

Invitation for Expression of Interest in Using the Spectrum in the 26 GHz and 28 GHz Bands for the Provision of Fifth Generation Mobile Services

7 December 2017

Purpose

The Communications Authority (“CA”) would like to invite expression of interest (“EOI”) from the industry and other interested parties in using the spectrum in the 26 GHz band (24.25 – 27.5 GHz) and the 28 GHz band (27.5 – 28.35 GHz) for the provision of fifth generation mobile (“5G”) services in Hong Kong.

Background

2. On 21 March 2017, the CA promulgated its work plan for making available additional spectrum for public mobile services to meet the increasing aspirations of mobile service users towards 2020 and beyond¹. Among others, the CA plans to make available the spectrum within the contiguous bandwidth of 4.1 GHz (24.25 GHz – 28.35 GHz) in the 26 GHz and 28 GHz bands as the first batch of spectrum for the provision of 5G services in Hong Kong. The CA has indicated in its work plan that it will invite industry players to express their interest in using the abovementioned spectrum for 5G services before end 2017 in order to gauge the local industry demand for such spectrum.

3. This invitation for EOI (“EOI Invitation”) aims to collect information and to solicit views and comments from the industry and interested parties on various aspects set out in paragraph 13 below to facilitate the CA’s consideration of the appropriate arrangements with a view to making available the abovementioned spectrum for the provision of 5G services.

¹ The CA’s work plan announced on 21 March 2017 is available at:
http://www.coms-auth.hk/en/media_focus/press_releases/index_id_1423.html

Potential Use of the Spectrum in the 26 GHz and 28 GHz Bands for 5G Services

Global Development

4. On the global level, the International Telecommunication Union (“ITU”) identified eleven candidate bands² in the range of 24.25 – 86 GHz for use by International Mobile Telecommunication – 2020 (“IMT-2020” or commonly known as 5G) services. ITU will convene the next World Radiocommunication Conference in November 2019 (“WRC-19”) with a view to harmonising the spectrum among its Member States so that commercial mobile services can be launched in around 2020.

5. The 26 GHz band is one of the ITU candidate bands for 5G services. Some major economies such as Europe and the Mainland are considering the use of the spectrum in the 26 GHz band for providing 5G services. On the other hand, the 28 GHz band is not an ITU candidate band for consideration in the WRC-19. That said, a number of advanced economies have also engaged in 5G related activities using the 28 GHz band. For instance, the United States has since 2016 opened up this band as a licensed band for 5G development, while in South Korea, an outdoor 5G trial using the 28 GHz band was conducted with a plan to providing pilot services in the 2018 Pyeongchang Winter Olympic Games.

Situation in Hong Kong

6. Currently, the 26 GHz and 28 GHz bands are yet to be allocated to mobile service in Hong Kong. Subject to the industry feedback on this EOI Invitation, the CA will consider allocating the 26 GHz and 28 GHz bands to mobile service as a primary service in these bands. The current frequency allocation of the 26 GHz and 28 GHz bands is set out in **Figure 1** below.

² These candidate bands are: (a) 24.25 – 27.5 GHz; (b) 31.8 – 33.4 GHz; (c) 37 – 40.5 GHz; (d) 40.5 – 42.5 GHz; (e) 42.5 – 43.5 GHz; (f) 45.5 – 47 GHz; (g) 47 – 47.2 GHz; (h) 47.2 – 50.2 GHz; (i) 50.4 – 52.6 GHz; (j) 66 – 76 GHz; and (k) 81 – 86 GHz.

