July. 31th, 2017

**Response to the public consultation on the band of 3.5GHz in Switzerland**

**COMMENTS OF GTI**

The Global TD-LTE Initiative (GTI) is pleased to be able to respond to Switzerland ‘s consultation on the band 3.5GHz. This response has been prepared by the Spectrum Working Group and 3.5GHz Working Group of GTI.

GTI (Global TD-LTE Initiative) is an open platform in 2011, advocating cooperation among global operators and vendors to energize the creation of a world-class and a growth-focused business environment. GTI aims to make TD-LTE a global standard and the convergence of TDD/FDD, help the whole industry benefit from the evolution of TD-LTE, TDD/FDD converged networks and global smartphones, and promote a unified 5G standard and mature end-to-end ecosystem, as well as explore cross-industry markets and opportunities. With 6 years’ development, GTI has become one of the most important cooperation platforms with 132 operator members and 144 vendors.

Accordingly, we welcome the initiative by the Switzerland to review the public consultation for the new band -which would maximize future flexibility for a review of planning issues. GTI hereby submits its comments in response to the Switzerland’s consultation on the band 3.5GHz.

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**Feedback for the consultation questions**

With regards to the consultation questions of the issues for the 3400-3800MHz spectrum, we would like to explain the views and comments on several aspects as below.

19. Comment évaluez-vous l'attractivité de cette bande de fréquences? Ces blocs devraient-ils aussi être attribués? (motiver votre réponse s.v.p.)

*19. How do you assess the attractiveness of this frequency band? Should these blocks also be awarded? (Please explain your answer)*

GTI recommends to allocate the 3400-3800MHz spectrum as soon as possible.

The growth and proliferation of mobile broadband services is increasingly an important part of overall economic growth. Failure to make available additional radio spectrum on a timely basis will suppress economic growth, development and innovation.

We consider that spectrum should be make available to the public as soon as it is ready to be released, thus providing clarity to the future supply of spectrum and allowing the free market to exploit its full potential. In fact, there is strong momentum for TDD systems in the 3.5GHz band for 4G deployment or early introduction of 5G.

In WRC-15, International Telecommunications Union members have designated IMT identification for the band 3400-3600 MHz which is nearly globally harmonized band for mobile use. The importance of 3.5GHz is becoming prominent as mobile data traffic continues unabated growth. More and more countries have already or plan to allocate the spectrum in near future and 29 commercial 3.5GHz/3.6GHz TD-LTE networks are in operation today according to GSA report.

In addition, there is a global consensus that 3.5GHz will be the primary mid-band for early introduction of 5G.

A. Radio Spectrum Policy Group RSPG16-031 FINAL, 8 June 2016

> *The RSPG considers the 3400-3800 MHz band to be the primary band suitable for the introduction of 5G use in Europe even before 2020, noting that this band is already harmonised for mobile networks, and consists of up to 400 MHz of continuous spectrum enabling wide channel bandwidth. This band has the possibility to put Europe at the forefront of the 5G deployment.*

B. GSMA 5G Spectrum Public Policy Position, November 2016

5G needs spectrum within three key frequency ranges to deliver widespread coverage and support all use cases. The three ranges are: Sub-1 GHz, 1-6 GHz and above 6 GHz.

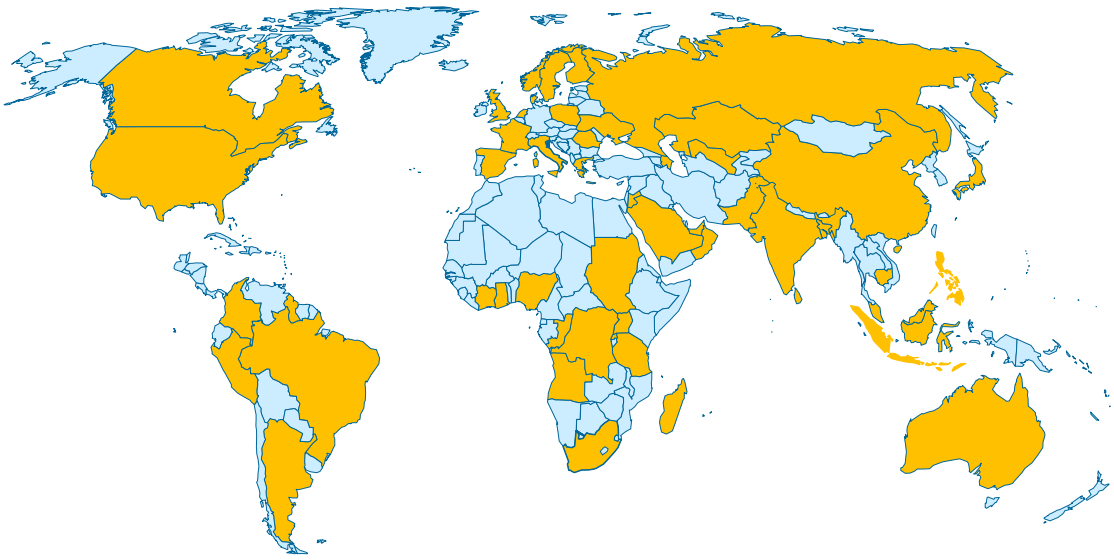
- Sub-1 GHz will support widespread coverage across urban, suburban and rural areas and help support Internet of Things (IoT) services
- 1-6 GHz offers a good mixture of coverage and capacity benefits. This includes spectrum within the 3.3-3.8 GHz range which is expected to form the basis of many initial 5G services
- Above 6 GHz is needed to meet the ultra-high broadband speeds envisioned for 5G. A focus will be on bands above 24 GHz – this includes growing interest in the 24 GHz and/or 28 GHz bands which could be easily implemented together in a single device due to their close proximity. There is also some interest in exploring bands in the 6-24 GHz range.

