

**Arrangements for Assignment of the Spectrum in the
600 MHz and 700 MHz Bands for the Provision of Public Mobile Services
and the Related Spectrum Utilisation Fee**

Consultation Paper

19 August 2020

PURPOSE

This paper is jointly issued by the Communications Authority (“CA”) and the Secretary for Commerce and Economic Development (“SCED”) to seek views and comments of the industry and other affected persons on the proposals in relation to the arrangements for allocation and assignment of a total of 140 MHz of spectrum within the frequency range of 614 – 806 MHz for the provision of public mobile services including fifth generation (“5G”) services, as well as the related spectrum utilisation fee (“SUF”).

BACKGROUND

2. Traditionally, spectrum in the 470 – 806 MHz band is used for broadcasting purposes. In view of the increasing demand for mobile telecommunications use, the 617 – 698 MHz and 703 – 803 MHz bands within the upper part of the broadcast band (i.e. the 614 – 806 MHz band) have been increasingly deployed by some economies to provide public mobile services, as these bands were identified by the International Telecommunication Union (“ITU”) for deployment of International Mobile Telecommunication (“IMT”) services¹ in specific countries.

3. In Hong Kong, the 470 – 806 MHz band is currently used for the transmission of analogue television and digital terrestrial television (“DTT”) services². Since DTT out-performs analogue TV in terms of picture quality and more importantly spectrum efficiency, the Government, in line with the worldwide trend,

¹ IMT is the generic term used by the ITU to designate broadband mobile systems based on third generation (3G), fourth generation (4G) and 5G technologies.

² Except for the 8 MHz of currently vacant spectrum in the 678 – 686 MHz band that was once deployed for broadcast-type mobile television service.

announced on 11 February 2019 the decision to switch off analogue television services (i.e. analogue switch off “ASO”) at 23:59 on 30 November 2020 and to start full digital television broadcasting from 1 December 2020³.

4. After ASO, all TV frequency channels⁴ currently being used in the 614 – 806 MHz band will be migrated to the 470 – 614 MHz band (“Channel Migration”) which enables the vacation of valuable spectrum in the 614 – 806 MHz band to address the growing demand for spectrum supporting high value-added mobile telecommunications services.

5. Among the spectrum vacated after ASO and Channel Migration, save for 2 x 10 MHz of spectrum in the 738 – 748 MHz band paired with 793 – 803 MHz band reserved for Government applications, 2 x 35 MHz of spectrum in the ranges of 703 – 738 MHz paired with 758 – 793 MHz (“700 MHz band”) will be made available in Hong Kong for territory-wide deployment to provide public mobile services; while 2 x 35 MHz of spectrum in the ranges of 617 – 652 MHz paired with 663 – 698 MHz (“600 MHz band”) will also be made available for indoor deployment to enhance the provision of public mobile services to indoor hotspots. They are collectively referred to as “600/700 MHz bands”.

6. The Office of the Communications Authority has completed the frequency coordination with the relevant Mainland authorities so that the deployment of spectrum in the 617 – 698 MHz and 703 – 803 MHz bands in Hong Kong and the Mainland (in particular Guangdong Province) post-ASO will not cause mutual interference with each other over the boundary⁵.

³ See <https://www.info.gov.hk/gia/general/201902/11/P2019021100515.htm>.

⁴ The lower part of the broadcast band in the range of 470 – 614 MHz will continue to be used for supporting broadcasting services. This will involve the migration of the Multiple Frequency Network channels currently shared by Television Broadcasts Limited and HK Television Entertainment Company Limited to Single Frequency Network (“SFN”) Channel 37 (598 – 606 MHz), as well as the migration of Radio Television Hong Kong’s SFN Channel 62 (798 – 806 MHz) to SFN Channel 27 (518 – 526 MHz). To avoid interruption to the viewing of DTT services by the general public, simulcasting the DTT signals at both the existing and new TV frequency channels will be implemented between April and November 2021.

