



**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**

**&**

**Arrangements for the Frequency Spectrum in the 850 MHz  
Band upon Expiry of the Existing Assignment for Public Mobile  
Telecommunications Services and the Related Spectrum  
Utilisation Fee**

**Response to Consultation Papers**

13 October 2020



## INTRODUCTION

1. Hong Kong Telecommunications (HKT) Limited (“**HKT**”) welcomes the opportunity to provide its views and comments in response to the proposals put forward by the Secretary for Commerce and Economic Development (“**SCED**”) and the Communications Authority (“**CA**”) in the consultation papers issued on 19 August 2020 regarding *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* (“**600/700 MHz Consultation Paper**”) and *Arrangements for the Frequency Spectrum in the 850 MHz Band upon Expiry of the Existing Assignment for Public Mobile Telecommunications Services and the Related Spectrum Utilisation Fee* (“**850 MHz Consultation Paper**”) (collectively, the “**Consultation Papers**”).

## Background

2. The 600/700 MHz Consultation Paper deals with the assignment of new spectrum being released for mobile services in the range of 617 – 652 MHz paired with 663 – 698 MHz (“**600 MHz band**”) and in the range of 703 – 738 MHz paired with 758 – 793 MHz (“**700 MHz band**”) arising from the forthcoming switch off of analogue television services on 30 November 2020 (“**Analogue Switch Off**” or “**ASO**”) and the commencement of full digital television broadcasting from 1 December 2020.

3. On the other hand, the 850 MHz Consultation Paper looks at the re-assignment arrangements for spectrum in the 825 – 832.5 MHz paired with 870 – 877.5 MHz (“**850 MHz band**”) which is currently assigned to a mobile operator, but which will become available for re-assignment upon expiry of the existing assignment term on 19 November 2023. The current holder of this frequency block was assigned the spectrum on the basis that the CDMA2000 family of standards adopted by 3GPP2 must be used with the spectrum to provide mobile services.

4. The subject spectrum bands in the two Consultation Papers are in close proximity to each other. Accordingly, HKT considers it necessary to



consider these spectrum bands together in order to provide appropriate comments on their respective assignment arrangements.

## Key Points

### *Restriction of 600 MHz band to indoor use*

5. In paragraphs 5 and 6 of the 600/700 MHz Consultation Paper, the CA explains that the spectrum being released in Hong Kong for mobile services in the 600 MHz band must be restricted to indoor use in order to avoid harmful interference with broadcasting signals in the Mainland (particularly in Guangdong Province) since the Mainland will continue to use the 600 MHz band for broadcasting purposes. This, however, results in a very restricted use for the spectrum in Hong Kong and is an unsatisfactory solution given the particularly valuable nature of this sub-1 GHz spectrum band to mobile services.

6. Instead of limiting the spectrum in the 600 MHz band to indoor use across the whole territory, HKT suggests that the CA should consider allowing the spectrum to be used both indoor and outdoor but imposing a “restriction zone” along the area bordering Hong Kong and the Mainland, or any particular areas where interference with Mainland broadcasting signals is likely to occur, such that the 600 MHz band is only permitted to be used indoors in these areas. This could then resolve the problem of interference between mobile signals in Hong Kong and broadcasting signals in the Mainland and allow the 600 MHz band to be used more efficiently.

7. HKT would note that restriction zones were previously used by the CA as a solution to the assignment of the 3.5 GHz band spectrum<sup>1</sup> in order to avoid interference between mobile and satellite signals in certain parts of Hong Kong. Adopting this kind of solution again would similarly allow the 600 MHz band to be used more efficiently.

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<sup>1</sup> Auction of radio spectrum in the 3.5 GHz band which took place in October 2019.

## *Separate 600 MHz band auction and combined 700/850 MHz band auction*

8. In the 600/700 MHz Consultation Paper, the CA has proposed a single auction of the 600 MHz band and the 700 MHz band. However, since the 600 MHz band will carry restrictions on how it can be used (i.e. for indoor use only at specific or all locations), it is fundamentally different in nature to the 700 MHz band. Accordingly, HKT considers it more appropriate for the 600 MHz band to be auctioned separately from the 700 MHz band.

9. On the other hand, given that the 700 MHz band and the 850 MHz band are comparable in terms of technical characteristics and both carry no restrictions on how they can be used, it is feasible and logical for these bands to be combined into one single auction.

10. Despite the 700 MHz band being new spectrum and the 850 MHz band being a re-assignment of existing spectrum in use, the 850 MHz band can effectively also be treated as the release of new spectrum (and hence no different to the 700 MHz band) since:

- (i) The current licence condition requiring the “CDMA2000 family of standards adopted by 3GPP2” to be used with the 850 MHz band will be removed in the new assignment term, and the spectrum will be re-assigned on a technology neutral basis in line with new spectrum which has been released by the CA in the past; and
- (ii) No customers are currently using the 850 MHz band in Hong Kong (due to the CDMA2000 standard being obsolescent), thus there will be no service continuity issues.

## *Band Plan and Auction Format*

11. While the allowable channel bandwidths for 5G equipment and devices per the 3GPP technical specifications in respect of the 600 MHz band and the 700 MHz band start from 2 x 5 MHz, in practical terms, operators participating in the spectrum auction would be seeking to obtain at least one contiguous block of 2 x 10 MHz in the 600 MHz band and/or 700 MHz band.



