



**Proposed Allocation of the 26 GHz and 28 GHz Bands to
Mobile Service and the Associated Arrangements for
Spectrum Assignment and Spectrum Utilisation Fee**

Response to Consultation Paper

22 August 2018



KEY MESSAGES

1. This Consultation Paper has been prepared by the Government based on the feedback received from the industry on its previous Expression of Interest exercise regarding the 26/28 GHz Band. This is new spectrum which is being released for mobile services and is one of the bands identified for 5G purposes.
2. The Government should be aware that mmWave (high frequency) spectrum such as the 26/28 GHz Band is only one part of the whole package of spectrum that is needed by mobile operators to provide a comprehensive and effective 5G service. Besides spectrum in the high frequency band (above 6 GHz) which provides the super data layer for a 5G service, spectrum in the mid-band (2-6 GHz) and low band (below 2 GHz) are also needed to supply coverage and capacity for the service.
3. Accordingly, mobile operators require the full range of 5G spectrum to be made available to them at the same time in order to allow them to properly plan, develop and roll out a cost effective 5G network in a timely manner. This current piecemeal approach to 5G spectrum releases adopted by the Government is not conducive to that cause and hence entirely unsatisfactory.
4. The Expression of Interest exercise showed there to be more than sufficient spectrum available in the band to cater for all requests from interested mobile operators. Accordingly, the Government proposes that all of the spectrum will be administratively assigned to the industry without going through any costly auction process. The Government should be applauded for this.
5. Yet, with such an approach in mind, the Government should not then seek to impose restrictions on how the spectrum should be deployed (large scale public 5G services versus specified location services) and how much spectrum should be allocated for each mode of deployment. Once the Government has released the spectrum, it should let go and leave the market to decide how the spectrum should be used. Its attempt to predict how much demand there will be, and hence how much spectrum is needed, for large scale public 5G services as opposed to specified location services is highly intrusive and speculative and does



nothing to support the Government's aim of ensuring that spectrum is used in the most efficient way.

6. While HKT is not opposed to network and service rollout requirements being imposed for new spectrum (as this goes some way towards ensuring that the spectrum will be used, and not simply left idle), it finds the milestones sought to be imposed by the Government for the 26/28 GHz Band to be fraught with potential problems.

7. Given the technical characteristics of the spectrum (high transmission speed and capacity but short distances covered), it is generally accepted that a significant number of street level cell sites will be needed in order to maximize use of the 26/28 GHz Band and provide an optimum 5G service. From past experience, the opening up of access to "street level furniture" (e.g. lamp posts, bus shelters, payphone kiosks) to install small cells takes a long time due to the need to seek approval from Government departments.¹ In some cases, more than one Government department may be involved. It is simply not realistic to expect licensees to have 5,000 5G small cells installed by 2024 under the current Government policy and procedures without radical changes.

8. Accordingly, should the Government wish to impose aggressive rollout obligations on the licensees in the form of a specified number of base stations installed within five years, then HKT would ask that in return there be a commitment from the Government to facilitate access to street level furniture (and at a reasonable price) so that the targets it has set can be realistically achieved.

9. Without the commitment and support of the Government, the chances of successfully developing and rolling out 5G services in Hong Kong are unfortunately quite slim, no matter how quick the Government is to release the required spectrum bands. Much, much more work is

¹ For instance, even with the established procedures for installation of micro-cell base stations, the industry as a whole has only been able to install no more than 10 cell sites on lamp posts in the past 10 years. Even with the current Smart Lamp Post project pushed by the Government under the Smart City Blueprint which can accommodate the installation of 5G small cells, the initial pilot project of 400 lamp posts will only be completed in 2022.



needed to be done by the Government to turn Hong Kong into a world class Smart City than mere lip service.



INTRODUCTION

10. Hong Kong Telecommunications (HKT) Limited (“**HKT**”) welcomes the opportunity to provide its comments on the consultation paper issued jointly by the Commerce and Economic Development Bureau and the Office of the Communications Authority on 26 July 2018 regarding *Proposed Allocation of the 26 GHz and 28 GHz Bands to Mobile Service and the Associated Arrangements for Spectrum Assignment and Spectrum Utilisation Fee* (“**Consultation Paper**”).

11. This Consultation Paper follows on from the Expression of Interest (“**EOI**”) exercise² conducted by the Communications Authority (“**CA**”) in which the industry was asked for its views on using the 4100 MHz of spectrum in the **26/28 GHz Band**³ for the provision of 5G services.

