DIGITALEUROPE

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DIGITALEUROPE Position on the 700 MHz Band

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1 Executive Summary

The ITU World Radiocommunication Conference 2012 (WRC-12) has decided on a co-primary Mobile Service allocation identified for IMT in the 700 MHz band, below and adjacent to the 800 MHz band, to be effective immediately after the next World Radiocommunication Conference 2015 (WRC-15). The ITU-R has been tasked[1] to carry out co-existence studies, develop frequency arrangements and help define the exact lower band edge at WRC-15 under agenda item 1.2.

This decision has led to intensive discussions regarding the future use of the band to provide the maximum benefit to the European citizens. Mobile Broadband (MBB) and Digital Terrestrial Television (DTT) are the key services under consideration in the 700 MHz band.

In the context of the discussion, it should be understood that DIGITALEUROPE's membership comprises a diverse range of companies and organisations. Some are predominantly engaged in the Digital Television business, others are predominantly engaged in the Mobile Communications business. Others are involved in both. DIGITALEUROPE is thus keen to see both industry segments flourish and prosper.

Issues relating to spectrum are simultaneously good opportunities and represent challenges to various existing businesses. Also any responses on spectrum issues are affected by national context, which can vary significantly by the historical and legacy situation within any given territory in Europe. Thus what might be an inconsequential issue in one country could be a significant issue in another, especially for example a country which has a large widespread deployment of Digital Terrestrial Television. Thus on some specific issues it may not be possible to provide a simple single unambiguous position that represents the whole of Europe, as represented by DIGITALEUROPE's membership.

Linear Television remains the most popular media with, in 2010, an average daily viewing time in Europe of 228 minutes per person a day (+ 6 minutes from 2009)[2]".
Digital Terrestrial television is the most harmonized way of transmitting TV channels throughout Europe and will certainly remain an important multimedia content delivery path in several countries. In this manner, broadcasters continue to invest in the digital terrestrial platforms through interactive television like HbbTV.

Building on this popularity, DTT services support an important sector of the CE industry which represents several billion Euros.

Furthermore, DTT plays an integrated role in the Digital Agenda in enabling consumers to have access to a variation of citizen informative and entertaining multimedia content through encouraging them to use availability of different TV delivered as data services over fixed and mobile broadband networks.

In parallel, the number of subscriptions and the demand for mobile traffic has shown an unprecedented growth over the last two decades creating a multi-billion Euro industry. With the GSM technology, voice and SMS services became affordable connecting virtually every

[1] Resolution 232 (WRC-12)
[2] Source: Eurodata TV Worldwide, 2011.)

European. UMTS with HSPA data services has opened mobile broadband access to the internet with laptops, smart phones and tablet computers and shows immense growth in data and multimedia consumption. New technologies such as LTE and LTE-Advanced address the increase with improved spectral efficiency and better user experience in terms of supported data rates and lower latency. While LTE and LTE-Advanced can use higher frequency bands such as 2.1 GHz and 2.6 GHz band in suburban, urban and metro areas, bands in lower frequencies below 1 GHz play an important role in quickly providing mobile service coverage and capacity to large remote and sparsely populated areas. Converting the band 800 MHz band (790-862 MHz) from DTT use to MBB use is reducing the digital divide between regions in countries by providing a basic broadband connectivity to previously underserved and unconnected or non-served regions in Europe.

However the capacity of the current 800MHz band is constrained and with the ambitious European Digital Agenda target of 30 Mbps to every household in the EU by 2020, access to more spectrum in bands below 1 GHz is therefore required to cost effectively provide such data rates in remote areas that cannot be addressed in an economically viable way by wire-line solutions. Consequently, opening the 700 MHz band for the MBB service will substantially add to delivering the requirements of the Digital Agenda targets and thus support the underlying targets of fostering economic growth and providing more equal opportunities, particularly for Europeans living and working in rural areas.

When assessing the opportunity of using the band 694 – 790 MHz for mobile broadband, Digital Europe observes that:

- The complete band 470 – 790 MHz band has been planned for broadcast services throughout Europe. Its usage intensity varies strongly across Europe. Certainly, it can be reasonably expected that new technologies would decrease the required spectrum to reproduce exactly the same quality and same offer as currently transmitted. However, upgrading to higher quality like HDTV, 3DTV and UHD will require additional spectrum in order to satisfy consumer demands for high quality services in DTT. Furthermore, any transition from one technology to another requires a temporary additional spectrum for transition.

