



**Arrangements for Assignment of the Spectrum in the 3.3 GHz  
and 4.9 GHz Bands for the Provision of Public Mobile Services  
and the Related Spectrum Utilisation Fee**

**Response to Consultation Paper**

26 September 2018



## KEY MESSAGES

1. HKT welcomes the Government's decision to release 200 MHz of spectrum in the 3.3/4.9 GHz Band to facilitate the development of 5G mobile services. This spectrum supplements the 200 MHz of spectrum in the 3.5 GHz Band which the Government has previously decided to assign for 5G mobile services.
2. HKT is also encouraged by the Government's quest to make Hong Kong a leader rather than a follower in the development of 5G mobile networks and services. This is a critically important matter for a services-based economy trying to ensure its future and has, in turn, resulted in the Government bringing additional spectrum to the market sooner rather than later.
3. The Government is correct in allocating more spectrum for the provision of mobile (i.e. 5G) services. HKT supports that action. However, further consideration should be given by the Government as to its proposals regarding: (a) releasing further spectrum to the market; (b) the method by which that spectrum is assigned to operators; and (c) the rules governing how the spectrum is to be deployed. These points are elaborated on below.

### **The Government should have a single comprehensive spectrum allocation exercise**

4. The 3.5 GHz Band and the 3.3/4.9 GHz Band share similar radio characteristics, yet they are planned to be auctioned within a few months of each other. HKT would suggest that the Government seriously consider holding a combined auction.
5. The spectrum scarcity is exacerbated by the Government's occupation of valuable frequency in the 4.94 – 4.99 GHz range and its delay in bringing spectrum in the 700 MHz band (i.e. the "Digital Dividend") to the market. This effectively limits the amount of spectrum which can be released for mobile use. The Government's current utilization of the 4.94 – 4.99 GHz range requires a serious review given



the increasing demand for more important and valuable 5G mobile services.

### **The manner in which spectrum is assigned to operators should be reconsidered**

6. The Government makes two fundamental errors in the way it proposes to make the spectrum available to licensees and users.

7. Firstly, the Government concludes, without any substantial data or analysis, that there are likely to be competing demands for this spectrum. In reality, the issue of competing demand cannot be decided until the operators fully understand and react to the terms, conditions and pricing of the relevant spectrum.

8. Secondly, the Government states that an auction is the most appropriate market-based approach to assign spectrum. Again, this conclusion is backed by neither data nor analysis, and there is no discussion of the pros and cons of alternative market-based approaches.

### **Spectrum swapping should be permitted**

9. The Government is proposing to bar operators from swapping any spectrum they have acquired in the 3.3/4.9 GHz Band within the initial five years of assignment. Yet, spectrum swapping (just like spectrum trading) is a useful and market-based process to enable operators to function more efficiently (e.g. to rectify any spectrum fragmentation issues resulting from frequency bands being acquired over different auctions). This is consistent with Section 32G of the Telecommunications Ordinance which requires the CA to promote the efficient use of spectrum. Spectrum trading would bring similar efficiency gains.

10. With only a limited amount of spectrum being put up for auction each time, and no prospect of spectrum swapping or trading, operators are forced to bid aggressively in order to secure particular spectrum blocks. It is counter-productive and inconsistent with the Telecommunications Ordinance for the Government to seek, per the

Consultation Paper, “the full market value of each individual frequency block in the auctions” rather than the efficient use of spectrum. The Government’s ultimate goal to raise as much revenue as possible from each spectrum auction is clearly contrary to the provisions of the Telecommunications Ordinance.

## **No spectrum caps should be imposed**

11. The Government proposes to place a cap on the amount of spectrum that can be acquired by each operator in the 3.3/4.9 GHz Band. A spectrum cap can only be justified in a market-based regulatory regime when serious competition concerns are likely to arise. If a cap is imposed, it must be justified by a comprehensive competition analysis.

12. In summary, the Government needs to answer the following questions:

- What is the rationale for holding separate auctions for spectrum in the same frequency range, particularly when their timing is so close together? One comprehensive auction would be better.
- What is the Government’s current utilization of the 4.94 – 4.99 GHz range and can this be released to mobile services?
- Why can’t the 700 MHz band be released for mobile services (even for indoor use)?
- What are the reasons for not permitting spectrum swapping and spectrum trading?
- How are the spectrum caps justified?
- How does the Government justify each of the proposed restrictions on a competition basis and against its statutory obligation of promoting the efficient allocation and use of spectrum in Hong Kong?

