

Radio Spectrum Policy Group

Questionnaire on the long term spectrum requirements for television broadcasting in the European Union including the number of TV services, HDTV, interactive services, mobility requirements and the possible introduction of Ultra High Definition Television

The questionnaire in **Annex 1** has been prepared to facilitate the work of the sub-working group of Radio Spectrum Policy Group (RSPG) preparing the draft opinion on the future spectrum requirements for Wireless Broadband, specifically issues relative to the future of the 700 MHz frequency band (694 -790 MHz). This frequency band is currently used in Europe for terrestrial television and in many countries also for PMSE on secondary basis and represents approximately 30% of the total remaining UHF spectrum used by the television broadcasting. The impact of an exclusive reallocation of this spectrum to wireless broadband will therefore be significantly more important for the broadcasting service than in the case of the 800 MHz band.

The responses to the questionnaire¹ will contribute to the analysis of the RSPG on the future use of the 700 MHz as well as on the evolution of the digital terrestrial platform (DTT) over the next decade (2012 – 2022)

For more information on the background to the various elements of the questionnaire see **Annex 2**.

For an example of how to respond to Question 1 please see **Annex 3**.

Please submit completed questionnaire contained in Annex 1 and return to [zeeshan.nazneen@comreg.ie] by [Friday 28th September 2012].

¹ The RSPG is aware of the ITU-R WP 6A questionnaire which addresses similar issues and we will if possible try to use responses to that questionnaire to complement the information/views in the draft opinion.

Annex 1: Questionnaire

Member State Response details (please complete):

| <i>Member State</i> | <i>Name</i> | <i>Organisation</i> | <i>Date</i> |
|---------------------|--------------------|---------------------|-------------------|
| France | A. Lucaussy | TDF | 28/09/2012 |

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 mode² | Number of TV program services and content format | DTT System and modulation | Intended coverage reach³ | Coverage obligation (Y/N)⁴ | Coverage (as a percentage of population) | Spectrum band used (UHF IV/V or VHF Band III) |
|---------------------|---------------------------|-------------------------------|-----------------------------------|---|----------------------------------|--|--|---|--|
| F | 1 | Free to Air | Fixed | 6SD with Regional programs | DVB-T 64 QAM $\frac{3}{4}$ 1/8 | N+R+L | Y | 96% | UHF |
| F | 1 | Free to Air | Fixed | 6 SD programs | DVB-T 64 QAM $\frac{3}{4}$ 1/8 | National | Y | 96% | UHF |
| F | 1 | Pay TV | Fixed | 6 HD/SD programs | DVB-T 64 QAM $\frac{3}{4}$ 1/8 | National | Y | 96 | UHF |
| F | 2 | Free to Air | Fixed | 4 SD Pay TV 7 SD FTA, 1 HD FTA | DVB-T 64 QAM $\frac{3}{4}$ 1/8 | National | Y | 96 | UHF |
| F | 1 | Free to Air | Fixed | 3 HD programs | DVB-T 64 QAM $\frac{3}{4}$ 1/8 | National | Y | 96 | UHF |
| F | 1 | Free to Air | Fixed | Local programs | DVB-T various schemes | Local | | 25 | UHF |

² E.g., fixed (roof-top), portable indoor, portable outdoor, mobile.

³ E.g., national, regional, local.

⁴ Is there a legislative coverage obligation, e.g., a Public Service Broadcaster.

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)

| Member State | additional Multiplexes (Y/N) | No. of additional Multiplexes | Reception availability | Reception mode ⁵ | Expected content format (SD and or HD) | Expected DTT system and modulation (if known) | Intended coverage reach ⁶ | Intended Coverage (as a percentage of population) | Spectrum band used (UHF IV/V or VHF Band III) |
|--------------|------------------------------|-------------------------------|------------------------|-----------------------------|--|---|--------------------------------------|---|---|
| F | Y | 2 Fix | FTA | Fixed (rooftop | HD | DVB-T 64 QAM ¾ 1/8 | National | 96 | UHF |
| F | Y | 1 or 2 | Controlled access | Mobile | | T2 Lite | Regional to National | Starting ca 30-50%,then 80% | UHF |
| | | | | | | | | | |

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

| 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 Definiti on TV (Y/N) | Other (Y/N) | If answer Yes to Other, please specify |
|--------------|---------------------------|--|------------------------|--|----------------------------|-----------|---------------------------------|-------------|--|
| F | Y | Generalizat ion of HD 1080p | Fixed/mobile | HD | HbbTV | ? | Y | Y | (i) EPG (ii) Multimedia Mobile content delivery (live and non live ; cf TDF B2M concept as an alternative to broadband networks) (iii) DTT based delivery of non linear video content (“PUSH”) |
| | | | | | | | | | |

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

⁶ E.g., national, regional, local.

