HKT

# Arrangements for the Frequency Spectrum in the 850/900 MHz and 2.3 GHz Bands upon Expiry of the Existing Assignments for the Provision of Public Mobile Services and the Related Spectrum Utilisation Fee

## Response to Consultation Paper

22 December 2022

## INTRODUCTION

1. Hong Kong Telecommunications (HKT) Limited ("**HKT**") welcomes the opportunity to provide its comments on the proposals put forward by the Communications Authority ("**CA**") and the Secretary for Commerce and Economic Development ("**SCED**") in their consultation paper on *Arrangements for the Frequency Spectrum in the 850/900 MHz and 2.3 GHz Bands upon Expiry of the Existing Arrangements for the Provision of Public Mobile Services and the Related Spectrum Utilisation Fee* issued on 17 November 2022 ("**Consultation Paper**").

2. The frequency bands dealt with in the Consultation Paper relate to spectrum which is currently assigned to the following licensees for which the assignment period will expire in the next few years:

| Band | Range (MHz) | MHz | Current Assignee | Expiry Date |
|---|---|---|---|---|
| **850/900 MHz band** | 832.5 - 837.5<br>877.5 - 882.5<br>"**850 MHz band**" | 10 | SmarTone Mobile Communications Limited ("**SmarTone**") | 31 May 2026 |
| | 885.0 – 890.0<br>930.0 – 935.0<br>"**900 MHz band**" | 10 | Hutchison Telephone Company Limited ("**Hutchison**") | |
| **2.3 GHz band** | 2300 - 2330 | 30 | VNET Group Limited ("**VNET**") | 29 March 2027 |
| | 2330 - 2360 | 30 | China Mobile Hong Kong Company Limited ("**CMHK**") | |
| | 2360 - 2390 | 30 | Hutchison Telephone Company Limited | |

3. The purpose of the consultation is therefore for the CA/SCED to seek views on how the spectrum in question is to be re-assigned in the new term.

4. In the following sections, HKT provides its comments on the CA/SCED's proposals and responds to the individual questions raised in the Consultation Paper concerning the re-assignment arrangements.

## PRELIMINARY MATTERS

### Demand for Spectrum in the 850/900 MHz and 2.3 GHz Bands

5. The CA has looked at the following factors in deciding whether there are likely to be competing demands for the spectrum in the 850/900 MHz and 2.3 GHz bands:

- The rapid growth in the mobile telecommunications market over the past number of years, which is expected to continue given the development of new innovative mobile broadband applications. This requires mobile operators to acquire more spectrum.

- While the spectrum is currently being used for 4G mobile services, the frequency bands meet the required technical specifications for 5G mobile services and hence can be deployed for a higher generation of mobile service. This makes the spectrum bands attractive to mobile operators.

- Both bands are highly sought after by mobile operators due to their technical characteristics: the radio propagation characteristics of the 850/900 MHz band enable extensive mobile coverage and high building penetration, while the wider bandwidth of the 2.3 GHz band which make it suitable for supporting cost effective provision of mobile broadband services to meet both coverage and capacity demands.

- The competition for low-band and mid-band spectrum as experienced during the last spectrum auction held in October 2021[1] indicate that both the 850/900 MHz and 2.3 GHz bands also likely to be in demand by the mobile operators.

6. After considering the above factors, the CA's assessment is that there are likely to be competing demands for spectrum in the 850/900 MHz and 2.3 GHz bands.

[1] Auction of Radio Spectrum in the 600 MHz, 700 MHz, 850 MHz, 2.5/2.6 GHz and 4.9 GHz Bands for the Provision of Public Mobile Services.

## Proposed Re-Assignment Approach

7. The guiding principles under the Radio Spectrum Policy Framework[2] specify that the CA should adopt a market-based approach for the re-assignment of spectrum if there are likely to be competing demands for the spectrum, unless there are overriding public policy reasons to do otherwise.