12. On this basis, HKT would recommend that both the 600 MHz band and 700 MHz band be divided up into three blocks of 2 x 10 MHz and one remaining block of 2 x 5 MHz in order to make it easier for bidders to acquire the required contiguous blocks of spectrum.

13. As this would result in uneven sized blocks<sup>2</sup>, a Simultaneous Multiple Round Ascending (“**SMRA**”) type auction (in which bidders place bids on specific blocks of spectrum), as proposed in the 600/700 MHz Consultation Paper, would be appropriate.

14. If, on the other hand, the CA decides to stick to its original proposal and split the 600 MHz band and 700 MHz band into equal blocks of 2 x 5 MHz, then an SMRA type auction would make it more difficult for bidders to acquire contiguous spectrum blocks and hence, in this case, a Clock auction (which ensures bidders are assigned contiguous blocks) would be more suitable. Indeed, a Clock format was adopted in the auction of the 3.3 GHz and 3.5 GHz bands in November 2019 and October 2019 respectively.

### Detailed Response to Consultation Papers

15. In the following sections of this submission, HKT provides its comments in response to each of the specific questions contained in the Consultation Papers. **Part A** deals with the questions asked in the 600/700 MHz Consultation Paper while **Part B** deals with the questions raised in the 850 MHz Consultation Paper.

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<sup>2</sup> In the case of a combined 700/850 MHz band spectrum auction as suggested by HKT, the size of the frequency blocks on offer will be even more varied, ranging from 2 x 5 MHz to 2 x 7.5 MHz to 2 x 10 MHz.

## **Part A**

### **Comments in Response to the Specific Questions raised in the Consultation Paper on**

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



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

16. At present, in the Hong Kong Table of Frequency Allocations, the 614 – 806 MHz range is allocated to broadcasting services on a primary basis, except for 2 small blocks<sup>3</sup> of spectrum which are also allocated to mobile services on a co-primary basis.

17. Following ASO, spectrum in the 614 – 806 MHz range will no longer be required for broadcasting services and hence, consistent with the Government's plans to make more spectrum available for high value-added public mobile telecommunications services, the CA considers it appropriate to allocate the entire 614 – 806 MHz range to mobile services on a primary basis. This allocation would be consistent with the ITU's Radio Regulations for Region 3 to which Hong Kong belongs.

<p><b>Question 1:</b> <i>Do you have any views on the proposed changes of frequency allocation to mobile service for the entire 614 – 806 MHz band?</i></p>
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18. HKT agrees with the CA's proposal to allocate the entire 614 – 806 MHz range to mobile service on a primary basis. In fact, this is a necessary first step in order to enable mobile operators to make use of the spectrum which has been vacated by the broadcasters following ASO.

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<sup>3</sup> Namely, the 678 – 686 MHz and 798 – 806 MHz range.

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

### Demand for Spectrum in the 600/700 MHz Bands

19. The CA considers that there are likely to be competing demands for spectrum in the 600/700 MHz band on the basis of the following:

- The 600/700 MHz band falls within the sub-1 GHz spectrum range which is particularly well suited to providing mobile coverage to wide areas and indoor locations, yet, at present, spectrum in the sub-1 GHz range accounts for less than 10% of the total spectrum currently deployed for the provision of mobile services in Hong Kong. Sub-1 GHz spectrum is therefore in short supply;
- In the past, mobile operators have asked the CA to release spectrum in the 600/700 MHz band for cost efficient provision of wide area coverage of mobile services, so keen interest in the spectrum has already been expressed; and
- From 2021 onwards, it is expected that 5G equipment and devices operating in the 600/700 MHz band will become commonly available in the market.

20. HKT, however, considers that the existence of competing demand for spectrum cannot be truly ascertained until operators fully understand the terms, conditions and pricing of the relevant spectrum and then react to these. In practical terms, this means the real demand for spectrum cannot be assessed until operators are presented with the details of the spectrum and are required to express their demand for the spectrum. Depending on the amount of spectrum required by each operator and the amount of spectrum available, the CA should then have a more realistic idea as to whether competing demand exists.

21. Accordingly, HKT would suggest that, as a matter of general procedure, the CA undertake a more stringent assessment before concluding there is competing demand for any spectrum blocks to be released. At the very least, the CA could invite the industry and other



interested parties to express their interest in using the spectrum blocks in question, similar to the exercise conducted for the 26/28 GHz band in December 2017.

22. Nevertheless, for the purposes of responding to this submission, HKT will adopt the CA's assumption that competing demand does exist for the spectrum.

## Assignment Approach

23. Given that the CA considers there are likely to be competing demands for spectrum in the 600 MHz band and the 700 MHz band, based on the Radio Spectrum Policy Framework<sup>4</sup>, a market-based approach will be used to assign the spectrum.

24. As in past spectrum assignments, the CA proposes to use an auction process to determine assignment of the spectrum, with minimal requirements being imposed on interested bidders in order to qualify for participation in the auction, namely the lodging of deposit and the ability to demonstrate technical and financial capability to provide service in accordance with the licence to be issued in respect of the spectrum.

25. All interested parties, including the existing mobile operators, will be permitted to apply for participation in the auction.

<p><b>Question 2:</b> <i>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?</i></p>
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26. Given that the spectrum being made available is new spectrum and not a re-assignment of spectrum in existing use, on the basis that the CA assumes competing demand for the spectrum, HKT does not object to the use of an auction to assign the spectrum.

