



Digital Terrestrial Television

&

Digital Dividend

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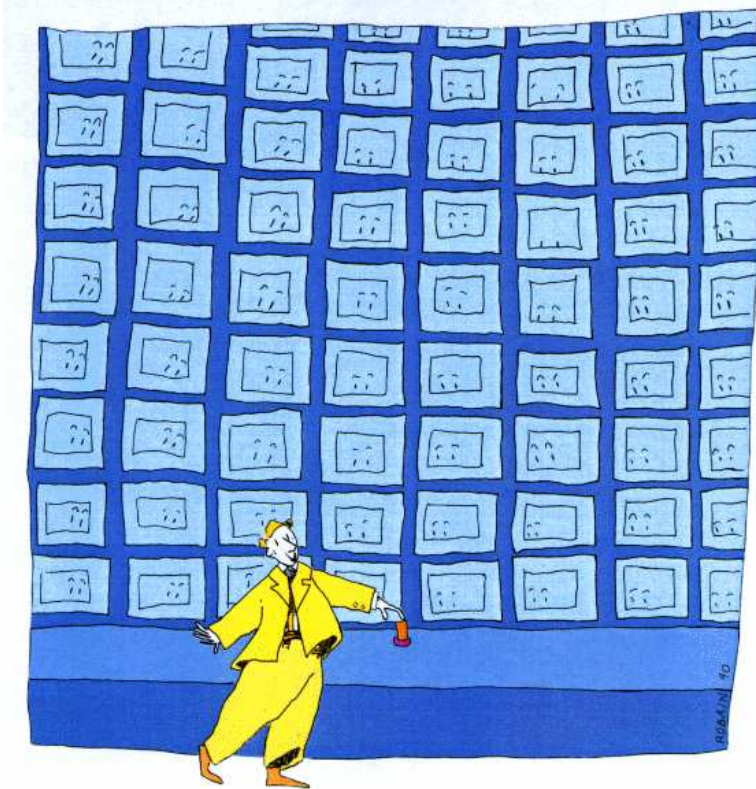
- A non profit association formed in 1996, in the vicinity of the DVB project and the EBU, in Geneva
- To promote and help Digital Terrestrial Television launch and development in Europe
- Created by 70 member organisations from 4 constituencies
 - ❑ Broadcasters (public, commercial, private)
 - ❑ Manufacturers equipment and consumer products
 - ❑ Network and transmission operators
 - ❑ Broadcast regulators and frequency spectrum administrations

- The words « Digital Dividend » are used for designating two different topics:
 - ❑ The upper part of the UHF band(792MHz and above): we may call it Digital Dividend 1
 - ❑ The spectrum made available when analogue terrestrial TV services have migrated to DTT

- It has to be noted that in order to encourage consumers to migrate to DTT by themselves(so to minimize the need of subsidies for helping the process), the DTT offering has already been enlarged as compared to the original analogue TV offering (example 18 FTA+9pay DTT channels versus 5 analogue in France)

- So, one has to keep in mind that DTT is already using part of the Digital Dividend, and indeed already utilises far more than 1/6 or 1/4th of analogue TV spectrum !

Terrestrial TV



- France 1990
 - ❑ 5 Free to Air channels
 - ❑ 1 pay-TV channel
 - ❑ A few local channels

- France 2010
 - ❑ 20 FTA Standard definition
 - ❑ 4 FTA HD
 - ❑ 8 Pay-TV SD
 - ❑ 1 Pay-TV HD