- Irrespectively of future spectrum requirements, any frequency usage change has important impact on both the new entrants and incumbents (replanning, changing the transmitting equipment and solving issues). **There are also implications on the end consumer in terms of upgrading equipment and / or installation and consumer awareness.**

- **A new transition to 470 – 694 MHz in addition to the just achieved transition of the analogue digital switchover ("ADSO") and the digital dividend 790 – 862 MHz may cause additional confusion to the consumer if not appropriately addressed.**

- A change of frequency usage implies a change of interference environment for DTT reception equipment. Based on the experience of the digital dividend 790 – 862 MHz, it could be concluded that managing the interference represents a challenging task which can only be appropriately achieved by proactive measures from competent

authorities. DIGITALEUROPE recently published a Recommendation on interference avoidance from LTE transmission[3].

Considering the above facts,

- DIGITALEUROPE supports the target of the European Parliament, Council and Commission in the RSPP to make available at least 1200 MHz of spectrum for wireless broadband by 2015. DIGITALEUROPE's members will continue to develop technological solutions to address the increase in capacity demand, which DIGITALEUROPE expects will extend beyond this timescale.

- DIGITALEUROPE welcomes the recently published Information of the Commission RSCOM12-15[4] as a well balanced approach to identify best possible use of the 700 MHz band.

- DIGITALEUROPE maintains that harmonised designation of spectrum and usage conditions are essential ingredients to support cost effective devices that will meet the needs of consumers in the future.

- Leveraging on 3GPP Band 28 as an extension and in a compatible manner with Band 20 (EU800 MHz) would be a unique opportunity for economy of scales and roaming capabilities. DIGITALEUROPE supports such opportunities.

- In achieving the objective, DIGITALEUROPE considers essential that the harmonization process should be managed by administrations in a timely manner and be properly resourced, while applying accurate frequency planning and good spectrum engineering practices, in particular ensuring that
  - The broadcast service continuity is guaranteed
  - There should be no disruption of the existing DTT services to consumers
  - Interference problems should be minimized and solved in the least disturbing way for the consumer
  - The cost impact should be minimized for both manufacturers and consumers
  - There should be a clear communication to consumers.

[3]DIGITALEUROPE Recommendations On Interference avoidance from LTE transmissions. Document publically available at digitaleurope.org under TRPG-Broadcast Document Page

[4] https://circabc.europa.eu/sd/d/bb24e589-5231-4549-a97e-f453be2612de/RSPG12-425%20-%20Discussion%20Paper%20on%20future%20use%20of%20700MHz.pdf

2 Digital Terrestrial Television

2.1 Relevance of DTT in the context of EU / EC policy objectives

TV is a seen as primary source of information in many countries and continues to be a prime entertainment object: The European consumer spends more than three hours per day in front of his TV set at home[5]

The importance of TV of the contribution to cultural diversity is demonstrated by the requirement on broadcast service to promote European production in the AVMS directive[6] .

Overall, the important role in the European Society of television is recognized by the European Parliament and the European Council through integration of access to television within the concept of universal service provision[7] and is seen as integration factor in the society. Indeed, accessibility to television programmes is a recognized European priority.

With the introduction of connected TV, television devices play now an additional role in the society to give access to a number of connected services and to motivate citizens to step in the connected world.

The television value chain represents also an important economic sector of the European Union:

- In 2007 European broadcasters employed over 2.2 million people directly and indirectly[8]
- In 2007 European broadcasters invested around € 19bn in original European commissioned TV programming[9].
- The Television represented a turnover valued to € 84.4 Bn Euro in 2010[10]
- The TV sales business forms a substantial part of the total consumer electronics business which estimated value was € 62 Bn[11] in 2011. Alone TV the TV sales in Germany the 2012 forecast represents € 6.3 Bn[12] in Germany and € 3.8 Bn[13] in France.

Finally, undoubtedly in line with EU objectives, DTT is characterized by being largely driven by horizontal markets for equipment.

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[5] According to the IDATE DigiWorld Yearbook 2011, the European consumer spent 206,7 minutes in average daily in 2011 to consume live TV programmes

[6] Source European Comission: European Directive on Audio Visual Media & Services

[7] European Directive on Universal Service Provision

[8] Source: The Effects of a Market-Based Approach to Spectrum Management of UHF and the Impact on Digital Terrestrial Broadcasting by Oliver & Ohlbaum Associates Ltd and DotEcon Ltd

[9] Source: The Effects of a Market-Based Approach to Spectrum Management of UHF and the Impact on Digital Terrestrial Broadcasting by Oliver & Ohlbaum Associates Ltd and DotEcon Ltd

[10] Source: on the online distribution of audiovisual works in the European Union: opportunities and challenges towards a digital single market