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<sup>4</sup> Radio Spectrum Policy Framework promulgated by the Government in April 2007.



27. As HKT has already explained, it would be preferable for the 600 MHz band auction to be conducted separately to the auction of the 700 MHz band.

28. Placing no restrictions on who may participate in the auction(s) (as long as they satisfy the minimal requirements)<sup>5</sup> would also be consistent with the application arrangements for previous spectrum auctions and hence HKT has no objection.

### Band Plan

29. Based on the harmonized band plan for the 600/700 MHz band adopted worldwide and the technical specifications by 3GPP for 5G equipment and devices, the allowable channel bandwidths for the 600 MHz band range from 2 x 5 MHz up to 2 x 20 MHz, whereas those for the 700 MHz band range from 2 x 5 MHz up to 2 x 40 MHz.

30. The CA intends to adopt the lowest common denominator of 2 x 5 MHz and hence proposes the following band plans for the 600/700 MHz band, effectively making available seven blocks of 2 x 5 MHz spectrum in each of the 600 MHz band and 700 MHz band as follows:

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

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<sup>5</sup> HKT would, nevertheless, urge the CA to impose more stringent “minimal requirements”, particularly on new entrants, in order to ensure that successful bidders of the spectrum are able to make the most valuable use of the frequency bands and avoid a repeat of “The 21 ViaNet Disgrace”. See Appendix E of HKT’s submission in response to the Consultation Paper on *Arrangements for the Frequency Spectrum in the 900 MHz and 1800 MHz Bands upon Expiry of the Existing Assignments for Public Mobile Telecommunications Services and the Spectrum Utilisation Fee* (18 May 2016) which outlines the failure of 21 ViaNet, a new market entrant, to make use of the spectrum it acquired via auction in 2012 to provide mobile services.

	B1	B2	B3	B4	B5	B6	B7	
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?*

31. Although the smallest allowable channel bandwidth for 5G equipment and devices specified by 3GPP for the 600/700 MHz band is 2 x 5 MHz, in practical terms, operators participating in the spectrum auction(s) would be seeking to obtain at least one contiguous block of 2 x 10 MHz so that the most efficient use can be made of the spectrum. On this basis, HKT would suggest that both the 600 MHz band and 700 MHz band be divided up into three blocks of 2 x 10 MHz and one remaining block of 2 x 5 MHz in order to make it easier for bidders to acquire a contiguous 2 x 10 MHz block as follows:

Proposed 600 MHz Band Plan

	A1	A2	A3	A4	
Lower Band	617	622	632	642	652 MHz
Upper Band	663	668	678	688	698 MHz

or

	A1	A2	A3	A4	
Lower Band	617	627	637	647	652 MHz
Upper Band	663	673	683	693	698 MHz

32. For the 600 MHz band, HKT would suggest that the 2 x 5 MHz block be put at either end of the frequency range in order to allow for the possibility of this spectrum block being combined with spectrum being released in the adjacent band in the future in order to form a 2 x 10 MHz block.

33. As for the 700 MHz band, HKT would note that the Government is currently occupying 2 x 10 MHz of spectrum located at the upper end of the frequency range directly next to the spectrum blocks proposed to be released by the CA:

	B1	B2	B3	B4	B5	B6	B7	Gov	
Lower Band	703	708	713	718	723	728	733	738	748 MHz
Upper Band	758	763	768	773	778	783	788	793	803 MHz

34. Given that, as noted in paragraph 2 of the 600/700 MHz Consultation Paper, some economies have already started deploying the full 703 – 803 MHz band for the provision of mobile services in response to increasing demand for such services, it would make sense for the Government to critically review its spectrum requirements in this band and consider whether it could vacate this band entirely or at least release part of its current holding in order to make more spectrum available for mobile services in Hong Kong.

35. For instance, even if it were only possible for the Government to free up 2 x 5 MHz in the 738 – 743 MHz paired with 793 – 798 MHz range, this would enable a fourth block of 2 x 10 MHz to be created for auction for mobile services instead of just three blocks of 2 x 10 MHz plus one block of 2 x 5 MHz as follows:

Proposed 700 MHz Band Plan

	B1	B2	B3	B4	Gov	
Lower Band	703	713	723	733	738	748 MHz
Upper Band	758	768	778	788	793	803 MHz

or, if 2 x 5 MHz is freed up from Government use spectrum:

	B1	B2	B3	B4	Gov	
Lower Band	703	713	723	733	743	748 MHz
Upper Band	758	768	778	788	798	803 MHz

## Spectrum Cap

36. After taking into account the existing spectrum holdings of the incumbent mobile operators, the CA proposes to set a cap for each bidder of 30 MHz in the 600 MHz band as well as the 700 MHz band. The CA regards such a cap as being sufficient to prevent an over-concentration of spectrum holding by any single mobile operator and hence avoid giving rise to any competition concerns.

**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?*

37. Firstly, as a matter of principle, HKT is not in favour of imposing spectrum caps unless there is a need to address a clearly identified competition concern. Restricting the amount of spectrum that can be acquired by a single operator is effectively preventing that operator from achieving economies of scale in using the spectrum with its equipment.

