

**For discussion
on 10 May 2019**

**Legislative Council
Panel on Information Technology and Broadcasting**

Assignment of Spectrum for Fifth Generation Mobile Services

PURPOSE

This paper briefs Members on the spectrum assignment exercises in various frequency bands that are planned for 2019 and measures to facilitate the provision of the fifth generation mobile (5G) services in Hong Kong.

BACKGROUND

2. To facilitate the introduction of advanced and innovative communications services, Hong Kong's spectrum policy aims to facilitate the most economically and socially efficient use of spectrum by putting it in the hands of those who would make the best use of the spectrum.

3. With the completion of harmonisation of worldwide 5G spectrum by the International Telecommunication Union and the availability of subscriber equipment in 2019, the market expects commercial 5G services to be available in around 2020. 5G will revolutionise mobile user experience by its technical capabilities of high speed, high capacity, high reliability, massive connectivity, and low latency, and it will open up vast potential for various commercial and smart city applications.

Preparations made in 2017-2018

4. To prepare for the arrival of the 5G era, in March 2017, the Communications Authority (CA) promulgated its work plan for making available additional spectrum to facilitate further development of public mobile communications. The spectrum release plan issued by the CA in July 2018 stated that a total of about 4 500 MHz of spectrum in various bands (including the 3.3 GHz, 3.5 GHz, 4.9 GHz, 26 GHz and 28 GHz bands) would be released starting from April 2019 for the deployment of

public mobile services, including 5G services. The amount of spectrum is more than eight times of that currently allocated in Hong Kong for public mobile services.

5. Meanwhile, to facilitate the industry to test 5G technologies for future deployment in Hong Kong, the CA has, as at end April 2019, issued 27 trial permits to interested parties including equipment vendors and mobile network operators for conducting 5G technical tests.

The Joint Statements

6. Between May and September 2018, the Secretary for Commerce and Economic Development (SCED) and the CA jointly conducted three separate public consultations in relation to frequency allocation, assignment arrangements and the related spectrum utilisation fee (SUF)¹ for the spectrum in the 3.5 GHz band, 26 GHz and 28 GHz bands, 3.3 GHz and 4.9 GHz bands respectively. While respondents had expressed different views and suggestions with regard to the details of the proposals, there was general support for the increased supply of spectrum for public mobile services.

7. Having thoroughly considered all the views and comments received in the public consultations, SCED and the CA promulgated three Joint Statements on 13 December 2018 to announce their respective decisions on the frequency allocation and assignment arrangements for the spectrum in these frequency bands, as well as the related SUF.

8. In gist, a total of 4 100 MHz of spectrum in the 26 GHz and 28 GHz bands would be made available by way of administrative assignment, whilst a total of 380 MHz of spectrum in the 3.5 GHz, 3.3 GHz and 4.9 GHz bands would be assigned by auctions. The Joint Statements have been uploaded on the websites of the Commerce and Economic Development Bureau and the CA².

¹ Sections 32H(2) and 32I(1) of the Telecommunications Ordinance (TO) empower the CA to allocate radio frequencies and to designate the spectrum which shall be subject to the payment of SUF following consultation with the telecommunications industries and other affected persons; while sections 32I(2) and 32I(4) of the TO empower SCED to prescribe the method for determining SUF and to specify the minimum fee of the SUF (including the minimum fee or reserve price of an auction where it is used for determining the SUF).

² The Joint Statements can be located respectively at:
3.5 GHz: https://www.cedb.gov.hk/ccib/eng/paper/pdf/joint_statement_3.4_3.6GHz_2018en.pdf
26/28 GHz: https://www.cedb.gov.hk/ccib/eng/paper/pdf/joint_statement_26_28GHz_2018en.pdf
3.3&4.9 GHz: https://www.cedb.gov.hk/ccib/eng/paper/pdf/joint_statement_3.3_4.9GHz_2018en.pdf

9. After the promulgation of the Joint Statements, industry association and operators have continued to convey their views on the assignment arrangements to the Administration having regard to the latest market development and operators' business needs. Having taken into careful accounts of all views received, summary of the assignment plans and indicative timetable are tabulated at **Annex**. Details of the spectrum bands planned for disposal in 2019 are set out in the ensuing paragraphs.

