

Transforming the Digital Dividend opportunity into social benefits and economic growth in Europe

*The response of Alcatel-Lucent to
the European Commission
Information Society and
Media Directorate-General*

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Executive Summary

This response to EC's public consultation on the Digital Dividend opportunities into social benefits for the European citizens presents Alcatel-Lucent's key points and recommendations concerning an optimized spectrum policy for terrestrial and mobile television, mobile and fixed wireless services, taking into account 2G, 3G and 4G technologies, DVB-T and DVB-SH from the DVB-H mobile television family.

One major proposal refers to using the dividend allocation process to create an economic stimulus for the mobile industry in Europe.

Generally, we ask the Commission to consider the current tendencies regarding the normalization of the spectrum of this band - which several European countries are already implementing - in order to analyze the possibility of normalizing these frequencies on a European level.

Alcatel-Lucent favours the allocation of the digital dividend in a timely manner at European level, at the earliest possible switch-off, to make more European citizens reap the benefits of very high speed mobile broadband access networks as soon as possible.

We proceed firstly with a point by point answer to the consultation. **Moreover, we also introduce into the debate the possibility of an economic stimulus to accelerate the benefits of digital dividend spectrum allocations by reinjecting part of the license fees into mobile sector investment.**

We conclude with our overall view on the digital dividend, its strong relationship between the allocation of spectrum in other bands and some thoughts on cognitive radio.

Specific responses to some sections of the EU consultation published on July 10th 2009

3- Towards an EU Roadmap

3.1 Benefits of a common way forward on the digital dividend

Both the economical and social merits of the various alternatives proposed for the efficient use of the digital dividend band should be considered with care.

We believe that the EU should bring its political weight while maintaining the current level of cohesion of all CEPT countries and use its leading role for spectrum provisioning and spectrum harmonizing for all member states that is bound by Community legislation.

A European-wide decision will improve the application of high-quality broadcasting services as well as mobile broadband services and eventually will improve the current state of the European economy.

3.2 An EU roadmap as a practical way forwards

The EU roadmap is very important and necessary even if certain EU states can not implement it in the short timeframe. At least availability of this roadmap will help them establish their future plans and facilitate any necessary shift from existing plans. Once all EU states use a harmonised plan, the roadmap will allow the industrial anticipation that brings cost effective solutions for consumers.

3.3 An EU roadmap must offer sufficient flexibility

Yes, for a certain period of time, this flexibility can remain taking into account the difficulties to be encountered in case of any changes to existing licenses. This can also cause a great deal of financial burden. Therefore, EU should promote the adoption of the harmonised plan as quickly as possible and to encourage the countries that cannot adopt it as early as the others, to consider it in the next phase of their planning or licensing the bands in line with other EU countries.

3.4 Endorsement of the roadmap by the European Parliament and Council

We agree that the proposed multi-annual radio spectrum policy program, foreseen in the reformed framework for electronic communication services, is the main vehicle to achieve the endorsement by the European Parliament, and the Council, of the most strategic elements of the EU roadmap for the digital dividend.

4- Proposed Elements for a Roadmap

4.1 Improving consumers' experiences by ensuring high quality standards for terrestrial digital TV receivers in Europe

The coordinated approach by the Commission will facilitate the migration to more efficient and flexible terrestrial broadcasting systems.

The study outcome given in the consultation report emphasizes the benefits for Europe to increase the standards for digital compression capacity on DTV (4 billion Euros to 10 billion Euros in the near future). This is a significant increase. However, at this stage, introduction of any new services along with the new DTV receivers needs a careful deployment steps. Interference issues with existing DTV receivers should be avoided. Therefore any recommendations coming from various CEPT studies should be carefully taken into account.

As mentioned above, existing primary services should be protected. In designing future DTV receivers, the process should be more flexible and it should make use of the harmonised spectrum arrangements. Moreover, future DTV receivers should consider very carefully green issues by respecting energy consumption and result in more efficient receivers that satisfy the European citizens with minimum hazardous factors.

4.2 Increasing the size of the digital dividend through further spectrum efficiency gains

We, as Alcatel-Lucent, are aware that spectrum is a precious and scarce resource and that it should be allocated so as to create the most value for society. The present allocation of 72 MHz of the UHF bands should be first efficiently used and all the necessary techniques to develop the spectral efficiencies of all services should be exploited.