38. In paragraph 22 of the 600/700 MHz Consultation Paper, the CA explains that with a cap of 30 MHz in place, the maximum amount of spectrum which an operator would be able to hold in this band (i.e. 60 MHz) would be limited to 43% of the total spectrum being made available in the 600/700 MHz band (i.e. 140 MHz). As a result, no competition concerns would arise since each of the major mobile operators have already been assigned hundreds of MHz of spectrum across various frequency bands, including spectrum that can be used for 5G mobile services as well as 2G/3G/4G spectrum that can also be refarmed for 5G use.

39. In particular, the CA suggests that even if the operator who currently holds the largest amount of spectrum (i.e. HKT) were to acquire the maximum permitted 60 MHz of spectrum in the 600/700 MHz band, that operator's share of the total spectrum available for mobile services would only increase slightly from 30.5% to 32%, hence this would unlikely risk any adverse impact on effective competition in



the mobile telecommunications market, especially since the CA intends to release more spectrum in different frequency bands in the future.

40. However, the CA has not explained why it is necessary to impose any spectrum cap at all. There is no analysis or consideration of whether anti-competitive effects would result even if the operator who currently holds the largest amount of spectrum were permitted to, and subsequently acquires, the majority (if not all) of the spectrum being offered in the 600/700 MHz band. Specifically, the CA has failed to carry out an evaluation to determine (based on a rigorous analysis of the market) what level of spectrum holding needs to be attained by a single operator before there can be said to be competition concerns and what these competition concerns might be. Without such an analysis, it is difficult to see how any spectrum caps can be justified.

41. Secondly, the CA has not demonstrated that there is a clear adverse relationship between the amount of spectrum held by an operator (which is merely one of the inputs enabling an operator to provide mobile services) and the state of competition in the mobile services market. The CA assumes, without any explanation or analysis, that a significant spectrum holding in the hands of an individual market player will automatically lead to an adverse impact on effective competition in the mobile services market.

42. Technically speaking, an operator who does not possess sufficient spectrum to meet its required capacity to supply mobile services can, to a certain extent, compensate for this by installing more cell sites. Also, holding large stocks of spectrum alone does not guarantee an increase in the number of subscribers for an operator or automatically bring about a higher market share. The operator still needs to attract customers to subscribe to its services. It is therefore difficult to see how an over-concentration of spectrum alone would be sufficient to raise competition concerns.

43. Thirdly, even if the CA is justified in setting a spectrum cap, it is unreasonable for the exact same cap to apply to all mobile operators regardless of their market share. Logically, the greater the number of subscribers sitting on an operator's network, the more spectrum that

operator needs to continue providing its mobile services or offer new services to its customers. Spectrum caps, if they are to be imposed, must be tailored to reflect the relative market share of each mobile operator.

## Auction Format

44. The CA proposes to use an SMRA format auction to assign the spectrum on the basis that this type of auction was mostly used in auctions conducted in the past and is a type of auction with which the industry is familiar.

<p><b>Question 5:</b> <i>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?</i></p>
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45. The CA has specified in the 600/700 MHz Consultation Paper that the spectrum to be released in the 600 MHz band can only be used indoors. This makes the nature of the spectrum completely different to that in the 700 MHz band. As such, it would not be appropriate to make available both the 600 MHz band and the 700 MHz band in the same auction. HKT would, accordingly, suggest that separate auctions be conducted for the 600 MHz and 700 MHz bands.

46. On the contrary, as explained earlier, given the similarity in characteristics between the 700 MHz band and the 850 MHz band, these two frequency bands should be auctioned together.

47. If HKT's proposal to divide the 600 MHz band and 700 MHz band into blocks of 2 x 10 MHz (and one remaining block of 2 x 5 MHz) is accepted, then HKT would find it acceptable to adopt an SMRA auction format as the spectrum can be readily acquired by bidders in contiguous blocks of 20 MHz (i.e. 2 x 10 MHz). Indeed, the SMRA auction format has been used in several past spectrum auctions and is a format with which the industry is well familiar.

48. On the other hand, if the CA keeps to its original proposal to split the 600 MHz band and 700 MHz band into smaller blocks of 2 x 5 MHz,



bidders would have some difficulty acquiring contiguous blocks of 2 x 10 MHz spectrum if an SMRA auction format were adopted. In this case, HKT would suggest that a Clock auction format be used in order to make it easier for bidders to acquire contiguous spectrum blocks. Indeed, such a format was adopted for the 3.3 GHz band and 3.5 GHz band spectrum auctions which took place in November 2019 and October 2019 respectively.



## LICENSING ARRANGEMENT

### Licensing and Validity Period

49. As with previous spectrum assignments, the CA proposes to assign the spectrum in the 600/700 MHz band for a period of 15 years. Bidders who successfully acquire the spectrum at auction will be granted a new Unified Carrier Licence (“UCL”) which will be coterminous with the 15 year spectrum assignment period. Incumbent licensees may apply to the CA to combine their existing UCL with the new licence.

50. In principle, HKT supports longer spectrum assignment/licence terms in order to allow operators sufficient time to recoup their investment (i.e. price paid for the spectrum as well as the network rollout costs). Accordingly, an assignment/licence term of at least 20 to 25 years would make more commercial sense. Indeed, across the globe, some major markets have already moved towards longer licence terms, unlimited licence terms and an expectation of renewal, so Hong Kong appears to be lagging behind in this area.

### Restriction on Frequency Swap

51. The CA proposes to prohibit the swapping of frequency blocks in the 600/700 MHz band during the initial 5 years after the spectrum is assigned. This is intended to allow the full market value of the spectrum to be realized at auction.