⁵ As one of the specific countries registered under ITU for deploying the 703 – 803 MHz band for IMT service, the Ministry of Industry and Information Technology announced the change in allocation of spectrum in the frequency ranges of 703 – 743 MHz paired with 758 – 798 MHz from broadcasting services to mobile services on 1 April 2020. While the Mainland will continue to use the 600 MHz band for broadcasting purpose, Hong Kong can deploy the band for indoor mobile telecommunications use without harmful interference.

7. Against the above background, the CA sets out in this consultation paper the proposed amendment to the Hong Kong Table of Frequency Allocations for the 614 – 806 MHz band and the arrangements for assignment of 140 MHz of spectrum in the 600/700 MHz bands. SCED also sets out in this consultation paper his proposal for the arrangement of the SUF for the use of the two frequency bands concerned.

LEGAL AND REGULATORY FRAMEWORK

8. Under section 32G(1) of the Telecommunications Ordinance (Cap. 106) (“TO”), the CA has the statutory duty to promote the efficient allocation and use of the radio spectrum as a public resource of Hong Kong. Sections 32H(2) and 32I(1) of the TO empower the CA to allocate and assign radio frequencies and to designate which of them shall be subject to the payment of SUF following consultation with the telecommunications industry and other affected persons. Sections 32I(2) of the TO empowers SCED to prescribe the method for determining the SUF. Before exercising the respective statutory powers conferred on them by the TO, the CA and SCED jointly conduct the present public consultation.

9. Section 4(4) of the Communications Authority Ordinance (Cap. 616) stipulates that the CA, in performing its functions, must have regard to the following matters which appear to the CA to be relevant in the circumstances: (a) the fostering of an environment that supports a vibrant communications sector to enhance Hong Kong’s position as a communications hub in the region; (b) the encouragement of innovation and investment in the communications market; (c) the promotion of competition and adoption of best practices in the communications market for the benefit of the industry and consumers; and (d) acting in a manner consistent with the provisions of the Hong Kong Bill of Rights Ordinance (Cap. 383).

10. The Radio Spectrum Policy Framework promulgated by the Government in April 2007 (“Spectrum Policy Framework”)⁶ sets out the policy objectives and the guiding principle in spectrum management which the CA should take into account in discharging its spectrum management responsibilities under the TO. By a statement issued in April 2007, the former Telecommunications Authority (“TA”) (now the CA) explained that, in exercising his statutory powers under the TO, he would, in addition to all relevant considerations as required by law, give due regard

⁶ See <https://www.cedb.gov.hk/ccib/eng/legco/pdf/spectrum.pdf>.

to the Spectrum Policy Framework to the extent that there would be no inconsistency with the objectives and provisions of the TO⁷.

11. Pursuant to the Spectrum Policy Framework, the policy inclination is that a market-based approach will be used in spectrum management wherever the CA considers that there are likely to be competing demands from providers of non-Government services, unless there are overriding public policy reasons to do otherwise. The Spectrum Policy Framework also specifies that in the case of a spectrum re-farming exercise, an appraisal of the impacts of different options, including an option of “do nothing”, will be undertaken by the CA before a decision is taken.

PROPOSED AMENDMENT TO THE HONG KONG TABLE OF FREQUENCY ALLOCATIONS FOR THE 614 – 806 MHz BAND

12. According to the Radio Regulations of ITU, the 614 – 806 MHz band is allocated to fixed, mobile and broadcasting services on a co-primary⁸ basis in Region 3⁹. Under the Hong Kong Table of Frequency Allocations, the 614 – 806 MHz band is allocated to broadcasting service on a primary basis, with two blocks of 8 MHz in it (i.e. 678 – 686 MHz and 798 – 806 MHz) also allocated to mobile service on a co-primary basis. Taking into account the Government’s decision on and rationale for the implementation of DTT broadcasting and ASO, and the plan to make available spectrum in the 600/700 MHz bands for high value-added public mobile telecommunications services, the CA considers that, from spectrum management’s point of view, there are sound justifications and public interest reasons to vacate the 614 – 806 MHz band after ASO and re-allocate it for mobile telecommunications services to satisfy market demand and to fully realise the advantages of digital dividend for the benefits of the Hong Kong community at large. As mentioned in paragraph 8 above, the CA has the statutory duty to promote the efficient allocation and use of the radio spectrum as a public resource of Hong Kong. Having regard to

⁷ The former TA statement on the Spectrum Policy Framework is available at: http://tel_archives.ofca.gov.hk/en/tas/others/ta20070424.pdf/.