8. As in the past, the CA has considered the following policy objectives in deciding whether they provide any grounds to deviate from a market-based approach:

(i) *Ensuring customer service continuity*. The current spectrum assignees already have access to other frequency bands which they can deploy to ensure service continuity even if they fail to re-acquire their existing holdings in the 850/900 MHz or 2.3 GHz bands the new term.

(ii) *Efficient spectrum utilisation*. This re-assignment exercise provides the mobile operators an opportunity to assess their spectrum holdings and adjust their holdings having regard to their own commercial and technical considerations. Using a market-based approach would ensure that the spectrum ends up in the hands of the operators who value it most. This will therefore lead to the most efficient utilisation of the spectrum.

(iii) *Promotion of effective competition*. The Hong Kong mobile telecommunications market is already recognized as being highly competitive. Adopting a market-based approach to the re-assignment of spectrum resources would encourage operators to value their spectrum and make the most use of it in rolling out new service offerings, thereby further spurring competition.

(iv) *Encouragement of investment and promotion of innovative services*. Adopting a market-based approach to re-assign the spectrum will likely result in spectrum changing hands. This will require spectrum assignees to invest in network infrastructure in

[2] Issued by the then Commerce, Industry and Technology Bureau in April 2007.

order to make use of the spectrum effectively. In so doing, this will encourage the development of new and innovative services.

9. After considering the above factors, the CA has determined that there are no public policy reasons to deviate from a market-based approach and hence such an approach shall be adopted for the re-assignment of the spectrum blocks.

10. The market-based approach that has been commonly used by the CA in the past is a spectrum auction. The CA therefore considers that the spectrum in the 850/900 MHz and 2.3 GHz bands should be re-assigned by way of auction.

## HKT's Comments

11. Given that the spectrum to be assigned in the 850/900 MHz and 2.3 GHz bands relates to frequency bands which are already extensively being used by the major incumbent licensees, it is likely that there will be competing demand for the spectrum in the new term. It is therefore justified for the CA to adopt a market-based approach to the re-assignment of the spectrum.

12. The use of a spectrum auction as the market-based approach to be adopted by the CA is also acceptable in view of the industry's familiarity with this assignment method.

## PROPOSED RE-ASSIGNMENT ARRANGEMENTS

13. On the basis that the spectrum in the 850/900 MHz and 2.3 GHz bands is to be re-assigned by way of auction, in this section, the CA addresses the associated re-assignment arrangements.

### Scope of Service

#### *850/900 MHz Band*

14. According to the *Hong Kong Table of Frequency Allocations* issued by OFCA (May 2022) ("**Frequency Table**"), spectrum in the 806 – 960 MHz range, which covers the 850/900 MHz band, is allocated to "Land Mobile" in Hong Kong. The CA therefore considers that the 850/900 MHz band should continue to be used for the provision of mobile services only.

#### *2.3 GHz Band*

15. Per the Frequency Table, spectrum in the 2300 – 2400 MHz range, which covers the 2.3 GHz band, is allocated to both "Fixed" and "Mobile" services on a co-primary basis in Hong Kong. While, presently, the 2.3 GHz band is being used by the spectrum assignees for mobile services, one of the assignees (i.e., VNET) is also using a small portion of the spectrum for fixed wireless services. The CA considers this "far from satisfactory" from an efficient use of spectrum perspective. On this basis, the CA suggests that the 2.3 GHz band be restricted to mobile use only in the new assignment term.

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| ***Question 1:*** | *Do you have any views on re-assigning the spectrum in the 2.3 GHz band for the provision of mobile services only?* |

16. In paragraph 9 of the Consultation Paper, OFCA has already recognized the tremendous growth in demand for mobile services which has been spurred on by the continued development in broadband applications riding on 4G and 5G mobile networks. This growth requires to be fueled by an ever-increasing supply of frequency spectrum.

17. The 2.3 GHz band, which is classified as mid-band spectrum, is also highly sought after by mobile operators due to its ability to support cost-effective provision of mobile broadband services to meet both coverage and capacity requirements.