Moreover, considering the wider allocation of digital dividend bands in other Regions such as Region 2 (Americas) and Region 3 (Asia Pacific), Europe, in the longer terms should consider how the channel arrangements developed by CEPT for the band 790-862 MHz could be adopted to allow for the possible increase of the amount of the spectrum dedicated to mobile systems and could be extended below 790 MHz, for instance in the sub-band 750-790 MHz.

4.3 Making 800 MHz available for low/medium power electronic communication networks, under harmonised technical conditions, following the principle of technology and service neutrality

This is another critical issue that should be a key element of the roadmap and therefore, Alcatel-Lucent supports this initiative by EU. In assigning 790-862 MHz dedicated to mobile broadband networks, Alcatel-Lucent supports an approach based on technology neutrality. This approach is compatible with the choice of a

given duplex mode (FDD) we believe that the terms of the license should not prescribe which technology the operator should implement in its blocks.

Hence, Alcatel-Lucent supports technology neutrality and a certain level of service neutrality in the part of the UHF band dedicated to the Digital Dividend (i.e. Alcatel-Lucent does not support the full service neutrality in the UHF band.

“Technology neutrality” in our opinion means that the operator should have the possibility to adopt the technology of its choice, or to change of technology, provided that it respects pre-defined technical constraints. Therefore the regulator should just ensure that these constraints are enforced but should not prescribe the technology used by the operator.

“Service neutrality” should be allowed up to a certain point. For instance we believe that an Operator should be allowed to deliver both Mobile and Fixed Service Access applications in the UHF band.

On the contrary we do not think that full neutrality of services will be possible. For technical reasons the co-existence between high power broadcasting services and mobile/fixed services in adjacent channels in the same area or in the same channel in the same frequency band would be very difficult. Moreover, harmonized technical conditions developed by CEPT taking into account specified BEMs (Block Edge Masks) should be respected.

We also do not think it will be possible to mix FDD and TDD solutions for broadband applications in a 72 MHz wide band, and we do not think that such mixing could be efficiently used to respond to specific local situations where the use of a harmonised plan would not be possible.

4.4 Adopting a common position on the potential use of the “white spaces” as part of a possible extension of the digital dividend

“White Spaces” concept is receiving a lot attention at the moment at Community level. Any technological advances related to white spaces with their capabilities as well as limitations are being investigated by CEPT. The EU should take the conclusions of CEPT work into account and also take all the necessary measures in order to protect the existing users as well as potential future primary users in the band.

4.5 Ensuring the continuity and further development of the wireless microphone applications and other secondary uses of the UHF spectrum

There were many discussions within CEPT/ECC/PT1 related to whether such applications can be exploited by using FDD central gap (11 MHz) or the TDD guard

band of 7MHz. So far there are no clear-cut solutions, however, for microphone applications, the space outside UHF bands may not be excluded and should be considered by CEPT.

4.6 More effective cross-border coordination with non-EU countries

This is also key issue to be considered with care. The Commission should play a significant role for monitoring this issue, for smooth cross-border coordination, especially with Russia on ARNS issues. Indeed, WRC-2012, an Agenda Item deals with Broadcasting, Mobile as well as ARNS (Aeronautical Navigation Services) in this band.

4.7 Addressing Future Challenges (Alcatel-Lucent vision for a Mobile Industry Stimulus)

In our view, the body of this consultation lacks perhaps focus on the objectives summarized in its title, i.e.: “Transforming the digital dividend opportunity into social benefits and economic growth in Europe”. To specifically address possible ways to implement such an ambitious and overarching program, in particular as regards the mobile industry, we would like to table a new subject for debate related to the spectrum attribution process itself.

Given the current technological and economical status quo, we can expect a deflationary trend in telecommunication services as well as in the devices used for wireless connectivity.

The disposable income of European families has shrunk and the citizen’s budget devoted to connectivity may stagnate or slightly decrease. On the other hand, the capital assets of telecom service providers have followed the depreciation of stock markets; the overall liquidity available for embracing LTE appears today, more limited that only one year ago.

We would like to propose that the Commission and Member States of the European Union consider providing tangible investment incentives by changing the economic impact which spectrum fees traditionally have on operator CAPEX provisioning.