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

Answer: The first DTT authorizations have been awarded in 2005. Licenses of commercial broadcasters theoretically expire after 10 years but can be extended for 5 additional years which should be the case. For the Public service broadcasters, the duration is subject to decision of the government. According to these rules, the licenses may end between 2020 and 2022 as all authorizations were not distributed at the same time.

Question 2

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

Answer:

The current market share for primary reception is 51% for DTT, 25 % over fixed broadband networks, 18% for satellite and 7% for cable. In the next ten years, the DTT platform should remain the main platform even if ADSL has progressed over the last decade. The free to air access, the nationwide coverage, the highest quality of HD programs are and will remain the main assets of the DTT platform. Regarding the complementary issue, it has to be taken carefully as DTT is the only free to air platform which gives a global coverage at efficient cost. This specific status implies that DTT is something like a public service for television broadcasting with a national coverage when its competitors are not free to air and present limits in terms of eligibility (Satellite in city centers or DSL in rural areas).

We should also have in mind:

- the very high economic efficiency of DTT (we estimate that the DTT delivery of TV content is approximately 10 times less expensive than the IP based delivery, ignoring the cost of local loop; if this cost is taken into account, the multiplier may be as high as 30)
- terrestrial IP solutions (e.g.: IPTV over DSL) are facing / will face limits in their expansion; there are limits of coverage (not all homes are eligible to receive IPTV over DSL), limits of throughput (as users are willing to have HD and possibly more than one simultaneous feed , the required bit rate is increasing and may move to values in the 8-20 Mbps, which are available only for a fraction of the audience) and limits of costs, as telecom operators and ISPs will be reluctant to support substantial upgrade costs which are necessary to make IPTV available to larger segments with more quality / bandwidth
- as for fiber, an infrastructure that would not face the quality / bandwidth constraints of DSL, there can be significant doubts on the pace of massive deployment, and even the more, the fear that fiber will initially (and possibly eventually also) reach only/mostly the homes and areas which are already eligible for DSL
- the emergence of nonlinear and so called OTT services and usage patterns (e.g.; VOD, catch up, time shifting, recording, ..) will most likely not be a factor causing a decrease of the usage of DTT , as these new services can now be fully accessible for homes relying on DTT for the capture of their TV

programming, thanks to the fast emergence of so called “connected TVs “ or “smart TVs” ; these features, whether embedded in TV sets or implemented on low-cost external add-ons , will enable the end –user to fully benefit, in a seamless manner, from the new services (delivered by an IP connection) while retaining the well established benefits (quality, High Definition, stability and resilience to network events and congestions,) of DTT for the traditional linear content

Some observers for example in the USA point to the trend (“cord-cutting”) where more and more users, who were receiving their TV content as part of a cable , fiber or satellite subscription, are now switching to the combination of “OTT + DTT”, which they find delivering best value for money

- going even further, there are also signals that for many users, the insufficient speed of the available IP connection (say below 1 Mbps) is a major hurdle to a satisfactory delivery of the on-demand services that they increasingly ask; in this context, DTT could bring a solution by offering a high throughput, high stability / quality and low cost delivery pipe for video content which can be received at the user’s home through the standard DTT antenna, stored and replayed under the control of the end-user (and/or of the program’s provider, depending on the commercial arrangements made)

In summary, we see many signals that the current changes in the market and consumption trends are not likely to reduce the need for DTT capacities, and may on the contrary make DTT even more necessary to ensure a national availability of high quality, wide choice and low cost digital media proposals for the entire population.

Having these high quality, high coverage, low cost options available will be of major importance to sustain end-user satisfaction and freedom of choice, as well as the an easy and open access for content owners / creators to the public, which is a major factor required to ensure the cultural diversity and dynamic creation and digital markets in our economy

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:

- We see the delivery of digital content for mobile receivers across a broadcast, DTT type of network, as a major strategic development to be integrated into any frequency planning scenario, this being linked to the massive /explosive demand for digital media consumption on the move while traditional broadband /unicast networks are not fit to meet such huge demand in optimized conditions; this point of view is increasingly endorsed by leading players of the mobile telecom industry .

- However, we do not anticipate that a single DTT mux should be 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.

We see more relevance to the development of mostly specific / dedicated muxes, with 8 muxes in the case of France dedicated principally to fixed rooftop reception and 1-2 muxes dedicated to mobile reception.

- As for the mobile broadcast, we consider that the relevant model is the one of Mobile Multimedia Broadcast, 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 broadcasted, 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 fully 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.