⁸ Radio stations of a secondary service shall neither cause harmful interference to radio stations of primary services to which frequencies are already assigned or to which frequencies may be assigned at a later date, nor claim protection from harmful interference from radio stations of a primary service to which frequencies are already assigned or may be assigned at a later date.

⁹ ITU divides the world into Region 1, Region 2 and Region 3, and for the purpose of radio spectrum management. China including Hong Kong situates in Region 3.

the guidance given in the Spectrum Policy Framework, the CA considers that the alternative option of “do nothing” (i.e. leaving the vacated spectrum unused) would not be justifiable from the angle of efficient use of spectrum.

13. In order to enable the use of the 600/700 MHz bands for the provision of public mobile services including 5G services in Hong Kong after the completion of Channel Migration to vacate the bands by end 2021, the CA proposes to re-allocate the 614 – 678 MHz and 686 – 798 MHz bands from broadcasting service to mobile service on a primary basis and remove the existing allocation of broadcasting service in the 678 – 686 MHz and 798 – 806 MHz bands. In other words, the entire 614 – 806 MHz band will be allocated to mobile service on a primary basis only. The proposed changes are in compliance with the ITU frequency allocation. The existing and proposed allocations of the 614 – 806 MHz band are depicted at Figure 1 and Figure 2 below.

Figure 1: Existing Allocation of the 614 - 806 MHz Band

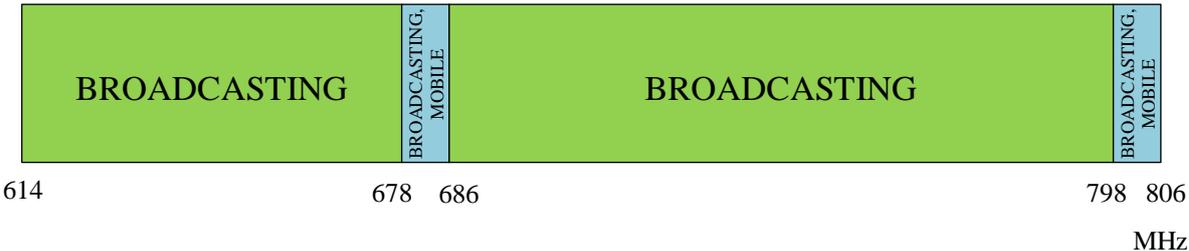
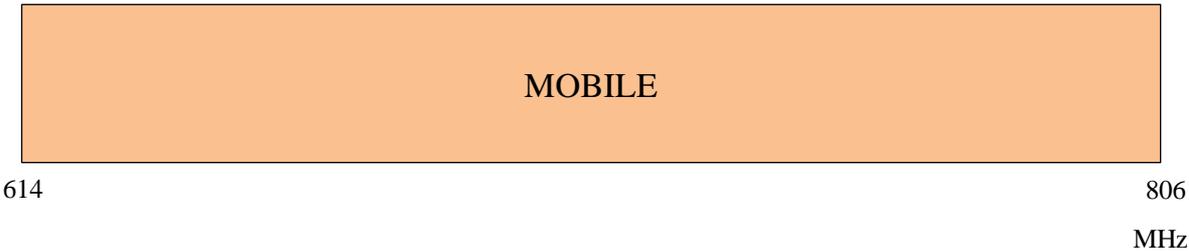


Figure 2: Proposed Allocation of the 614 – 806 MHz Band



Question 1: Do you have any views on the proposed changes of frequency allocation to mobile service for the entire 614 – 806 MHz band?