## INTRODUCTION

13. Hong Kong Telecommunications (HKT) Limited (“**HKT**”) welcomes the opportunity to provide its comments on the proposals put forward by the Communications Authority (“**CA**”) and Secretary for Commerce and Economic Development (“**SCED**”) in their consultation paper concerning *Arrangements for Assignment of the Spectrum in the 3.3 GHz and 4.9 GHz Bands (“**3.3/4.9 GHz Band**”) for the Provision of Public Mobile Services and the Related Spectrum Utilisation Fee* issued on 28 August 2018 (“**Consultation Paper**”).

14. The 3.3/4.9 GHz Band consists of a total of 200 MHz of spectrum made up as follows:

- 100 MHz of spectrum in the 3.3 – 3.4 GHz range (“**3.3 GHz Band**”); and
- 100 MHz of spectrum in the 4.83 – 4.93 GHz range (“**4.9 GHz Band**”).

15. HKT notes that this Consultation Paper closely follows the consultation that was recently conducted by the CA/SCED regarding the **3.5 GHz Band**<sup>1</sup>, which is located in close proximity to the 3.3/4.9 GHz Band currently being considered. As both spectrum bands share similar radio characteristics and are considered mid-band spectrum for 5G deployment, HKT would expect the 3.3/4.9 GHz Band to be generally dealt with by the CA/SCED on a similar basis to the 3.5 GHz Band. Indeed, the comments made by HKT concerning assignment of the 3.3/4.9 GHz Band are broadly similar to those comments submitted by HKT in response to the consultation regarding the 3.5 GHz Band.

16. In the ensuing sections, HKT responds to the individual questions raised by the CA/SCED in the Consultation Paper.

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<sup>1</sup> Consultation Paper on *Arrangements for Assignment of the Spectrum in the 3.4 – 3.6 GHz Band for the Provision of Public Mobile Services and the Related Spectrum Utilisation Fee* issued jointly by the CA and the SCED on 2 May 2018.

## PROPOSED AMENDMENT TO THE HONG KONG TABLE OF FREQUENCY ALLOCATIONS FOR THE 3.3 GHZ AND 4.9 GHZ BANDS

17. The CA proposes to make the following amendments to the Hong Kong Table of Frequency Allocations with effect from 1 January 2019:

- As the 3.3 GHz Band is currently allocated for use by radiolocation services, the CA plans to change the allocation so that the band is allocated to both radiolocation service and mobile service on a co-primary basis. In order to avoid any interference to radiolocation services which are being operated outdoors on a territory-wide basis, mobile use of the spectrum will be restricted to indoor use only<sup>2</sup>.
- As spectrum in the 4.80 – 4.94 GHz range is currently allocated for use by fixed services, the CA plans to change the allocation so that the frequency range 4.83 – 4.94 GHz is allocated to both fixed service and mobile service on a co-primary basis. 10 MHz of spectrum in the 4.93 – 4.94 GHz range will be used as a guard band to minimize potential mutual interference with Government services operating in the adjacent 4.94 – 4.99 GHz range.

<p><b>Question 1:</b></p>	<p><b><i>Do you have any views on the proposed amendment to the Hong Kong Table of Frequency Allocations as regards the allocation of the 3.3 – 3.4 GHz band and the 4.83 – 4.94 GHz band for mobile service on a co-primary basis in addition to the respective existing uses?</i></b></p>
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18. While HKT supports the 3.3/4.9 GHz Band being extended to mobile services, it questions why the 4.9 GHz Band needs to be constrained in the 4.94 – 4.99 GHz range. What is the current utilization of that spectrum by the Government? Why can't the whole frequency

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<sup>2</sup> Per footnote 6 in the Consultation Paper, base stations operating in the 3.3 GHz Band will only be permitted to be installed, maintained and operated inside buildings and enclosed areas (such as tunnels) and shall be configured in such a way that no service can be provided to mobile terminals situated outdoors and no harmful interference is caused to other lawful telecommunications services.



band from 4.80 – 5.0 GHz be allocated to mobile service on the same basis as that in the Mainland? This would result in a contiguous band of 200 MHz of spectrum being available for 5G mobile use, which is double the amount currently being proposed for the 4.9 GHz Band.