12. HKT’s responses to each of the questions raised in the Consultation Paper are outlined in the following sections.

² A paper on *Invitation for Expression of Interest in Using the Spectrum in the 26 GHz and 28 GHz Bands for the Provision of Fifth Generation Mobile Services* was issued by OFCA on 7 December 2017 (“**EOI Paper**”).

³ This is made up of 3250 MHz in the range from 24.25 – 27.5 GHz (“**26 GHz Band**”) and 850 MHz in the range from 27.5 – 28.35 GHz (“**28 GHz Band**”).

PROPOSED ALLOCATION OF THE 26/28 GHZ BANDS TO MOBILE SERVICE

Proposed Allocation to Mobile Service

13. The CA proposes to allocate the 26/28 GHz Band from 24.25 – 28.35 GHz to mobile service on a primary basis. At the same time, the CA will also allocate the 24.25 - 24.45 GHz band to fixed service on a primary basis, thereby extending the existing allocation for fixed service (i.e. 24.45 – 28.35 GHz) to exactly match the new allocation being made to mobile service.

14. Given that Fixed Satellite Services (“FSS”) are currently allocated spectrum in parts of the 26/28 GHz Band (i.e. 24.75 – 25.25 GHz and 27 – 28.35 GHz), this means that, in future, 5G services whether in the form of mobile or fixed wireless applications will be operating alongside FSS on a co-primary basis.

15. Accordingly, radio stations of co-primary users will be protected on a first-come-first-served basis. That is, any newly installed base stations will not be permitted to cause interference to stations of co-primary users which are already in place. At the same time, they will not be entitled to protection from any interference caused by stations which are already in place.

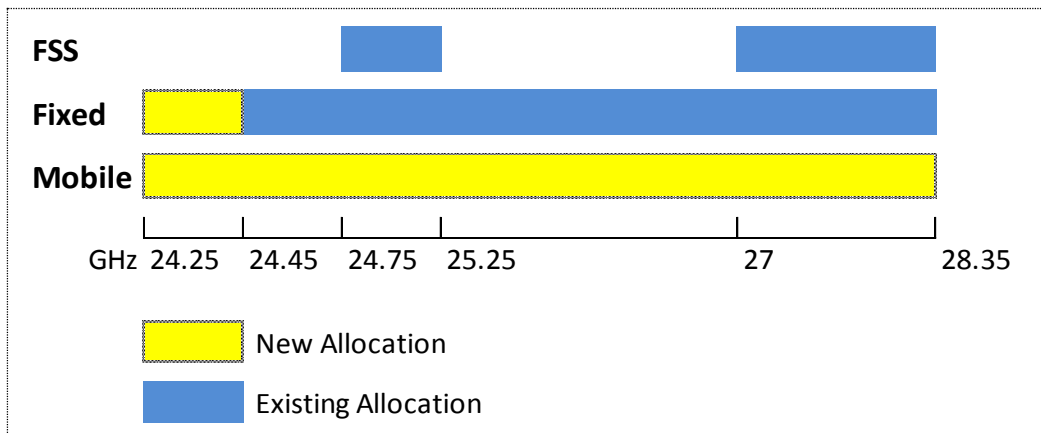


Figure 1: Proposed Frequency Allocation in the 26/28 GHz Band

Question 1: *What are your views on the proposed allocation of the 26/28 GHz bands to mobile service and of the sub-band of 24.25 – 24.45 GHz to fixed service, both on a primary basis?*

What are your views on the protection of radio stations of co-primary users on a first-come-first-served basis?

16. Per the EOI Paper, the CA has stated that while part of the spectrum in the 26/28 GHz Band has been assigned to Government users and network operators for the provision of fixed services, the CA has already served notice on the network operators concerned with the result that, from 1 April 2019 onwards, both Government users and network operators will cease using this band.

17. Furthermore, although the 24.75 – 25.25 GHz and 27 – 28.35 GHz bands are allocated to FSS, they are currently not being used for any FSS applications.⁴

18. On this basis:

- (i) For fixed services, given that the existing users of the spectrum have already been asked to vacate the spectrum band before 1 April 2019, it would be reasonable to expect that they will have planned to relocate their fixed links to other frequency bands and/or use alternative means to substitute for the use of these links; and
- (ii) For FSS, given that there has been no use of the spectrum for such services for so many years, this should provide strong evidence that there is no demand for use by FSS in this frequency band.

