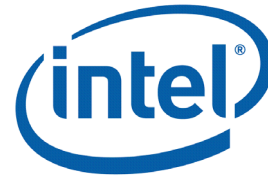


# Intel Corporation Response to EC Consultation "Transforming the digital dividend opportunity into social benefits and economic growth in Europe"

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## INTRODUCTION

Intel welcomes the opportunity to comment on "*Transforming the digital dividend opportunity into social benefits and economic growth in Europe*". We support the broad goals, especially the goal of meeting "*the growing demand for radio spectrum, particularly to allow new wireless services such as the next generation of mobile broadband*". However, we believe that demonstrable errors in the key inputs to the consultation, namely the Commission study<sup>1</sup> and CEPT studies in response to the Digital Dividend mandate, have led to errors in the CEPT conclusions and proposed actions that if enacted and codified in an EC Decision will adversely affect European consumers.

Intel believes legacy, voice centric biases have led to the proposed preferential (rather than technology neutral), treatment for FDD technologies, even though TDD technologies are better suited. FDD is less efficient for the delivery of IP data and (as pointed out in the Commission study) ill suited to fragmented deployment in small portions of a band over time. Yet despite these shortcomings, despite successful commercial deployment of 4<sup>th</sup> generation TDD technologies, and despite clear direction from the EC for a technology neutral approach to spectrum regulation, European-wide Digital Dividend proceedings are on the verge of codifying these errors. The result would be to deny European consumers the immediate benefits of 4<sup>th</sup> generation broadband technology, and to inappropriately impede the deployment of potentially technologically superior TDD technologies. Such a scenario, "*cementing the existing market shares and prevent[ing] users from accessing spectrum when needed*"<sup>2</sup> is exactly what the European Commission has sought to avoid by adopting a market based, technology neutral policy. Fortunately, as shown below, these errors can be easily corrected.

## INPUT ERRORS

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<sup>1</sup> Commission study "A European approach to the digital dividend" launched on 15 November 2008, conducted by Analysys Mason, DotEcon and Hogan&Hartson.

<sup>2</sup> Improving access through Market Mechanisms;  
[http://ec.europa.eu/information\\_society/policy/ecomms/radio\\_spectrum/eu\\_policy/market/index\\_en.htm](http://ec.europa.eu/information_society/policy/ecomms/radio_spectrum/eu_policy/market/index_en.htm)

The European Commission conducted a large scale study to analyze and evaluate various social and economic aspects of the Digital Dividend. The study also provided draft recommendations to the European Commission which served as a key input for the preparation of most of the proposals included in the consultation. In addition the European Commission requested technical input from the Member States' experts in CEPT. Although in general the studies are thorough and high quality, there are a few significant errors and omissions. Moreover, the study's conclusions are not supported by the study's results. In the case of the CEPT Draft Reports, the studies' conclusions contravene their explicit mandates.

**1. The European Commission Study erroneously concludes that FDD technologies are the only wireless broadband technologies currently available and that TDD requires "research"- when exactly the opposite is true**

The consultants presented the draft findings of their study at Second Member States' workshop on the Digital Dividend - Brussels, 26 June 2009. Among the results presented on 26 June (attached), Slide 67 states that "*FDD is currently the dominant technology for wireless broadband*". This statement which appears to be based on the current deployment of 3G technologies such as HSPA is wrong and backward looking given the success of the first 4G technology, WiMAX, which is TDD based and already deployed and providing commercial service in 141 countries with 487 networks deployed<sup>3</sup>.

***FDD Legacy Bias***

Frequency Division Duplex possesses some spectrum management advantages for symmetric mobile voice communications, in particular the separation of high-power base-stations on one band and lower-power mobile stations on the other. The initial and subsequent spectrum allocations made for mobile communications were made during a time of more stringent, less technology-neutral spectrum policies. While crafted to enable the deployment of FDD technologies, these allocations ended up fixing FDD deployment as default. The IT bubble fostered huge capital investments (including the record setting 3G spectrum auctions) in incumbent and near-term FDD technologies. The recession of 2001 further heightened the need for the incumbent operators to maximize their return on FDD investments thereby strengthening the market bias toward FDD technologies. These legacy effects favoring FDD technologies resulted from the normal operation of market forces in the technology industry. However, regulation then reinforced this industry process to the detriment of the innovation and competitive mechanisms that led to the technology successes in the first place.