19. HKT notes from OFCA's<sup>3</sup> RSAC Paper 1/2005 on *Allocation of the 4940 – 4990 MHz Band to Mobile Service* that OFCA had proposed the allocation of the 4.94 – 4.99 GHz range for use by the Government's radiocommunications systems for the purposes of public protection and disaster relief ("PPDR"). This was put forward by OFCA in order to follow ITU Resolution 646 (WRC-03) which identified the 4940 – 4990 MHz band as the harmonized frequency band for PPDR systems in Regions 2 and 3. However, it is important to note that, in paragraph 6 of RSAC Paper 1/2005, OFCA also recognized that:

- The allocation of the 4940 – 4990 MHz band to emergency services was not mandatory;
- The identification of the 4940 – 4990 MHz band for PPDR did not preclude the use of the band for other fixed/mobile applications; and
- There was a possibility of assigning the band to other non-emergency services in the event of there being such a need in the future in order to maximize spectrum utilization.

20. In the 2010 *Review on Efficiency of the Use of Spectrum for Government Services* ("**2010 Government Spectrum Review**"), for the 4.94 – 4.99 GHz range, OFCA found that no demand had been identified by the Government because there was still only a limited supply of suitable radio equipment that could make use of the spectrum in the market.<sup>4</sup> In fact, even today, it is highly unlikely that such equipment is available for PPDR purposes for the 4940 – 4990 MHz band given that

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<sup>3</sup> Formerly OFTA.

<sup>4</sup> Paragraph 13(d) of the 2010 Government Spectrum Review.

countries in the same region as Hong Kong (e.g. China, India, Japan, South Korea) are not using this band for PPDR purposes.<sup>5</sup>

21. In the latest review of the efficiency of spectrum utilization of Government services<sup>6</sup>, OFCA states that:

*One primary objective of the review is to promote efficient use of spectrum. If a frequency band is found to be used inefficiently by a government user, technical and administrative measures as set out in paragraph 2(a) – 2(d) above [such as increased band sharing with other non-government users] should be implemented to rectify the situation.*<sup>7</sup>

*[...] To attain maximum benefit for the community, efficient use of the spectrum should be more vigorously pursued to the extent that the spectrum freed up will likely be readily deployed for other productive use.*<sup>8</sup>

22. Accordingly, HKT would suggest that, in order to ensure that the most efficient use is being made of spectrum resources for the maximum benefit of the community, the Government should return the 4940 – 4990 MHz band and have it re-assigned to the mobile operators for 5G use, or allow the mobile operators to share use of the frequency range.

23. Even if the 4.94 – 4.99 GHz range is currently being used by the Government, it should recognize the importance of this spectrum to the development of 5G mobile services and hence seek to vacate this band by looking at alternative spectrum or means of service provisioning. On this basis, it would be perfectly feasible for 100 MHz in the 4.8 – 4.9

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<sup>5</sup> Refer to Table 3.5 in the consultation paper issued by the Telecom Regulatory Authority of India on *Next Generation Public Protection and Disaster Relief (PPDR) communication networks* issued on 9 October 2017, which shows the frequency bands adopted for PPDR in various countries.

<sup>6</sup> Paper on *Third Review of Efficiency of Spectrum Utilisation of Government Services* issued by OFCA in January 2017 (“**2016 Government Spectrum Review**”).

<sup>7</sup> Paragraph 6 of the 2016 Government Spectrum Review.

<sup>8</sup> Paragraph 7 of the 2016 Government Spectrum Review.





range to be released to mobile services first and then, after the Government has vacated the 4.94 – 4.99 GHz range, for the second block of 100 MHz in the 4.9 – 5.0 GHz range to be released for mobile use.

24. There is no reason why both blocks of spectrum cannot be assigned in the same exercise despite being made available for use at different times. In this way, the spectrum being released in the 4.9 GHz Band should be revised from 4.93 – 4.93 GHz to 4.8 – 5.0 GHz with 200 MHz of spectrum.



## **PROPOSED ARRANGEMENTS FOR ASSIGNMENT OF THE SPECTRUM IN THE 3.3 GHZ AND 4.9 GHZ BANDS**

### **Demand for Spectrum in the 3.3 GHz and 4.9 GHz Bands**

25. The CA proposes to adopt a market-based approach for the assignment of the 3.3/4.9 GHz Band as it considers there are likely to be competing demands for the spectrum in view of:

- The scarcity and limited bandwidth of spectrum in the frequency bands below 6 GHz suitable for mobile use, which is where the 3.3/4.9 GHz Band is located;
- The possibility of using the 3.3/4.9 GHz Band for 5G mobile services; and
- The expected supply of 5G standard compliant equipment and devices supporting the two bands.