(a) The 3.5 GHz band

10. Given its good radio propagation characteristics, the 3.5 GHz band is amongst the first lot of frequency bands identified by many economies for initial 5G deployment. The CA has decided that a total of 200 MHz of spectrum in the 3.5 GHz band will be assigned by way of auction for the provision of territory-wide public mobile services from 1 April 2020 in Hong Kong. In view of the current satellite operations at Tai Po and Stanley, the deployment of this band shall be subject to technical measures as detailed in paragraph 11 below to facilitate coexistence with the existing satellite services.

11. As satellite communications is an important part of Hong Kong's diverse telecommunications services, restriction zones³ will be imposed at Tai Po and Stanley respectively. The Office of the Communications Authority (OFCA) is working with the relevant satellite and mobile network operators to enable controlled deployment of the 3.5 GHz band for mobile services within the restriction zones⁴.

(b) The 26 GHz and 28 GHz bands

12. Spectrum in the 26 GHz and 28 GHz bands are well placed to support enhanced mobile broadband services in providing extremely high speed and high capacity data transmissions to end users. Among the 4 100 MHz of spectrum in the 26 GHz and 28 GHz bands, 3 700 MHz of

³ Satellite operators have set up telemetry, tracking and control (TT&C) Stations to control and manoeuvre the licensed satellites in orbit. To protect the existing TT&C Stations, the CA decided in March 2018 to impose two restriction zones in Tai Po and Stanley respectively in order to constrain the deployment of mobile base stations of public mobile services operating in the 3.5 GHz band.

⁴ OFCA has set up a working group comprising representatives of mobile network operators, satellite operators, the Hong Kong Applied Science and Technology Research Institute and the Hong Kong Science Park to explore feasible technical arrangements for deployment of base stations operating in the 3.5 GHz band within the restriction zones.

spectrum has been set aside as non-shared spectrum for the provision of large scale public mobile services. The remaining 400 MHz of spectrum will be assigned on a geographically shared basis for providing localised wireless broadband services in specified locations such as university campuses, industrial estates, airport and technology parks, etc. Such sharing arrangement will facilitate the development of innovative 5G and smart city applications.

13. The CA invited applications for administrative spectrum assignment in the two bands in late December 2018 and at the close of the application, the CA assigned 400 MHz of spectrum to each of the three applicants⁵ as per their applications for deployment from April 2019 onwards for 5G services. In line with the established charging scheme for spectrum assigned administratively, assignees do not need to pay any SUF for the use of the spectrum⁶.

(c) The 3.3 GHz and 4.9 GHz bands

14. A total of 180 MHz of spectrum, including 100 MHz of spectrum in the 3.3 GHz band and 80 MHz of spectrum in the 4.9 GHz band, will be assigned by way of auction for the provision of public mobile services in the second half of 2019. The 4.9 GHz band has the advantage of being able to support the deployment of 5G services in any location in Hong Kong, whereas the 3.3 GHz band can be used for enhancing 5G indoor coverage⁷ in conjunction with spectrum in other frequency bands.

OTHER FACILITATION FOR 5G DEVELOPMENTS

15. Apart from the above spectrum assignments, other facilitating measures are also put in place to promote 5G development and to facilitate the early roll-out of network infrastructure.

⁵ The applicants were Hong Kong Telecommunications (HKT) Limited, China Mobile Hong Kong Company Limited and SmarTone Mobile Communications Limited.

⁶ As the total amount of spectrum to be assigned accounts for less than 75% of the total available spectrum supply in the 26/28 GHz bands, no SUF will be charged.

⁷ The 3.3 GHz spectrum will be deployed for indoor use only to avoid causing interference to existing radiolocation services outdoors.

Fibre-based network in Remote Areas

16. As reported to this Panel on 14 May 2018⁸, we are implementing a rural broadband subsidy scheme to provide financial incentives to telecommunications operators for extending fibre-based network to villages in remote locations in the New Territories and on the outlying islands. We have completed consultation with the nine relevant District Councils in the New Territories and outlying islands and the Rural Committees concerned and have drawn up tender briefs for six projects. According to the latest on site information/assessment, fibre-based network will be extended to about 235 remote villages across nine districts, benefitting about 110 000 villagers. We plan to invite tenders in the second quarter of 2019.

