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**Qualcomm response to FICORA's public consultation on draft regulation on auction rules and technical conditions of the radio license for the upcoming 2500-2690MHz spectrum award.**

Qualcomm appreciates the opportunity to comment on FICORA's proposed regulation for the upcoming 2500-2690MHz spectrum award.

Mobile Broadband has been recognized as a key factor to an economic competitiveness and hence is crucial for a sustainable economic growth. Qualcomm believes that Finland citizens' best interest lies in ensuring the availability and evolution of mobile broadband networks. Mobile broadband connections based on available 3G networks have considerably increased over the past year and next generation networks, e.g. based on LTE networks, are being planned now. These future networks come with promises of higher data rates, support for a large number of simultaneous users and reduced price of the Mbit/s. Qualcomm views the 2500-2690MHz frequency band as a unique opportunity for the deployment of next generation mobile broadband networks as LTE technologies can only achieve their optimal performance and truly deliver on their promises over 20MHz channels. Therefore, Qualcomm encourages FICORA to ensure that the research, development and education spectrum allocations do not restrict the future large scale deployment by operators of 2x20 MHz LTE systems in urban areas.

Most importantly, Qualcomm stresses the importance of the adoption of the European harmonized band plan. This band plan was defined in the ECC Decision ECC/DEC/(05)05



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and has been already adopted by many large European countries such as Germany, the UK and Poland. Most other European countries are expected to adopt this harmonized band plan. Any deviation from the European harmonized band plan would directly imply that mass-market equipment cannot operate in Finland. Operators would need to acquire Finland-specific terminals and customers would not be able to use their terminals while roaming in neighbouring countries. Such undesirable outcomes would put considerable uncertainty on the availability and sustainability of next generation mobile broadband networks in Finland.

Qualcomm welcomes FICORA decision to adopt the CEPT band plan. However, Qualcomm strongly recommends FICORA not to allow FDD operators to deploy TDD systems in FDD allocations. As most major standards are available both in FDD and TDD flavours, such an approach is compatible with technology neutrality, which Qualcomm fully supports.

Qualcomm's detailed responses to FICORA's proposals are further detailed in the Annex. Wassim Chourbaji or Guillaume Lebrun (email: [wassim@qualcomm.com](mailto:wassim@qualcomm.com), [glebrun@qualcomm.com](mailto:glebrun@qualcomm.com), phone: +33 1 4133 4120, address: 52 Boulevard Rodin, Issy les Moulineaux, (France)) remain available for any further information you may request regarding this response.

Sincerely yours,

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## **Qualcomm response to FICORA public consultation on draft regulation on auction rules and technical conditions of the radio license for the upcoming 2500-2690MHz spectrum award.**

Qualcomm views the 2500-2690MHz frequency band as a unique opportunity for the deployment of next generation mobile broadband networks. The evolution of mobile broadband is of critical importance to citizens and to the economic competitiveness of a country. However, there are two prerequisites for technologies such as LTE to fulfil their potential:

- The adoption of a harmonized band plan to ensure the availability of mass-market devices.
- The availability of 20MHz FDD channels which in the near-future can only be achieved in the 2500-2690MHz frequency range.

As a result, Qualcomm welcomes FICORA decision to adopt the CEPT band plan, but strongly recommends FICORA not to allow FDD operators to deploy TDD systems in FDD allocations. Qualcomm encourages FICORA to ensure that the research, development and education spectrum allocations do not restrict the future large scale deployment by operators of 2x20 MHz LTE systems in urban areas.

Qualcomm views on specific topics are detailed in the following sections.

### *Support for Harmonized Frequency Plan*

Qualcomm considers that spectrum harmonization in Europe is necessary to provide clarity, and generally having a predictable regulatory framework in place to be able to develop technologies and services in a timely manner. We support technology neutrality and we believe that the IMT-2000 framework as established by the ITU is consistent with this principle while enabling global collaboration taking into account the interests of administrations, operators and manufacturers in order to reach spectrum harmonization and compatibility.

With regards to the 2.6 GHz band, Qualcomm welcomes FICORA's decision to structure the award around the 2.6 GHz harmonized channelling arrangement as set in ECC DEC(05)05 and which defines the split between FDD and TDD blocks into 2x70 MHz for FDD and 50

MHz for FDD Downlink (external) or 50 MHz TDD. However, Qualcomm strongly recommends FICORA to review their decision allowing TDD network in the FDD spectrum. This potential implementation is not compatible with the selection of the harmonized band plan. Such a 'flexible' band plan in terms of TDD and FDD blocks assignment would be detrimental to the development of mobile services in Finland as it would lead to "Finnish only" terminals.