19. Accordingly, HKT would suggest that the existing spectrum allocations within the 26/28 GHz Band to fixed services and FSS can be

⁴ HKT would note that in the EOI Paper the CA also states that the 24.25 – 24.65 GHz band is not currently being used for any radionavigation services even though this band has been allocated for such services.



safely revoked⁵ or, if necessary, only allocated for such use on a secondary basis. At the same time, the allocation of the 26/28 GHz Band should be made to mobile services on a primary basis.

20. Given the tremendous demand for, and critical need to develop, advanced mobile services in Hong Kong, particularly 5G services, this approach would ensure that mobile operators do not have to deal with burdensome co-primary arrangements with fixed services, FSS and any other services allocated spectrum within this band, which could adversely affect the progress of 5G development in Hong Kong.

21. Should the 26/28 GHz Band be allocated to mobile services on a sole primary basis, its radio stations will be fully protected from interference caused by secondary users (if any) operating within this band.

⁵ By the same token, the existing spectrum allocation to radionavigation services within the 26/28 GHz Band should also be revoked.

ASSIGNMENT OF SPECTRUM IN THE 26/28 GHZ BANDS: ADMINISTRATIVE APPROACH

22. According to paragraph 19 of the Consultation Paper, the CA has decided there are unlikely to be competing demands for spectrum in the 26/28 GHz Band after taking into account the following factors:

- The ample supply of spectrum in the 26/28 GHz Band;
- The technical characteristics of such higher frequency bands (including the potential for use by different operators on a shared basis);
- The use of this spectrum in other countries around the world;
- The potential supply of equipment operating in the 26/28 GHz Band; and
- The feedback from the industry, including the responses to the EOI Paper.

23. On this basis, in accordance with the **Spectrum Policy Framework**⁶, the CA proposes adopting an administrative approach to assigning spectrum in the 26/28 GHz Band.

Question 2: Do you have any views on adopting an administrative assignment approach for the release of spectrum in the 26/28 GHz bands?

24. The CA has concluded that there is more than sufficient spectrum available in the band to cater for all requests from interested mobile operators and that there are therefore unlikely to be competing demands for spectrum in the 26/28 GHz Band from providers of non-Government services. Hence the CA proposes the use of an administrative approach to assign the spectrum. HKT fully supports such an approach.

⁶ Radio Spectrum Policy Framework promulgated by the Government in April 2007.

SPECTRUM ASSIGNMENT ARRANGEMENTS

Band Plan

25. Taking into account the technical specifications of 5G technology being developed by 3GPP and the views of the respondents under the EOI exercise, the CA proposes adopting unpaired frequency blocks using Time Division Duplex mode in the band plan for the 26/28 GHz Band.

26. As equipment vendors have also indicated that 5G equipment will support channel bandwidths of 50, 100, 200 and 400 MHz, with aggregated bandwidth up to 800 MHz, the CA proposes to split the total bandwidth of 4100 MHz in the 26/28 GHz Band into blocks of 100 MHz each to cater for the requirements of different 5G use cases.

27. This results in a total of 41 frequency blocks of 100 MHz each per the following band plan:

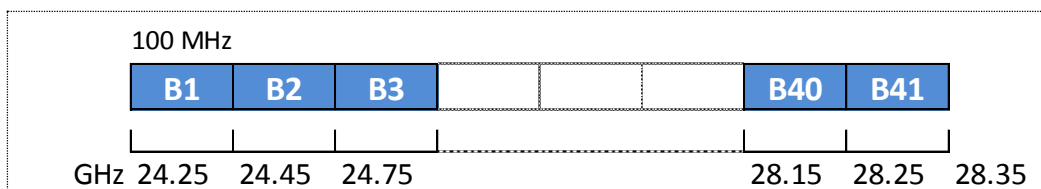


Figure 2: Proposed Band Plan for the 26/28 GHz Band

28. In recognition that 5G technology will support the development of a new telecommunications infrastructure that will allow a variety of innovative services and applications to be offered on both a large and small scale, the CA is considering assigning the 26/28 GHz Band for the provision of:

- (i) Large scale public 5G services across the whole territory (“large scale public 5G services”); and
- (ii) Smaller scale localized services in specified locations with the use of the spectrum on a shared basis, e.g. university campus, industrial estate (“specified location services”).