As for TDF, we have initiated an innovation project (B2M) which is intended to prototype this concept of multimedia mobile broadcast delivery; the prototype will be running in Paris in Q4 2012 and its successful completion should be a starting point to work on commercial deployment of such a service.

The economic benefit of mobile broadcast delivery

TDF recently developed a preliminary modeling of the benefit of off-loading mobile data traffic to broadcast network.

This model predicts that in 2018, about 350 PB of mobile traffic could be off-loaded from mobile (telecom) networks to a broadcast network, out of a total national mobile data traffic of 6.800 PB.

The offloaded traffic of 350 PB may seem small, as it would amount only to about 5% of the national mobile data traffic; it becomes much more relevant if considering

- it will be about 12% of the national cellular traffic (i.e., WiFi off load excluded)
- it will be about 40% of the cellular traffic on the area covered by the broadcast network
- it will result, on this area, in a reduction in the capacity required which should be in the order of 60%.

This off-loaded traffic will be carried on the broadcast network at a cost below 100 m€(France); assuming an average production cost of 4€/ GB on cellular networks, the aggregate saving to the economy at large will amount to 1.3 Bn € resulting in a production cost for the broadcasted GB in the area of a few tenth of an Euro.

This model is based on a set of quite reasonable assumptions amongst which;

- only media, fat tail (i.e. media of high audience) of tablets and smartphones is considered for off load
- a tablet/smart device is consuming in average 7 GB / month of media, of which 70% is eligible for fat-tail handling
- 30% of the footprint / French population is covered with the broadcast network
- 80% of tablets/smartphones (2018) are capable of receiving data from Broadcast network

These figures are self-speaking as for the huge economic benefit that can be obtained from mobile broadcast delivery. Such huge economic benefit will translate in more affordable and richer proposals to end users, as well as more and easily accessible delivery options for content producers, which is key to sustaining a dynamic creation environment as well as cultural diversity.

- ii) If yes, what is the required evolution of the DTT network platform architecture? Please give details in relation to: -
- a. 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);

Regarding the network topology, the intended use cases, the capacity needed by the services and the area to be covered will help in defining the solution. At this stage, TDF thinks that:

- Fixed reception oriented DTT networks will remain essentially the same (with enhanced radio protocols; DVB-T2 and coding)
- A DVB-T2 multiplex sharing a PLP to DTT fixed reception and a T2 Lite PLP for mobile reception from a classical DTT (DVB-T2) network appears quite unrealistic at this stage.
- Conversely, mobile reception oriented networks will be mostly developed on separate muxes, with high power / high tower architectures reusing part of the classical DTT network as macro-cells.
- Low power / low towers broadcast for fixed reception seems highly unrealistic; pending a detailed study, we believe that the spectrum benefit will be limited, while the network cost increase will be extremely important!

b. to the use of MFN versus SFN networks to achieve the evolution, and

SFNs and MFNs are already widely used trough Europe in the broadcast networks. Each of them presents limitations which at the end imply that a mixture of both techniques is in operation in the DTT networks.

c. 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.).

as for fixed DTT distribution, we are of the opinion that the introduction of T2 is a natural path that will have to be followed at a certain time, including to match increased bandwidth requirements as 3D, HD or UHD become standard ;

as for mobile distribution, we are of the opinion that early mobile broadcast deployments will find it relevant to use T2 / T2 lite standard , while the ultimate goal is the one of a new global broadcast standard , which is referred to by many as CBS (Common Broadcast System).

CBS should be a best of breed and global mobile broadcast standard (as opposed to the current broadcast standards which are only regional, which puts them at a disadvantage against the telecommunication and internet standards) that should be also acceptable / close enough to the mobile industry (LTE eMBMS) while taking full advantage of the unique broadcast features and benefits; TDF is using its longtime presence and position in the industry to work towards this goal, and we find in this respect of special interest the creation of the FOBTv (Future of Broadcast Television) , a global initiative engaging the leading stakeholders from the USA, Asia and Europe, that aims to promote the development and adoption of global broadcast technology components and business models that would be fully meeting the changing needs of the digital consumption in the 21st century, and have precisely such a CBS among its goals.

- 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:

We answer strongly YES to the two questions above, as developed in answer to question (ii) ; again , we believe that it will be impossible to meet the exponential demand for mobile media consumption without taking advantage of the un-paralleled efficiency of broadcast networks.

If this is not accomplished, there will be a scarcity of mobile media delivery capacity, which will translate in substantial social issues including; high prices of mobile data, limited options for content players resulting in a loss of diversity and opportunity for cultural creation, and a loss of incentive for digital/mobile technology and business innovation.