Indeed, it will be highly difficult for an FDD handset to operate in both the harmonized ECC channelling arrangement and a national specific FDD/TDD band plan with one Transmit/Receive (Tx/Rx) chain while protecting the unpaired spectrum from Tx interference. An FDD terminal with roaming capabilities between ECC and a national specific FDD/TDD band plan would require a second set of PA/Duplexer/LNA, which would ultimately impact the consumers as it may lead to specific handsets which cannot roam within other European countries. Such equipments will be more costly and deny consumers' access to new capable high bit rates services while visiting neighbouring countries. Terminals with roaming capabilities between the country implementing a specific FDD/TDD band plan and the rest of Europe will require more complex implementation resulting in higher cost, higher power consumption, bigger form factor and shorter coverage due to higher filter insertion loss.

In this context, Qualcomm welcomes FICORA decision to adopt the CEPT band plan, but strongly recommends FICORA not to allow FDD operators to deploy TDD systems in FDD allocations.

*The 2.6 GHz band plan and CEPT Report 131*

The European Commission decision 2008/477/CE was adopted based on the technical conclusions of the CEPT Report 19. This report focused exclusively on the interference scenarios from base station to base station. Neither the CEPT Report 19 nor the European Commission decision 2008/477/CE take into account the interference and implementation constraints linked to terminals. The ECC Report 131 has studied such constraints and identified technical conditions of access to the band for terminals.

The ECC Report 131 identifies some mobile station to mobile station interference issues at the border of each frequency blocks, especially at the FDD/TDD border but also between unsynchronized TDD blocks. The interference-free coexistence of terminals in the band 2500-2690 MHz imposes severe emission restrictions at the FDD/TDD domains borders. These constraints go well beyond the 3GPP standards defined filtering capabilities of terminals and

request additional filtering, in the form of specific RF components (RF filters). Qualcomm recommends FICORA to consider carefully these interference issues. It is critical for operators to ensure both an interference-free environment but also the availability of mass market equipment, which can only occur through the adoption of single Europe-wide technical conditions of access to spectrum.

Therefore, Qualcomm:

- Welcomes the selection by FICORA of the harmonized band plan. Any deviation from this band plan will have a severe impact on the availability of equipments and terminals in the band.
- Recommends considering carefully the conclusions of the ECC Report 131, taking into account the requirement for operators to operate in an interference free environment, under a single Europe-wide adopted set of technical conditions of access to spectrum.

#### Possibilities linked to TDD Spectrum Award based on 5 MHz blocks

FICORA currently proposes to auction the 2570-2620 MHz spectrum as a single TDD block. Qualcomm wonders whether FICORA compared the merit of such an approach with an award based on 5MHz spectrum blocks. In such an alternative approach, FICORA would award 8 TDD blocks of 5MHz each. Qualcomm would recommend assessing the merits of each award alternative in terms of competition, device market scale (and therefore price) and technical constraints on network roll-out.

#### 2570-2575 and 2615-2620MHz blocks

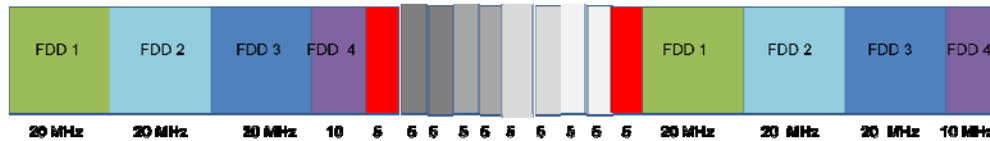
Following the conclusions of the CEPT report 19 and ECC Report 131, the 2570-2575 MHz and 2615-2620 MHz frequency blocks can only be used under very stringent technical restrictions. Furthermore, the emission limits defined to protect adjacent frequency blocks indicate that these two frequency blocks will correspond to the RF-filters transition bands of the equipments and therefore will be subject to severe interference.

Such constraints raise major questions regarding the value of such bands, as well as the availability of equipments capable of operating in such bands. Following these considerations,

Qualcomm recommends to identify these bands as guard band between FDD and TDD blocks, rather than simply restricted blocks. The adopted 2570-2575 MHz and 2615-2620 MHz guard bands will reduce the interference risks between FDD and TDD networks.

Optimal FDD bandwidth in the 2.6GHz band

The 2.6 GHz band represents a unique opportunity for the deployment of LTE networks with 20MHz channel bandwidth. This 2x20 MHz channelization will enable to achieve the promises of the LTE technologies, i.e. support for a large number of simultaneous users and reduced price of the Mbit/s. Therefore, Qualcomm supports to structure the award in order to enable the emergence of 3 licenses of 2x20 MHz and one license of 2x10 MHz, as represented in the Figure below.



In areas with usage restrictions, such as the specific geographic areas where a 10MHz frequency band has been reserved for research, development and teaching purposes, the award process should enable the emergence of 3 licenses of 2x20MHz. This is particularly crucial in urban areas, where LTE is expected to be most critically required.

The specific frequency bands proposed for research, development and teaching purposes are currently compatible with 3 nationwide licences of 2x20MHz, and therefore should not be modified without taking into account the requirement for 2x20MHz licences. Furthermore, FICORA should ensure that the research, development and education spectrum allocations do not restrict the future large scale deployment by operators of 2x20 MHz LTE systems in urban areas.

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