***Superiority of TDD for Data in General***

While the legacy 3G technologies have made significant improvement in providing data rates they originally promised at the beginning of the decade,

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<sup>3</sup> WiMAX Forum website; <http://www.wimaxforum.org/>

they still fall far short of true 4G, OFDMA based broadband technologies. The development and successful deployment of commercial service based on WiMAX TDD, which benefits from combining OFDMA technology with TDD, provides strong evidence of the potential superiority on TDD for broadband data transmission. Below is a recent independent comparison on GIZMODO between WiMAX and existing wireless broadband services. It shows the dramatic superiority of WiMAX TDD. <http://gizmodo.com/5174718/exclusive-wimax-uncapped-speed-tests>. Importantly, in the area of latency, where TDD was presumed to have a disadvantage because of the need to switch between receive and transmit, WiMAX TDD shows dramatic improvement over the FDD technologies.

<b>Gizmodo's WiMax Field Test</b>							
<b>Location</b>	<b>My In-Laws' House</b>	<b>Starbucks, Washington Square Mall</b>	<b>My Buddy Tom's</b>	<b>PDX Airport Cellphone Lot</b>	<b>Fubonn Shopping Center</b>	<b>PGE Park</b>	<b>Fred Meyer</b>
<b>Neighborhood</b>	<b>Lake Shore, WA</b>	<b>Tigard, OR</b>	<b>Forest Park, OR</b>	<b>Cully-Sumner, OR</b>	<b>South Tabor, OR</b>	<b>Goose Hollow, OR</b>	<b>Hazel Dell, WA</b>
<b>Time of Day</b>	<b>3:20pm Friday</b>	<b>4:50pm Friday</b>	<b>6:10pm Friday</b>	<b>7:50am Saturday</b>	<b>8:45am Saturday</b>	<b>9:20am Saturday</b>	<b>9:45am Saturday</b>
<b>Signal Strength</b>							
<b>WiMax</b>	1/10 bars	10/10 bars	4/10 bars	10/10 bars	1/10 bars	0/10 bars	10/10 bars
<b>3G EVDO</b>	4/4 bars	4/4 bars	4/4 bars	4/4 bars	4/4 bars	4/4 bars	4/4 bars
<b>Average Download Speed</b>							
<b>WiMax</b>	1120Kbps	10400Kbps	2840Kbps	9000Kbps	1220Kbps	No Service	12740Kbps
<b>3G EVDO</b>	1170Kbps	2250Kbps	1230Kbps	2180Kbps	1860Kbps	Didn't Test	990Kbps
<b>Average Upload Speed</b>							
<b>WiMax</b>	40Kbps	1710Kbps	360Kbps	1680Kbps	50Kbps	No Service	1850Kbps
<b>3G EVDO</b>	470Kbps	590Kbps	580Kbps	600Kbps	560Kbps	Didn't Test	230Kbps
<b>Average Wikimedia Hubble Page Load Time (Lower = Better)</b>							
<b>WiMax</b>	120s	21s	31s	24s	78s	No Service	22s
<b>3G EVDO</b>	50s	39s	52s	48s	48s	Didn't Test	85s
<b>Average Latency (Lower = Better)</b>							
<b>WiMax</b>	139ms	81ms	96ms	78ms	129ms	No Service	75ms
<b>3G EVDO</b>	123ms	174ms	224ms	193ms	151ms	Didn't Test	156ms

***Superiority of TDD for the Digital Dividend in Particular***

Moreover, TDD is inherently better suited to situations, such as the Digital Dividend, where the available spectrum may be limited in size and exact harmonization across Member States may be difficult. The European Commission

Study confirmed this fact and noted that FDD is ill suited to the Digital Dividend stating:

*"But current requirements for a fixed duplex spacing between the downlink and uplink means an identical, paired-channel allocation is needed across Europe to realise economies of scale and roaming:*

- This limits the scope for other uses to share the band*
- This prevents variation between member States<sup>4</sup>*

The European Commission also noted the superiority of TDD for this application "*encouraging research into- frequency-agile wireless broadband systems, such as TDD<sup>5</sup>*". The European Commission further stated that:

*"if greater flexibility can be introduced without unduly increasing technology costs, then economic benefits could be substantial:*

- Member States whose requirements differ significantly from the European average may no longer need to follow the actions of neighbours in order to realise economies of scale"*

Therefore because of its inherent flexibility which makes it particularly suited to the Digital Dividend spectrum, in the event that a true technology neutral approach is not taken, a TDD band plan would likely be the more common and minimal (least restrictive) technical condition for the band.

