



HUAWEI

Technologies Canada Co. Ltd.

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Re: Comments from Huawei Technologies Canada Co., Ltd.

Ref. the *Canada Gazette* Part I

Consultation on Revisions to the 3500 MHz Band to Accommodate Flexible Use and Preliminary Consultation on Changes to the 3800 MHz Band
SLPB-004-18 – June, 2018.

Huawei Technologies Canada Co., Ltd. (“Huawei Canada”) is pleased to provide these comments in response to the Innovation, Science and Economic Development Canada (“ISED”) Consultation (SLPB-004-18 – June, 2018). Huawei Canada thanks ISED for its strategic and forward-thinking spectrum policy to develop Canadian communications infrastructure and for its spectrum and technical planning efforts (both in Canada and globally with leadership in the ITU-R deliberations).

Huawei Canada agrees that the 3500 MHz and 3800 MHz bands will be extremely important for 5G, and will emerge quickly driven by global acceptance and ecosystem development. Generally Huawei agrees with ISED’s view of commercial and deployment timelines and supports including 3450 – 3475 MHz flexible use as part of the 3450 – 3650 MHz 5G assignments. From a band-plan perspective, Huawei Canada promotes plans consistent with the 3GPP standards. For 3.5 GHz, Huawei Canada believes being able to aggregate to 50 or 100 MHz traffic channels will provide the bandwidth needed to deliver the high throughput services envisioned for 5G.

Huawei Canada would be pleased to work further with ISED and others in the industry to assist in this important planning process.

Sincerely,

Robert Backhouse
VP Marketing and Solution Sales
Huawei Technologies Canada Co., Ltd.

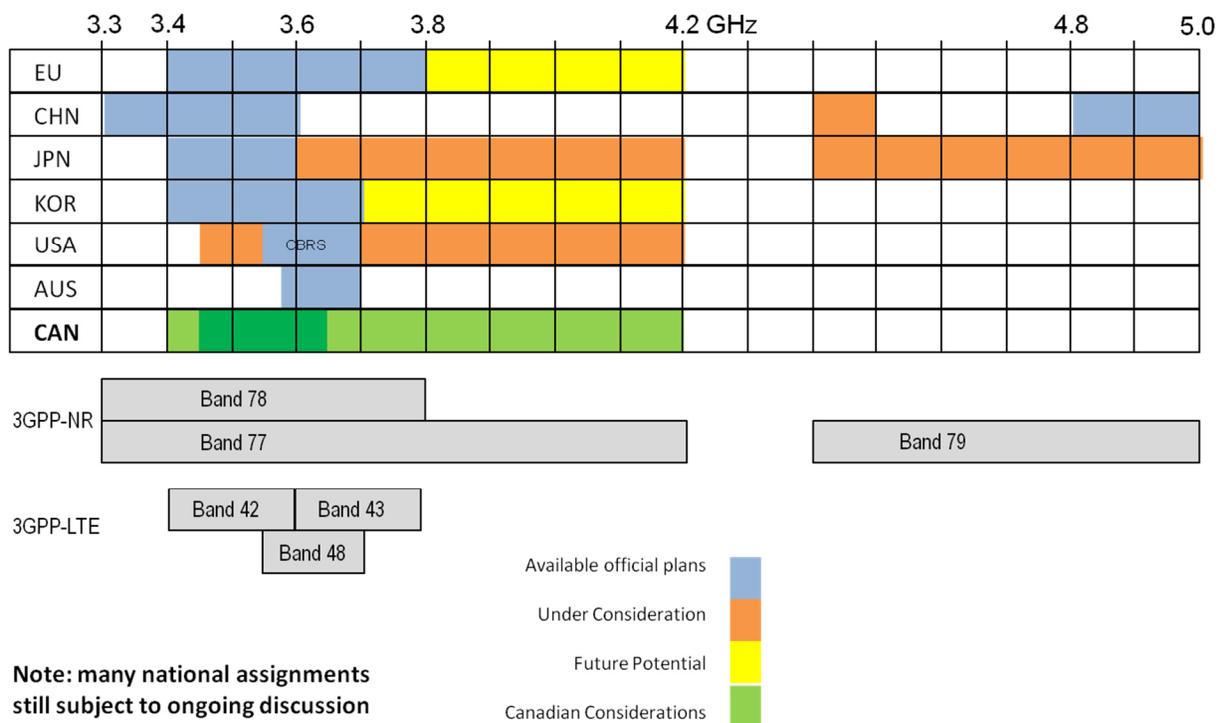
Consultation on Revisions to the 3500 MHz Band to Accommodate Flexible Use and Preliminary Consultation on Changes to the 3800 MHz Band

Comments of Huawei Technologies Canada Inc.

Q1 – ISED is seeking comments on its assessment of the timelines identified for the development of an equipment ecosystem for 5G technologies in the 3500 MHz and 3800 MHz bands, and whether the timelines will be the same in both bands.