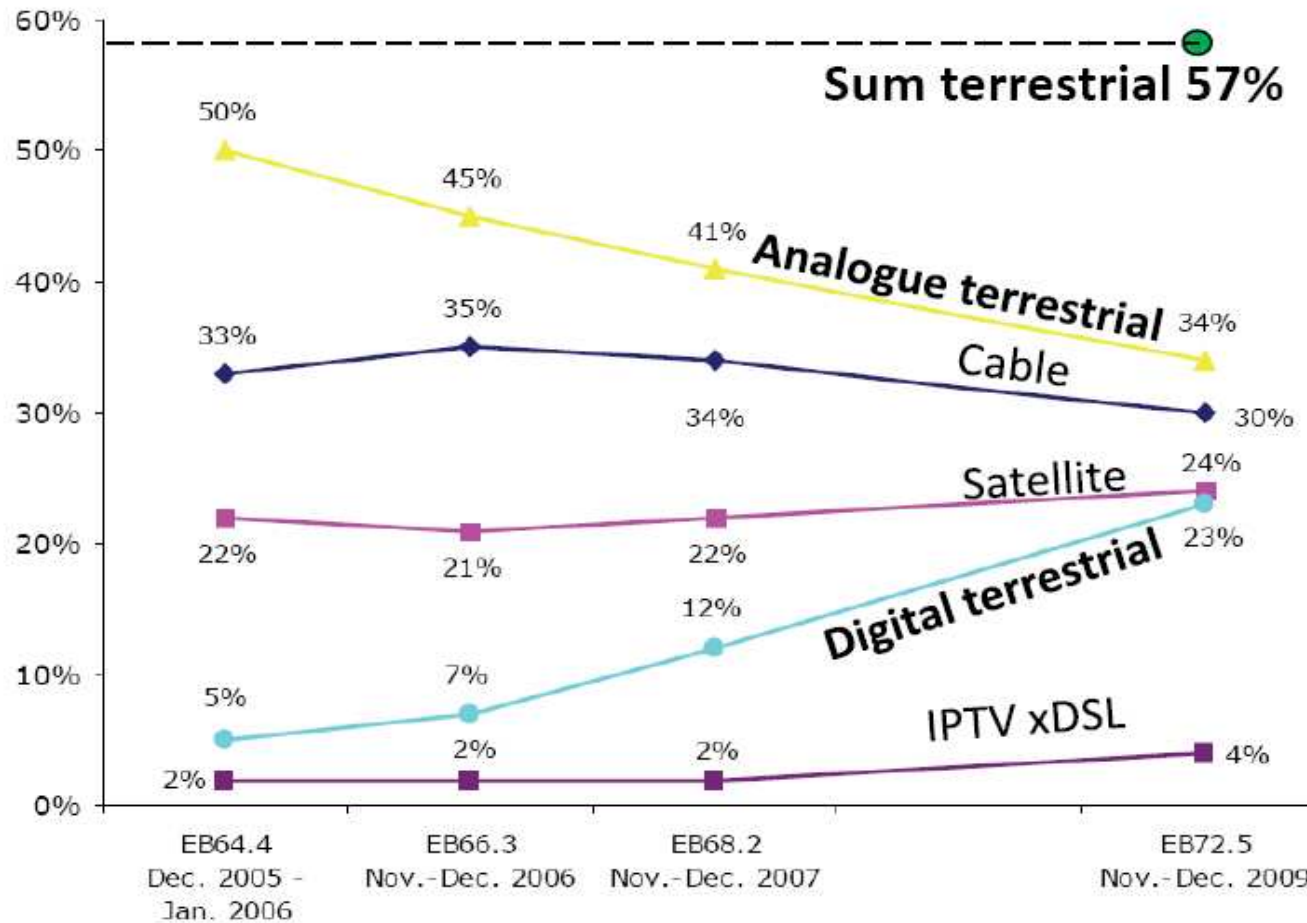
5 times more + HD quality!

clec spectrum conference Brussels December 14th 2010

- The Terrestrial Television platforms provides television services to the vast majority of European households, and in many parts of Europe, DTT is the fastest growing digital television platform
- It has enabled many households to access digital television services for the first time, and for many countries, it is the dominant television reception platform.
- In some countries, especially those with traditionally few television households 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

- The DTT platform is the only platform throughout Europe that guarantees nearly all viewers with access to free-to-air television services. National regulators have ensured that the DTT platform provides nearly universal coverage (90% of the population and above). At this stage, only satellite can provide a similar level of coverage
- However, terrestrial transmissions offer better flexibility in terms of regional coverage and the possibility to accommodate local content and seems to be the preferred choice by many consumers because of easy installation and lower cost, and satellite is neither an option for all households given that in many areas, local rules prohibit the installation of satellite antennas
- The DTT platform is currently 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 for the broadcaster, and has the **unique feature to give to the viewers a rich offer of Free to Air channels.**
- The unique features of the DTT platform allow also viewers to benefit from regional and local content as well as portable and mobile.
- Furthermore, viewers have benefited from launches pay-DTT platforms, allowing both for pay bouquets and pay-per-view events.

The Terrestrial Broadcast market is by far the leading platform for TV - 57% of EU households use the terrestrial networks - DTT is the growing faster than analogue replacement



At the same time evidence shows that demand for linear television is increasing both for young and old



A2 – Which one of these would you miss doing the most?