We propose that the operators winning the auctions or beauty contests for the dividend be given the choice to obtain a refund of 50% of the value for the winning spectrum bid in the form of a voucher to be used exclusively for the deployment of wireless broadband networks under the rigorous time, coverage, and capacity conditions justifying the use of a stimulus refund mechanism.

We believe that the social benefits and economic growth ambitions of this consultation could be thus fulfilled more concretely. The market knows that consumers are ready to integrate mobile “pocket internet” into their lives as much as they have already integrated mobile telephony. Also, in terms of microelectronic building blocks; memory, chipsets, and screens are achieving a level of performance and affordability that will trigger a swift emergence of

powerful internet devices ranging from USB-dongles to laptops. The urgency of new network infrastructure deployments cannot be understated.

Investing in spectrum and infrastructure simultaneously is even more difficult under the current economic conditions. In the absence of some new form of investment stimulus, we fear even greater delay in reaping the benefits that a higher level of connectivity could bring to the citizens and mobile economy of the European Union.

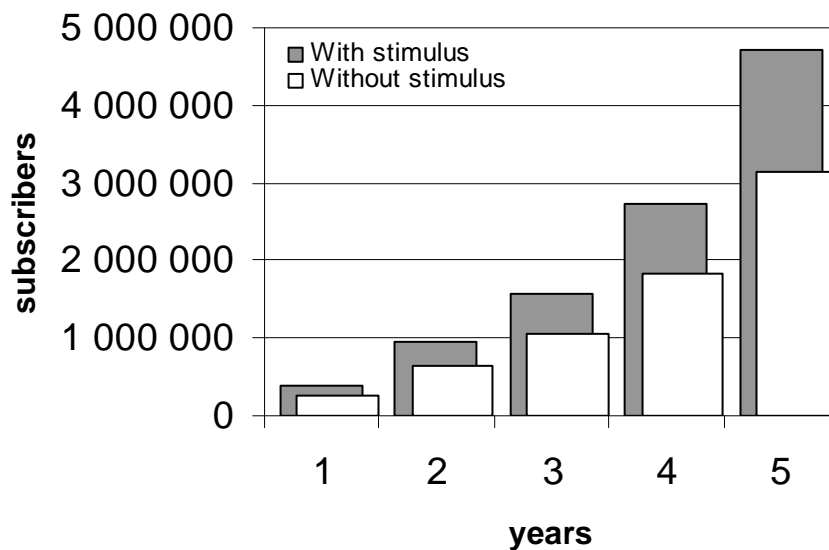
Illustrating the impact of the stimulus plan

In order to illustrate the impact of the stimulus in question, we have performed some calculations that use the costs incurred by an existing operator that wishes to deploy LTE using digital dividend spectrum. We did the case with and without a 50% refund voucher for a license cost of 500 million euros that is paid in five installments, and where a voucher is received simultaneously at the moment of each license fee payment.

We assumed the case of an operator that is capable to devote 200 million euros per year, for five years, in all its expenses including Opex, Capex and license fees, and that the operator provisioned all its profits as investments in network capacity each year for five years.

We assumed that capital expenditures are covered by a single investment of 191 euros per subscriber. We considered that the operator only deployed a portion of the network each year, with the right capacity to cover the number of subscribers that would be possible to serve considering that license fees, CAPEX and OPEX together cannot exceed 200 million euros per year.

**Subscriber base evolution
with and without stimulus**



We assumed that the operational expenditures per subscriber per month were of 16 euros and that the subscriber base evolved following a single abrupt incremental step the first day of each year. We considered an ARPU of 30 euros per month and for the sake of simplicity no device subsidies were considered.

Our finding was that an operator with a stimulus refund in the form of an access infrastructure voucher can reach nearly 50% more subscribers after the five year period compared to an operator that does not have a voucher. See graph.

5- Urgent Actions

5.1 Accelerating analogue switch-off by 2012

The time limit of “by 2012” should be respected as planned and indicated clearly in the roadmap. Although some EU countries have already adopted this and even applied it in their countries, other countries should respect the roadmap and achieve this switch-off process in time. This would lead to a better and timely harmonization and facilitate cross-bordering issues.