Q1: Huawei agrees with the timelines identified by the Department for early availability of commercial mobile 5G services beginning in 2019. Huawei is participating globally in the development of the 5G ecosystem including bands ranging from 3400 to 3800 MHz. Portions of these bands are becoming available for commercial mobile or flexible use internationally, including (for example) in the United States, the United Kingdom, Ireland, Japan, China, Singapore and Australia. The mobile industry technical standards group, 3GPP, has identified the range 3300–4200 MHz for its 5G New Radio (NR) standards. Globally, it is expected that equipment for 5G operations based on these specifications will become available in 2019. Broad deployment of 5G, including new fully-featured mobile products for consumer use, will accelerate in 2020.

The following illustration shows *some* of the recent global discussion for spectrum assignment for mobile usage in these bands and the indicated industry band plans¹. While national and regional deliberations are ongoing, and some of the detailed assignments may change, the discussion makes it clear that there is some consensus for band usage globally.



¹ This chart has been compiled from multiple public sources; however, changes may still be in development by the relevant local authorities.

The diagram illustrates that the proposed Canadian frequency plan, as discussed in this Consultation, is common with assignments globally. The alignment of the ISED proposed band plan with the global direction and will benefit Canadians and industry as a part of the worldwide communications ecosystem.

Q2 – ISED is seeking comments on the proposals for:

- **adding a primary mobile allocation to the 3450–3475 MHz band;**
- **removing the radiolocation allocation in the 3450–3500 MHz band;**
- **making the corresponding changes to the Canadian Table of Frequency Allocations.**

Q2: Huawei concurs with the Department’s proposal to adjust the Canadian regulations to add the primary mobile allocation to the 3450-3475 MHz segment, and to remove the current primary radiolocation allocation for the 3450-3500 sub-range. Huawei also supports the corresponding changes in the Canadian Table of Frequency Allocations.

Q3 – ISED is seeking comments on the proposal to allow flexible use in the 3450–3475 MHz band.

Q3: Huawei supports the Department’s proposal to extend flexible use to the 3450-3475 MHz band. Such allowance will promote innovation and early adoption of 5G technologies in Canada and enable operators to better target services to the needs of their customers. Such flexibility will foster efficient spectrum usage through integration of access, backhaul and control functions within the same band and channel set. This approach will enable new technology and innovations to evolve in support of the multiple use cases envisioned for the 5G era.

Q4 – ISED is seeking comments regarding interest in sharing spectrum between radiolocation and other services in the 3400–3450 MHz band, and options for doing so.

Q4: Huawei considers that further study of sharing between terrestrial radiolocation and fixed/mobile services in the 3400-3450 MHz band could be worthwhile. Such sharing may be quite practical on a geographic basis where each service is confined to limited areas. More general deployments may also be possible for intermittent use in cases where the radiolocation and the fixed/mobile services are amenable to some intervals of intermittent interference. That is, sharing may be practical if both services are error tolerant and can accommodate retransmissions and the consequent delay.

Q7 – ISED is seeking comments on a revised band plan using unpaired blocks of 10 MHz in the frequency range of 3450–3650 MHz.

Q7: Huawei observes that future mobile and fixed services, particularly 5G, will be attractive in the 3450-3650 MHz band and will be of most benefit when applied to support high-throughput and high-traffic applications. Thus, a band plan consistent with the 3GPP channels (both LTE and 5G NR) and facilitating aggregation to 100 MHz contiguous packages would be most appropriate. Such package sizes are important to permit the wide-band, high-throughput services that are the basis of 5G. Sub-division into smaller packages may severely limit the potential to accommodate future services and traffic growth.

Q8 – ISED is seeking comments on whether any additional measures should be taken to limit potential interference issues with the proposed TDD band plan.

Q8: Huawei notes that wide area TDD operation in these and other bands must be carefully engineered and deployed. The TDD mode of operation is attractive for its potential efficiency as it

enables the radio system to adapt to asymmetry in the uplink/downlink traffic flows. With the major concentration of 5G on data services and their intermittent flows, it is expected that radio resources including spectrum channels will best be asymmetrically assigned flexibly between uplink and downlink directions. The system will be most efficient when it can flexibly adapt the time division intervals to accommodate the traffic of the moment. However, to avoid overall system self-interference, the timing of uplink and downlink intervals must preferably be synchronised across the network. As the receivers in the mobile devices typically must accommodate the whole band (i.e. 3450-3650+) they are particularly sensitive to interference from other nearby devices (unsynchronised) that may be transmitting to other systems during their reception interval. The early versions of the 3GPP standards have been developed assuming a level of time division synchronisation across all network facilities. Later versions of the 3GPP 5G standards, which are the subject of current ongoing industry work, are expected to formalise the mechanisms and level for synchronisation across multiple networks and to permit adaptive synchronisation.