Base: All adults aged 16+ (3244 in 2005, 2905 in 2007, 1824 in 2009), adults aged 16-24 (530 in 2005, 413 in 2007, 253 in 2009), adults aged 25-34 (604 in 2005, 473 in 2007, 274 in 2009). Circles show statistically significant change between 2008 and 2009.

Source: Ofcom research, fieldwork carried out by Saville Rossiter-Base in April to May 2009 and September to October 2009

- DTT HD is already a reality today in a number of European countries thanks to DVB specifications(France, Hungary, Italy, Spain, UK), will soon appear in others(Finland, Sweden,) and will expand all around Europe. Furthermore, consideration are already there for providing "Full HD" in 1080p/50.
- While mobile television develops so far quite slowly, the mass consumption of such services will require the use of broadcast technologies so to avoid the saturation of 3G and LTE networks.
- It should also be noted that in many European countries, it has not been possible to provide a full range of regional and local television services during the simulcast period due to a lack of available frequencies, until the completion of digital switchover.
- Other services such as catch up TV with Push VoD have already been launched in some countries(Italy...), and are under consideration in others (France...)

On October 1st, in Italy, Mediaset has launched the first in the world commercial pay 3D DTT (Push VoD) service

DigitAG

Furthermore 3D DTT is already here



Mediaset has launched the first in the world commercial pay 3D DTT (Push VoD) service

News

Mediaset to broadcast 3D films

Thursday 30 September 2010 | 06:26 CET

Italian pay-TV service Mediaset Premium will offer 3D films starting with 1 October. To watch the films viewers will need a 3D TV and a Premium on-demand HD decoder. The Premium On Demand HD decoder provides viewers with digital terrestrial reception of all the standard TV channels, as well as a constantly updated package of 50 films and TV series at any time, also in HD. Starting 1 October, the list of Premium On Demand films will be expanded to include a new title in 3D, which will be updated every month.

- Use of Digital Dividend over 790 MHz is already on the way for introduction of non broadcasting electronic communication services, but DTT needs to keep the whole spectrum below 790 MHz in order to continue to provide citizens with its unique features whilst staying up to date by offering new innovative services (HD, 3D, Mobile...)

- This will possible thanks to :
 - ❑ Smart frequency planning :
 - In accordance with the GE06 rules and the coordination process between countries, spectrum optimization will allow to add new DTT networks on a national basis beyond the GE06 layers.
 - ❑ Smart use of innovative technologies for compression and transmission of TV signals
 - MPEG-4, and every when appropriate DVB-T2, will be essential for providing further spectrum optimisation

- But provided that:
 - ❑ the spectrum below 790MHz will be protected from :
 - Interferences Services in adjacent bands(MFCN)
 - Pollution from other services inside (white spaces devices)
 - Or both combined(PLT)

- The **harmonised** European “dividend” band for non broadcast services is to be implemented
- Fortunately, like it has been the case for Stockholm 61:

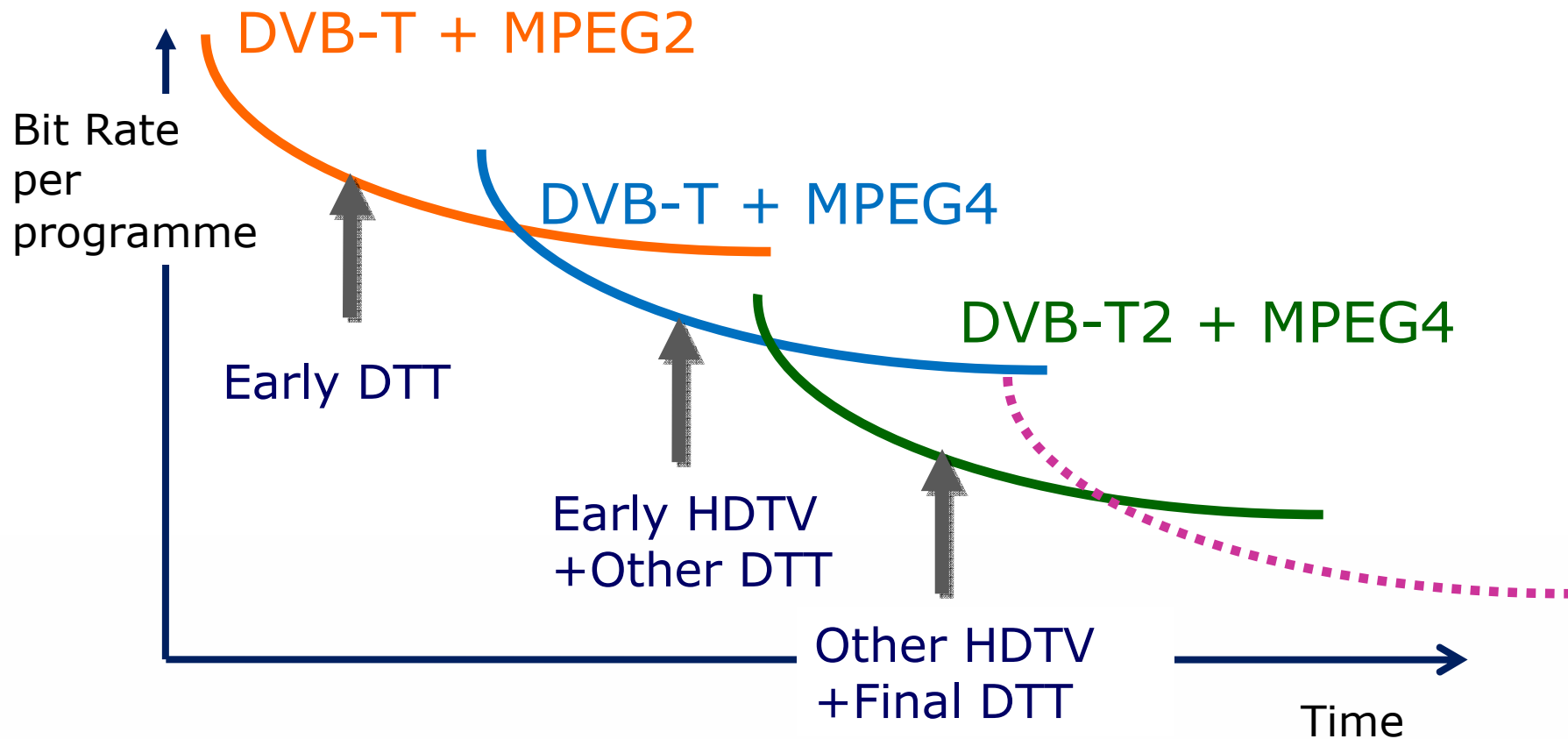
RRC-06 Plan is only a starting point for evolution

- It can accommodate more networks and services than foreseen in 2006...

French example

- Decisions by Government on 21/10/2008:
 - ❑ The majority of the radio spectrum released by the switching off of analogue television broadcasting is to be allocated for use by digital audiovisual services.
 - ❑ This will allow the equivalent of 11 DTT multiplexes covering approximately 95% of the French population and 2 mobile TV multiplexes (capable of providing 32 TV channels) with a coverage of 80% of the population. The 11 DTT multiplexes will enable a widespread move to HDTV with a total of 40 HD channels...
- And subsequently:
 - ❑ Spectrum over 790 MHz will be allocated to non broadcast electronic communication services

Technical innovation is essential,
but be careful and smart when using it !



- The use of improved technologies (better compression and/or modulation of the signals) can be very helpful for optimizing the use of spectrum. However, the conditions of their introduction must be carefully considered to ensure beneficial results, and avoid considerable damages for the end consumers.
 - ❑ Technology changes in the provision of existing television services has a cost impact not only on broadcasters, but, more importantly, also on viewers. In particular, **migration of existing digital services** to a different technology would be **more difficult and more costly than the transition from analogue to digital, with a risk to destabilize those services.**
 - ❑ Due to the migration from analogue to digital technology, viewers have been, are or will be required to invest in new DTT receivers. Such a financial burden is only acceptable to viewers so long as this offers substantial new experiences and benefits.
 - ❑ This cannot be repeated at short intervals, in particular for the free-to-air television services. Cycle of replacement of TV sets is far longer than the one for mobile phones, and secondary usage of TV set with a long life time has become essential
- Use of new technologies can be wisely implemented in a variety of ways, such as providing DTT SD (MPEG-4 with DVB-T where DTT not already implemented), DTT HD (MPEG-4 with DVB-T or DVB-T2 depending on country needs), and DTT 3DTV (DVB-T or DVB-T2 depending on country needs).
- Improved technologies should therefore mainly be used as a means for providing new services to the viewer, and due to the variety of situations in Europe, the best way to use those new technologies will vary from country to country