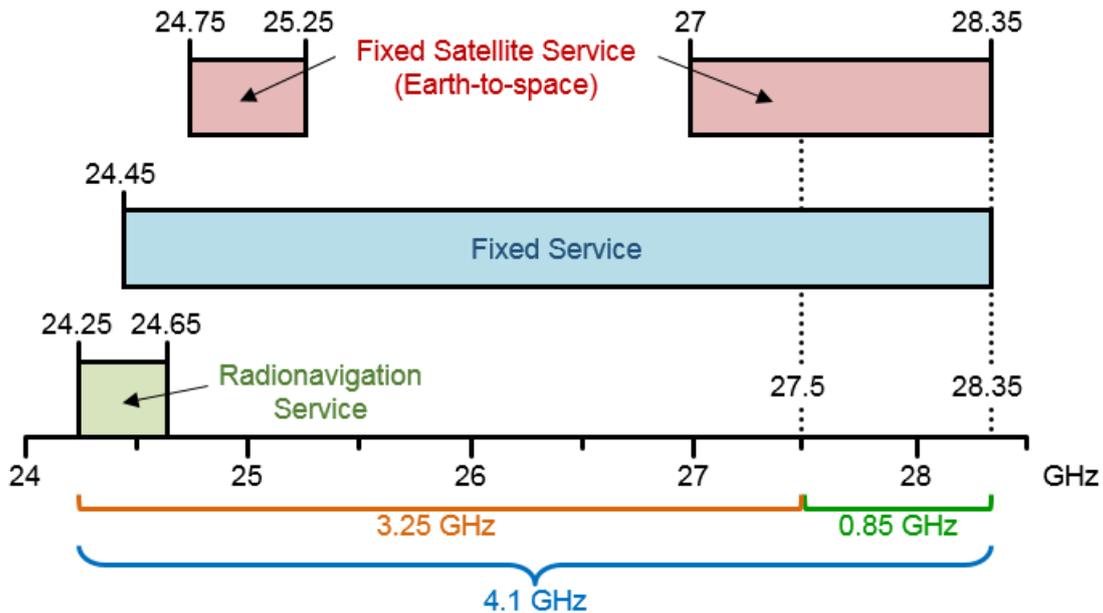


Figure 1: Current frequency allocation in the spectrum 24.25 – 28.35 GHz

The 26 GHz Band

7. From the perspective of frequency planning, spectrum in the 26 GHz band is allocated to radionavigation service (24.25 – 24.65 GHz), fixed service (24.45 – 27.5 GHz) and fixed satellite service (“FSS”) (Earth-to-space) (24.75 – 25.25 GHz and 27.0 – 27.5 GHz). In particular, spectrum in the 24.25 – 24.45 GHz sub-band is reserved for Government use.

8. As the 24.25 – 24.65 GHz sub-band is currently not used for any radionavigation service, subject to the industry feedback on this EOI Invitation and views of the relevant Government users, the CA will consider reviewing the frequency planning of this sub-band.

9. As regards fixed service in the 26 GHz band, some spectrum (including spectrum in the 24.605 – 24.633 GHz paired with 25.613 – 25.641 GHz, and 25.144 – 25.294 GHz paired with 26.152 – 26.302 GHz sub-bands) was assigned to both Government users and network operators for providing fixed service. In April 2017, the CA served notices on the network operators concerned for withdrawal of the abovementioned sub-bands which shall take effect from 1 April 2019. Government users would also stop using spectrum in the 26 GHz band for fixed service on or before 1 April 2019. As a result, all existing users would cease using spectrum in the 26 GHz band for fixed service with effect from 1 April 2019.

10. As regards the FSS in the 26 GHz band, while the 24.75 – 25.25 GHz and 27.0 – 27.5 GHz sub-bands are allocated to both FSS (Earth-to-space) and fixed service as primary services, they are currently not used for any FSS application. Nevertheless, parties interested in using spectrum in the 26 GHz band should take into account the potential use of these sub-bands for FSS (Earth-to-space) in future when planning for the deployment and spectrum requirement of their potential 5G services. Subject to the industry feedback on this EOI Invitation, the CA will consider if any regulatory measure is needed to facilitate the shared use of these sub-bands by 5G service and other co-existing services in the future.

The 28 GHz Band

11. Similar to the 24.75 – 25.25 GHz and 27.0 – 27.5 GHz sub-bands, the 28 GHz band is allocated to both FSS (Earth-to-space) and fixed service as primary services. However, spectrum in the band is currently unused for any FSS application. Subject to the industry feedback on this EOI Invitation, the CA will consider if any regulatory measure is needed to facilitate the shared use of this band by 5G services and other co-existing services in the future.