5.2 Taking steps towards the opening of the 800 MHz band for electronic communications services by adopting harmonised technical conditions of use in Europe

As far as the industry is concerned fast and solid steps for providing a harmonized 800 MHz band will be the key element for investment. Any delay in this process, will obviously result in less benefits for economy and also for the European citizens. Consequently, harmonized technical conditions are essential so that the expected benefits in a cost efficient way in European consumer markets will be exploited sooner.

Alcatel-Lucent's views on the digital dividend

The desired impact of using the digital dividend at the economic and social levels

Analog-to-digital switchover of TV broadcasting happens in a strategic moment where various economical and technological factors meet together. Portable computers, from pocket size to laptop size are more and more affordable. The cost of USB dongles for wireless connectivity is dramatically decreasing, and UMTS and LTE access are poised for massive adoption worldwide.

The properties of digital dividend spectrum make it particularly efficient in rural environments. Frequency bands below 1 GHz bring to wireless broadband the affordability needed to match the ubiquitous coverage of GSM today. Moreover, the currently available spectrum will not be enough for higher bit-rates. More spectrum of the kind provided by digital dividend will greatly enhance coverage and capacity matching the demand surge that is expected in the near future.

A study by Analysis and Hogan & Hartson consultants performed for France's ARCEP, compared the results that would be obtained by allocating the digital dividend's 72 MHz sub-band (available from 790 to 862MHz) for broadband mobile, on the one hand; and to broadcast on the other. They concluded that the incremental value of the sub-band would be relatively small in the case of broadcast, and very high for broadband mobile. Concretely, the 72 MHz in question we would yield:

- 48 HDTV channels instead of 40, for broadcasting exclusive usage,
- Wireless broadband coverage of 99% of the French population compared to the current 30% population coverage.

The allocation of the sub-band to broadband mobile could thus generate an extra value (consumer plus producer surplus) of about 26Bn Euro over 12 years (2012-2024), without mentioning the positive impact that connectivity brings to productivity and social well-being.

The Roles of EU: Co-ordination, Harmonisation levels, Services to be provided

EU could enforce a coordination process at technical level, to recognise, possibly by an EC Decision, the technical work made by CEPT for the definition of the channel arrangements with less stringent technical conditions, for the introduction of Mobile / Fixed Communications networks in the UHF band.

Taking into account that some countries are using the upper sub-band of the UHF spectrum for DTT introduction, it is important that the EU overall plan for the Digital Dividend includes appropriate provisions for these cases or even recommendations for coverage.

Moreover, at first glance it is possible to combine the delivery of HDTV programs with the introduction of new services in the UHF band.

In this respect, Alcatel-Lucent proposes further discussion on:

- Dual band allocations, including the usage of digital dividend spectrum and higher band allocations (mainly in the 2.6 GHz band) in response to the needs high traffic areas
- The introduction of Public Protection and Disaster Relief (PPDR) spectrum; in Europe there is a lack of spectrum for broadband PPDR applications, and the UHF band is one of those perfectly fitted for this type of service.

On the adoption of a technological and/or Service Neutrality criteria and their implementation in terms of regulation of the spectrum use

Alcatel-Lucent has supported the definition of separate sub-bands fully dedicated to Broadcasting applications on one side, and fully dedicated to mobile telecommunications access applications on the other side. Because of the different nature of these networks, as well as propagation characteristics of the UHF band, it is difficult to ensure their compatibility in the same band, and it was preferable to define dedicated sub-bands, like for instance 470-790 MHz for Broadcasting, and 790-862 MHz for Broadband Mobile Access.

Concerning Broadcasting applications, there is a consensus in Europe to consider that there is no need to define specific spectrum for Portable TV multiplexes, and Alcatel-Lucent supports this position. Therefore multiplexes for Portable TV should be placed only in the sub-band dedicated to Broadcasting.

Therefore, in the sense that *high power* broadcasting services and telecommunications services should be clearly split, Alcatel-Lucent does not support the *full* service neutrality in the UHF band.

Within the part of spectrum dedicated to Mobile networks, Alcatel-Lucent supports an approach based on the technology neutrality. This approach is compatible with the choice of a given duplex mode (FDD) but it means that the terms of the license should not prescribe which technology the operator should implement in its blocks.

“**Technology neutrality**” in our opinion means that the operator should have the possibility to adopt the radio interface of its choice, or to change it, provided that it respects pre-defined technical constraints. The regulator should just ensure that these constraints are enforced, but should not prescribe the technology used by the operator.