- Market evidence shows that the MPEG-4 AVC compression technology is increasingly being integrated into DTT receivers. In France, and as from 2010 in Spain, all HD receivers must include an MPEG-4 AVC chipset. Markets that have launched DTT services since 2008 have overwhelmingly adopted MPEG-4 AVC. As a result, MPEG-4 AVC is expected to become the de-facto compression technology used in almost all DTT receivers.
- But in many countries, transmissions using MPEG-2 compression technology will continue to be used beyond 2012 and it will always be a national decision when to stop such transmissions after careful evaluation of implications for the market players and the end consumers .
- Furthermore, while it can be assumed that consumers generally purchase a new television set every 5-8 years, many of the older television sets continue to remain in use. Secondary television sets are widespread and their lifecycle surpasses 8 years..

DVB-T2 : yes, but for new services depending on business case and without dreaming about migration!

- DVB-T2 is a new terrestrial transmission standard which provides better spectrum efficiency compared with the DVB-T standard. The kinds of services that will be launched using this standard will vary between countries depending on the needs of the market.
 - ❑ In France, Hungary, Italy and Spain where HDTV services are provided using DVB-T and MPEG-4 AVC (and this will also apply to), the DVB-T2 standard may be considered for the launch of future new services such as 3DTV.
 - ❑ In the United Kingdom, Sweden and Finland, on the other hand, where DVB-T has so far been used to provide only SDTV services, DVB-T2 is already, or will be used for the provision of HDTV services.

- But should DVB-T2 be used in any circumstances when launching a new service? Not sure, this may depend on the business case:
 - ❑ Example of NO: existing Pay DTT player: 3D Mediaset case has kept DVB-T MPEG 4(use of existing STBs)
 - ❑ Example of YES: new pay DTT player case (with or without 3D): DVB T-2 would be preferable!

- In any case migration of an existing service (SD with DVB-T/MPEG2 or MPEG4, HD with DVB-T MPEG4) would even be, both for consumers and broadcasters, more difficult and more costly than the transition from analogue to digital,

1. In terms of quality due to :

1. Interferences from LTE
(as a result of current Digital Dividend)
1. Cognitive Radio/ White Spaces
2. Power Line Telecommunications

2. In terms of quantity, due to initiatives towards a Digital Dividend 2

Item 1.1 is related to the process of granting frequencies by administrations

Items 1.2 is subject to a report of CEPT SE 43 and is subject to public consultation since September 30th, will be dealt with at the upcoming WRC 2012, but is not stricto sensu related to Digital Dividend

Item 1.3 is subject to current work in ITU SG 1&6(but is not related to Digital Dividend

Item 2 is subject to proposals for the upcoming WRC 2012, in order to have it on the agenda of WRC 2016, and starts to be appearing in the draft decision on the Radio Spectrum Policy Programme proposed by EC to Parliament and Council

- The facts:
 - ❑ The implementation of MFCN(Mobile/Fix Communication Networks) in the 790-862 MHz frequency band will cause severe disturbance to Digital Terrestrial Television (DTT) Services (in terms of signal to noise degradation and/or overload of TV receiver input stages as well as of antenna mounted amplifiers) unless appropriate measures to eliminate harmful interference are taken by European Regulators and Administrations when awarding frequencies for MFCN in the in the 800 MHz band

- The current regulatory situation is as follows:
 - ❑ EC decision 2010/267/UE related to European harmonisation of the implementation of MFCN in the 790-862 offers in its Annex different levels of protection to limit radio frequency emission from Mobile Base Stations into the TV band, depending on the case considered, according to CEPT Report 30.
 - ❑ Even when the most stringent level of protection, is put in place, interference may occur in the absence of additional mitigation measures (CEPT Report 30 Executive summary, paragraph 6)
 - ❑ The EC decision 2010/267/UE also states that Member States shall ensure that the new systems in the frequency band 790-862 MHz provide appropriate levels of protection to systems in adjacent bands, e.g. DTT services

- Not to be forgotten :
 - ❑ Channel 60 (782-790 MHz) is part of the band allocated to DTT and is already used to deliver DTT Services. Furthermore, Channel 60 is assigned to stations recorded in the GE06 Plan and has to remain fully available for future DTT use (GE06 evolution).