PROPOSED ARRANGEMENTS FOR ASSIGNMENT OF THE SPECTRUM IN THE 600/700 MHz BANDS

Demand for Spectrum in the 600/700 MHz Bands

14. The 600/700 MHz bands are the lowest frequency bands for 5G operation specified in the technical standards developed by the industry standardization body 3rd Generation Partnership Project (“3GPP”). Its long range radio propagation characteristics are particularly well suited for providing mobile coverage to wide areas and indoor locations. For the 700 MHz band, with the World Radiocommunication Conference 2015 of the ITU identifying it for the provision of IMT services, the band has been identified by major economies in Europe and Asia Pacific regions such as Germany, United Kingdom and Thailand for providing public mobile services. As to the 600 MHz band, it has been assigned for public mobile use in the United States. Other economies such as Canada and Mexico also have identified or are considering to identify the band or parts thereof for the provision of public mobile services. It is expected that 5G equipment and devices operating in the 600/700 MHz bands will become more commonly available in the market from 2021 onwards, particularly for the 700 MHz band following the announcement of ASO and re-allocation of the relevant spectrum for 5G services in the Mainland¹⁰.

15. At present, spectrum in the sub-1 GHz band, at 84.8 MHz in total, accounts only for less than 10% of the total spectrum currently deployed for the provision of public mobile services in Hong Kong. In the past, mobile network operators (“MNOs”) have repeatedly urged the CA to release spectrum in the 600/700 MHz bands for cost efficient provision of wide area network coverage of mobile services. The newly available spectrum in the 700 MHz band will provide the much needed additional spectrum capacity in the sub-1 GHz band to enhance the coverage of 5G services and underpin the Internet-of-things applications. Notwithstanding that the Mainland will continue to use the 600 MHz band for broadcasting services, it is technically feasible to deploy the 600 MHz band for public mobile services for indoor use in Hong Kong without mutual interference with the Mainland’s broadcasting services. It provides the much needed additional network capacity in congested or high traffic indoor mobile hotspots such as Hong Kong Convention and Exhibition Centre, Hong Kong International Airport, shopping malls and confined areas in the MTR system.

¹⁰ See footnote 5.

16. In view of the scarcity of the sub-1 GHz band spectrum, the keen interests expressed by the mobile industry, and the expected widespread availability of 5G standard compliant equipment and devices supporting the 600/700 MHz bands from 2021 onwards, the CA's assessment is that there are likely to be competing demands for spectrum in the 600/700 MHz bands when it is released to the market. According to the guiding principle in spectrum management as set out in the Spectrum Policy Framework, the CA proposes that a market-based approach should be adopted for assignment of the spectrum in the 600/700 MHz bands.

Assignment Approach

17. In the current case of the new spectrum to be made available for public mobile services in the 600/700 MHz bands, auction is regarded as the most appropriate market-based approach for the assignment of spectrum as scarce public resource since it provides a fair, transparent, objective and economically efficient means to determine to whom the spectrum should be assigned. Auction is also commonly used by many overseas economies for assigning spectrum for provision of public mobile services. The CA, therefore, proposes to assign the 140 MHz of spectrum in the 600/700 MHz bands by way of auction.

18. Similar to previous spectrum auctions, the CA considers that there should only be minimal qualification requirements for registering bidders' interest and for demonstrating their capability to provide satisfactory service. The CA proposes to impose the following qualification requirements on a bidder who is interested in participating in the auction of the spectrum in the 600/700 MHz bands. In short, an eligible bidder should –

- (a) lodge a specified amount of deposit which may be forfeited if the bidder violates the auction rules or fails to take up the licence after winning the auction; and
- (b) demonstrate its technical and financial capability to provide services in fulfilment of the licensing obligations to the satisfaction of the CA and submit any other relevant supporting information which the CA may deem necessary.

19. Subject to fulfilment of the above qualification requirements, the CA proposes that all interested parties may apply for participation in the auction to be conducted for the assignment of the spectrum in the 600/700 MHz bands.

Question 2: Do you have any views on assigning the spectrum in the 600/700 MHz bands by way of auction and allowing all interested parties to apply for participation in the auction?