29. For large scale public 5G services, the CA intends to assign 3300 MHz to 3700 MHz of the spectrum in the 26/28 GHz Band, whereas, for specified location services, the CA proposes to assign the remaining 400 MHz to 800 MHz in the 26/28 GHz Band.

30. The exact of amount of spectrum to be assigned for large scale public 5G services and specified location services will be determined by the CA after taking into account the applications received for use of the spectrum in the 26/28 GHz Band. Operators (and their connected parties) who apply for use of the spectrum for large scale public 5G services will not be permitted to apply for spectrum for specified location services.

Question 3: Do you have any views on the proposed band plan with frequency slots of 100 MHz each?

31. HKT considers it sensible to apply frequency slots of 100 MHz each in the 26/28 GHz Band in order to cater for the requirements of different 5G use cases.

Question 4: Do you have any views on the proposal of assigning (a) 3300 MHz to 3700 MHz of spectrum in the 26/28 GHz bands for the provision of large scale public 5G services; and (b) the remaining 400 MHz to 800 MHz of spectrum in the two frequency bands to other entities for the provision of 5G services in specified locations on a shared basis?

32. HKT suggests that, for this new release of spectrum, the market should be permitted to decide for itself how the frequency band should be deployed, whether this be for large scale public 5G services or specified location services, as this would ensure the most efficient use of the entire 26/28 GHz Band.

33. It would be of great concern to HKT if the CA were to impose highly artificial restrictions on how much spectrum can be used for each mode of deployment, particularly in circumstances where, for instance, mobile operators making use of the spectrum to offer large scale public 5G services are finding the maximum amount of spectrum available to

them (3700 MHz) to be insufficient and the remaining spectrum in the 26/28 GHz Band being off-limits to them. As a result, they will be forced to wait for at least another 15 years (the proposed duration of the spectrum assignment period) before they can have any chance of being able to access this additional spectrum.

34. Accordingly, it would only make sense for spectrum to be offered for provision of the more geographically restrictive specified location services if there is any spectrum which has not been taken up by those mobile operators wishing to provide large scale public 5G services.⁷

35. Should licensees of large scale public 5G services be required to co-exist with licensees providing specified location services only, then the potential problem of network overlaps between both sets of players needs to be resolved. For example, HKT is particularly concerned about site access issues in cases where the site owner (who is a licensed provider of specified location services), for example a campus owner, is competing with a mobile operator offering large scale public 5G services. As both service providers are competing with each other at that location, what access rights does the mobile operator have in the event that the campus owner does not permit the mobile operator access to install its cell sites? HKT has experienced numerous instances in the past whereby the site owner, particularly at restricted locations where the mobile operator has no alternative choice, imposes significant access fees or access conditions on the mobile operator (if it is allowed access) and the latter has no choice but to pay up or comply. The MTRC, road tunnel operators and shopping mall landlords are the biggest offenders.

36. As a matter of fact, there are already mature and field proven technologies/arrangements in the market to support different network sharing schemes, ranging from site sharing, equipment sharing, carrier hosting (MORAN), carrier sharing (MOCN) and capacity sharing (MVNO). There is no reason to believe these technologies/arrangements cannot

⁷ Although, even if this assignment approach were adopted, given that the future demand for large scale public 5G services will be difficult to assess at the time spectrum is assigned (April 2019), there is a risk that more spectrum may be needed later on as such services become more mature and demand picks up.



address the need for the aforementioned localized deployment scenarios.

37. Furthermore, in the 5G era, the 3GPP Standard is designed with network slicing capabilities such that a single mobile network can be sliced to support both public and private networks at the same time. On this basis, it would be more cost effective to build a common network/infrastructure for logically separate network slices instead of the current traditional separate networks. In this way, specific location services providers could outsource their network build to large scale public 5G services providers in order to save costs and avoid duplicating infrastructure. Perhaps this method of network construction could be encouraged in the future to prevent the aforementioned site access problems.

Spectrum Cap

38. The CA intends to impose a spectrum cap of 800 MHz on each assignee using the spectrum to provide large scale public 5G services, while a cap of 400 MHz will be imposed on assignees providing specified location services.

39. In setting the cap of 800 MHz for large scale public 5G services, the CA has taken into consideration the fact that major equipment vendors are working to provide devices which support a maximum bandwidth of 800 MHz in the 26/28 GHz Band using carrier aggregation technology to provide very high speed transmission.