- On October 1st, DigiTAG Steering Board has approved a first document which first reminded the current status of the regulatory framework, the facts which results from it, and then presented recommendation to Administrations and Regulators for maximizing protection of DTT up to Channel 60 included, and managing the consequences of the remaining interferences towards DTT from LTE
- DigiTAG has then seeked cosigning of its document by other organisations involved in the DTT value chain for being addressed to Regulators and Administrations at national level, as well to Parliament and Commission at EU level
- Cosigning by ACT, BNE and EBU has been agreed, and agreement reached for having a joint press release(issued on Tuesday November 22nd), with the cosigned document attached

DigiTAG LTE downlink interference document cosigned by DigiTAG, ACT, BNE and EBU



October 2010

Minimising the potential interference to Digital Terrestrial Television (DTT) broadcasting services from Mobile/Fixed Communications Networks (MFCN) operating in the 790-862 MHz frequency band

Joint recommendations from DigiTAG¹, EBU², BNE³ and ACT⁴

Introduction

Terrestrial broadcasting has an important societal role and economic value. The analogue to digital television switchover, which requires considerable investments and commitments from broadcasters, network operators and viewers, will result in releasing a 'Digital Dividend' in frequency spectrum.

Several national Administrations have decided to allocate the 790-862 MHz frequency band (the 800 MHz band) to mobile/fixed communications networks (MFCN), following the switch off of analogue terrestrial television services.

The European Commission issued a Decision (2010/267/UE) on harmonized technical conditions of use of this frequency band in the European Union by MFCNs. This decision is based on studies carried out by the CEPT, the results of which are published in CEPT Reports 30 and 31.

These harmonised technical conditions have been derived aiming to reduce the risk of disturbance that the implementation of MFCN in the 790-862 MHz frequency band may cause to Digital Terrestrial Television (DTT) broadcasting services in the lower adjacent band. However, as expressed in the CEPT Report 30, the concept of 'block edge masks' used to define these conditions does not always provide the required level of protection for victim services and, in order to resolve these cases of interference, additional mitigation techniques would need to be applied.

The EC Decision (Article 2, second paragraph) also states that Member States shall ensure that the new systems in the frequency band 790-862 MHz provide appropriate levels of protection to systems in adjacent bands, e.g. DTT broadcasting services.

¹ Digital Terrestrial Action group, www.digitag.org

² European Broadcasting Union, www.ebu.ch

³ Broadcast Networks Europe, www.broadcast-networks.eu

⁴ Association of Commercial Television in Europe, www.acte.be

In order to provide an appropriate level of protection to DTT services below 790 MHz with respect to emissions from mobile/fixed communications networks (MFCN) operating within the 790-862 MHz band, DigiTAG, EBU, BNE and ACT, recommend that prior to the award of licences for use of the spectrum, the following protection measures be applied:

- ❑ the most protective level defined in EC decision 2010/267/EC (baseline requirement in case A) should be applied in all cases;
- ❑ additional mitigation measures are required to be put in place, as necessary, by mobile/fixed communication network licence holders to ensure full protection of DTT broadcasting services. These services include also portable and mobile DTT when these reception modes are part of the national coverage concept. The basis for this protection should be careful network planning by the MFCN operator to avoid situations that may create interference to the reception of DTT. The associated costs of implementing remedies should not be borne by broadcasters, broadcast network operators or viewers. Depending on the actual situation, these measures may include but are not limited to:
 - reducing the power of the MFCN transmitters and adjusting their antenna characteristics to reduce interference problems, taking into account local conditions, especially for the MFCN Base Stations using the first frequency block above 790 MHz;
 - using a Base Station antenna polarisation that is opposite to that of the DTT transmitter, especially for Base Stations using the first frequency block above 790 MHz;
 - use of additional RF filtering at MFCN Base Stations, especially for Base Stations using the first frequency block above 790 MHz;
 - use of on-channel low-power DTT repeaters at the MFCN Base Stations to restore the degradation of signal to noise ratio at affected DTT receivers. Such remedies should be coordinated with the impacted broadcast multiplex operator, since it may not be easily applicable, such as in the case of DTT transmitters operating in a Single Frequency Network (SFN);

- ❑ It is further recommended that when granting frequencies in the 800 MHz band the following additional measures be considered:
 - to make appropriate information on the licences awarded available, for instance on regulators' websites, so that consumers suffering from interference know why this is happening, to whom they can complain and what action can be taken;
 - setting-up an Entity, independent of the MFCN licence holders, as a point of contact to which cases of interference or loss of DTT service can be reported, to ensure a prompt and effective resolution in a timely manner;
 - ensuring that consumers experiencing loss of DTT service, even after mitigation measures mentioned above have been implemented, are promptly provided with adequate equipment to allow continued reception of DTT services. Such equipment may include filters connected in front of the DTT receiver or receiving antenna amplifier system to eliminate harmful interference stemming from emissions in the frequency band 790-862 MHz. Such measures must not unduly impair reception of channel 60. The associated costs of these necessary remedies should not be borne by broadcasters, broadcast network operators or the viewers;
 - any other actions necessary for circumstances when the above measures have proven ineffective.
- ❑ It is highly recommended that field trials be organised to observe the 'real world' impact of the deployment of mobile/fixed communications services versus the results of theoretical models utilised for prediction purposes. The results should be made available to interested parties in Europe.