12. As illustrated in **Figure 1** above, the spectrum within the contiguous bandwidth of 4.1 GHz in the 26 GHz band and the 28 GHz band (24.25 GHz – 28.35 GHz) may be made available in 2019 at the earliest for assignment to interested parties for the provision of 5G services.

Invitation for EOI

13. To facilitate the CA's assessment of the mobile industry demand for the spectrum in the 26 GHz and 28 GHz bands and consideration of the appropriate arrangements for assignment of the spectrum for the provision of 5G services, the CA would like to invite the industry and other interested parties to make submissions in the following aspects –

- (a) frequency planning;
- (b) services and applications to be provided;

- (c) spectrum requirements and caps;
- (d) equipment availability and timing of spectrum assignment;
- (e) shared use of spectrum;
- (f) performance requirements and network rollout plan; and
- (g) technical trials.

Specific questions on each of the abovementioned aspects are at the **Appendix**.

14. Individual submissions received will not be disclosed to the public and the identities of the submitting parties will be kept confidential. Parties making submissions should clearly identify any commercially sensitive information in their submissions so that the CA may take reasonable care in publishing any information about the result of this EOI Invitation.

15. For the avoidance of doubt, this EOI Invitation does not constitute an offer or invitation to apply for or to participate in the bidding of radio spectrum in the relevant frequency bands for the provision of public mobile services, nor does it constitute the basis of any contract which may be concluded in relation to the application/bidding exercise or in respect of any allocation/assignment of radio spectrum in the relevant frequency bands for the provision of mobile services. This EOI Invitation shall not bind the CA to allocate or assign any radio spectrum in the relevant frequency bands, or to grant any licence.

Submission of EOI

16. Submissions should be sent to the Office of the Communications Authority, marked with “Expression of Interest in Using the Spectrum in the 26 GHz and 28 GHz Bands for the Provision of Fifth Generation Mobile Services”, on or before **18 January 2018**, by any of the following means. **Late submissions will not be considered.**

By post: Office of the Communications Authority
29/F Wu Chung House
213 Queen's Road East
Wanchai
Hong Kong
Attention: Principal Regulatory Affairs Manager (R13)

By fax: (852) 2116 3334

By e-mail: EOI-INVITATION@ofca.gov.hk

Office of the Communications Authority
7 December 2017

Invitation for Expression of Interest in Using the Spectrum in the 26 GHz and 28 GHz Bands for the Provision of Fifth Generation Mobile (“5G”) Services – Specific Questions

(In this Appendix, the “26 GHz band” and “28 GHz band” refer to the spectrum 24.25 – 27.5 GHz and 27.5 – 28.35 GHz respectively.)

A. Frequency Planning

Question 1

The channelling plan of a frequency band would directly affect the deployment of technical platforms employing Time Division Duplex or Frequency Division Duplex technologies. What are the views of your company on the channelling plans in the 26 GHz and 28 GHz bands?

Question 2

Taking into account the latest technological development, such as carrier aggregation, massive multi-input multi-output antennae, advancement in modulation schemes, etc., what are the views of your company on the channel bandwidth of carriers operating in the 26 GHz and 28 GHz bands?

B. Services and Applications

Question 3

What kind of 5G use cases (e.g. enhanced mobile broadband service, massive machine type communication service, and ultra-reliable, low latency communication service, etc.) does your company intend to provide with the use of the spectrum in the 26 GHz and 28 GHz bands?

Question 4

What other innovative applications will be provided by your company with the use of the spectrum in the 26 GHz and 28 GHz bands on top of the 5G use cases set out in Question 3 above?

C. Spectrum Requirements and Caps

Question 5

Please indicate, with justifications, the amount of spectrum in each of the 26 GHz and 28 GHz bands which your company would like to acquire for the provision of 5G services and applications mentioned in your replies to Questions 3 and 4 above. What is the minimum amount of spectrum which your company will need to support the launch of these services and applications?

