DigiTAG Position Paper

The Digital Dividend
&
the Future of Digital Terrestrial Television

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1 The importance of the DTT platform

1.1 Digital terrestrial television today

The DTT platform provides television services to over 75 million households across Europe. In many parts of Europe, it is the fastest growing digital television platform and has enabled many households to access digital television services for the first time. For many countries, it is the pre-dominant television reception platform.

The DTT platform is the only platform throughout Europe that guarantees nearly all viewers access to a broad range of free-to-air television services. National regulators have ensured that the DTT platform provides nearly universal coverage (90% of the population and above) and access to television services from the public service broadcasters. In many countries, the DTT platform has allowed broadcasters to increase the number of services that they provide to viewers and better fulfil their service obligations.

The DTT platform remains one of the most economic broadcast transmission systems. It allows broadcasters to easily provide content to a maximum number of viewers at a low, per-viewer cost. The unique features of the DTT platform allow viewers to benefit from regional and local content as well as portable and mobile reception.

The launch of the DTT platform has increased competition in the television market. Not only can viewers choose between a number of options for the medium of delivery of television services but they also have greater choice regarding pay television services. Viewers have benefited from the business models adopted on the pay-DTT platform, allowing for such services as pay-per-view events, near video-on-demand, and pay bouquets. The increase in competition between service providers has allowed viewers to benefit from appealing content and lower prices.

The launch of DTT services has enabled to the terrestrial television platform to retain its competitiveness vis-à-vis other television delivery platforms. In some countries, especially those with traditionally few television households which depending on the analogue terrestrial television platform for their primary television services, the reliance upon the terrestrial platform has increased significantly. This has been the case in both the Netherlands and Germany, mainly because of the easy-to-use portable reception and the significant increase in the number of television services available.

1.2 Comparing DTT with other television delivery platforms

Only satellite is able to rival the DTT platform in terms of household covered. Neither cable nor IPTV have sufficient reach to ensure that services are made universally available to all television households. However, in many areas, satellite is not a television delivery option since shadowing and local rules prohibit the installation of satellite antennas. In addition, the installation and up-keep of a satellite antenna is not simple for all viewers.

The DTT platform is the only television delivery platform that can provide local and regional television services in a cost effective manner. While such services are possible to provide on the satellite platform, it requires the simultaneous transmission of all local and regional services from a single satellite. The provision of such services by the DTT platform is more efficient in terms of cost and spectrum usage.

It is important for the market to give viewers choice between several television delivery platforms to access television service. Currently, some platform operators, such as IPTV, provide their subscribers with hybrid set-top boxes that can receive both DTT and IPTV services showing their reliance upon the DTT platform for the provision of certain broadcast services. It would not be economical to provide the full range of available broadcast services using a wireless broadband network.

1.3 Terrestrial television households

Viewer dependency on the terrestrial television platform for primary television services varies significantly between Member-States. In some countries, the terrestrial television platform is used by well over 50% of viewers (France, Greece, Italy) while in other countries, it is used by approximately 10% of viewers (Belgium, Germany, the Netherlands) for primary television services. Policy decisions made at a European level must take into consideration the variations in television usage between the different television markets. It is unlikely that uniform decisions can be applied across Europe given the difference in the market for the delivery of television services.

In many homes, including those that subscribe to cable, IPTV, or satellite providers, the terrestrial television platform is used for most of the secondary television sets. It is generally assumed by the consumer electronics industry that households own an average of 2.2 television sets which can lead to the assumption that a very large portion of secondary television set in Europe rely on the terrestrial television platform.

In the United Kingdom, where 9.8 million households [out of a total of 25 million households] rely exclusively on the DTT platform, it is estimated that 17.8 million households watch DTT services on at least one television set. The significance of the terrestrial television platform is therefore much greater than may be assumed from the number of television households in which the DTT platform provides their primary television services.

1.4 DVB-T is the de facto standard in TV sets

The market for DTT services is further augmented by the inclusion of the DVB-T standard in all digital television sets. At this stage, DVB-T is the de-facto standard present in nearly all television sets sold in EU Member-States, and legislation in several countries reinforces this market reality.