Band Plan

20. In accordance with the harmonised band plan for the 600/700 MHz bands based on the Frequency Division Duplex (“FDD”) mode of operation¹¹ adopted worldwide, it is considered that the future network equipment and user terminals would likely adopt the FDD mode of operation stipulated in the relevant 3GPP standards. According to the 3GPP technical specifications for 5G equipment and devices, the allowable channel bandwidths for the 600 MHz band are 2 x 5 MHz, 2 x 10 MHz, 2 x 15 MHz and 2 x 20 MHz, and those for the 700 MHz band are 2 x 5 MHz, 2 x 10 MHz, 2 x 15 MHz, 2 x 20 MHz, 2 x 30 MHz and 2 x 40 MHz¹². The CA proposes to divide the 2 x 35 MHz of spectrum in each of the 600 MHz and 700 MHz bands into seven frequency blocks with a bandwidth of 2 x 5 MHz each, as shown respectively in Figure 3 and Figure 4 below. Under this proposal, individual bidders will be given the flexibility to acquire and aggregate contiguous blocks to form carriers of larger bandwidth according to their commercial and technical considerations.

Figure 3: Proposed Band Plan for the 600 MHz Band

	A1	A2	A3	A4	A5	A6	A7	
	5	5	5	5	5	5	5	
Lower band	617	622	627	632	637	642	647	652 MHz
Upper band	663	668	673	678	683	688	693	698 MHz

¹¹ The FDD mode of operation means that the uplink and downlink communications are separated in the frequency domain via different frequency bands.

¹² The 3GPP technical specification TS 38.104 entitled “NR; Base Station (BS) radio transmission and reception” specifies the allowable channel bandwidths for the 600/700 MHz bands, which is available at: <https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=3202>.

Figure 4: Proposed Band Plan for the 700 MHz Band

	B1	B2	B3	B4	B5	B6	B7	
	5	5	5	5	5	5	5	
Lower band	703	708	713	718	723	728	733	738 MHz
Upper band	758	763	768	773	778	783	788	793 MHz

Question 3: Do you have any views on the proposal that the spectrum in each of the 600 MHz and 700 MHz bands be divided into seven frequency blocks each with a bandwidth of 2 x 5 MHz?

Spectrum Cap

21. Having considered the overall spectrum holding in various frequency bands by the incumbent MNOs and their holdings of 5G spectrum, as well as the excellent radio propagation and indoor penetration characteristics of the 600/700 MHz bands, the CA proposes to set a cap for each bidder at 30 MHz (i.e. 2 x 15 MHz) for each of the 600 MHz and 700 MHz bands, in order to prevent over-concentration of spectrum holding in the hands of any individual MNO.

22. If the above proposed spectrum cap is applied, a successful bidder of the spectrum in the 600/700 MHz bands will at most acquire a total of 60 MHz or 43% of the spectrum in the bands. This should not give rise to any competition concern as each of the major MNOs have been assigned with hundreds of MHz of spectrum across various frequency bands, including (a) spectrum in the 3.3 GHz, 3.5 GHz and 4.9 GHz bands which are deployed for the provision of 5G services; and (b) other spectrum being used for the provision of the second, third and fourth generation (“2G”, “3G”, “4G”) mobile services which could also be re-farmed for the provision of 5G services in the future. The existing distribution of spectrum among major MNOs is given in Table 1 at the **Annex**. If the incumbent MNO that currently holds the largest amount of spectrum acquires in total 60 MHz of spectrum in the 600/700 MHz bands, its share in the spectrum available for the provision of public mobile services will slightly increase from 30.5% to 32%¹³, while the shares of spectrum holding by the other major MNOs will be in the range of 18% – 30%. Furthermore, the CA has

¹³ Calculation of spectrum holding shares by MNOs does not include spectrum assignments in the 26 GHz and 28 GHz bands, as this millimetre-wave spectrum is of different radio propagation characteristics and serves different purposes as compared to the low and mid-band frequencies in the provision of mobile services.

planned to release more spectrum in different frequency bands for mobile use in the coming few years¹⁴. In view of the above, the proposed spectrum caps should not give rise to over-concentration of spectrum holding in the hands of any individual market player and will unlikely risk any impact on effective competition in the mobile telecommunications market.

Question 4: Do you have any views on the proposed spectrum cap of 30 MHz in each of the 600 MHz and 700 MHz bands to be imposed on each bidder?

Auction Format

23. For the 600/700 MHz bands, the CA proposes to adopt the simultaneous multiple-round ascending (“SMRA”) auction format for auctioning these two bands. This auction format was mostly used in auctions conducted in the past and the industry is familiar with it.