52. As a matter of principle, HKT disagrees with the imposition of any ban on spectrum swapping. Spectrum swapping allows operators to make the most efficient use of their spectrum resources by combining spectrum blocks acquired from other operators in order to achieve contiguous frequency bands and hence minimize costs arising from carrier aggregation.

53. By only permitting spectrum swapping after the initial 5 years, this increases operators’ costs compared to allowing spectrum swapping right from the very start. In fact, it is difficult to see the rationale behind



the CA imposing such a restriction other than to maximize the revenues derived from the spectrum auction.

### **Technology Neutrality**

54. As per (almost all of) the previous spectrum assignments, the CA intends to impose no requirements on the technology that can be used with the spectrum as long as it is based on widely recognized standards and does not cause any harmful interference to other legitimate services. In this particular instance, per 3GPP standards, the FDD mode of operation should be deployed.

55. HKT supports a technology neutral approach. In fact, HKT considers that any technology restrictions that are currently being applied to any of the spectrum assigned to the mobile operators should be abolished immediately.

### **Network and Service Rollout Obligations**

56. In line with past spectrum assignments, the CA intends to impose network and service rollout obligations on the successful bidders of spectrum in the 600/700 MHz band in order to prevent spectrum hoarding and to ensure timely provision of mobile services to the public.

57. For the 600 MHz band, the CA suggests that, as this spectrum is only permitted to be used indoors, it would be appropriate to adopt the same network and service rollout obligations applicable to spectrum in the 3.3 GHz band, which also carries an indoor use restriction. Accordingly, the CA proposes that successful bidders of the 600 MHz band be required to establish at least 400 indoor base stations with the use of the assigned spectrum within the first 5 years from the date of spectrum assignment.

58. For the 700 MHz band, which carries no indoor use restriction, the CA would like to adopt the same network and service rollout obligation which has been applied to spectrum assignments in other sub-1 GHz band spectrum, namely the requirement for an operator to roll out its network and service using the spectrum to provide a minimum coverage

of 90% of the population in Hong Kong within the first 5 years from the date of spectrum assignment.

59. Both of these network and service rollout obligations are to be backed up by a performance bond to be provided by the successful bidders.

**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?*

60. Generally speaking, given the competitive conditions in the Hong Kong mobile market, operators who have been successfully assigned spectrum would be keen to roll out their network and service as quickly as possible, so there is little incentive for operators to hoard spectrum or delay provisioning service. Accordingly, as a matter of principle, HKT does not consider it necessary to impose network and service rollout obligations or require spectrum assignees to provide a performance bond to guarantee fulfillment of such obligations. The funds could more productively be put towards investment in network rollout.

61. Nevertheless, if the CA considers it necessary to impose network and service rollout obligations and to provide a performance bond as a precondition for assignment of the spectrum then, in the interests of consistency, these should be benchmarked against the network and service rollout obligations and performance bonds that were previously imposed for spectrum bands with similar characteristics.

62. On this basis, HKT does not object to a network and service rollout requirement being imposed on successful bidders of the 600 MHz band (expressed in terms of the number of indoor base stations required to be installed within a certain number of years), though HKT would urge the CA to consider reducing the required number of indoor base stations to much lower than 400 given that HKT is finding this number of indoor base stations to be an aggressive target for the 3.3 GHz band given the



limited number of indoor locations which justify a capacity layer for indoor hotspots.

63. For the 700 MHz band, HKT considers it reasonable to apply the same network and rollout obligations as other previously assigned sub-1 GHz band spectrum, i.e. a minimum coverage of 90% of the population in Hong Kong within 5 years.

64. Of course, if the CA does heed HKT's advice and allow the 600 MHz band to be used both indoors and outdoors, but subject to restriction zones where the spectrum can only be used indoors, then it would be appropriate to express the network and service rollout obligation for the 600 MHz band in terms of a percentage population coverage within a specified number of years, similar to the 3.5 GHz band.

## SPECTRUM UTILISATION FEE

65. While the exact level of the SUF will be determined by auction, the initial reserve price to kick start the bidding is to be set by the SCED.

66. As per the recent spectrum auctions, the SCED proposes to allow spectrum assignees to pay their SUF either in one lump sum upfront (which is the SUF amount determined at auction), or in 15 annual instalments, with the first instalment being the SUF determined at auction divided by 15, and each subsequent instalment being calculated as the previous year's instalment increased by a fixed percentage (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?*

67. HKT, along with the other mobile operators in the industry, have all along urged the SCED to set minimal reserve prices for spectrum auctions, as the reserve price is merely intended to be an opening price to kick start the bidding process. The reserve price should allow ample room for the bidding process to discover the true market price for the spectrum and hence should not be set with reference to any assumed current market price for the spectrum. Setting the reserve price at too high a level will simply hinder the bidding process.

68. In the previous set of spectrum auctions held in 2019 (i.e. for assignment of spectrum in the 3.3 GHz, 3.5 GHz and 4.9 GHz bands), HKT is pleased to note that the SCED heeded the call of the industry and set minimal reserve prices for each of these auctions.<sup>6</sup>

69. Accordingly, HKT would once again urge the SCED to set a minimal reserve price for the 600/700 MHz band spectrum auction(s), particularly given the impact on operators' cash flow caused by the ongoing impact of COVID-19 on the local economy. It would be rational for the SCED to set the opening price for the forthcoming 600/700 MHz

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<sup>6</sup> The auction reserve prices previously set were as follows: (i) 3.3 GHz band at \$2m per MHz; (ii) 3.5 GHz band at \$4m per MHz; and (iii) 4.9 GHz band at \$3m per MHz.



band auction(s) at a level which is no higher than the range of the last set of reserve prices.