Furthermore, the development of new technologies such as the DVB-T2 standard demonstrates the broadcast industry continued confidence in the terrestrial television platform.

2 Terrestrial broadcasting needs the Digital Dividend and appropriate regulatory frameworks

2.1 Terrestrial Broadcasting needs the Digital Dividend

In many European countries, it has not been possible to provide a full range of DTT services during the period of the simultaneous transmission of analogue and digital terrestrial television platforms due to a lack of available frequencies. However, as countries increasingly

switch-off their analogue terrestrial television services, some spectrum capacity is becoming freed-up and this can be used to offer new services. The availability of this spectrum capacity, the so-called digital dividend, can offer present opportunities for new digital television services as well as for other services such as broadband wireless telecommunication.

It can be expected that viewer demand will be high for additional or new broadcast services such as pay-DTT, high-definition (HDTV), mobile television, regional and local TV, and Push VoD. Viewer demand for HDTV services has been high as is demonstrated by the penetration of HD-ready television sets in households. Currently, some countries (France, Hungary, Italy) offer HD services on the DTT platform using the MPEG-4 AVC compression format in combination with the DVB-T standard. Spain may also do so while others such as Finland, Sweden and the UK will start HDTV services at the end of 2009 using the new DVB-T2 standard.

It is expected that an interesting market for broadcast based mobile television services will soon develop. 3G networks are beginning to reach saturation levels and LTE may also encounter the same inability to address the mass mobile television market. For this reason, a broadcast network will be needed to provide such services.

Frequencies will need to be made available for these services as well as to allow for the evolution of the DTT platform towards new, and currently nascent, services such as full HD and 3DTV.

2.2 Terrestrial Broadcasting needs appropriate regulatory frameworks

The regulatory frameworks put in place can have a beneficial impact on the successful implementation of broadcasting service. National consensus is necessary the development of a national strategy which must be implemented through an appropriate legislative and regulatory framework. Such a framework is essential to allow for the introduction of new services on the DTT platform such as mobile television, pay-DTT, full HD, interactivity and push VoD.

The regulatory framework plays an important role in determining the success of a given business model when introducing new services as has been the case of with mobile television. It is for this reason that the regulatory frameworks should be business-oriented and established in such a way that it can help frame the business cases between all parties involved in the value chain. In Austria, the regulatory framework has proven successful and has resulted in a short time period between the launch of the tender and the effective launch of commercial services.

An effective regulatory framework should put in place that can be tailored to a variety of situations and, in particular, allow for the launch of future new DTT services.

3 Using the Digital Dividend efficiently

3.1 Implementing the most advanced technologies

The MPEG-4 AVC video and audio codec and the DVB-T2 standard provide the broadcast industry with new opportunities to launch new types of services on the DTT platform and better meet viewer expectations.

MPEG-4 AVC video and audio coding
Market evidence shows that the MPEG-4 AVC compression technology is increasingly being integrated into DTT receivers. Markets that have launched DTT services since 2008 have overwhelmingly adopted MPEG-4 AVC while markets that presently use MPEG-2 will likely transition to MPEG-4 AVC. In France, and as from 2010 in Spain, all integrated HDTV receivers must include an MPEG-4 AVC chipset. As a result, MPEG-4 AVC is expected to become the de-facto compression technology used in almost all DTT receivers.

In many countries, transmissions using MPEG-2 compression technology will continue to be used beyond 2012 but it will always be a national decision when to stop such transmissions based upon the needs of its market. Hence all receivers should remain backwards compatible with MPEG-2.

DVB-T2 terrestrial modulation standard
DVB-T2 is newest terrestrial transmission standard developed by the DVB Project and is currently the subject of a number of pilot trials throughout Europe. It is as of yet too early to assess the potential wide-scale deployment of the DVB-T2 standard as many countries are still considering its potential use, with at this stage, three countries, the United Kingdom, Sweden and Finland, have indicated firm plans to launch services using the DVB-T2 standard. Other countries may do so, but will likely seek to first benefit from the experiences learned early deployments. In addition, many countries do not have sufficient frequency capacity to launch new services using the DVB-T2 standard until they complete analogue switch-off.