Question 5: Do you have any views on the adoption of the SMRA auction format for the assignment of the spectrum in the 600/700 MHz bands?

LICENSING ARRANGEMENT

Licensing and Validity Period

24. The CA will grant a new unified carrier licence (“UCL”) to each successful bidder of the spectrum in the 600/700 MHz bands. According to Schedule 2 of the Telecommunications (Carrier Licences) Regulation (Cap. 106V), UCLs are issued with a period of validity of 15 years from the day on which they are issued. The validity period of the frequency assignment will last for 15 years and be coterminous with the term of the newly issued licence. For incumbent licensees who successfully acquire spectrum in the proposed auction, they may apply to the CA for combining their existing UCLs with the new UCL to be issued.

¹⁴ Please refer to the Spectrum Release Plan for 2020 – 2022 issued by the CA on 10 January 2020, which is available at:
https://www.ofca.gov.hk/filemanager/ofca/common/Industry/broadcasting/spectrum_plan2020_en.pdf.

Restriction on Frequency Swap

25. In order to facilitate competitive bidding in the auction and realise the full market value of each individual frequency block, the CA proposes that swapping of any frequency assignment in the 600/700 MHz bands within the first five years of the frequency assignment will generally not be considered.

Technology Neutrality

26. In the assignment of spectrum for the provision of public mobile services, the CA in general adopts a technology neutral approach whereby assignees are free to use whatever technology they choose based on widely recognised standards for service provision. As there is no overriding reason worth special consideration, the CA will adhere to this technology neutral approach in assigning and licensing the spectrum in the 600/700 MHz bands. The assignees may use the spectrum assigned for providing 5G or other generations of mobile services under their UCLs so long as the technology to be used is a widely recognised standard. However, to avoid causing any harmful interference among prospective assignees in the 600/700 MHz bands, the use of the spectrum should be in line with the band plan proposed in paragraph 20 above, which is based on the FDD mode of operation stipulated in the relevant 3GPP standards.

Network and Service Rollout Obligations

27. In order to prevent spectrum hoarding and to ensure that the auctioned spectrum will be put into efficient use for the timely provision of advanced telecommunications services for the benefit of the general public, the CA will in general impose network and service rollout obligations on successful bidders of a spectrum auction.

28. Since the spectrum in the 600 MHz can only be deployed indoors, drawing reference to the network rollout requirement for the previous assignment of the spectrum in the 3.3 GHz band¹⁵ which is also for indoor deployment only, the CA proposes to require each successful bidder of the spectrum in the 600 MHz band to establish at least 400 indoor base stations with use of the assigned spectrum within the first five years from the date of spectrum assignment.

¹⁵ Each assignee of spectrum in the 3.3 GHz band is required to establish at least 400 indoor base stations operating in the band within the first five years from the date of assignment on 30 December 2019.

29. As for the spectrum in the 700 MHz band, it can be deployed in both indoor and outdoor areas on a territory-wide basis. Having regard to the network rollout requirements prescribed for successful bidders of spectrum in other sub-1 GHz band¹⁶ with similar radio propagation and indoor penetration characteristics, the CA proposes to require each successful bidder of the spectrum in the 700 MHz band to roll out its network and services with use of the assigned spectrum for providing a minimum coverage of 90% of the population within the first five years from the date of spectrum assignment.

30. It is also proposed that each successful bidder of spectrum in either or both of the 600 MHz and 700 MHz bands be required to lodge a performance bond for guaranteeing its compliance with the corresponding network and service rollout obligations specified in paragraphs 28 and 29 above. The amount of the performance bond will be specified by the CA nearer the time of the auction.

Question 6: Do you have any views on the network and service rollout obligations proposed to be imposed on the successful bidders of the spectrum in the 600/700 MHz bands and the associated performance bond proposed for guaranteeing compliance?

SPECTRUM UTILISATION FEE

31. Under the Spectrum Policy Framework, SUF will in principle be applicable to all non-Government use of radio spectrum. Therefore, SUF should be paid by successful bidders for use of the spectrum in the 600/700 MHz bands.