Question 6

While there is a contiguous bandwidth of 4.1 GHz in the 26 GHz and 28 GHz bands, are there any concerns if spectrum assignment to an assignee is made in –

- (a) the 26 GHz band only;
- (b) the 28 GHz band only; or
- (c) a mix of spectrum in the 26 GHz and 28 GHz bands.

If yes, please explain in detail.

Question 7

In assigning the spectrum in the 26 GHz and 28 GHz bands, should any spectrum cap be imposed? If so, should there be a cap for each of the band, or one cap for two bands taken together? Should different spectrum caps be applied to incumbent network operators and new entrants respectively?

D. Equipment Availability and Timing of Spectrum Assignment

Question 8

When does your company expect the 5G network, as well as customer equipment and devices operating in the 26 GHz and 28 GHz bands to be available?

Question 9

Taking into account the withdrawal of the existing frequency assignments in the 26 GHz band by 1 April 2019, the expected timeframe for the availability of network and customer equipment and devices, and any other specific issues your company could identify, what is the appropriate timeframe for assignment of the spectrum in the 26 GHz and 28 GHz bands? Should the spectrum be released in phases? If yes, please provide the view of your company with supporting reasons on the amount of spectrum that should be released in each phase.

E. Shared Use of Spectrum

Question 10

As fixed satellite service (“FSS”) (Earth-to-space) is the existing service allowed to operate in the frequency bands of 24.75 – 25.25 GHz and 27 – 31 GHz on a primary basis in accordance with the current frequency

allocation plan of Hong Kong, what are your views on the co-existence of 5G services operating in the 26 GHz and 28 GHz bands with FSS (Earth-to-space)? If there are concerns on the possible interference caused by FSS (Earth-to-space) to 5G services, are there any mitigating measures that can be adopted by assignees to minimise such interference and promote the co-existence of FSS (Earth-to-space) and 5G services? Please explain in detail.

Question 11

As the path loss of radio waves in the 26 GHz and 28 GHz bands is much more significant than that of the radio waves below 3 GHz, the radio coverage of a base station operating in these frequency bands will be confined. Does this characteristic makes it feasible for shared use of the same piece of spectrum in the 26 GHz and 28 GHz bands by more than one mobile network operators? If yes, on what basis should such sharing be achieved and what mechanism/arrangement could be used to coordinate the use of the shared spectrum among network operators to ensure efficient use of the spectrum and to prevent congestion and harmful interference? Please explain in detail.

F. Performance Requirements and Network Rollout Plan

Question 12

What kind of performance requirements (e.g. network and service coverage) should be imposed on an assignee to ensure that it has put the spectrum into efficient use? Should different performance requirements be applied to incumbent network operators and new entrants in the market respectively?

Question 13

Please indicate the scale of the investment of your company for the network rollout with the use of the spectrum of the 26 GHz and 28 GHz bands.

Question 14

What geographical areas and what type of coverage deployment (e.g. outdoor, indoor and small cells) does your company consider suitable for the use of spectrum in the 26 GHz and 28 GHz bands to provide 5G services? Please explain in detail.

Question 15

Please elaborate the network rollout plan and schedule of your company for the provision of 5G services and applications set out in your replies to

Questions 3 and 4 above. How long will your company take from spectrum assignment to launch of 5G services?

G. Technical Trials

Question 16

Does your company have any plan to conduct technical trials of 5G services in the 26 GHz band and/or the 28 GHz band? If yes, please provide the inputs in respect of the following matters –

- (a) what are the objectives of the trial(s) and what kind of tests will be conducted?
- (b) how much spectrum will be needed for the technical trial(s)?
- (c) when and for what duration will your trial(s) will be conducted?

H. Others

Question 17

Are there any other considerations that should be taken into account in relation to the planning of the spectrum in the 26 GHz and 28 GHz bands for the provision of 5G services? Please explain in detail.

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