The kinds of services that will be launched using this standard will vary between countries depending on the needs of the market. For example, in some countries such as France, Hungary, Italy, Norway, HDTV services are provided using the DVB-T standard and MPEG-4 AVC. In these countries, the DVB-T2 standard may be used to launch future new services such as 3DTV. In the United Kingdom, Finland and Sweden, on the other hand, where DVB-T has provided only SDTV services, DVB-T2 will be used for the provision of HDTV services.

3.2 Increasing frequency spectrum planning efficiency

In the same way as the Stockholm 61 Plan originated with around 5,300 analogue television stations and was able to incorporate more than 85,000 stations by 2006, the Geneva 2006 Plan is only a starting point for evolution of the DTT frequency Plan.
Using the GE06 procedures and the coordination process between countries, spectrum optimization can allow to the addition of DTT networks on a national basis. As an example, the French government has made use of this flexibility when setting its "Plan Numérique 2012", the objective of which is to provide 11 fixed and 2 mobile television layers.

However, the evolution of the DTT frequency plan to allow for the increase in the number of national layers available may require changes to some of the GE06 planning criteria (e.g. coverage areas, density of DTT networks, quality of service).

3.3 The difficulty of migration to new technologies

The migration of existing services to new technologies enables the broadcast industry to provide viewers access to new services. This has been most evident in the recent transition from analogue to digital technology. Experience with digital switchover has demonstrated that a successful shift in technology will require the offer of new services to entice consumers to purchase the necessary conversion equipment. Any such migration must be guided by the market and within a timeframe compatible with the innovations of the broadcast industry, especially in terms of new service offerings.

However, such a conversion requires significant investments by the national administrations, the broadcast industry, and, most notably, viewers. A migration to a new compression technology or a new transmission standard will be similar in impact to the current migration from analogue to digital technology on the terrestrial television platform and cannot be repeated at short intervals, in particular on the free-to-air television platform.

Viewers will be required to change receiving equipment and a long simulcast period is inevitable given that new television sets are typically purchased every 5-8 years, while older television sets often continue to remain in use. Any change of technology will need to address the widespread use of secondary television sets (PVRs, etc) and ensure that measures are taken to allow for their continued performance. Consumer costs risk being high and will raise environmental concerns. Consequently, rather than calling for a short period of total migration, new technology should be used at the time of the introduction of new services with migration being considered independently at a later point in time.

The timeline for the introduction of new technologies will vary across Europe depending on specific market situations. Markets may choose to launch HDTV services on the DTT platform but will not necessarily choose the same technology for doing so.

4 The need for careful sharing of the Digital Dividend

4.1 Allocating 790 – 862 MHz to other Services

The European Commission has indicated its interest in European Union Member-States reserving the frequencies from 790-862 MHz for bi-directional, low/medium power services such as mobile broadband services. A significant number of countries have already decided to allow telecom applications in the “800 MHz” band: Denmark, Finland, France, Germany, UK, Spain, Switzerland, and Sweden. However, it is not yet clear if full harmonisation of this frequency sub-band will be possible throughout Europe.

Such a development is worthwhile so long as the reception of current DVB-T services is protected and it does not impede the development of current and future DTT services. It is important to note that the broadcast industry has already made significant investments over many years in the development of DVB-T networks and the burden for frequency transfers will not bring any added value to these broadcast networks. In addition, the investments made by viewers to receive DVB-T services, whether through the purchase and installation of DVB-T receivers and reception antennas for these frequency bands, should not be overlooked.

Nonetheless, the necessary technical preparation and the cost of migrating DTT networks to other frequencies will likely be a significant effort, and must be borne by the new users of this band, rather than those currently using it. Furthermore, all costs to protect existing broadcasting services in the adjacent band must be borne by the new users of this band.