70. To further ease the pressure on operators' cash flow, HKT supports the option to allow SUF payments to be made by instalment instead of in one lump sum upfront. This would be consistent with the approach taken in recent spectrum auctions. Nevertheless, in view of the decreasing cost of funds, the SCED could consider reducing the pre-set fixed percentage which is currently being applied to uplift each annual SUF instalment.

## **Part B**

### **Comments in Response to the Specific Questions raised in the Consultation Paper on**

Arrangements for the Frequency Spectrum in the 850 MHz Band upon  
Expiry of the Existing Assignment for Public Mobile Telecommunications  
Services and the Related Spectrum Utilisation Fee

## PROPOSED RE-ASSIGNMENT APPROACH

71. The CA considers that there are likely to be competing demands for spectrum in the 850 MHz band on the basis of the following:

- User devices and network equipment using the 850 MHz band are already widely available on the market;
- The 850 MHz band falls within the sub-1 GHz spectrum range and hence has good radio propagation characteristics which permit mobile services to cover a wider area and penetrate deep into buildings; and
- Because of these characteristics, the mobile operators have previously requested the CA to release more spectrum in the low frequency bands for the provision of mobile services.

72. HKT, however, considers that the existence of competing demand for spectrum cannot be truly ascertained until operators fully understand the terms, conditions and pricing of the relevant spectrum and then react to these. In practical terms, this means the real demand for spectrum cannot be assessed until operators are presented with the details of the spectrum and are required to express their demand for the spectrum. Depending on the amount of spectrum required by each operator and the amount of spectrum available, the CA should then have a more realistic idea as to whether competing demand exists.

73. Accordingly, HKT would suggest that, as a matter of general procedure, the CA undertake a more stringent assessment before concluding there is competing demand for any spectrum blocks to be released. At the very least, the CA could invite the industry and other interested parties to express their interest in using the spectrum blocks in question, similar to the exercise conducted for the 26/28 GHz band in December 2017.

74. Nevertheless, for the purposes of responding to this submission, HKT will adopt the CA's assumption that competing demand does exist for the spectrum.



## PROPOSED RE-ASSIGNMENT ARRANGEMENTS

### Re-assignment of Spectrum by Auction

75. Given that the CA considers there are likely to be competing demands for spectrum in the 850 MHz band, based on the Radio Spectrum Policy Framework<sup>7</sup>, a market-based approach will be used to assign the spectrum.

76. As in past spectrum assignments, the CA proposes to use an auction process to determine assignment of the spectrum, with minimal requirements being imposed on interested bidders in order to qualify for participation in the auction, namely the lodging of deposit and the ability to demonstrate capability to provide service in accordance with the licence to be issued in respect of the spectrum.

77. All interested parties, including the existing mobile operators, will be permitted to apply for participation in the auction.

<p><b>Question 1:</b> <i>Do you have any views on re-assigning the spectrum in the 850 MHz Band through an auction open for all interested parties?</i></p>
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78. As a matter of principle, HKT only considers it appropriate to assign spectrum by way of an auction for new releases of spectrum. While the 850 MHz band is, strictly speaking, a re-assignment of existing spectrum in use and not new spectrum, for all intents and purposes, it may be treated as “new” spectrum since:

- (i) The current licence condition requiring the “CDMA2000 family of standards adopted by 3GPP2” to be used with the 850 MHz band will be removed in the new assignment term, and the spectrum will be re-assigned on a technology neutral basis in line with new spectrum which has been released by the CA in the past; and

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<sup>7</sup> Radio Spectrum Policy Framework promulgated by the Government in April 2007.

- (ii) No customers are currently using the 850 MHz band in Hong Kong (due to the CDMA2000 standard being obsolescent), thus there will be no service continuity issues.

Accordingly, HKT does not object to the use of an auction process to re-assign the 850 MHz band on the basis of the CA's assumption that there is competing demand for the spectrum.

79. In any case, as HKT has already explained, it would be preferable for the 850 MHz band to be auctioned together with the 700 MHz band given their proximity to each other and their similarity in characteristics. In fact, given that the original auction timeframes proposed by the CA for the 700 MHz band auction ("fourth quarter of 2021")<sup>8</sup> and the 850 MHz band auction ("late 2021")<sup>9</sup>, a combined spectrum auction would be in keeping with the suggestion made by the CA in the 850 MHz Consultation Paper:

*[...] If there is any other spectrum to be made available for assignment or re-assignment in a similar time frame, the CA will carefully consider whether it is feasible to arrange a single auction such as based on the simultaneous MRA format for blocks of spectrum in different frequency bands.<sup>10</sup>*

80. Placing no restrictions on who may participate in the auction (as long as they satisfy the minimal requirements)<sup>11</sup> would also be

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<sup>8</sup> Paragraph 35 of the 600/700 MHz Consultation Paper.

<sup>9</sup> Paragraph 18 of the 850 MHz Consultation Paper.

<sup>10</sup> Paragraph 17 of the 850 MHz Consultation Paper.