The DigiTAG, EBU, BNE and ACT members are fully open for cooperation with Administrations, Regulators, and all parties interested in the use of the 800 MHz band, in the context of the above recommendations.

- Protect the consumer receiving conditions from interferences caused by nearby mobile phones



- Further work is therefore ongoing aiming at producing a second document related to uplink interferences (coming from handheld and sticked to computers consumer devices)

- GSMA has proposed to last CPG PT A that WRC 2012 should put Digital Dividend 2 (700MHz) on the agenda of WRC2016 conference
 - ❑ "To consider the frequency bands identified for IMT with a view to rationalising, consolidating, and expanding these as appropriate, with the objective of achieving internationally harmonised bands, preferably on a global basis."

- Finnish Administration that the whole UHF should be allocated to mobile wireless broadband as an equal primary service with broadcasting service:
 - ❑ "to consider the spectrum related issues for International Mobile Telecommunications (IMT), including a new primary mobile service allocation in the frequency band 470-790 MHz in Region 1, taking into account the current and planned use of this band by services to which this band is allocated"

- Being a worldwide organisation, GSMA will lobby other continents of Region 1, in particular Africa

□ The RSPP (Radio Spectrum Policy Programme)
A proposal made by the EC to the Parliament and Council (for consideration on February 2011, vote on May 2011)

- ... Whereas (13)
- “(13)- **The 800 MHz band is optimal for the coverage of large areas by wireless broadband services. Building on the harmonisation of technical conditions under Decision 2010/267/EU, and on Commission Recommendation of 28 October 2009 calling for analogue broadcasting to be switched off by 1 January 2012, and given rapid national regulatory developments, this band should in principle be made available for electronic communications in the Union by 2013. In the longer term, additional spectrum below 790 MHz could also be envisaged, depending on experience and the lack of spectrum in other bands adequate for coverage. Considering the capacity of the 800 MHz band to transmit over large areas, coverage obligations should be attached to rights.**”
- .. Article 6 : spectrum for wireless broadband communications
- “... **the Commission, in cooperation with the Member States, shall keep under review the use of the spectrum below 1GHz and assess whether additional spectrum could be freed and made available for new applications.**”

- Europe has more or less same amount of spectrum in 800MHz band that the USA have in 700MHz band
 - ❑ BUT: 700 MHz band in USA has holes in it which makes it far less easily manageable

- Broadband wireless data traffic will hugely increase in coming years:


- YES BUT:
 - ❑ The largest part of this will be for TV/Video distribution
 - ❑ Unicast networks, even with LTE and multicast capacity are a wrong tool for this purpose
 - ❑ Doing so would result in **bad way of using spectrum!**

1

Faire use policy, but frustrating customer experience

- Fair use policy
 - limitation of mobile data usage
 - or throughput rate after a certain amount of GB/month
- Consequence : customer frustration (limited experience),
 - provides arguments for competitors

→ Alternative : dedicated offer

Ex : Finland 

	Nopeusluokka	Kuukausimaksu
■ price bound to speed rate	384 kbit/s	9,90 €/kk
	512 kbit/s	14,90 €/kk
■ Assumed marketing policy	1 Mbit/s	19,90 €/kk
	2 Mbit/s	29,90 €/kk

