have an advantage in this respect in comparison with broadcast networks of much fewer, larger and higher antennas. But this is only a real advantage if the mobile radio networks consist indeed of small cells everywhere. However, the average diameter of the mobile radio cells is rather large (up to 10 km) in sparsely populated areas for economical reasons today. This results in a reduction of the efficiency of the transmission in these areas which can outweigh the advantage of large single frequency networks.

Another point qualifies the argument even more: Not all the TV programs are distributed uniformly on the national level. Other programs are more or less regionalized (in Germany: regional programs of the ARD, Das Erste, programs of the private broadcasters). Consequently, a uniform distribution of the latter programs using only a single frequency channel without delimited supply areas is not possible so that the potential advantage of mobile radio networks is more or less restricted. National borders restrict the extension of single frequency networks in any case. Based on the above, it is still unclear at the moment whether the terrestrial television supply of Germany by mobile radio would be feasible with less frequency spectrum than is required today for broadcasting or not.

Question b) is much easier to answer than a): using a mobile radio network consisting of many thousand transmitters and of an elaborate “backhaul” for the data supply and control of the transmitters would be much more expensive than utilising a relatively uncomplicated broadcast network comprising few transmitters. It will need to be determined whether other advantages (e.g. backchannel from the viewer to the TV station on-hand) would compensate for the additional cost of mobile radio networks for the distribution of television programs.

Question 4:

- i) How many DTT multiplexes do you expect will be needed in your country in the long-term (beyond 2020),

Answer:

It is expected that 6 multiplexes, intended mainly for portable outdoor and mobile reception, interleaved in 320 MHz in the UHF band (470 - 790 MHz) are needed to fulfill the requirements of public and commercial broadcasters.

3 multiplexes out of these are envisaged to cover the demand of public service broadcasters for full area coverage (95% - 100% population coverage).

The remaining 3 multiplexes will be either used by commercial broadcasters for nationwide (full) area coverage as well, or alternatively, to provide metropolitan and local area coverage with more than 3 multiplexes.

Country	No. of Multi-plexes	System & Modulation	Reception Mode	Capacity per multi-plex (Mb/s)	Intended Percentage Population Coverage	Content per Multiplex	Total Capacity (Mb/s)	Total Spectrum Bandwidth needed (MHz)
D	3	DVB-T2, 64-QAM ⁷	Fixed, portable	18 - 25	95% - 100%	4 - 8 HD/SD	54 - 75	168 ^{1,3}
	3 ²	DVB-T2, 64-QAM	Fixed, portable	18 - 25	95% - 100% ²	4 - 8 HD/SD	54 - 75	168 ^{1,3}

¹: From experience with the GE06 planning process and the experience with coping with the impact of Digital Dividend I it is assumed that 7 channels are required to construct a layer with full area coverage.

²: 3 multiplexes with full area coverage (95% - 100% population coverage) are to be understood as a placeholder for options To deploy more than three multiplexes on a local or regional basis with a lower population coverage.

³: It is expected that the intended coverage target, with minor restrictions, can be achieved with the presently available spectrum of 2 x 160 = 320 MHz (470 – 790 MHz). This takes into account also secondary usage by other services which cannot be “migrated” (radio astronomy and wind-profile radars).

⁷ Some regional PSB providers are considering to use 256-QAM.

ii) What services do you expect the DTT multiplexes to carry (assuming use of DVB-T2/HEVC)?

Answer:

It is expected that all programmes will be in HD quality in the future.

iii) What transition and migration paths do you anticipate will be required to achieve this long-term DTT goal for your country?

Answer:

- Extra spectrum is required for a transition period to move from traditional linear-only SD DTT to a future converged linear/nonlinear programme offer in HD quality.