Q13 – ISED is seeking comments on whether the fixed and mobile equipment for LTE and 5G technologies will be able to operate with intermittent interference from radars, including cross-border interference, within the 3450–3650 MHz band and in adjacent bands.

Q13: Huawei observes that there has been little detailed industry study of the behaviour of LTE and 5G systems when subjected to interference from external systems such as RADARs, either in-band/channel or in adjacent-bands/channels. End user satisfaction with intermittent interrupted service has also not been generally studied. It is to be expected that, for distant RADAR signals (i.e. that are consequently of low signal strength at the mobile service receivers), their intermittent presence would appear to the mobile system as “noise” and be generally accommodated by the established inherent coding and retransmission capabilities of the mobile systems. Thus the intermittent RADAR signals would manifest themselves as somewhat increased error rates and additional delays in the mobile service (i.e. due to retransmissions). This may be inconsequential for many common mobile services beyond a small reduction in capacity during the intervals of RADAR operation (i.e. due to the time and radio resources required for retransmissions and error recovery). However for some 5G services, including Ultra Reliable Low Latency (URLL) services, the RADAR interference intervals may be catastrophic and unacceptable as the communications may be unreliable or delayed beyond the contracted system time limits. Similarly, the mobile system signals may affect the RADAR system performance with excess “clutter” if the RADAR system designs are not well protected against foreign signals. Minor degradations of short duration to the mobile/fixed service due to mobile RADARs (ships or aircraft) passing in the vicinity may be user acceptable. However, severe disruption for intervals of hours while ships are docking or with frequent aircraft fly-overs may preclude shared use of the band for commercial mobile use because, even if infrequent, intermittent unreliability is frustrating for the unknowing users who would quickly migrate to another system. Intermittent unreliability may also be frustrating to the RADAR users. Unfortunately, intermittent unreliability, even if infrequent, can lead to customer dissatisfaction and the labeling of the RADAR or communications equipment as being “unreliable and of poor quality”. Hence, sufficient geographic or frequency band separation is preferred to prevent either system from interfering with the other. However, for deployments in which the RADAR system usage is infrequent, of short duration and the mobile system traffic is low and does not include URLL or safety related traffic then some level of frequency sharing may be operationally practical for some service profiles. The development of suitable sharing conditions may be the subject of further studies.

Q14 – ISED is seeking preliminary comments on how to optimize the use of the 3650–3700 MHz band, including the potential use of a database access model.

Q14: Huawei observes that the band segment 3650-3700 and the adjacent segment 3700-4200 MHz are becoming key resources globally for new mobile services. Channel plans have been established across this band by the 3GPP (e.g. band numbers 42, 43, 48 for LTE covering 3.4 – 3.8 GHz, and band numbers 77, 78, 79 covering 3.3 – 4.2 and 4.4 – 5 GHz) and globally new system deployments are being planned across this range. Thus, the inclusion of the 3650-3700 MHz portion for mobile services is appropriate to further harmonise Canadian usage with future global services. Huawei recognises that there is existing usage in Canada of this band portion that provides many valuable services, particularly to smaller communities, isolated locations or individual services. The use of a database (locally and or nationally) to facilitate coordination for the introduction of new services without disruption to established services would seem a practical way to enable additional usage of this spectrum resource. Such coordination may enable the deployment of high density mobile services (and associated backhaul) in areas where it will not disrupt established services or may enable repacking of some incumbent systems to other (or adjacent) channels. Some incumbent systems may become a part of the new deployments. Such coordinated usage may together provide much improved services nationally.

Q15 – ISED is seeking comments on the importance of the 3700–4200 MHz band to future FSS

Q15: Huawei recognises that there is an established and widely varied usage across the 3700-4200 MHz bands in Canada². The usage may range from traditional personal voice communications (e.g. “telephone”), industrial control, public services (e.g. police/fire/ambulance), transportation coordination, weather reporting and information and entertainment broadcast services. Many receive-only terminals may be “unlicensed”. These are all of vital importance to the communities and the users they serve and are an essential resource to bind these areas and users to the Nation. Having the detailed technical parameters of these varied systems available to the ISED in a database would facilitate the coordination and frequency management not only for continuing support of the existing deployments but also to facilitate upgrades and new uses on a local and national basis. There may be some practical difficulty, however, for ISED to obtain the technical parameters due to the wide variety and age of some of the existing systems and due to many users being unfamiliar with the technical details of their usage and equipment. The introduction of new services should ensure the continuity of existing services through (for example) updating of existing installations and or by combining established services as a part of new facilities. In some cases establishment of exclusion zones in geographic area or frequency may facilitate harmonious operations of old and new spectrum usage. It is to be expected however that such measures of coordination will permit the overall improved usage of the spectrum resources to enable new services to be provided both to the more populous areas as well as delivering these new services economically to the remote areas. Thus, the multiple aspects and challenges to improving information needed for coordination and sharing will enable greater utilisation of radio resources and delivery of improved services to users – new and old.

² Such varied usage is also a factor globally.