Proactively Opening Up Suitable Government Premises for Mobile Network Operators to Install Radio Base Stations

17. In the course of building their 5G infrastructure, mobile network operators will need to install a large number of radio base stations. To facilitate operators to roll out their networks in a timely manner, we have just launched a pilot scheme in March this year to proactively open up suitable Government premises for installation of radio base stations. With the support of the Food and Environmental Hygiene Department, Leisure and Cultural Services Department, Government Property Agency, Planning Department, Lands Department, Electrical and Mechanical Services Department and Architectural Services Department, over 1 000 government premises have been shortlisted. The OFCA has also adopted streamlined application processes as a facilitation measure to help operators install radio base stations in a more efficient manner. Subject to the feedback of this pilot scheme, we will review if this facilitation measure would be adopted in other suitable premises.

Additional supply of spectrum

18. As we have reported to this Panel at the meeting in February 2019⁹, after the switching off of analogue television broadcast on 30 November 2020, a total of 160 MHz of spectrum in the 600/700 MHz bands thus vacated will be deployed for telecommunications use, mainly for improving indoor mobile services, so as to relieve the currently congested indoor mobile hotspots, such as MTR stations. The CA plans to hold a

⁸ Vide LegCo Paper No. CB(4)1036/17-18(07).

⁹ Vide LegCo Brief CCIB/A 200-10-40/1(C).

public consultation on the assignment arrangement and the relevant spectrum is preliminarily expected to be available for use from the second half of 2021 the earliest.

NEXT STEP

19. To implement the decisions on the auctions and SUF arrangements in relation to the 3.5 GHz, 3.3 GHz and 4.9 GHz bands, we will table the relevant subsidiary legislation for consideration of the Legislative Council through the negative vetting procedure. Our aim is to complete the exercise before the end of this legislative session. Auctions of the above bands are expected to be held in the second half of 2019. In line with established practice, SCED will take into account all relevant factors and decide on the auction reserve prices nearer the time of auctions.

20. The CA will continue to actively explore additional spectrum in other frequency bands for public mobile services. Any new spectrum suitable for 5G services will be released to the market as soon as it is available. In addition, mobile network operators also have the flexibility to re-farm spectrum in other frequency bands used for the second to the fourth generation mobile services under their existing licences to provide 5G services in different districts of Hong Kong.

ADVICE SOUGHT

21. Members are invited to note and comment on the content of this paper.

**Commerce and Economic Development Bureau
(Communications and Creative Industries Branch)
Office of the Communications Authority
May 2019**

**Summary of Assignment Arrangements of 5G Spectrum
in Various Frequency Bands**

Frequency Band	26 GHz and 28 GHz bands		3.3 GHz band	3.5 GHz band	4.9 GHz band
	<i>Large scale public mobile services</i>	<i>Localised innovative wireless services</i>			
Amount of Spectrum	3 700 MHz	400 MHz	100 MHz	200 MHz	80 MHz
Condition of Use	Territory-wide use	Specified areas of no more than 50 square km	Indoor use only	Territory-wide use ¹	Territory-wide use
Assignment Method	Administrative assignment	Administrative assignment	Auction	Auction	Auction
SUF	Not charging SUF if less than 75% of the spectrum assigned or occupied ²	Not charging SUF if less than 75% of the spectrum assigned or occupied ³	To be determined by auction	To be determined by auction	To be determined by auction
Date to Invite Application	Dec 2018	Second half of 2019	Second half of 2019	Second half of 2019	Second half of 2019
Target Assignment Date	Mar 2019 ⁴	Ditto	Ditto	Ditto	Ditto
Start Date of Use	Apr 2019	Ditto	Shortly after auction	Apr 2020	Shortly after auction

Notes

- 1 Any use within the restriction zones of Tai Po and Stanley shall comply with the relevant guidelines and directions to be issued by the CA.
- 2 \$21,600 per MHz per annum to be charged only if 75% or more of spectrum in these bands is assigned or occupied
- 3 \$1,080 per MHz per annum to be charged only if 75% or more of spectrum in these bands is assigned or occupied
- 4 1 200 MHz of spectrum was offered for assignment on 27 March 2019 to three mobile network operators (each with 400 MHz of spectrum).