Costs

Guarantee has to be given to Broadcasters and Broadcast Network Operators that they will not bear any part of the burden for the migration (costs, interference, additional activities in order to protect existing receiving equipment …)

The costs to migrate broadcasting from channels 61-69 to other channels may be very high:

- Frequency planning and network modification (this includes costs in country A to provide possibilities to country B to migrate from channels above 60 in other channels as well)
- Cost/inconvenience for viewers (retuning, in some cases antennas replacement or re-orientation)
- Costs for measures to solve interference problems
- Public information/assistance including potential help scheme

The migration costs may vary a lot depending on the local situations. They depend on the number of frequencies to be moved and transmitters to be modified, especially further rearrangements or modifications in order to find new frequencies for those in the 800 MHz sub-band. In countries using heavily channels 61-69, the costs will be higher. A significant part of the cost can be mutualised with switchover operations if and only if migration is undertaken at the time of analogue switch-off.

Furthermore, national administrations should guarantee to fully protect broadcast services in all reception modes up to and including channel 60 at no cost for broadcast users, while looking at acceptable conditions of use for the 800 MHz band. It should also consider providing funding to support research into the interference problems with existing receivers that may result from the allocation of channels 61-69 for non-broadcast services.

But in some countries it would involve the loss of some digital-terrestrial channels and the cost of upgrading DTT networks and replacing and realigning aerials and DVB-T receivers.

Depending on the country, it is not yet clear who will be responsible for paying these costs, and who will get added value. Some Member States may need more time and funding to successfully manage the harmonisation of the 790-862 MHz band.

Protecting Digital TV receivers

The requirements of the current interference levels have been established based on the use of adjacent frequency channels as per the ITU Radio Regulations. Many countries already have defined minimum requirements specifications for their own DTT receiver market

Changes made to increase interference resistance will require coordinated effort within the broadcast industry, and specifically from the consumer electronics manufacturers. The cost and timing for the development and inclusion of any new “anti-interference specification” should also be taken into consideration. Products currently in the market will not benefit from any revision made to increase interference resistance. The cost of possible upgrades to these

receivers will be high given the quantity of receivers currently in the market. New products shall not cost more or consume significantly more power than products currently in the market, at least not due to new technologies needed in order to improve resistance against interferences.

Furthermore, all different usage scenarios and applications need to be taken into account. Any improvement in the ability of digital TV receivers to resist interference shall not lead to a loss of its unique features like portable and mobile reception.

If the introduction of new services in the 800MHz band actually impairs reception in the remaining 470-790 MHz band for TV it could be discussed whether some of the proceeds from 800 MHz frequency auctions should be set aside to provide technical solutions for those consumers actually losing their current TV services due to other system being introduced on adjacent frequencies.

4.2 White Spaces

Licence-exempt use of the UHF white spaces may become possible if such technologies are developed and if it can be shown that such services can co-exist with current broadcasting services without impairment.

Within this context, in order to protect the Broadcasting services (broadcasting itself and PMSE) appropriate technical studies are needed. Technical and policy issues must be carefully examined prior to giving access to licence-free white space devices. Such work is underway within the CEPT in its SE43 group which will submit its final recommendations by the summer of 2010. DigiTAG members are actively involved in such work and have been providing measurement and compatibility studies.

White space usage should not reduce flexibility or create obstacles for properly managing frequency changes for DTT services. Studies on white space usage fail to note that many of the frequencies that could potentially be available are often used by DTT transmission gap-fillers. In Finland, about 370 such transmitters have been coordinated bilaterally case-by-case and they represent additional frequencies to the GE06 agreement. In Sweden, more than 800 transmitters have been coordinated under the same conditions. If these frequencies are not taken into account, it is possible to overestimate available white space.

Furthermore, unlicensed white space devices could interfere with mobile television devices, both in co-channel and in adjacent channels, by causing receiver front-end blocking/overloading. It may be extremely difficult avoid such interference since unlicensed white space devices may be located in close proximity and would use interleaved spectrum. This would significantly impact the quality of the established services and the user acceptance for these services.

Two potential technical approaches to white space devices are under consideration:

- Cognitive spectrum sensing approach uses radio-frequency sensitivity to track available frequencies. While attractive in principle, this approach cannot be reliably achieved with current technology. Requirements for outdoor sensing are difficult while indoor sensing is currently not possible. The type of signals used by the DVB standards (OFDM signals) are far more difficult to detect than the signals used by the

ATSC standard (V8SB) used in the United States so sensing may prove particularly impractical in countries using DVB-T and DVB-T2.