40. The CA does not elaborate on how he has derived his proposed spectrum cap of 400 MHz per assignee for specified location services, although it would appear that this is related to the minimum amount of spectrum in the 26/28 GHz Band it wishes to make available for specified location services.

Question 5: Do you have any views on the proposed caps of (a) 800 MHz of spectrum in the 26/28 GHz bands for spectrum designated for the provision of large scale public 5G services; and (b) 400 MHz of the Shared Spectrum designated for the provision of specified location services?

41. HKT finds the imposition of a spectrum cap contradictory to the arguments used by the CA in justifying the adoption of an administrative assignment approach to the 26/28 GHz Band. On the one hand, the CA admits that there is ample supply of spectrum in the 26/28 GHz Band, as supported by the responses received from the industry to the EOI Paper. On the other hand, he now states in paragraph 25 of the Consultation Paper that there is a “limited initial supply of mmWave spectrum suitable for the provision of 5G services”.

42. If the CA has already assessed there to be no shortage of spectrum based on the responses received under the EOI exercise, HKT sees no reason why any spectrum cap needs to be imposed.

43. In any case, the fact that the CA seeks to impose a spectrum cap of 800 MHz per licensee (providing large scale public 5G services) based on the maximum bandwidth of equipment currently planned to be supported by vendors shows the CA to be very shortsighted about technology development. The CA has simply ignored the possibility that vendors will be able produce equipment in the future which support bandwidths higher than 800 MHz. Indeed, even if one were to accept the current restrictions, this does not prevent operators from deploying multiple pieces of equipment to overcome the 800 MHz limitation. Using the 800 MHz as a spectrum cap is purely arbitrary and cannot be supported.

Spectrum Assignment Methods

Assignment of Spectrum for Provision of Large Scale Public 5G Services

44. Spectrum for the provision of large scale public 5G services is proposed to be assigned for 15 years from 1 April 2019 to 31 March



2034. Applications to use the spectrum for such purposes will be open to both incumbent mobile operators and new entrants.

45. The following application procedures are proposed to be adopted:

- (i) Applications for spectrum can only be made during an application period to be specified by the CA;
- (ii) The application indicates the types of services planned to be provided, the technical, organizational and financial capability of the applicant to provide the services in fulfilment of the licensing obligations;
- (iii) The applicant pays a deposit based on the amount of spectrum it wishes to apply for (taking into account the spectrum cap);
- (iv) The CA considers all the applications received and the total amount of spectrum being applied for in order to decide how much spectrum to assign to each applicant.

46. If the total amount of spectrum being applied for is equal to, or less than, the total amount of spectrum being offered for large scale public 5G services then each applicant will be assigned the exact amount of spectrum it has applied for. On the other hand, if demand exceeds supply, the following 2 stage procedure will be adopted:

Stage 1

- (i) Each applicant is distributed one frequency block in each round;
- (ii) This process is repeated. Applicants whose demand has been fully satisfied will be excluded from the next round of distribution;
- (iii) The process stops when the number of frequency blocks available for distribution is less than the number of remaining applicants.

Stage 2

- (i) The remaining applicants draw lots for the remaining frequency blocks until all frequency blocks have been distributed;

- (ii) After completion of the foregoing step, each applicant's total amount of spectrum will be confirmed;
- (iii) The CA then decides on the exact position of each applicant's frequency blocks by drawing lots.

Question 6: What are your views on the proposed method of assigning spectrum in the 26/28 GHz band to qualified applicants for the provision of large scale public 5G services?

47. Firstly, HKT considers a 15 year spectrum assignment period to be much too short for any spectrum assignment, particularly since there is no solid identified business case for 5G as of yet. 5G is presently still in its infancy and is based on advanced technologies, such as connected/autonomous vehicles, Artificial Intelligence, etc. that have not yet been fully developed. Furthermore, critical issues such as access to cell sites and Government street furniture have not been resolved, and there are a host of logistic issues that nobody has yet worked out for such a massive program as building a true territory-wide 5G network.

48. On this basis, operators will be taking a massive gamble on rolling out tens of thousands of small cells for 5G and may be stuck with a huge "sunk" investment (indeed a "white elephant" investment) if a profitable 5G business case simply doesn't evolve or takes much longer to evolve.