32. While the exact amount of SUF will be determined by auction, each frequency block will be subject to a reserve price which should be set at a level that represents the minimum base value of the spectrum for the purpose of kick-starting the competitive bidding process. The auction reserve price will be specified by SCED nearer the time of the auction.

33. Regarding the method of payment of SUF, SCED proposes that spectrum assignees will be given a choice to pay the SUF either by –

¹⁶ For the re-assignment of spectrum in the 900 MHz band which will take effect in 2021, each assignee is required to provide a minimum coverage of 90% of the population of Hong Kong within the first five years from the date of assignment on 12 January 2021.

- (a) lump sum payment upfront, which is the lump sum amount determined in auction; or
- (b) annual instalments, with the first instalment equivalent to the lump sum amount obtained in (a) above divided by 15 (i.e. the number of years of assignment), and subsequent instalments increased every year by a pre-set percentage which aims to reflect the time value of money to the Government.

Question 7: Do you have any views on the proposal in relation to the setting and collection of SUF as specified in paragraphs 32 and 33 above?

INVITATION OF COMMENTS

34. This consultation paper sets out preliminary views as well as respective proposals of the CA and SCED on the arrangements for allocation and assignment of the 140 MHz of spectrum in the 600/700 MHz bands for the provision of public mobile services and the related SUF. For the avoidance of doubt, all the information provided and views expressed in this consultation paper are for the purpose of discussion and consultation only. Nothing in this consultation paper represents or constitutes any decision made by the CA or SCED. The consultation contemplated by this consultation paper is without prejudice to the exercise of the powers by the CA and SCED under the TO or any subsidiary legislation thereunder.

35. The CA and SCED will carefully consider the submissions received in this public consultation and are minded to make a decision on the arrangements for assignment of the 140 MHz of spectrum in the 600/700 MHz bands and the related SUF in the first quarter of 2021. Taking into account the time required for making the relevant legislative amendments and completion of the Channel Migration works as explained in paragraph 4 above, the spectrum concerned is expected to be put to auction in the fourth quarter of 2021 and assigned before end 2021.

36. Any person who would like to respond to this public consultation should do so on or before **15 September 2020**. **Late submissions would not be considered.** The CA and SCED may publish all or part of the views and comments received, and disclose the identity of the source in such manner as they see fit. Any part of the submissions considered commercially confidential should be clearly marked. The CA

and SCED would take such markings into account in making the decision as to whether or not to disclose such information. Submissions should be sent to –

Office of the Communications Authority
29/F Wu Chung House
213 Queen's Road East
Wanchai, Hong Kong
(Attention: Principal Regulatory Affairs Manager (R22))

Fax: 2803 5112
Email: consult-600-700MHz@ofca.gov.hk

An electronic copy of the submission should be provided by email to the address indicated above.

**Commerce and Economic Development Bureau
(Communications and Creative Industries Branch) and
Office of the Communications Authority
19 August 2020**

**Table 1: Distribution of spectrum below 6 GHz by major operators
as at 30 September 2021 (MHz)**

	850/ 900 MHz	900 MHz [^]	1800 MHz [^]	1.9 - 2.2 GHz	2.3 GHz	2.5/ 2.6 GHz*	3.3 GHz	3.5 GHz	4.9 GHz	Total	Share in Total
CMHK		10	40	19.6	30	40	20	60	40	259.6	27.8%
HKT	15	20	40	29.6		60	30	50	40	284.6	30.5%
Hutchison	10	10	30	29.6	30	20	30	40		199.6	21.4%
SmarTone	10	10	40	39.6		20	20	50		189.6	20.3%
Total	35	50	150	118.4	60	140	100	200	80	933.4	100%

Notes:

- ([^]) Distribution of the spectrum in the 900 MHz and 1800 MHz bands is based on the arrangements for re-assignment of the spectrum concerned to be effective on 12 January 2021 and 30 September 2021 respectively.
- (*) Assuming that the 40 MHz of spectrum in the 2.5/2.6 GHz band held by Genius Brand Limited, a joint venture between HKT and Hutchison, is divided equally between HKT and Hutchison for calculation purpose.