2

Offload some part of their traffic on other networks : unicast or broadcast



High availability but limited customer experience

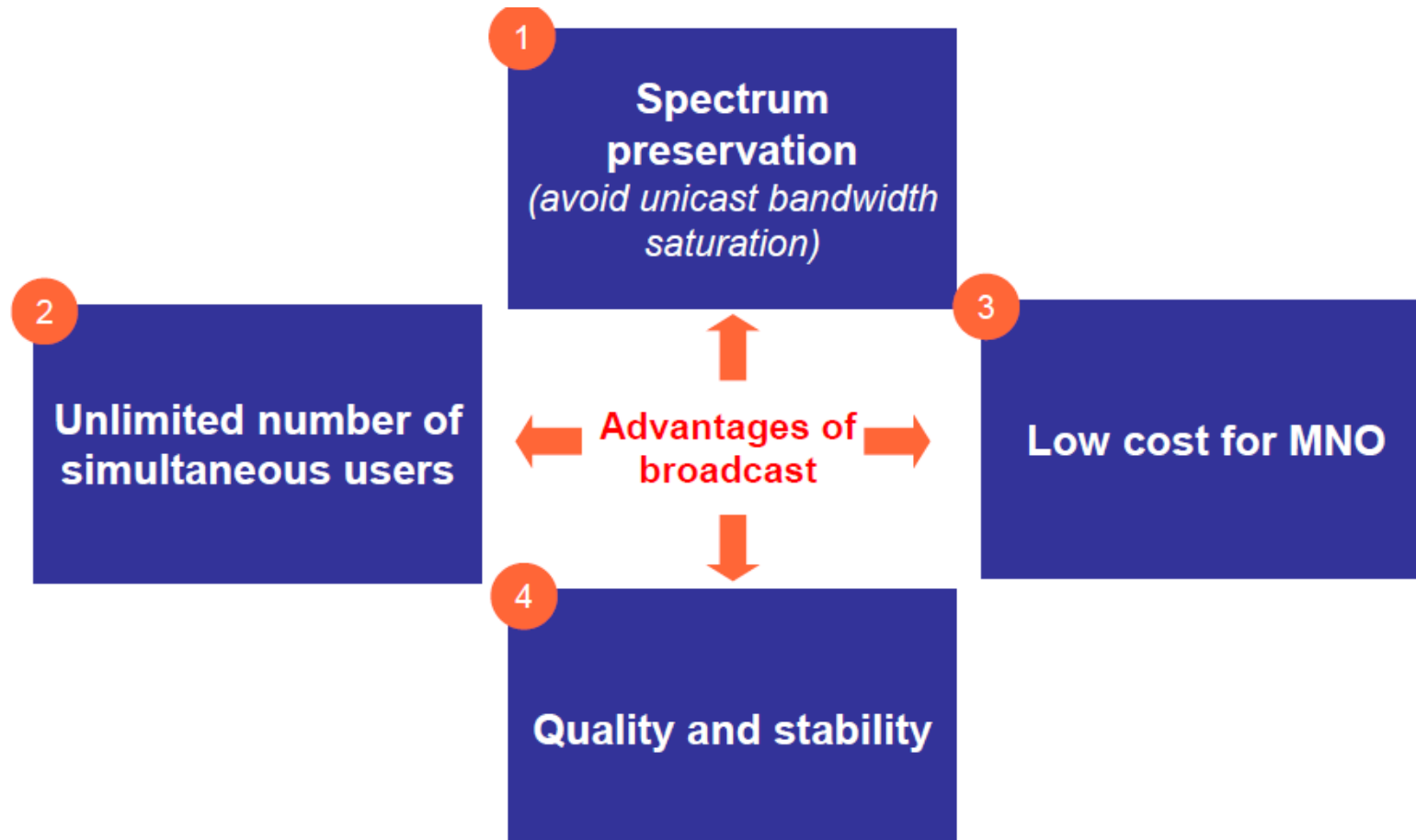
(indoor only, non guaranteed speed rate, high battery consumption on wifi devices ...)



Significant throughput and cost improvement against 3G but the fundamental unicast limitation will continue to apply

Broad-cast networks

Unlimited number of users, no saturation risk



- Digital Terrestrial Television is the unique platform to provide universal service to all television households in an optimal way for both citizens and broadcasters
- The broadcasting community has made its duty by arranging DTT deployments below 790 MHz, so to allow use of Digital Dividend for other services.
- DTT needs to keep use of full spectrum below 790 MHz in order to continue to offer its unique features to European citizens and stay up to date with innovative developments in a context of competition with other platforms
- This will also require combination of smart spectrum management and smart use of innovative technologies
- Protection of broadcasting services from interferences, and prevention of a Digital Dividend 2 has to be ensured, but cooperation with other interested parties interested in the delivery of TV towards nomadic devices will result into key benefits for the citizens and all parties involved in the value chain of content creation, management and delivery

DigiTAG is looking for cooperation of all parties interested in DTT future for the benefit of the European citizens