<u>20. Dans la bande des 3400-3600 MHz, privilégiez-vous l'utilisation TDD ou FDD?</u>

*20. In the 3400-3600 MHz band, do you favour the use of TDD or FDD?*

GTI recommends TDD arrangement (3GPP Band 42) be implemented in the entire 3400-3600 MHz band which is consistent with the global trends. Harmonization is vital to achieve economies of scale in end-user devices, facilitate regional and global roaming and deploy/re-farm to 5G in future.

Once regarded as a regional technology, today's TD-LTE is so much more. Its advanced performance and wide ecosystem make it a superb technology choice for operators everywhere. Today there are 101 LTE TDD commercial networks in 53 different countries, over 1 billion users and over 39% of LTE devices supporting LTE TDD mode.



In Europe, the 48 pan-European member countries of the CEPT/ECC passed the ECC Decision (11)06 resolution (amended March 14, 2014) harmonising arrangements for 3400-3800MHz across the wider European continent. This decision designates this spectrum to mobile/fixed communications networks (MFCN) with TDD the preferred duplex mode for 3400-3600MHz and compulsory for 3600-3800MHz.

In US, FCC opened 150 MHz of spectrum (3550MHz to 3700MHz) that it named Citizens Broadband Radio Service (CBRS). The channel arrangement is unpaired (i.e. TDD) and the CBRS is governed by a three-tiered spectrum authorization framework to accommodate a variety of commercial uses on a shared basis.

In Japan, the Ministry of Internal Affairs and Communications issued TDD 3.5 GHz licenses to SoftBank, Docomo and KDDI in 2014.

21. Quels aspects faut-il prendre en considération lors de l'adjudication de cette bande de fréquences?

*21. What aspects should be taken into account when awarding these frequencies?*

There are 3 aspects to be considered:

1) TDD arrangement (3GPP Band 42) is recommended for the entire 3400-3600 MHz band which is consistent with the global trends;

2) Contiguous and broad channel bandwidths for 3.5GHz band would be desirable to support higher data rate and future development, which is also recommended in ITU-R M.2083-0 “IMT Vision - Framework and overall objectives of the future development of IMT for 2020 and beyond”. Furthermore “Draft new Report ITU-R M. [IMT-2020.TECH PERF REQ] - Minimum requirements related to technical performance for IMT-2020 radio interface(s)” specifies the requirement for bandwidth is at least 100 MHz for frequency below 6GHz;

3) When multiple TDD operators operate with adjacent frequency in the same band, it is recommended to use the same UL/DL configuration (i.e. Inter-operator synchronization) to fully utilize the spectrum. Block edge mask specified in ECC report 203 for TDD-synchronized and TDD-unsynchronized operation should also be adopted.

4) The price on the minimum block is suggested to be reconsidered. If the current day auction pricing, for example, 10 or 20 MHz of spectrum was applied, then apply it to an 800MHz allocation of spectrum, the pricing would be ridiculously unaffordable, yet for the good of customers and to meet demand, that amount of spectrum is becoming necessary, therefore a re-think is necessary, including how any reserve pricing may be considered.

22. Comment évaluez-vous votre intérêt à acquérir des fréquences dans cette bande? A votre avis, existe-t-il un besoin minimal au-dessous duquel l'utilisation serait inefficace? Si oui, quel est ce volume de fréquences?

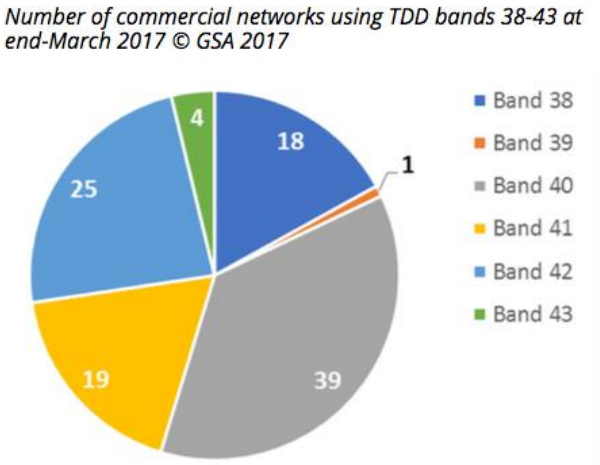
*22. How would you rate your interest in acquiring frequencies in this band? In your opinion, is there a minimal need below which use would be ineffective? If so, what is this volume of frequencies?*

No comment

**General information on the 3.5GHz bands**

3.5GHz is one of the primary and globally harmonized TD-LTE bands. There are already 29 TD-LTE commercial networks in 3400-3800MHz band around the world including Japan and Australia. Besides, 3.5GHz has also designated as Citizens Broadband Radio Service (CBRS) in US.