49. Operators were already caught with 3G this way, i.e. the much hyped "video-call" justification for 3G investment cases simply didn't materialize, and 3G investments were stranded for many, many years. If the same thing happens with 5G and the mobile operators only have a 15 year spectrum assignment period, then they could be approaching the end of the 15 years and still be heavily underwater yet find themselves having to decide whether or not to renew their spectrum rights.

50. In view of this, HKT urges the CA to provide the mobile operators with more runway in the form of a perpetual spectrum assignment period, or at least a longer assignment period of say 25 years in order to give the industry more confidence to invest in 5G.

51. Secondly, HKT is confused by the spectrum assignment approach proposed by the CA. The EOI exercise has already demonstrated to the CA that the aggregate demand for the spectrum in the 26/28 GHz Band is less than the total amount of spectrum available in that band. If that is the case, HKT does not understand why the CA is now suggesting the possibility that the total amount of spectrum applied for exceeds the amount of spectrum available, and hence the need to adopt a 2 stage procedure to determine the assignment of spectrum.

52. In any case, on the assumption that the EOI exercise has produced a valid result and that the total supply of spectrum in the 26/28 GHz Band does indeed exceed the aggregate demand indicated by the respondents the procedure outlined in the Consultation Paper does not describe how the spectrum will be assigned amongst the applicants in the event that two or more applicants ask for the same block of spectrum or if there are overlapping requests. The CA should clarify these steps (which should include ensuring that applicants are assigned contiguous blocks of spectrum) before commencement of the spectrum application process.

Question 7: Do you have any preference on the assignment of spectrum in either the 26 GHz or 28 GHz band?

53. HKT does not have any preference at this moment.

Assignment of Spectrum for Provision of Specified Location Services

54. Applications for use of the shared spectrum for specified location services may be made at any time after the application period for the spectrum in respect of large scale public 5G services.

55. For efficient spectrum management and administration, the spectrum is proposed to be assigned for a period which expires at the same time the assignment period for the large scale public 5G services spectrum expires, i.e. 31 March 2034.

56. Assignments for specified location services will be made on a first-come-first-served basis.

57. The CA will determine the amount and position of the frequency blocks to be assigned to each applicant on a shared basis after receiving the applications.

58. The aggregate network coverage by each spectrum assignee is proposed to be limited to 50 square kilometres, and this total limit will apply to the applicant and its connected companies (if any) taken as a whole.

59. The spectrum will be assigned to the applicant under an appropriate licence such as the Public Radiocommunications Service Licence.

Question 8: What are your views on the proposed assignment method for the Shared Spectrum?

60. HKT does not consider it necessary to earmark any particular amounts of spectrum for the provision of specified location services. The market should be allowed to decide of its own accord whether the spectrum will be used for large scale public 5G services or specified location services, and if so, how much spectrum is to be used for each mode of deployment. This is the only way to ensure that the spectrum is put to its most efficient use.

61. If, nevertheless, the CA finds there to be compelling reasons why a portion of the 26/28 GHz Band should be reserved for specified location services, then HKT would suggest that either:

- (i) A time limit be imposed on the spectrum application process for such services such that, if there are no applications received for the use of the spectrum for specified location services after say 1 year, then any spectrum which has been reserved for such services will be released for large scale public 5G services by mobile operators; or
- (ii) A review of the demand for specified location services be conducted at the end of 3 years to ascertain whether there is any surplus spectrum. If so, this surplus spectrum should be re-allocated for use by providers of large scale public 5G services.

62. The CA should also explain how it proposes to measure the 50 square kilometre coverage restriction it intends to impose on the licensee, as HKT would imagine it difficult to ensure compliance with this requirement in practice.

Network and Service Rollout Obligations

63. Per the Consultation Paper, network and service rollout obligations are only intended to be imposed on licensees assigned with spectrum for large scale public 5G services. Licensees using the spectrum for specified location services will not be subject to any such obligations as under-utilisation of this spectrum is not a concern given that the frequency bands are being used on a shared basis.

64. The CA proposes that the network and service rollout obligation for assignees of spectrum for large scale public 5G services be set with reference to the number of radio base stations established and put into use within the first 5 years of the spectrum being assigned.