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We also do not think it will be possible to mix FDD and TDD solutions for broadband applications in a 72 MHz wide band, and we do not think that such mixing could be efficiently used to respond to specific local situations where the use of a harmonised plan would not be possible.

Schedules and modes for release/allocation of the digital dividend spectrum

As mentioned before, Alcatel-Lucent considers it critical to make the 790-862 MHz sub-band available for mobile use as soon as possible. Although in some European countries like Portugal, presently, it seems impossible to achieve this before switch-over is finished in 2012 since all the bands are assigned for DTV under official licenses. However, some u-turn decisions (like Spain in order to harmonise this band with other EU countries) will accelerate EU wide harmonisation and facilitate cross-border issues as well.

It is now clear that the telecom industry will focus on solutions based on FDD mode as the preferred channel arrangement in the band 790-862 MHz which is subject to ECC approval in October 2009 along with the alternative solution for those countries which can not implement this FDD in the very near future. It should be noticed that the latter case will jeopardize European wide harmonisation and therefore the Commission should take a strong measures to minimise this.

Contribution of the Digital Dividend to the development of the Next Generation Networks and impact on its use and mobile data services

Assuming that 3G mobile national coverage will be assured using the 900 MHz band via GSM re-farming, the primary target for the digital dividend band should be to provide economical nationwide coverage for public next generation mobile services like LTE and acting as a capacity complement to the services using higher band allocations most likely in the 2.5 and 3.5 GHz bands. This is expected to bring relief to capacity bottlenecks in high traffic areas like urban/suburban zones, major roads, and others. Services such as mobile TV and fixed high

definition TV should be provided using the remainder of the UHF band that is devoted to high power broadcasting services.

By the time the target band is available throughout Europe, LTE type solutions will be more mature and consequently, LTE appears as the most probable choice for the evolution of existing 2G/3G operators. For this reason, we believe that best approach is to adopt technology neutrality for the target digital dividend band.

Concerning mobile data services, all independent studies of the Mobile Telecom market indicate there is a consistent trend for growth of Mobile Data services. Mobile data traffic volumes have been growing at rates around or above 40% a year since 2007, in all countries where broadband internet access services have been introduced.

Alcatel-Lucent data confirms these estimates and indicates that the introduction of new and more performing devices, together with the launch of a variety of innovative services (combining location-based information with high-speed access to IT resources, for example) will fuel even higher growth rates in the coming years. This trend is expected to last at least up to 2015 globally. The digital dividend spectrum allocations will help avoid a capacity crunch in the near future.

On Cognitive Radio and White Spaces topics

Work on Cognitive Radio Systems has left the initial stage and standardisation on Cognitive Radio Systems is already ongoing in IEEE Standards Coordinating Committee 41 on Dynamic Spectrum Access Networks as well as in the ETSI Technical Committee on Reconfigurable Radio Systems (RRS).

IEEE 1900.4 has published the standard on "Architectural Building Blocks Enabling Network-Device Distributed Decision Making for Optimized Radio Resource Usage in Heterogeneous Wireless Access Networks". IEEE also works on Spectrum Sensing (IEEE 1900.6) and Policies for Dynamic Spectrum Access (IEEE 1900.5).

Further on, mechanisms and data models of a Cognitive Pilot Channel (CPC) are investigated in ETSI RRS. Interactions between ETSI RRS and CEPT CPG PTA are ongoing for the preparation of WRC-11 to analyze if there is need for a harmonized, regulated CPC frequency for the operation of Cognitive Radio Systems. Additional CPC solutions like an "In-band CPC" which do not need a worldwide harmonized CPC frequency are also available, but these solutions require some knowledge in the terminal on how to find such an in-band CPC.

No regulatory changes seem to be required for spectrum sensing schemes, multi sensor approaches are architectural choices. The only possible regulation involvement is the setting of sensitivity levels, but they may also be indicated by the standards that will be implemented as possible secondary systems.

On the specific issue of SDR/CR and white spaces in the UHF band, ECC WG SE has just created, on ECC request, a new Project Team to define technical and operational requirements for the operation of cognitive radio systems in the white spaces of the UHF broadcasting band (470-790 MHz) to ensure the protection of incumbent radio services/systems and investigate the consequent amount of spectrum potentially available as "white space".