- Geo-location approach is requires white space devices to access channel tables in combination with GPS or similar location capabilities to determine the availability of frequencies at a given location. This approach is emerging as the preferred technique. While this technique will prevent co-channel interference to incumbent PMSE and DTT services, adjacent channel interference remains a concern. Worst-case adjacent-channel inference analysis suggests that indoor DTT installations, including portable and loft mounted antennas, may be particularly vulnerable to interference.

Current studies suggest that, at present, both techniques are unable to provide an adequate solution: sensing remains unsatisfactory and has not been retained by the communications regulator in the United States while geo-location combined with a database may need an update of the data since the frequency usage plan is dynamic and usage by gap-fillers not fully known.

While successful implementation of unlicensed white space devices can contribute to more intensive spectrum usage, DigiTAG members believe that the introduction of such devices must not cause any interference to existing DTT services nor prevent the introduction of new DTT services.

4.3 Protecting wireless microphones

Wireless microphone applications are an essential part of broadcast production and their continued ability to make use of frequencies in the UHF band must be ensured. Some of these applications, especially those used for live broadcasts and special events, require a high degree of protection from interference which should be taken into consideration when addressing the amount of interleaved spectrum available.

However, the amount of interleaved spectrum available for such services is significantly reduced should the 800 MHz band be allocated to electronic communications services. Simultaneously, it is expected that the spectrum demand for wireless microphones will grow. This could result in the lack of frequencies available for one-off events such as festivals since frequencies will be used for other purposes.

Attempts to harmonise frequencies for wireless microphone applications may be difficult to achieve given the different frequency usage among EU Member-States. The benefits of such a measure would need to be further studies and take into consideration the cost of migrating any existing services to allow for harmonised frequency usage. Such a harmonisation measure could also significantly reduce the flexibility for national administrations and users to find sufficient frequencies for such applications.

However, in order to increase the flexibility of wireless microphone applications, the tuning ranges for such devices should be as large as possible.

5 DigiTAG opinions related to the proposed European Union roadmap

The European Commission has proposed to set-up an EU roadmap for the use of the digital dividend. Such information can allow for a coordinated and efficient approach to spectrum management while also providing the market with confidence on future spectrum usage. This will enable economies of scale and limit market fragmentation.

The European Commission's initiative to set up an EU roadmap for the use of the digital dividend is an important step. It allows for a coordinated and optimized approach in providing the market with confidence in spectrum usage across Europe, enabling economies of scale and limiting market fragmentation.

DigiTAG members will make all the necessary efforts to contribute to the transformation of the digital dividend into social benefits and economic growth in Europe. Already, DigiTAG members have offered support to their national administrations on such issues as network planning, spectrum optimisation, and coordination activities.

DigiTAG is of the opinion that in considering how to allocate the digital dividend the European Commission should take into consideration all the points addressed above as well as other key issues such as:

- The effects on competition (in particular platform competition),
- Incremental private value of DTT platform,
- External value (e.g. economic growth),
- Public value (e.g. public service and regional policy benefits provided by DTT).

Furthermore the below specific elements should also be noted.

5.1 Completing analogue switch-off by 2012

The European Commission's call for the completion of analogue switch-off by 2012 may be difficult to achieve for some Member-States. Based on currently available evidence, it can be generally assumed that the digital switchover process will take between 14 years (as in the United Kingdom) and 3 years (as in the Netherlands) from the time of the first launch of DTT services to the switch-off of the last analogue services. Factors that will influence the process include the number of viewers relying on the terrestrial television platform, spectrum availability, and the penetration of DTT services.

Countries that have already launched DTT services and begun to switch-off their analogue terrestrial platform will likely complete digital switchover by 2012. However, countries that have not yet launched their DTT platforms risk being unable to complete analogue switch-off by 2012.

At this stage, all Member-States, apart from Poland, appear to have confirmed their intention to complete analogue switch-off by 2012. Already, the process have been completed by 6 Member-States (Denmark, Finland, Germany, Luxembourg, the Netherlands, Sweden) while a further 8 Member-States (Austria, Belgium, Czech Republic, Estonia, France, Italy, Spain, the United Kingdom) have begun switching off analogue services in one or more areas. It is

expected that these countries will be able to complete analogue switch-off by the end of 2012, if not earlier.