65. Spectrum assignees are required to install a total of 5,000 radio base stations with the following minimum number being required to be added by the end of each year as follows:

Year	No. of Stations
1	500
2	1,000
3	1,000
4	1,000
5	1,500
Total	5,000

Figure 3: Network and Service Rollout Obligations

Question 9: *What are your views on the network and service rollout obligations proposed to be imposed on the use of spectrum assigned for the provision of large scale public 5G services?*

66. As a matter of principle, HKT does not understand why providers of specified location services, if assigned with spectrum in the 26/28 GHz Band, should be exempt from any network and service rollout requirements. The explanations provided in the Consultation Paper are not convincing. For any new spectrum, the imposition of network and service rollout requirements will go some way towards ensuring that the spectrum will be used once it has been assigned.

67. If no such requirements are imposed on operators of specified location services, there is a danger that they will simply sit on the spectrum, and the frequency bands will lay idle (perhaps for 15 years).

68. As for the rollout requirements proposed for operators assigned with spectrum for large scale public 5G services, the targets need to be set on a sensible basis. In the Consultation Paper, there is no explanation of how the required target of 5,000 base stations has been derived. This needs to be explained by the CA as the number seems aggressive.

69. In any case, HKT strongly considers that there needs to be greater support and commitment from the Government if the spectrum assignee is required to achieve a targeted number of installed radio base stations at the end of each year, particularly given the specific technical characteristics of the 26/28 GHz Band (high transmission speed and capacity but short distances covered) which necessitate a significant number of cell sites to be installed at street level in order to maximize use of the spectrum and enable an optimum 5G service to be provided. The need for street level cell sites creates two problems for 5G rollout.

70. Firstly, the availability of suitable base station equipment for large scale small cell rollout is not yet certain at this point in time.

71. Secondly, past experience has shown that gaining access to such “street level furniture”, e.g. lamp posts, bus shelters, payphone kiosks, to install small cells takes a long time due to the need to seek approval from various Government departments.⁸ In some cases, more than one

⁸ For instance, even with the established procedures for installation of micro-cell base stations, the industry as a whole has only been able to install no more than 10



Government department may be involved. It is simply not realistic to expect licensees to have 5,000 5G small cells installed by 2024 under the current Government policy and procedures without radical changes.

72. On this basis, HKT would like to make the following suggestions:

- (i) Assuming that it is reasonable to target the total number of installed base stations at 5,000 at the end of 5 years for large scale public 5G services (and HKT would want to understand how this figure was arrived at before accepting this number), the phasing of the number of base stations should be loaded towards the latter part of the 5 year period in order to allow more time for the right equipment to become available to mobile operators. For example, it could be more practical to adopt the following phasing:

Year	No. of Stations
1	-
2	-
3	2,500
4	1,000
5	1,500
Total	5,000

Figure 4: Example Revised Network and Service Rollout Obligations

- (ii) In addition, if the CA intends to impose such rollout obligations, HKT considers it imperative that in return there be a strong commitment and practical steps from the Government to facilitate access to street level furniture (and at a reasonable price) so that the base station targets set can be realistically achieved.

cell sites on lamp posts in the past 10 years. Even with the current Smart Lamp Post project pushed by the Government under the Smart City Blueprint which can accommodate the installation of 5G small cells, the initial pilot project of 400 lamp posts will only be completed in 2022.

Performance Bond

73. Per the Consultation Paper, spectrum assignees using spectrum for the provision of large scale public 5G services will be required to provide a performance bond to guarantee that their network and service rollout commitments will be met. Assignees using spectrum for specified location services will not be required to provide any performance bond since they have no network and service rollout obligations.

74. For licensees assigned with spectrum for large scale public 5G services, a performance bond set at \$1 million per MHz of spectrum assigned is proposed. The bond will be released in five phases in equal portions upon the licensee having met its network and service rollout obligation for that year. If the spectrum assignee is not able to fulfill any of the rollout milestones as required, the relevant part of the bond will be forfeited.

Question 10: *What are your views on the proposed performance bond for guaranteeing compliance with the proposed network and service rollout obligations for using spectrum assigned for the provision of large scale public 5G services?*

75. It would only make sense to require spectrum assignees to provide a performance bond if they have network and service rollout obligations, since the performance bond acts as a guarantee that the rollout obligations will be met in accordance with the specified schedule. On this basis, if network and service rollout requirements are to be imposed on operators of specified location services then such service providers should also be subject to a performance bond.