[11] Source: Source: IDATE Digiworld 2011 Yearbook

[12] Source: handelsblatt http://www.handelsblatt.com/unternehmen/it-medien/ifa-2012-elektronikbranche-rechnet-mit-umsatzplus/7040790.html

[13] Source Gfk: Bilan GfK des ventes de biens technologiques en 2011

2.2 Status of the DTT market

In Europe to date since DVB-T introduction, more than 200 Million DVB-T receivers have been sold and 275 million European are watching television over DTT[14] [BNE]. DVB-T is available in most European countries to more than 90 % of the population. Most of the DTT platforms are based on a Free to Air business models. Hence DTT has an essential role in providing television programs direct to households without any subscription fee.
The market share of terrestrial television compared to other distribution paths in Europe is heterogeneous across Europe. In some countries, it reaches more than 60 % like France, Greece and Italy, whilst in other countries like Belgium, Germany, Netherlands it represents less than 10 % market share[15]. Some of these markets rely on portable reception concept; some others rely on rooftop aerial reception. However, in many European countries household may have an average of more than 2 TV sets with at least one used for DTT reception.

2.3 Receiver technology

The majority of receivers in the market and in operation are using DVB-T technology. DVB-T with MPEG-2 was firstly introduced at the end of the 90's. In some countries, DVB-T is used together with MPEG-4 video coding. In 2009 the second generation transmission system DVB-T2 was introduced.

2.3.1 DTT compared to other platforms

DTT as the cost efficient delivery path
The analogue to digital switchover has not changed fundamentally the split of the various delivery systems in the various countries. It has even opened the terrestrial broadcast to some usage that was not seen as feasible for years but hardly achievable in the analogue context like mobility or portability for second, third or even fourth TV. DTT is and will remain in most countries the most cost efficient reception method as it is mainly based on FTA services and on reusing of existing reception equipment or base on elementary means of reception like indoor antenna.

DTT as a mass access to new services
Even if new services (HDTV services, 3DTV services ...) are generally firstly deployed on free and Pay Satellite, IPTV and Cable delivery, they are generally getting their popularity (and success) when they become available on DTT. But they can only be introduced over DTT if there is sufficient spectrum available given their cost of delivery. In some countries, limiting the DTT offer despite the high number of HDTV capable IDTVs was aimed at to motivate households to switch to Satellite, Cable and IPTV for accessing these new services. However, this holds true mainly for the primary TV sets because of the complexity of distribution and access of Satellite, Cable and IPTV.

In some countries (UK, Sweden, France, Poland), an offer of several HD services is present over DTT. In some other countries where terrestrial is historically low (e.g. Germany), HD services are not available and no concrete plans have been announced but the network has been optimized to offer mobility and portability not achievable with other delivery means.

[14] Source: Broadcast Networks Europe
[15] Eurobarometer 362, E-communications household survey, July 2011 conducted by TNS Opinion & Social at the request of Directorate-General Information Society and Media of the European Commission.

Despite the growing number of services delivered by satellite, IPTV, cable, DTT is globally still the most popular delivery paths[16]. DTT operators have invested and continue to invest to meet the consumer's interest with enhanced offers and distribution quality.

2.4 DTT evolution

Digital Terrestrial Television will continue to be a popular delivery system for many countries in Europe. However, there may be several factors affecting its importance in the future like the service evolution, the impact of hybrid services and new technologies.

2.4.1 Future Importance of DTT vs other delivery paths

DTT is expected to remain so for many years in numerous countries, to be the most cost efficient reception mean for mass market multimedia content reception. Overall, when observing the evolution of DTT in the various markets compared to cable IPTV, Satellite distribution, one can expect that the popularity of DTT multimedia content delivery to remain unchanged or to slightly decline in terms of viewers and viewing time compared to other distribution paths.

2.4.2 Linear and non linear consumption of broadcast content

The emergence of new catch up services and video on demand services gain in popularity. However, the overall consumption of linear TV remains relatively stable and will still represent the major TV consumption mode at least in the coming 5 years following the IDATE Digiworld Yearbook 2011.

2.4.3 Impact of hybrid services

The recent interest for hybrid technologies (e. g. HBBTV-Hybrid Broadband Broadcast TV) for the DTT platform shows that broadcasters are still convinced of the attractiveness of the terrestrial platform. Broadcasters do better master the content delivery end to end on this platform because there is less third party interaction, whereas the TV / receiver, as a known mean of AV consumption, is the first entry point of these new services.
Those new services can allow broadcasters to make a better balance between the main streams (needed by majority of the viewers) and the specific streams (needed by a small part of the viewer) and decided also the balance on the delivery path (broadcast vs broadband).Thus making the use of the spectrum even more efficient.
However, the final balance will depend on the user satisfaction given their motivation to upgrade their equipment and the actual performance of both broadcast and broadband path.