This would be especially worrying if this absence of mobile broadcast would be limited to Europe (as other geographies like China, Japan have deliberately initiated the development of second generation mobile broadcast systems), because then Europe would suffer a strong social, economic, technology and cultural disadvantage against other parts of the world with more dynamic ecosystems and delivery options.

This development of mobile broadcast technology should definitely encompass linear and non linear content, as well as non video content (press, magazines, ...) : only such versatility will create sufficiently large traffic / economic scope to have sustainable business models and a sufficiently attractive value proposal towards intended users and stake holders ; networks that would be dedicated to one vertical application / type of media with a strict content definition supposed to apply for long period of time, are doomed to fail, as demonstrated by recent un-successful attempts (digital radio, mobile TV in DVB-H)

- 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:

We are of the opinion (Cf. answer to question 3i above) that fixed and mobile reception should be addressed by distinct networks, because;

- a network able to address mobile receivers must be significantly over-specified against a network designed for rooftop reception, and it thus would be a waste to use such network for fixed reception

- additionally, the contents to be carried for fixed and mobile reception will be for a large part quite different; for example, a multiplex intended for fixed reception will predominantly (but not solely) be made of HD (even UHD) live programs with high bit rates, while content intended for mobile reception will be made of shorter items, with lower resolutions (say about 1 Mbps versus the 5-8 Mbps in fixed), and have a much higher weight of non-linear / on demand content

As a consequence, we are of the opinion that using for example mobile networks (even operated in their broadcast mode) for home TV reception is a very unproductive approach, which will eventually yield minimum or negligible spectrum gains at the cost of massive site deployments, with all the associated consequences in terms of environment, economic costs, etc.. This would be even worse, if each MNO deploys such a network in order to follow/propose the same service as its competitors.

- 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:

We are of the opinion that the current “micro-broadcast” approaches intended in the mobile networks are quite valuable in their intent, but quite under-optimal in their execution and will eventually result in limited benefits as broadcast distribution will be achieved only on a small number of users in each cell⁷.

On the contrary, we believe that macro-broadcast (in the style of the classical DTT networks with high powers high towers) will provide a much bigger economic benefit; this will be true for both linear and non-linear (cached) traffic.

Again, achieving this model and its underlying benefits, requires significant adaptations in the broadcast environment both at the level of technology / standards and at the level of the regulatory / frequency assignment framework; as the successful model is the one of a versatile and multimedia broadcast platform, the frequency authorization needs to be assigned to the operator of the broadcast network (with some possible media oriented obligations provided they leave sufficient flexibility) and not to individual program creators or editors, which have shown that they were not in the position to make a concrete and meaningful usage of these frequencies.

⁷ The current mobile networks in LTE adapts the robustness of the constellation used in transmission to the reception conditions which implies that at the cell borders due to interference the useful bit rate is lower than just near the base station. If such networks have to ‘broadcast’ linear programs to tablets or for fixed antenna TV reception, there will be a need to have more base stations (each 1.5-1.7km) in order to provide the sufficient data capacity to all users. Will it be really achievable over a country as France?

Question 4:

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

Answer: referring to our contribution to the ITU questionnaire but also to the French answer, 8 multiplex will be necessary on the long term for fixed reception and at least 1 and most probably 2 for mobile reception.

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

Answer:

Fixed Multiplexes

We assume that the current offer will evolve more to HD over 1080p and that added services (HbbTV, EPG ...) and new services as Ultra HD, Mobile TV will appear on the platform. One has also to note that 3D services has so far not been very successful, but one main reason, in addition to the relative scarcity of 3D content, appears to be the need of wearing spectacles for having a good quality of service. This weakness will not last for a long time. Some 3D without glasses TV sets, not yet convincing, had been shown recently at the IFA in Berlin, but more promising are the presentations of Dolby at IBC in Amsterdam, especially when associated with the transmission of metadata. This showed an astonishing 3D without glasses experience, with no artifacts when moving around. Interestingly such a system requires transmission of a 4K stream, which DTT will have to accommodate, continue to serve the citizens which require it to keep its competitiveness with the other platforms.

Mobile Multiplexes

See answers to question 3.

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

Answer: The first transition is the generalization of MPEG-4 over DTT for all the multiplex. The second one will be the introduction of DVB-T2 but it is unclear at this stage if we'll wait for HEVC or if France will introduce another step in the process which would be difficult to explain to the end-users. TDF thinks that a transition to DVB-T2/HEVC in one step is preferable but has to be incentive for end users by providing an even better experience on DTT with

enhanced quality, additional programs or services. Therefore, the transition plans should also be evaluated with regards to the worldwide activities of the broadcast industry in the context of the FOBTv initiative which aims at a goal for finalization of worldwide harmonized DTT standardization in the 10-12 coming years, and which, if goal met, should therefore be obviously the best candidate for a transition