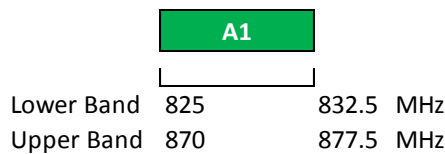
<sup>11</sup> HKT would, nevertheless, urge the CA to impose more stringent "minimal requirements", particularly on new entrants, in order to ensure that successful bidders of the spectrum are able to make the most valuable use of the frequency bands and avoid a repeat of "The 21 ViaNet Disgrace". See Appendix E of HKT's submission in response to the Consultation Paper on *Arrangements for the Frequency Spectrum in the 900 MHz and 1800 MHz Bands upon Expiry of the Existing Assignments for Public Mobile Telecommunications Services and the Spectrum Utilisation Fee* (18 May 2016) which outlines the failure of 21 ViaNet, a new market entrant, to make use of the spectrum it acquired via auction in 2012 to provide mobile services.



consistent with the application arrangements for previous spectrum auctions and hence HKT has no objection.

### Band Plan

81. The spectrum in the 850 MHz band which will become available for re-assignment in November 2023 was originally assigned to, and was used by, the incumbent mobile operator as a single paired block of 2 x 7.5 MHz. Given this small amount of spectrum, in order not to fragment the spectrum and lower the spectrum efficiency of the frequency block being re-assigned, the CA proposes to make available one single block of 2 x 7.5 GHz for auction as follows:



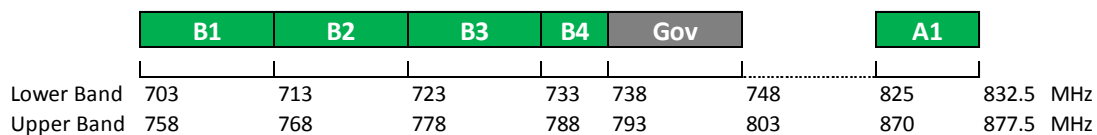
82. In addition, the CA does not consider it necessary to impose any bidding restrictions in the form of a spectrum cap.

**Question 2:** *Do you have any views on the proposed re-assignment of the spectrum concerned as a single frequency block of bandwidth 2 x 7.5 MHz?*

83. HKT agrees that it does not make sense to split the existing single block of 2 x 7.5 MHz into smaller blocks for re-assignment via auction. Retaining the spectrum as a block of 2 x 7.5 MHz would enable the most efficient use to be made of the frequency band.

84. If the CA agrees to HKT’s proposal to combine the auction of the 700 MHz band with the 850 MHz band, this would result in the following band plan (assuming the Government is unable to vacate any of the spectrum it has currently been assigned in the 700 MHz band):

Proposed 700/850 MHz Band Plan



## Auction Format and Timing

85. Per the proposal in the 850 MHz Consultation Paper, only one single block of spectrum is being auctioned. The CA therefore proposes to adopt a simple Multiple Round Ascending (“MRA”) auction format. The MRA auction format was similarly used in a previous spectrum auction in which one frequency block was being offered. It is also an auction format with which the industry is well familiar.

**Question 3:** *Do you have any views on the proposed format and timing of the auction?*

86. Given that the MRA auction format has been used in several past spectrum auctions and is a format with which the industry is well familiar, HKT supports the use of a simple MRA format to auction the 850 MHz band should this band be auctioned on its own.

87. The MRA auction format (in particular, the Simultaneous MRA auction format) is well suited to an auction where there is more than one spectrum block being offered and the spectrum blocks are of different sizes, such as the combined 700/850 MHz band auction which HKT has proposed, in which there are blocks of 2 x 5 MHz, 2 x 7.5 MHz and 2 x 10 MHz.

88. In this regard, HKT would note that the CA has previously successfully conducted a multi-band spectrum auction in which the frequency blocks are of different bandwidths, so a 700/850 MHz band auction is a feasible proposal. Specifically, in the auction of radio spectrum in the 850 MHz, 900 MHz and 2 GHz bands conducted in March 2011, the spectrum blocks on offer for bidding were as follows:

Frequency Band	MHz	Bandwidth
A	832.5 - 837.5 877.5 – 882.5	2 x 5 MHz
B	885 – 890 930 - 935	2 x 5 MHz
C1	2010.0 – 2014.8	4.8 MHz
C2	2014.8 – 2019.7	4.9 MHz

## PROPOSED LICENSING ARRANGEMENTS

### Licensing and Validity Period

89. As with previous spectrum assignments, the CA proposes to assign the spectrum in the 850 MHz band for a period of 15 years. Bidders who successfully acquire the spectrum at auction will be granted a new Unified Carrier Licence (“UCL”) which will be coterminous with the 15 year spectrum assignment period. Incumbent licensees may apply to the CA to combine their existing UCL with the new licence.

90. In principle, HKT supports longer spectrum assignment/licence terms in order to allow operators sufficient time to recoup their investment (i.e. price paid for the spectrum as well as the network rollout costs). Accordingly, an assignment/licence term of at least 20 to 25 years would make more commercial sense. Indeed, across the globe, some major markets have already moved towards longer licence terms, unlimited licence terms and an expectation of renewal, so Hong Kong appears to be lagging behind in this area.

### Technology Neutrality

91. The CA recognizes that the use of the CDMA2000 standard has declined in recent years and hence there is no longer a need to require the CDMA2000 family of standards to be adopted by the successful bidder of the frequency band when the spectrum is re-assigned in November 2023.