2.4.4 New technologies

Successful switch over to new technologies
New technologies can only be successfully introduced and speed up the migration if the consumers recognize the value of upgrading their reception equipment (e.g. new services, better service quality). It is necessary to motivate users with existing equipment to switch over to these new transmissions by providing additional value (e.g. new services, better picture quality) in order to simplify the final band transition. In this context, government and

[16] According to the. Eurobarometer 362, E-communications household survey, July 2011 Conducted by TNS Opinion & Social at the request of Directorate-General Information Society and Media of the European Commission DTT represents the highest reception mean with 30 % in European Union

regulators need to plan with involved stakeholders how to set a framework in order to achieve sufficient motivation for the consumer to switch over.

New audio / video coding technologies
High Efficiency Video Codec is expected to allow for an efficiency increase of 50 % with a comparable quality to Advance Video Codecs. Some countries are considering the introduction of HEVC together with DVB-T2 in order to achieve a disruptive improvement in Efficiency. First HEVC capable IDTV are expected after2015. HEVC will be incompatible with current chipset. However, HEVC capable chipsets will be backward compatible which will facilitate the transition process. Those new codecs will be probably available on broadband (both fix and mobile) first. Their respective availability is expected to reduce some of the pressure on the mobile spectrum as well as on the DTT spectrum.

New broadcast transmission system
A new transmission system beyond DVB-T2 could be introduced in the future. This may allow for additional efficiency based on new technologies. However, complete new equipment will be needed if not the complete receiving equipment (incl. Antennas). Taking into account that only a minority have upgraded to DVB-T2 and the majority of countries have no published switchover strategy, the introduction of a more efficient broadcast transmission system on middle term is not likely in Europe. It could rather be counterproductive to increase the discrepancy across Europe, insecure consumers and stakeholders with respect to a possible transition to DVB-T2. In the short term, setting the target to a new transmission system would reduce the likelihood of timely availability of additional spectrum for mobile broadband.

2.5 Consequences of introduction of IMT in the 700 MHz band

2.5.1 Coexistence Issues

Coexistence between mobile and broadcast service shall be ensured with both legacy receivers and future receivers. The interference impact of IMT is not only limited to DTT receivers but can affect masthead amplifiers, distribution amplifier, active antenna as well. All receiving equipment is designed to receive the whole band 470 – 862 MHz and are therefore as such potentially impacted by mobile based on LTE technology interference signals.
In this respect, Digital Europe recently published a guideline to DTT interference [17]which shows that LTE interference cannot be simply solved by a single solution (e.g. tightening receiver characteristics) and recommends a proactive management by competent authorities.

2.5.2 Re-planning implications and their costs

DTT is currently using the whole band 470 – 790 MHz according to the GE06 agreement. The band 694 – 790 needs to be freed by re-planning the whole band 470 – 790 MHz.
Any re-planning of DTT frequency usage implies several costs:

- Re-planning costs
- International coordination costs
    - A planning conference may be needed
- Upgrade of the transmitters and additional transmitters sites

[17] DIGITALEUROPE Recommendation on interference avoidance from LTE transmissions. Document publically available at digitaleurope.org under TRPG-Broadcast Document Page.

    - On the broadcast side, the compression of spectrum usage from 470 - 790MHz to 470 – 694 MHz implies new investments and or additional transmitter sites
    - If the reduction of available spectrum leads to a more intense usage of Single Frequency Networks, this may require careful planning to avoid difficult to resolve self-interference cases.
- Additional transmitters for transition time
    - In some European countries by law, any existing free to air channels public or commercial must be simulcast in case of introduction of a new format during a minimum overlap period.
- Communication to the general public
- Assistance of the general public
- Upgrades of antenna reception and amplifiers, etc.
    - On the consumer side it implies frequency changes leading possibly to equipment changes and antenna reorientation and filter changes.
- Upgrade of set top boxes
    - Assuming a change in broadcast transmission technology, the user will have to invest in new equipment through subsidies or sufficient motivation through better user experience.

Part of these costs were already present during the ASO (Analogue to Digital Switchover) with the difference that the costs were shared between the users (motivated through an extended offer), the public organization (motivated through general interests and future spectrum auctions) and broadcasters (motivated through access to spectrum or distribution savings).
Should now the same costs arise with a pure motivation to clear out spectrum, it is likely that the main costs remain to be carried by the states (which could be a part of the revenue obtained by spectrum auctions). If not, the move towards a mobile band plan within 694+X – 790 MHz is not achievable on short to middle term. It is therefore essential for states to set out a public plan with appropriate funding in order to achieve a freeing of the spectrum 694+X – 790 MHz.