Member States that have not yet launched DTT services will have more difficulty in reaching a sufficiently high level of penetration to allow for analogue switch-off by 2012. Currently, 6 Member-States (Bulgaria, Cyprus, Greece, Ireland, Romania, Slovakia) have not yet launched official DTT services.

Less than two years to complete digital switchover, especially in countries where a significant percentage of the population relies on the terrestrial television platform for their primary television services, will not be sufficient without the significant involvement of national administration. It may also be necessary for the European Commission to provide assistance to those Member-States with difficulty completing digital switchover by 2012 since the cost of an accelerated DTT transition will be high to viewer and broadcasters.

It should also be noted that the date for the completion of analogue switch-off will not necessarily correspond with the availability of frequencies in the 800 MHz band. In some countries, such as the United Kingdom and Spain, the migration of broadcasters in currently using the 800 MHz to lower frequencies will not be completed until 2014-2015.

5.2 Migration costs

The European Commission should take into consideration the general above points and provide guidelines/recommendations to Member States willing to free the 800 MHz band asking them to

- Make a full evaluation of the migration costs and interference scenarios before deciding to implement the 800 MHz band
- Favour the migration at the same time as Analogue Switch Off
- Identify adequate funding from State or future spectrum users and do not ask current users to bear the costs
- Optimize national planning
  - to compensate lost frequencies in channels 61-69 (in countries deciding to reallocate the 800 MHz band)
  - if needed, to identify additional capacity for current and future development of the DTT platform.
- Avoid a new European planning conference (regional modification of the GE06 Agreement), that would be very long to prepare, to hold and unnecessary because of cross-border coordination.

5.3 Cross-border coordination

Currently, cross-border coordination is well handled by national administrations, the CEPT, and the ITU. However, the support of the European Commission to further the endeavors of national administrations, the CEPT, and the ITU can have a positive impact.

Activities undertaken by the European Commission can greatly benefit from the experience and expertise of broadcasters and network operators in spectrum coordination. Often, national administrations make use of this expertise and the European Commission should do likewise.

5.4 Harmonization of spectrum usage across Europe

It must be recognized that there are significantly different market situations across the various EU Member-States. Attempts to harmonize spectrum usage should take into consideration the very different use of the DTT platform made by different markets. For this reason, it will be difficult to adopt frequency usage plans in the VHF/UHF bands that can meet with the needs of all local markets.

5.5 Mandating the use of MPEG-4 AVC or other broadcast technologies

Market-led technical development is generally a better choice than a regulated development. It can be questioned whether a formal EU regulation of receiver specifications is advisable. Such regulation risks being counter-productive, since it may slow down further compression technology developments.

It should be noted that mandating the inclusion of MPEG-4 AVC in DTT receivers will penalize consumers in markets that only make use of MPEG-2 given the price differential between the two technologies. Consumers will be required to pay a higher cost for receiver features that do not function in their market. However, this will only be the case until the price difference between MPEG-2 and MPEG-4 AVC chipsets (including license royalties) becomes negligible, which may take several years.

5.6 Deployment of SFNs

The European Commission recommends the use of national Single Frequency Networks (SFNs). The deployment of Single Frequency Networks (SFNs) with a very large number of medium power sites can provide some spectrum capacity gains in comparison with Multi-Frequency Networks (MFNs). This is the especially pertinent for smaller countries where the deployment of SFNs can be technically more feasible than in larger countries. The spectrum benefits of SFN are already available in many countries, but generally in smaller geographical areas (50 km radius) and using high power transmitters.

The deployment of national SFNs is not straightforward. Technically, providing SFNs to cover large countries requires a trade-off between maximum bit rate available and maximum power transmitted, and may lead to new sites operating at medium power increasing the cost of transmission. In addition, attempts to re-engineer existing MFNs to SFNs will bring high costs to network operators and change the current configuration for DTT coverage. Furthermore, national administrations have undertaken significant work in terms of spectrum sharing between countries. Network modifications will be necessary to move towards SFNs so requiring extensive national and international coordination.