26. The CA also used justifications broadly similar to the above to propose the adoption of a market-based approach for the assignment of the 3.5 GHz Band.

### **Assignment of Spectrum by Auction**

27. The CA considers assigning the 3.3/4.9 GHz Band via auction to be the most appropriate market-based approach for the assignment of spectrum.

28. To participate in the spectrum auction, the CA suggests imposing the following minimal qualification requirements on the bidder to demonstrate its interest in acquiring spectrum and its capability to provide satisfactory service:

- (i) The bidder is required to lodge a specified amount of deposit which may be forfeited in the event that it violates the auction rules or fails to take up the licence after successfully bidding at the auction; and

- (ii) The bidder is able to demonstrate its technical and financial capability to provide service in fulfilment of the obligations under its licence to the satisfaction of the CA, and to submit any other relevant supporting information which the CA deems necessary.

**Question 2: Do you have any views on assigning the spectrum in the 3.3 GHz and 4.9 GHz bands by way of auction?**

29. Two issues arise here. Firstly, whether there is competing demand and secondly, if there is competing demand, whether an auction is the best market-based approach available.

30. The CA has addressed neither of these fundamental matters in any depth (i.e. with data and analysis). The CA needs to do so. As HKT has made clear elsewhere: (a) competing demand cannot be logically determined until much later in this process; and (b) multiple market-based approaches exist to choose from.

31. In view of the CA's current plans to conduct the 3.5 GHz Band auction and the 3.3/4.9 GHz Band auction within six months of each other, there is no reason why both spectrum band cannot be assigned at the same time. Indeed, given the similarity in radio characteristics between the 3.5 GHz Band and the 3.3 GHz Band in particular, it would make perfect sense to conduct one overall assignment exercise.

32. Whether to invest in radio equipment for the 3.3/3.5 GHz band or the 4.9 GHz Band is a major investment decision for operators. It would be unusual for operators to invest in equipment for both bands as each band requires separate radio equipment. Hence, it is more logical and efficient for operators to have one auction of all 3.3/3.5/4.9 GHz bands together. This would mean a total of 400 MHz (or, potentially 500 MHz of spectrum, if HKT's earlier suggestion regarding the spectrum currently assigned for Government use is taken on board) of 5G spectrum being made available for assignment in the sub-6 GHz range in one sitting.

33. This amount of spectrum would be sufficient to accommodate the requirements of the incumbent mobile operators and allow bidders to pick and choose, based on their limited financial resources, the specific bands they wish to acquire depending on the relative price of each



spectrum band during the course of the auction. This would not be possible if separate auctions were held for each spectrum band.<sup>9</sup>

34. In terms of the qualification requirements to take part in the spectrum auction as specified by the CA, HKT does not see how any party other than an incumbent mobile operator would be able to satisfy the requirement to demonstrate technical and financial capability to provide service since, for a new entrant, this would not be possible until after it has acquired spectrum and actually rolled out its service. Accordingly, HKT would suggest it appropriate to confine participation in the spectrum auction of the 3.3/4.9 GHz and 3.5 GHz Bands to the existing mobile operators.

### Band Plan

35. Per the technical specifications for 5G equipment and devices adopted by the 3<sup>rd</sup> Generation Partnership Project (“3GPP”), the allowable channel bandwidths for the 4.9 GHz Band include: 40 MHz, 50 MHz, 60 MHz, 80 MHz and 100 MHz. Given that future equipment will likely adopt the 3GPP standards, the CA suggests that the bandwidth of each frequency block in the 4.9 GHz Band should be “up to 50 MHz”.

36. For the 3.3 GHz Band, the 3GPP specifications dictate the allowable channel bandwidths to be the same as the 3.5 GHz Band, i.e. ranging from 10 MHz to 100 MHz. With reference to the responses received under the consultation exercise for the 3.5 GHz Band, the CA proposes to adopt a channel bandwidth of 10 MHz for each block in the 3.3 GHz Band, making a total of 10 blocks available for assignment.