2.6 Analysis

Television represents an important economic sector in terms of employment, in which consumer electronics has a key role. Television plays further important role for the European Society to promote cultural diversity and is integrate in the universal service provision concept
DTT is the most popular delivery television path across Europe for primary sets and largely dominant for secondary TV sets. DTT is a sizeable Market in Europe with more than 275 M European watching TV over DTT. To date, 200 Million DVB-T Receivers have been sold.
The introduction of hybrid services is showing that broadcasters and manufacturers still believe in the popularity of DTT services. The growing non-linear consumption of AV content has little impact on the linear consumption of DTT. DTT will continue to play an important role as delivery path for broadcast content. Compared to the other delivery paths, DTT remains relatively stable. It can be therefore expected that it will continue to evolve and develop in terms of services and picture quality and enhancements. DTT hybrid services offer may reduce partly future transmission capacity needs by balancing broadcast and broadband delivery but a significant reduction of transmission capacity needs for DTT platforms is rather an unlikely scenario. Conversely, a transition to another system requires additional spectrum for simulcast.

As a consequence, the release of the band 694 – 790 MHz would require the transition more efficient planning and / or more efficient transmission systems like DVB-T2 possibly combined with HEVC. **DIGITALEUROPE considers a transition to DVB-T2 an adequate measure to facilitate the release of the band 694 – 790 MHz.** Beyond its higher efficiency compared to DVB-T, DVB-T2 allows for larger SFNs than the previous DVB-T system if suitable variants are used, which can potentially reduce the required spectrum to achieve nationwide coverage.

The introduction of mobile services in the band 694 – 790 MHz introduces a new challenging interference management with requires appropriate management from the competent authorities. Also the replanning of DTT implies a number of activities with its associated costs.

DIGITALEUROPE considers essential

- **that plan transitions need to be well managed by competent authorities (e. g timely, properly resourced and accurate frequency planning, spectrum engineering).**
- **that any plan laid down is coherent with a pan-European strategy for the 700 MHz band, in order to maintain a sizeable market and to avoid market fragmentation for both mobile broadband equipment and CE equipment.**
- **that the time plan for the transition are developed with the Consumer Electronics Industry in order to enable the introduction of suitable products in time and to minimise disruption to DTT viewers.**

3 Mobile Broadband

3.1 Mobile broadband market and impact on the European industry

Back in the analogue, first generation mobile network days, Europe used to have a variety of mobile telephony systems such as NMT, TACS, C-Netz in a variety of 450 MHz band variations. By creating the common digital technology GSM as second generation (2G) around a harmonized band of initially 2x 25 MHz FDD in the 900 MHz range, Europe created a harmonized eco-system that became the de-facto global standard for mobile telephony with a huge commercial success and connecting more than 6 billion people on the planet today. In the quest for more capacity, more bands have been added like 1800 MHz as well as bands like 850 MHz and 1900 MHz for the American markets. The 900 MHz band could be extended to 2x 35 MHz so that today commonly available devices with GSM quad band support address a global market and have global roaming capabilities. Besides bringing mobile communications to virtually every European, GSM helped to establish a healthy communications industry in Europe delivering to a global market.
This success had been replicated with the introduction of UMTS and its HSPA enhancements for mobile data primarily operating in the 2100 MHz band but more and more complemented in Europe by 900 MHz for better coverage. The Americas and parts of other regions adopted UMTS in 850 MHz, 1900 MHz and AWS (1700 MHz paired with 2100 MHz) so that a total of five FDD bands can address all of today's global deployments of UMTS. Three of these bands are identical with the GSM bands mentioned above as they are used by re-farming parts of bands prior used by 2G services. Nowadays, around 1 billion smart phone connections globally primarily based on UMTS/HSPA.

LTE and LTE-Advanced as 4G technology address the huge demand for mobile data in the six FDD bands mentioned above plus in several new bands including a set of unpaired bands by means of its TDD mode. Following the WRC-07 decisions, several countries in Europe have made available the 800 MHz band as an excellent coverage band in particular to close so-called white spots with basic broadband connectivity and to lay the foundations of a quick rollout of LTE mobile broadband services on a nationwide footprint which allows for adoption of LTE even faster than UMTS. Verizon Wireless in the US is demonstrating impressively how coverage and capacity can be rolled out quickly in a band like 700 MHz and the amount of economic value generated.