There’s no denying TD-LTE is a proven technology and the ecosystem is well-established comparable to FDD counterpart. The technology continues to evolve and its advantages will be even more prominent in the 5G era. The European Commission has already concluded that 3.5GHz is the priority band for early deployment of 5G. In China, 5G R&D trial had been carried in this band as well.




By the end of March, 2017, there are 97 LTE TDD networks in 56 countries, and 30% of them are in 3.4-3.8GHz.

| LTE TDD | |
|---|---|
| 2300 MHz band 40 | 2,369 devices |
| 2600 MHz band 38 | 1,889 devices |
| 2600 MHz band 41 | 1,733 devices |
| 1900 MHz band 39 | 1,454 devices |
| 3500 MHz band 42 | 118 devices |
| 3600 MHz band 43 | 93 devices |

By the end of March, 2017, 211 different models of devices support 3400-3800 MHz

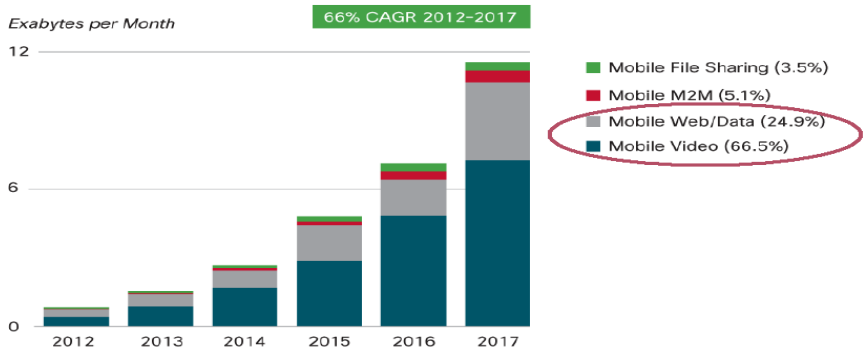
We would also like to point out that ecosystem for Band 22 (FDD mode) virtually does not exist as of today.

TDD technology offers significant advantages with respect to spectrum efficiency, network performance and capacity and smooth evolution path to 5G.

- **TDD supports traffic asymmetry efficiently and flexibly**

  The UL/DL adaptivity of TDD allows for the adjustment of the downlink and uplink resource ratios. Downlink-to-uplink ratios can be e.g. 8:1, 3:1, 2:2 and 1:3. A downlink-oriented configuration fits perfectly with the current and foreseeable user behavior where streaming and data downloads use more downlink resources than uplink resources.

There are several predictions about the future trends for the traffic asymmetry. Cisco forecasts that there will be a dramatic increase in the downlink-oriented applications and that the use of DL-centric applications will result in more than 90% of mobile traffic being in the downlink in 2017.




- **TDD facilitates advanced antenna solutions**

Due to uplink and downlink channel reciprocity (ensured by the fact that the same portion of spectrum is used in both link directions), TDD technology has unique coordination abilities which are used in a number of technical areas including beamforming. Beamforming improves the system performance by utilizing channel state information to achieve transmit-array gain. FDD requires a very high signal overhead to obtain DL channel state information at the eNB thus making it less efficient when implementing beamforming.

Network test results show that single-layer, dual-layer and multi-user Beamforming can generate cell throughput gains of 15%, 15% and 10% respectively. Adoption of both Beamforming and Coordinated Multi-Point operation (CoMP), an approach called ‘Co-ordinated Beamforming’ (CBF), can further enhance network performance because interference is mitigated between eNodeBs.
Other advanced antenna solutions like massive MIMO and Distributed MIMO (D-MIMO) also utilize TDD’s uplink and downlink channel reciprocity to improve performance and capacity.

LTE Advanced Pro

LTE-Advanced Pro is the new official ‘marker’ approved by the 3GPP in October 2015 to denote the next stage in development towards 5G, and LTE-Advanced Pro will exploit full dimension MIMO (FD-MIMO), which simultaneously supports both elevation and azimuth beamforming to

significantly boost capacity and coverage. Massive MIMO technology will be further enhanced in the 5G.

- **Unpaired TDD bands can be made available more easily than paired bands**

  High performing mobile networks requires wide channel bandwidths; currently spectrum between 2GHz and 5GHz are the best candidates for obtaining these wide channels. From a spectrum management perspective, there are challenges making sufficient spectrum and wide channels available. Unpaired spectrum bands are generally easier to make available than paired bands simply because re-farming of one band is easier than re-farming two equally wide bands. This benefit is becoming increasingly important as re-farming of spectrum is the main source of new mobile spectrum.

  WRC-19 is expected to identify a significant amount of additional spectrum above 6GHz suitable for 5G. It is the general view that unpaired channels are preferred for the new spectrum, with TDD technology playing a more important role.