92. Accordingly, in line with past spectrum assignments, the CA intends to adopt a technology neutral approach for the spectrum in the next term of assignment, whereby the assignee is free to use whatever technology it chooses as long as it is a widely recognized standard and does not cause any harmful interference to other services.

<p><b>Question 4:</b> <i>Do you have any views on the adoption of a technology neutral approach for the use of spectrum in the 850 MHz Band in any new assignment which follows the expiry of the existing assignment?</i></p>
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93. HKT fully supports a technology neutral approach being adopted for all spectrum assignments, whether they be in relation to new spectrum or spectrum which is currently in use and being re-assigned.

94. In the 850 MHz Consultation Paper, the CA has recognized that the CDMA2000 standard has declined in use and hence there is no longer any need to impose a requirement to adopt such a technology-specific standard for use with the spectrum. However, the decline in popularity of the CDMA2000 standard happened several years ago. This recognition should have come much earlier when it was brought to the CA's attention by HKT. If HKT had been released from its obligation to adopt the CDMA2000 standard at that time then the spectrum could have been put to much more productive and efficient use.

## Network and Service Rollout Obligations

95. Consistent with past spectrum auctions, the CA intends to impose network and service rollout obligations on the successful bidder of the spectrum in the 850 MHz band in order to prevent spectrum hoarding and to ensure timely provision of mobile services to the public.

96. Since the 850 MHz band is comparable in technical characteristics to spectrum in the 900 MHz band that was previously auctioned (i.e. superb radio propagation which facilitates the provision of wide geographical coverage), the CA is inclined to impose similar network and service rollout obligations on the operator who will be assigned the block of 850 MHz band spectrum. Accordingly, a requirement to roll out network and provide mobile coverage to at least 90% of the population in the first 5 years after licence issue will be imposed.

97. The network and service rollout obligation will be backed up by a performance bond to be provided by the successful bidder of the spectrum.

<p><b>Question 5:</b></p>	<p><i>Do you have any views on the proposed network and service rollout obligations, as well as the proposed imposition of a performance bond on the successful bidder?</i></p>
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98. Generally speaking, given the competitive conditions in the Hong Kong mobile market, operators who have been successfully assigned spectrum would be keen to roll out their network and service as quickly as possible, so there is little incentive for operators to hoard spectrum or delay provisioning service. Accordingly, as a matter of principle, HKT does not consider it necessary to impose network and service rollout obligations or require spectrum assignees to provide a performance bond to guarantee fulfillment of such obligations. The funds could more productively be put towards investment in network rollout.

99. Nevertheless, if the CA considers it necessary to impose network and service rollout obligations and to provide a performance bond as a precondition for assignment of the spectrum then, in the interests of consistency, these should be benchmarked against the network and service rollout obligations and performance bonds that were previously imposed for spectrum bands with similar characteristics.

100. For the 850 MHz band, HKT considers it reasonable to apply the same network and rollout obligations as other previously assigned sub-1 GHz band spectrum, i.e. a minimum coverage of 90% of the population in Hong Kong within 5 years.

101. HKT notes that since the 700 MHz band network and service rollout obligations are the same as those proposed for the 850 MHz band, this would go one step further towards facilitating a combined 700/850 MHz spectrum auction as suggested by HKT.

## SPECTRUM UTILISATION FEE

102. While the exact level of the SUF will be determined by auction, the initial reserve price to kick start the bidding is to be set by the SCED.

103. As per the recent spectrum auctions, the SCED proposes to allow spectrum assignees to pay their SUF either in one lump sum upfront (which is the SUF amount determined at auction), or in 15 annual instalments, with the first instalment being the SUF determined at auction divided by 15, and each subsequent instalment being calculated as the previous year's instalment increased by a fixed percentage (to reflect the time value of money to the Government).

<p><b>Question 6:</b>      <i>Do you have any views on the proposed arrangement in relation to SUF above?</i></p>
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104. HKT, along with the other mobile operators in the industry, have all along urged the SCED to set minimal reserve prices for spectrum auctions, as the reserve price is merely intended to be an opening price to kick start the bidding process. The reserve price should allow ample room for the bidding process to discover the true market price for the spectrum and hence should not be set with reference to any assumed current market price for the spectrum. Setting the reserve price at too high a level will simply hinder the bidding process.

105. In the previous set of spectrum auctions held in 2019 (i.e. for assignment of spectrum in the 3.3 GHz, 3.5 GHz and 4.9 GHz bands), HKT is pleased to note that the SCED heeded the call of the industry and set minimal reserve prices for each of these auctions.

106. Accordingly, HKT would once again urge the SCED to set a minimal reserve price for the 850 MHz band spectrum auction or combined 700/850 MHz band spectrum auction, particularly given the impact on operators' cash flow caused by the ongoing impact of COVID-19 on the local economy. It would be rational for the SCED to set the opening price for the forthcoming 850 MHz band auction or combined 700/850 MHz band auction at a level which is no higher than the range of the last set of reserve prices.





107. To further ease the pressure on operators' cash flow, HKT supports the option to allow SUF payments to be made by instalment instead of in one lump sum upfront. This would be consistent with the approach taken in recent spectrum auctions. Nevertheless, in view of the decreasing cost of funds, the SCED could consider reducing the pre-set fixed percentage which is currently being applied to uplift each annual SUF instalment.