3.2 Why 700 MHz mobile broadband in ITU region 1?

Changing the use of parts of the UHF band from DTT to Mobile Broadband has become possible in the course of moving to higher spectrum efficiency when switching TV over from analogue to digital system. This allowed harvesting the so called Digital Dividend. In WRC-07, ITU region opted for the frequency range from 790-862 MHz (European 8 MHz TV channels 61 to 69) whereas ITU regions 2 and 3 due to their legacy systems decided on the frequency range of 698 to 806 MHz (US 6 MHz TV channels 52 to 69). The US defined a band plan based on the former 6 MHz TV channel grid with two FDD duplex systems and adhering to legacy systems such as narrow band public safety. Based on this band plan and auctions in 2008, the US were able to quickly roll out LTE services covering today the majority of the US population, but they need the four 3GPP band definitions 12, 13, 14 and 17 to cover the band and have created certain inefficiencies within the band plan. In-band guard bands are required to resolve the 6 MHz licence granularity not well in line with the 5 MHz channel structures of mobile broadband systems and mutual adjacencies as well as to

existing services. Consequently, ITU Region 3 bases their band plan on an efficient 2x 45 MHz FDD approach now defined by 3GPP Band 28 which most countries of the region committed to. Several Latin American countries including Mexico have expressed their intention to adopt Band 28 which led to the request of the Arab and African states in WRC-12 to also allocate the frequency range from 694 to 790 MHz to the mobile service also in ITU region 1. Many of these countries have limited use of broadcast in the band and want to make available sufficient spectrum for mobile broadband to bridge the digital divide. In addition, some of those countries have 850 MHz networks which overlap with Band 20 (EU800). Consequently, opening the 700 MHz band and using 3GPP Band 28 allows these countries to quickly roll out internet services to their population based on a terminal ecosystem shared with economies like India, Indonesia, Brazil and Mexico, to name a few. An immediate allocation across ITU region 1 as requested by the Arab and African states had not been acceptable to the CEPT countries. Therefore a compromise had been worded to allocate the band on co-primary base to the mobile service immediately after WRC-15. The time in between the two WRCs can be spent on co-existence studies and refinement of the lower band edge under WRC-15 Agenda Item 1.2. This compromise allows the CEPT countries to proceed in a well defined manner while setting the path for harmonisation with Arab and African countries based on Band 20 and Band 28 LTE networks. In the market place, momentum is increasing as e.g. recently Japan has assigned their licences in the 700 MHz band in compliance with 3GPP Band 28.

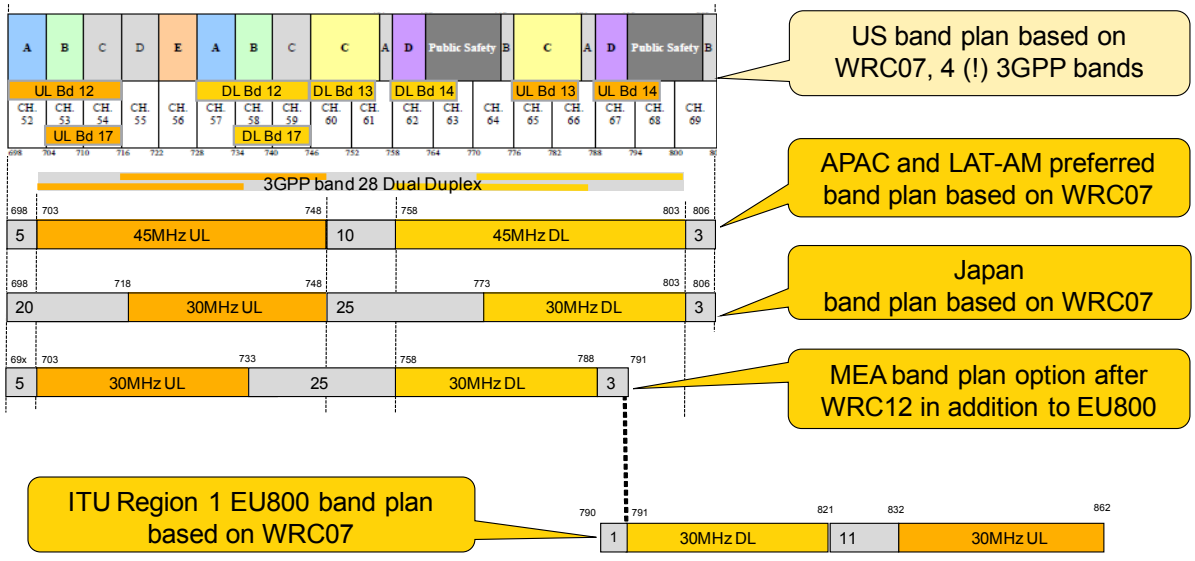

Figure 1 Band plan options around 3GPP Band 28

3.3 700 MHz for mobile broadband in Europe

DIGITALEUROPE sees two key arguments how Europe can benefit from assigning the 700 MHz band to mobile broadband:

Firstly, Europe can join and further foster a close-to-global eco-system in 700 MHz

Europe can participate in the 3GPP Band 28 ecosystem that has the potential of a close-to-global footprint ranging from Asia-Pacific, all Latin America, Africa and Middle East. This huge footprint is expected to lead to very affordable devices with excellent roaming capabilities. In emerging markets, large shares of the population will get first time internet access through affordable smart phones and tablets. Networks can be rolled out quickly and

cost-efficiently due to the excellent coverage properties of the 700 MHz band. Likewise, Europe can benefit from the band properties and its economies of scale and expect attractive end user devices based on that eco system. With first licences assigned in Japan and multiple countries in Asia Pacific and Latin America having declared their plans for licensing, commercial networks can be expected from 2014 onwards supplied by the global ecosystem with substantial contribution of the European industry. A healthy ecosystem with a wide choice of terminals can be foreseen for the point in time, when the WRC-12 decision becomes effective.
Technically, Band 28 devices implement the 2x 45 MHz of Band 28 with two duplexers, one for the upper 2x 30 MHz and one for the lower. With this solution, any Band 28 device can address the full 2x 45 MHz band in Asia Pacific and Latin America, and the reduced lower 2x 30 MHz in the Arab States, Africa and Europe.

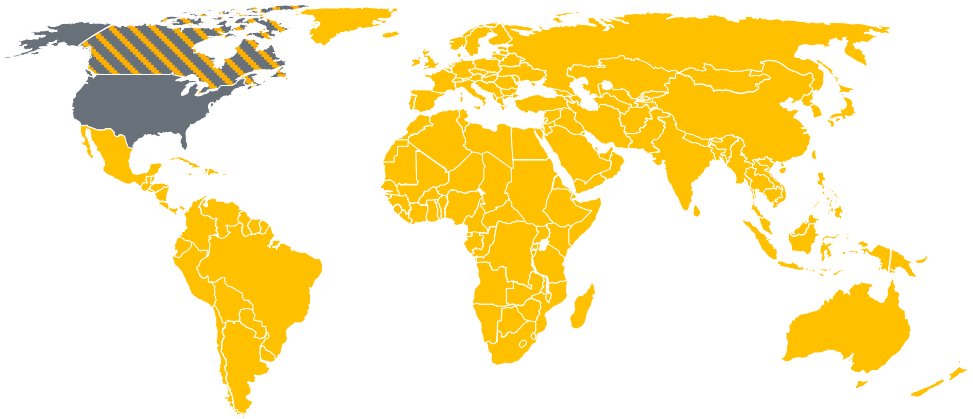

Figure 2 Close-to-global harmonization potential by the lower duplexer of 3GPP Band 28

As the lower 2x 30 MHz of Band 28 leave a duplex gap of 25 MHz, other highly prioritised services such as Public Safety (PPDR - Public Protection and Disaster Relief in ITU and CEPT terminology) may be allocated to shape an overall efficient band plan. Services like Public Safety target economies of scale with large commercial eco-systems but do not need or wish to be inside the commercial mobile bands. Consequently, a spectrum allocation close to but not within a commercial eco system may solve these targets for example by using part of the duplex gap. In this case, it has to ensure that the PPDR is not causing any additional coexistence issue to DTT and the measures discussed to avoid interference from MBB on DTT need to include PPDR interference.
This arrangement would help Europe to meet the target set in the EU Radio Spectrum Policy Programme for harmonised spectrum conditions for PPDR and at the same time contribute to efficient use of the 700 MHz spectrum.

Secondly, Europe can meet its ambitious Digital Agenda targets with 700 MHz

Europe can make available the amount of coverage spectrum required to meet the Digital Agenda target of 30 Mbps to every household in those areas where wire-line solutions are not cost efficient. With the 800 MHz band, Europe has an opportunity to offer mobile broadband in a pair of 2x 30 MHz as defined by 3GPP band 20. Several countries have awarded licences, typically in pairs of 2x 10 MHz; some countries have launched commercial service based on LTE technology. A primary use case so far has been providing internet access in remote areas where lengths of the copper land lines do not even allow for basic