<p><b>Question 3:</b>      <i>Do you have any views on the proposal that the bandwidth of each frequency block in the 4.9 GHz band spectrum should be up to 50 MHz?</i></p>
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<sup>9</sup> Operators also invest in radio equipment to be used in either the 3.3 GHz/ 3.5 GHz Band or the 4.9 GHz Band as each band requires separate equipment. Hence, at least, it would not make sense to separate the auction of the 3.3 GHz Band from the 3.5 GHz Band.

37. HKT assumes it is the intention of the CA to fix the bandwidth for the 4.9 GHz Band at, specifically, 50 MHz per block. If so, given that only 100 MHz of spectrum in the 4.9 GHz Band is being offered, this would result in just 2 mobile operators being assigned spectrum in this band.

38. Given that the 4.9 GHz Band has been suggested as the spectrum which could help resolve the exclusion zone problem<sup>10</sup> arising out of the 3.5 GHz Band, the fact that only 2 out of the 4 incumbent mobile operators would be able to secure spectrum in the 4.9 GHz Band means that 2 operators will be forced to live with “black holes” (i.e. geographical areas in Hong Kong with no mid-band 5G coverage) in their 5G mobile service offering. Customers of these two operators will therefore have to live with a sub-standard service through no fault of their service provider.

39. The better approach would be to:

- (i) Make more spectrum available in the 4.9 GHz Band by extending the band from 4.8 – 5.0 GHz as HKT suggested earlier; and
- (ii) Assign all the mid-band spectrum at the same time by bringing forward the 3.5 GHz Band auction so that all of the spectrum can be auctioned off in one go.

40. If this approach is adopted, the result will then be a total of 500 MHz<sup>11</sup> of spectrum being made available via a single auction (or, at least, 400 MHz if the 4.9 GHz Band is not able to be extended from 4.8 – 5.0 GHz), in which case, it would make sense to divide all of the spectrum into consistent blocks of 50 MHz each.

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<sup>10</sup> Per the Statement issued by the CA on 28 March 2018 concerning *Change in the Allocation of the 3.4 – 3.7 GHz Band from Fixed Satellite Service to Mobile Service*, the CA decided that geographical restriction zones in the surrounding Tai Po and Stanley area would be established in which mobile operators would be forbidden from using spectrum in the 3.5 GHz Band so as to prevent interference with the existing telemetry, tracking and control stations operating in those areas.

<sup>11</sup> 500 MHz consisting of: (a) 200 MHz in the 3.5 GHz Band; (b) 100 MHz in the 3.3 GHz Band; and (c) 200 MHz in the frequency range from 4.8 – 5.0 GHz.

**Question 4:** *Do you have any views on the proposal to divide the spectrum in the 3.3 GHz band into 10 frequency blocks, each with a bandwidth of 10 MHz?*

41. The Consultation Paper states that the allowable channel bandwidths for the 3.3 GHz Band are identical to those for the 3.5 GHz Band. As HKT previously advocated the use of frequency blocks of 10 MHz or 50 MHz each for the 3.5 GHz Band, HKT considers it appropriate to adopt the same approach for the 3.3 GHz Band.

42. If the CA were to auction a total of 400 MHz or 500 MHz in the 3.5 GHz, 3.3 GHz and 4.9 GHz Bands in one go as suggested by HKT earlier, it would make more sense to adopt a consistent band plan of 50 MHz blocks for the auction of all 3 bands.

## Spectrum Cap

43. The CA intends to impose separate caps on the amount of spectrum that an operator may acquire in each of the two bands being considered. This is stated to prevent an over-concentration of spectrum holding by an individual operator. Different caps are proposed for the 3.3 GHz Band (cap of 40 MHz, i.e. each bidder limited to acquiring four 10 MHz blocks) and the 4.9 GHz Band (cap of 50 MHz, i.e. each bidder limited to acquiring one 50 MHz block) due to the different deployment characteristics of each band.

**Question 5:** *Do you have any views on the proposed spectrum cap of 40 MHz to be imposed on any bidder in the auction for the 3.3 GHz band?*

44. HKT has always been against the imposition of any spectrum caps. Imposing an arbitrary limitation on the amount of spectrum that can be acquired by an operator is effectively preventing that operator from achieving economies of scale in using the spectrum with its equipment.

45. Importantly, there is no real explanation provided in the Consultation Paper as to why 40 MHz has been used as the cap for the 3.3 GHz Band. The CA should provide its reasoning.