However, despite the acknowledgement of the superiority of TDD, the existence of commercial deployments of WiMAX TDD today, and the development and deployment of LTE TDD in the near term (certainly sooner than the release of the vast majority of the Digital Dividend spectrum across Europe), the European Commission Study erroneously concludes that TDD needs research and is not "*practical for the 790-862 MHz sub-band<sup>6</sup>*". In fact TDD is not only practical but appears to be better suited for the 790-862 MHz sub-band.

## **2. Draft CEPT Reports 30 and 31, in response to the Mandate on DD, both conclude without justification that use of FDD is preferred for the band 790-862**

In similar fashion to the European Commission Study, Draft CEPT Reports 30 and 31, far from "*putting into practice the concept of flexibility as advocated in the Opinion of the RSPG on Wireless Access Policy for Electronic Communications Services (WAPECS)<sup>7</sup>*", conclude that use of FDD for the band 790-862 is preferred. The sole justification for the preference is existing FDD incumbent

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<sup>4</sup>Materials from the Member States workshop on 26 June 2009; Workshop materials; Introductory Slides for Second member States Workshop; Slide 67:  
<http://www.analysismason.com/PageFiles/12932/Slides%20from%20Member%20States%20workshop%2026%20June%202009.pdf>

<sup>5</sup> Ibid Slide 68

<sup>6</sup> Ibid Slide 102

<sup>7</sup> MANDATE TO CEPT TO DEVELOP LEAST RESTRICTIVE TECHNICAL CONDITIONS FOR FREQUENCY BANDS ADDRESSED IN THE CONTEXT OF WAPECS

support for an FDD plan. On the other hand, the Draft CEPT Report 31 recognizes several benefits of TDD. In addition to the aforementioned benefits of TDD supported by the European Commission Study, the Report states:

*"There are some reasons why an administration would need to consider the flexible approaches:*

- 1. Where an Administration cannot make all channels in the band available because they have already been allocated to other services (e.g. digital terrestrial television DTT, ARNS and programme-making and special events PMSE);*
- 2. Where it wishes that channels in the band that can be made available may be used either for two-way services or for one way services such as mobile multimedia;*
- 3. Where it cannot succeed with frequency coordination agreement to have access to the whole sub-band because of the constraint by another radio service in neighbouring countries."*

Furthermore, a comparison of the "preferred" FDD plan and the alternate TDD plan below shows that the use of TDD would actually be more spectrally efficient than FDD; it would enable 65MHz of the block to be used for communications vs. 60 for FDD.

790 - 791	791- 796	79 6- 80 1	80 1- 80 6	80 6- 81 1	81 1- 81 6	81 6- 82 1	821 - 832	832 - 837	837 - 842	842 - 847	847 - 852	852 - 857	857 - 862
Guard band	<b>Downlink</b>						Duplex gap	<b>Uplink</b>					
1MHz	30 MHz (6 blocks of 5 MHz)						11 MHz	30 MHz (6 blocks of 5 MHz)					

**Figure 2: Preferred harmonised channelling arrangement for the band 790-862 MHz**

790- 797	797- 802	802- 807	807- 812	812- 817	817- 822	822- 827	827- 832	832 - 837	837 - 842	842 - 847	847- 852	852- 857	857- 862
Guard band	<b>Unpaired</b>												
7 MHz	65 MHz (13 blocks of 5 MHz)												

**Figure 3: TDD channelling arrangement for the band 790-862 MHz**

In summary, the CEPT Report demonstrates that in the event that a true technology neutral approach to support both technologies is not taken, the most common and minimal (that is, least restrictive) technical use of the band would be a TDD arrangement. However the reports irrationally conclude that a more restricted FDD band plan would be preferred. Thus, the CEPT Draft Reports do not fulfill, but indeed directly contravene their explicit mandates.