broadband connectivity of 1 Mbps downstream capability. In several European countries, licences even have explicit coverage obligations to encourage quick closure of the so called white spots in internet access coverage maps. In Germany, who launched LTE at 800 MHz as a global first, in the meantime all federal states could declare coverage in prior white spot areas so that now the 800 MHz licences becomes applicable also in more densely populated areas. Typical data rates are within 10 MHz licences range from 5 to 20 Mbps, and towards the cell edges users can experience still 3 to 5 Mbps. First fully integrated smart phones supporting all today's relevant European LTE bands, i.e. 800 MHz, 1800 MHz and 2600 MHz, appear on the market so that besides providing fixed or nomadic internet connectivity to homes, LTE at 800 MHz can quickly deliver true mobile coverage on a national footprint.
In the meantime, the EU commission has set significantly more ambitious targets in their digital agenda: by the year 2020, every household in the EU shall be able to connect with at least 30 Mbps to the internet. Germany has worded the even more challenging target of 50 Mbps to every household by the year 2018. In densely populated areas, such data rates can be addressed economically viable with wired solutions such as fibre, cable or over existing twisted copper pairs with VDSL. Nevertheless, in rural areas legacy copper lines often are to long to support such data rates and replacing those with fibre or cable would come at prohibitively high cost. Consequently, wireless solutions need to be looked into as recently acknowledged in 4. Whilst today's LTE networks are capable of delivering peak data rates to an end user of up to 75 Mbps in a pair of 2x 10 MHz, average experienced user throughputs are in the range of 5 to 20 Mbps depending on network design and load. Towards the cell edge, users typically experience a range of 3 to 5 Mbps, sometimes requiring external antennas. LTE at 800 MHz over a single 2x 10 MHz licence with a limited number of base stations cannot provide for the targets set by the EU. With LTE-Advanced, improvements in technology lead to certain enhancements of the spectral efficiency, i.e. the amount of data that can be transmitted within a given spectrum, and the possibility to bond large amounts of spectrum in so called carrier aggregation. Improved spectrum efficiency e.g. by more sophisticated antenna technology may lead to an increase in data rates at the cell edge in the order of 25% whereas addressing additional spectrum translates to approximately linear increase in data rate. With a band plan compatible to 3GPP Band 28 in 700 MHz, Europe can double up the amount of spectrum provided today in 800 MHz and joint use of the total spectrum in 800 MHz could yield 60 MHz for downlink capable of delivering to remote household the targeted 30 and 50 Mbps, respectively.

4 Recommendations

DIGITALEUROPE recommends making available the 700 MHz band in addition to the 800 MHz band for Mobile Broadband in a timely manner as a corner stone in delivering on European Digital Agenda targets, particularly to sparsely populated and remote areas in Europe, providing that the transition is managed by administrations in a timely manner and be properly resourced, while applying accurate frequency planning and good spectrum engineering practices for DTT.

DIGITALEUROPE considers essential the following aspects:

- There should be no disruption of the existing DTT services to consumers
- Consumers should be appropriately informed
- Interference problems should be minimized and solved in the least disturbing way for the consumer in applying the guidelines recently published[18]
- Time plans for the transition are developed with the Consumer Electronics Industry

DIGITALEUROPE considers a transition to DVB-T2 as an adequate measure to facilitate the release of the band 694 – 790 MHz.

DIGITALEUROPE maintains that harmonised designation of spectrum and usage conditions are essential ingredients to support cost effective devices for both the consumer electronics industry and the mobile industry.

Regarding the channelling arrangement for mobile broadband, DIGITALEUROPE supports a frequency arrangement in ITU Region 1 that facilitates a global solution, leverages on standardization activity and is compatible with EU Band 20 (800MHz). This allows economies of scale and roaming capabilities across all ITU regions.

Figure 3 illustrates an example that would achieve this; however, it will be subject to agreement on the lower band edge frequency as defined by ITU-R and CEPT.

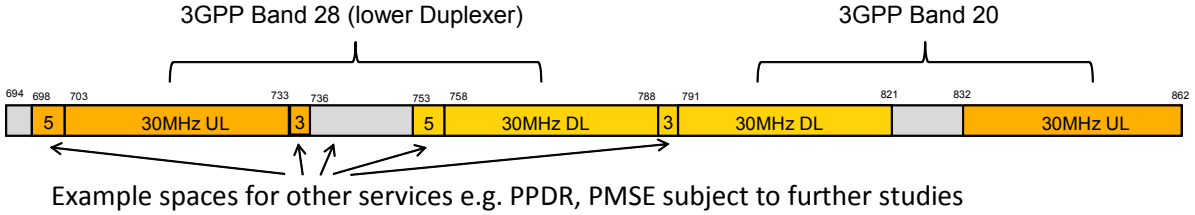

Figure 3 Example Band Plan

[18] DIGITALEUROPE Guidelines to reduce the LTE interference impact on DTT