46. A cap can only be justified when it can be demonstrated that, absent such a cap, anti-competitive results could occur. Without such a demonstration, a cap represents an unnecessary and harmful interference in the market.

**Question 6:** *Do you have any views on limiting any bidder to acquire only one frequency block with a bandwidth of up to 50 MHz of spectrum in the auction for the 4.9 GHz band?*

47. Ideally, to achieve maximum performance for 5G mobile services, an operator needs to deploy at least 100 MHz of spectrum. If the operator is only permitted to acquire one block, i.e. 50 MHz of the spectrum in the 4.9 GHz Band, this will lead to a sub-optimal and inefficient service.

48. This, again, supports making available more spectrum at the same time (i.e. extending the 4.9 GHz Band to cover the 4.8 – 5.0 GHz range and auctioning the 3.3/4.9 GHz Band at the same time as the 3.5 GHz Band) so that operators will have a greater chance to acquire 5G spectrum in contiguous blocks of 100 MHz in one exercise.

49. In the event that the CA still considers it necessary to apply a spectrum cap (which HKT disagrees with), it would make sense to apply the cap to the total amount of spectrum acquired by the bidder in the combined 3.3 GHz and 3.3/4.9 GHz Band due to the similarity in radio characteristics of these frequency bands.

## **Auction Format and Timing**

50. Given that there are ten blocks (of 10 MHz each) proposed to be auctioned in the 3.3 GHz Band and the importance of the spectrum being assigned to successful bidders in contiguous blocks, the CA considers it appropriate to adopt a clock auction format, followed by an assignment stage, to determine the assignment of the 3.3 GHz Band, similar to that proposed for the 3.5 GHz Band.



51. For the auction of the 4.9 GHz Band, the CA proposes to adopt the Simultaneous Multiple-Round Ascending (“SMRA”) auction format which has already been used for spectrum auctions conducted in Hong Kong in the past.

<p><b>Question 7:</b>            <i>Do you have any views on the proposed format of and timing for the auctions of the 3.3 GHz band and the 4.9 GHz band?</i></p>
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52. It is not necessary to adopt a clock auction format for the 3.3 GHz Band for the sake of ensuring that contiguous spectrum blocks are assigned. In the past, where the CA has conducted a spectrum auction using the SMRA format, operators have still managed to acquire contiguous blocks. For instance, in the auction for spectrum in the 2.5/2.6 GHz band conducted in March 2013, one bidder successfully secured two contiguous blocks of spectrum out of a total of five blocks being offered even though an SMRA auction format was being adopted.

53. Accordingly, HKT sees no reason why the SMRA auction format cannot be adopted for both the 3.3 GHz Band and the 4.9 GHz Band. This would then enable both bands to be auctioned off in one single exercise. In fact, in order to enable all of the 5G spectrum bands currently being considered (3.5 GHz Band and 3.3/4.9 GHz Band) to be auctioned off at the same time, HKT would suggest that the CA conduct one single SMRA auction.



## LICENSING ARRANGEMENT

### Licensing and Validity Period

54. The CA intends to assign spectrum in the 3.3/4.9 GHz Band for a period of 15 years.

55. As stated in many previous occasions, HKT would suggest that a much longer spectrum assignment period of at least 20 - 25 years be granted in order to permit operators sufficient time to recoup their investment (price paid for the spectrum as well as network rollout costs). This is particularly critical for spectrum which will be used to provide 5G mobile services, since such services are still in their infancy and there is no solid identified business case as of yet, other than to support the Government's initiatives of a Smart City. On this basis, a longer spectrum assignment period will be needed in order to allow sufficient lead time for the 5G mobile services (provided using the 3.3/4.9 GHz Band as well as other bands) to develop and mature.

56. HKT would note that other major markets have moved toward longer licence terms, unlimited licence terms and expectation of renewal. Hong Kong lags global best practice in this area.

### Restriction on Frequency Swap

57. The CA proposes that swapping of any frequency assignment in the 3.3/4.9 GHz Band within the first 5 years of assignment will generally not be considered. As the CA states in paragraph 23 of the Consultation Paper, the reason for prohibiting frequency swapping is to:

*[...] realise the full market value of each individual frequency block in the auctions [...]*

58. HKT does not understand why there is a need to impose this kind of restriction. If spectrum swapping were not permitted, this would prevent operators from combining spectrum blocks acquired from different auctions to achieve contiguous spectrum and hence minimize the costs arising from carrier aggregation. Allowing operators the

flexibility to swap frequency blocks within the 3.3/4.9 GHz Band or with other spectrum bands in the vicinity, such as the 3.5 GHz Band, would ensure that spectrum is put to its most efficient use as required under the Telecommunications Ordinance (“**TO**”). Indeed, the TO has only one spectrum directive (i.e. efficiency) and this cannot be ignored.