76. The amount of the bond and the manner in which it will be released are important factors which need to be considered by the CA. With regards to the 26/28 GHz Band in question, this is higher frequency spectrum which is to be used for 5G services, and carriers of 100 MHz each will be required in order to offer an acceptable level of performance in the 5G era. This is unlike spectrum in the lower



frequency bands, such as the 2.5 – 2.6 GHz band presently being used for 4G services and which only require carriers of 2 x 20 MHz (= 40 MHz) in order to offer an acceptable level of 4G service.

77. Given the significant difference in the magnitude of the spectrum needed, any performance bond required to be provided by a 5G operator should be priced on a substantially lower \$ per MHz basis than the performance bond for a 4G operator otherwise the total amount of the bond would act as a financial disincentive to potential 5G service providers applying for use of the 26/28 GHz Band.

78. On this basis, the proposed performance bond set at \$1 million per MHz of spectrum is excessive. An operator applying for use of 800 MHz of spectrum (which is the maximum amount proposed by the CA) would have to provide a performance bond of \$800 million! Just like licence fees and Spectrum Utilisation Fees (“**SUFs**”) in general, the amount of the performance bond needs to be significantly reduced in order to make it more affordable and to leave sufficient funds available to the operator to invest in network rollout.

79. In terms of the manner in which the performance bond is released, HKT agrees that the amount of the bond should be released in phases in order to reflect the extent of the network and service rollout which has already been achieved by the licensee.

80. Accordingly, instead of the bond being released in five phases in equal portions upon each annual milestone being achieved, HKT would suggest that, in order to encourage faster network and service rollout, the amount of the bond being released each year should be calculated based on the number of base stations which have actually been installed by the licensee at the end of each year subject to, of course, the targeted minimum number of base stations for that year having been met.

SPECTRUM UTILISATION FEE

81. In accordance with the Joint Statement of the SCED and Telecommunications Authority on *Spectrum Utilization Fee for Spectrum Assigned Administratively* issued on 23 September 2011 (“**SUF Charging Scheme**”), if a frequency band is congested (i.e. 75% or more occupied) and the demand for using that frequency band is expected to grow in the next three to five years, or a high potential demand for the band for alternative use is expected, then SUF should be payable.

82. In accordance with the SUF Charging Scheme, should SUF be payable, the amount would be computed using the Least Cost Alternative (“**LCA**”) approach. The designation of congested bands and the levels of the SUF to be imposed would also be reviewed every five years.

83. On this basis, the SCED proposes to charge SUF for the 26/28 GHz Band only if, having assessed all the applications for assignment of the spectrum, it is ascertained that the frequency band will become 75% or more occupied and is anticipated to become more congested in the future.

84. In adopting the principles under the SUF Charging Scheme, the SCED proposes the following SUF levels to be imposed:

- Spectrum for large scale public 5G services: \$21,600 per MHz per annum (same as the SUF levied on carrier licensees for use of fixed links or satellite uplinks)
- Shared spectrum for specified location services: \$1,080 per MHz per annum per geographical coverage of 50 square kilometres

85. Payment of the SUF will also be in accordance with the payment schedule stated in the SUF Charging Scheme as follows:

- Nil charged for 2019
- 30% of the SUF charged for 2020
- 70% of the SUF charged for 2021
- Full amount of the SUF charged for 2022 and beyond

Question 11: Do you have any views on the proposal for SUF as set out in paragraphs 45 to 50 above?

86. The CA's proposals appear sensible in terms of the LCA approach and the transitional period to be implemented for charging the SUF. The CA should, nevertheless, provide an explanation of how the \$1,080 per MHz per annum per geographical coverage of 50 square kilometres proposed to be levied on operators using spectrum for specified location services has been derived, as this is not explained in the Consultation Paper. HKT would also assume that all service providers making use of spectrum in the 26/28 GHz Band would be required to pay SUF, including providers of FSS (if any).

87. As for the manner in which the SUF is to be updated, HKT is concerned about the lack of protection being afforded to spectrum assignees regarding future SUF increases arising from the reviews which are planned to take place every 5 years. Once the spectrum has been assigned to the licensee it will be for a period of at least 15 years and, during this period, the licensee must pay whatever SUF is determined each time the review is conducted, even if there are significant increases in the price to be paid. This seems highly risky to the spectrum holder and is clearly unfair. HKT would suggest it better to at least provide some assurance to the operators in the form of a price cap.

**Submitted by
Hong Kong Telecommunications (HKT) Limited
22 August 2018**