## **ERRORS IN RESULTANT DRAFT ECC DECISION**

The above errors have been perpetuated in "*Draft ECC Decision on harmonized conditions for Mobile/Fixed Communications Networks operating in the band 790-862 MHz*" particularly at;

- 5) *Recognizing the advantage of a single harmonised frequency arrangement, the preferred frequency arrangement is based on FDD. TDD frequency arrangements and other approaches can be used on a national basis.*

and at;

#### *DECIDES*

2. *that those administrations wishing to implement Mobile/Fixed Communications Networks based on FDD in the entire frequency band 790-862 MHz should adhere to the preferred harmonised frequency arrangement given in Annex 1;*
3. *that those administrations wishing to implement Mobile/Fixed Communications networks in the frequency band 790-862 MHz with frequency arrangements other than the preferred harmonised arrangement in Annex 1 should follow Annex 2;*

This unwarranted preference for last generation FDD technology could shortchange the future of mobile broadband across Europe for the short term benefit of allowing incumbents to amortize old, legacy voice investments.

#### **REMEDIES**

##### **Draft ECC Decision on harmonised conditions for Mobile/Fixed Communications Networks operating in the band 790-862 MHz**

Intel proposes removing the bias with the simple modifications to the Draft ECC Decision text provided in **Attachment 1** on this document.

##### **Draft EC decision on the technical harmonisation of the 790-862 MHz**

The Consultation states:

*"The Commission would submit to the Radio Spectrum Committee (RSC) pursuant to the Radio Spectrum Decision a draft EC decision on the technical harmonisation of the 790-862 MHz band for regulatory opinion in autumn 2009, followed by a final adoption by the Commission at the beginning of 2010."*

The elements on a draft EC decision on the technical harmonization of the 790-862 MHz band will be largely based on the aforementioned draft ECC Decision. Accordingly, Intel proposes that the corrections to the ECC Decision supplied in Attachment 1 be reflected in the Draft EC Decision to be submitted to the RSC.

#### **CONCLUSION**

Intel agrees that the correct disposition of the digital dividend spectrum is important to economic growth in Europe. Unfortunately based on demonstrable errors in the key studies, a mistaken, backward looking disposition unfairly

favouring last generation FDD technology is being proposed. The net effect of such a course of action could be to curtail the future of mobile broadband across Europe. Fortunately, these errors can be easily corrected and the consequences avoided and we respectfully request the European Commission consider our suggested remedies.

Yours Sincerely

A handwritten signature in black ink that reads "Peter K Pitsch". The signature is written in a cursive style with a large initial 'P'.

Mr. Peter K Pitsch  
Executive Director, Communications Policy  
Associate General Counsel  
Intel Corporation

## ATTACHMENT 1

The following are proposed modifications to the Draft ECC Decision on harmonised conditions for Mobile/Fixed Communications Networks operating in the band 790-862 MHz”

- 5) *Recognizing the advantage of harmonised frequency arrangements, preferred frequency arrangements are provided for FDD& TDD/ Other approaches can be used on a national basis.*

and at;

### *DECIDES*

2. *that those administrations wishing to implement Mobile/Fixed Communications Networks based on FDD in the entire frequency band 790-862 MHz should adhere to the preferred harmonised frequency arrangement given in Annex 1;*
3. *that those administrations wishing to implement Mobile/Fixed Communications networks based on TDD in the frequency band 790-862 MHz should adhere to the preferred harmonised arrangement in Annex 2;*

### *ANNEX 1*

*Preferred FDD Harmonised frequency arrangement*

### *ANNEX 2*

*Preferred TDD Harmonised frequency arrangement*

- The harmonised frequency arrangement is 65 MHz based on a block size of 5 MHz and starts at 797MHz.

790-797	797-802	802-807	807-812	812-817	817-822	822-827	827-832	832 – 837	837 – 842	842 – 847	847-852	852-857	857-862
<b>Guard band</b>	<b>Unpaired</b>												
<b>7 MHz</b>	<b>65 MHz (13 blocks of 5 MHz)</b>												

### *ANNEX 4*

Guidance for administrations not implementing the preferred frequency arrangement in Annex 1

Administrations which do not wish to use the preferred harmonized frequency arrangement as described in Annex 1 or which do not have the full band 790 – 862 MHz available (e.g. where an Administration cannot make all channels in the band available because they have already been allocated to other services or are not able to coordinate the use of frequencies with neighboring countries), may consider:

- partial implementation of frequency arrangement described in Annex 1.
- the introduction of TDD frequency arrangement in all or part of the frequency band 790 – 862 MHz, based on a block size of 5 MHz starting at 797 MHz:
- a mixed introduction of TDD and FDD frequency arrangements as described in Annex 5 of CEPT Report 31
- implementation of a 1 MHz channel raster.

The least restrictive conditions given in Annex 3 shall apply to all possible combinations of channeling arrangements.