59. Should frequency swapping only be permissible after the first 5 years, this will result in greater expense being incurred by operators than if swapping were allowed right from the beginning.

60. The reasoning provided by the CA, as quoted above, suggests an objective to maximize revenues derived from the auctioning of the 3.3/4.9 GHz Band by firstly, creating an artificial scarcity for spectrum at each auction by holding separate auctions at different times, and secondly, by barring operators from swapping their spectrum holdings. Prohibiting spectrum trading results in the same undesirable effect. This is clearly contrary to the TO and any previously stated policy objective of the CA or SCED.

## **Technology Neutrality**

61. The CA indicates that successful bidders in the 3.3/4.9 GHz Band auction will be free to use the spectrum for providing 5G mobile services or other generations of mobile services as long as the technology being deployed complies with widely recognized standards and no harmful interference is caused to other legitimate services.

62. HKT welcomes such an approach. In fact, HKT considers that any technology restrictions that currently apply to any of the assigned frequency bands in Hong Kong should be immediately abolished.

## **Network and Service Rollout Obligations**

63. The 3.3 GHz Band is spectrum which is restricted to indoor use. Accordingly, the CA intends to impose a network and service rollout obligation expressed in terms of the number of indoor base stations to be installed by the operator within the first 5 years of the spectrum being assigned. With reference to the average number of indoor base

stations currently installed by the incumbent mobile operators, the CA considers it appropriate to require operators to have installed at least 500 indoor base stations by the end of the first 5 years.

64. For the 4.9 GHz Band, as this is spectrum which can be deployed everywhere in Hong Kong, the network and rollout requirement follows that adopted by the CA for previous spectrum assignments, i.e. each successful bidder will be required to roll out its network and service covering a minimum of 50% of the population within the first 5 years of the date the spectrum is assigned.

65. To safeguard compliance with these rollout obligations, the CA also intends to require operators to provide a performance bond. The amount of the bond and the manner in which the bond (or portions of the bond) will be returned to the spectrum assignee have, however, not yet been specified in the Consultation Paper.

**Question 8:**            ***Do you have any views on the proposed network and service rollout obligations, as well as the imposition of the associated performance bond on successful bidders for the 3.3 GHz and the 4.9 GHz bands?***

66. Given the competitive conditions in the Hong Kong mobile market, operators who have successfully acquired spectrum in the 3.3/4.9 GHz Band would undoubtedly be keen to roll out their 5G mobile services as quickly as possible in order to secure new, and retain existing, customers. Accordingly, HKT does not consider it necessary to impose network and service rollout obligations nor to require a performance bond.

67. In any case, for the 3.3 GHz Band, HKT does not understand how the CA has derived its target of 500 indoor base stations based on the number of such stations currently installed by mobile operators. There is no data or analysis to justify this or any other figure. In any case, the target appears to be too high based on HKT's experience. Currently, the number of HKT base stations which are situated indoors is not significantly more than this, and these have taken 10 to 20 years to install, so if the CA intends to require rollout to 500 indoor base stations



within 5 years, this target would seem too aggressive and likely unworkable.

68. There are also the well-known difficulties associated with gaining access to indoor sites to install base stations which HKT has brought to OFCA's attention on many instances in the past, such as site access problems and gouging landlords. These problems may render the network and service rollout targets impossible to achieve despite the best efforts of the operators.

69. HKT notes that no proposals have been put forward in the Consultation Paper regarding the level of the performance bond or the manner in which it will be returned to the spectrum assignee. In any case, HKT would suggest that:

- (i) A low performance bond \$ amount be set in order to make it affordable and leave sufficient funds available to the operator for network rollout; and
- (ii) The performance bond be returned to the operator in phases, perhaps annually, reflecting the extent of the operator's achievement in meeting the ultimate target. So, for instance, for the bond associated with the 3.3 GHz Band, part of the amount of the bond could be released back to the operator based on the actual number of indoor base stations installed at the end of each year.

## SPECTRUM UTILISATION FEE (“SUF”)

70. As the actual amount of SUF payable for the spectrum will apparently be determined via auction<sup>12</sup>, the auction reserve price needs to be set by the SCED. No proposals have been made regarding the level of the reserve price in the Consultation Paper, although it is suggested that the price should reflect the “minimum base value of the spectrum for the purpose of kick-starting the competitive bidding process.”

71. Per the proposals in the Consultation Paper, successful bidders of the spectrum will be permitted to settle the SUF either:

- (i) in one lump sum payment upfront; or
- (ii) in annual instalments, with the first instalment equivalent to the lump sum per (i) divided by 15 (years), and the subsequent instalments increased each year by a pre-set fixed percentage to reflect the time value of money to the Government.

**Question 9:            *Do you have any views on the proposal in relation to SUF above?***

72. Again, in this consultation, it seems clear that the SCED intends to adopt the traditional method of charging for assignment and use of spectrum, i.e. based on \$ per MHz. However, in view of the vast quantities of spectrum that will be needed to provide a quality 5G mobile service, continuing to charge for spectrum in this manner will put significant strain on the financial resources of the operator. This could jeopardize the development of 5G mobile services in Hong Kong.

73. With the advent of 5G, the SCED should take this opportunity to revamp the current SUF charging methodology and consider levying a fee that is linked to the service provided by the operator using the spectrum rather than the bandwidth itself. Spectrum on its own has little value. It is the mobile services which are offered by making use of the spectrum which creates the value. Accordingly, there is no reason

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<sup>12</sup> Note that HKT does not endorse auctions as the best or only method of spectrum assignment available.

why the SCED cannot charge for SUF based on a percentage<sup>13</sup> of the revenues collected by the operator through the services it sells using the spectrum. In this manner, as 5G mobile services take off, revenues increase and the SUF payments made to the Government also increase. This would be a win-win situation for both industry and Government. Importantly, it would be consistent with the Government’s efforts to make Hong Kong a regional 5G leader and an effective services-based economy.

74. In the event that the SCED chooses to revert to the current method of spectrum pricing, it is important to stress that the auction reserve price is simply intended to kick-start the bidding process. It does not need to be set in accordance with current market prices, so the SCED should leave room for the bidding process to discover the true market price.<sup>14</sup> The SCED should be careful not to set too high a reserve price which hinders the ensuing competitive bidding process. The reserve price should be a minimum price to kick-start the auction, nothing more.

75. HKT has looked at the reserve prices that were set for recent spectrum auctions in Hong Kong, the number of rounds it took for the auction to be completed, and the average SUF paid for the spectrum:

<b>Year</b>	<b>Frequency Band (MHz)</b>	<b>Reserve Price per MHz</b>	<b>No. of Bidding Rounds</b>	<b>SUF Payable per MHz (Average Bidding Price)</b>
2011	850/900	\$3m	41	\$97.6m
2012	2300	\$5m	6	\$5.2m
2013	2500/2600	\$15m	18	\$30.8m
2014	1900/2200	\$48m	6	\$49.2m

76. The reserve price for the most recent auction (\$48m per MHz in 2014) was overly aggressive and resulted in only 6 rounds of bidding.

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<sup>13</sup> The percentage could be determined via auction.

<sup>14</sup> In this case, the “true” market price of spectrum in the mid-band 5G spectrum band (i.e. frequencies in the 3.5 GHz and 3.3/4.9 GHz Band) can only be properly determined if these frequency bands are auctioned at the same time, not in separate auctions.



The result was an SUF which was largely in line with the reserve price. This is a strong indication that the reserve price was too high.

77. HKT also notes that the reserve price has risen significantly over the past four spectrum auctions and has been inflated more than three times over the last two auctions alone, increasing from \$15m per MHz in 2013 to \$48m per MHz in 2014. As HKT has pointed out on many occasions, Hong Kong operators are already paying rates per MHz which are multiples above what operators in other jurisdictions are paying. How can Hong Kong compete?

78. In any case, it is difficult to comment on the proposals in relation to the SUF if no concrete proposals have been put forth in the Consultation Paper. HKT reserves the right to submit comments on the level of the auction reserve price when this becomes available. HKT would note that, in past spectrum consultations, proposals were put forward regarding the level of the auction reserve price for comment.

**Submitted by**  
**Hong Kong Telecommunications (HKT) Limited**  
**26 September 2018**