18. On this basis, HKT considers it appropriate to re-assign the 2.3 GHz band for the provision of mobile services only.

## Band Plan

### *850/900 MHz Band*

19. The 850/900 MHz band is currently split into 2 blocks of 2 x 5 MHz each and is deployed for 4G mobile services based on the Frequency Division Duplex ("**FDD**") mode of operation. These blocks are marked as A1 and A2 in the diagram below:

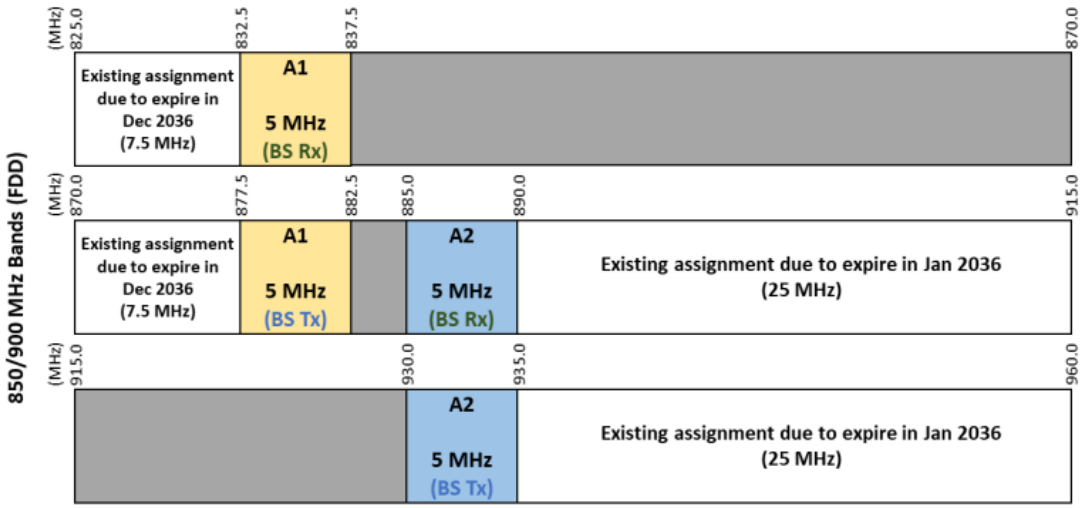


*Figure 1: Existing/Proposed band plan for the 850/900 MHz band (Source: Consultation Paper)*

20. According to the 3rd Generation Partnership Project ("**3GPP**"), if the spectrum is to be used for 5G mobile services based on the specification for 5G New Radio ("**NR**") FDD, the minimum allowable channel bandwidth would be 2 x 5 MHz.

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| ***Question 2:*** | *Do you have any views on the proposal that 20 MHz of spectrum in the 850/900 MHz bands be divided into two paired frequency blocks with a bandwidth of 2 x 5 MHz each?* |

21. Given the way the 850/900 MHz band is currently used and the potential for use in 5G mobile services based on the 5G NR FDD specification, HKT considers it appropriate to maintain the band plan for the 850/900 MHz band at 2 paired blocks of 2 x 5 MHz each for the purposes of re-assignment.

### *2.3 GHz Band*

22. The 2.3 GHz band is currently split into 3 blocks of 30 MHz each and is being deployed for 4G mobile services based on the Time Division Duplex ("**TDD**") mode of operation. However, the spectrum may be used for 5G mobile services based on the specification for 5G NR TDD.

23. Per 3GPP, both 4G and 5G can operate on a standalone basis with a channel bandwidth as low as 5 MHz. However, a 5 MHz channel bandwidth for 5G cannot support all SCS configurations described in the specification, thereby limiting the flexibility of deployment.

24. On this basis, in order to allow the spectrum blocks to continue to be used for 4G mobile services or enable the blocks to be used for 5G mobile services, the CA proposes the 2.3 GHz band to be divided up into 9 equal blocks of 10 MHz each for the purposes of re-assignment.

25. The existing and proposed band plans are illustrated in the diagram below:

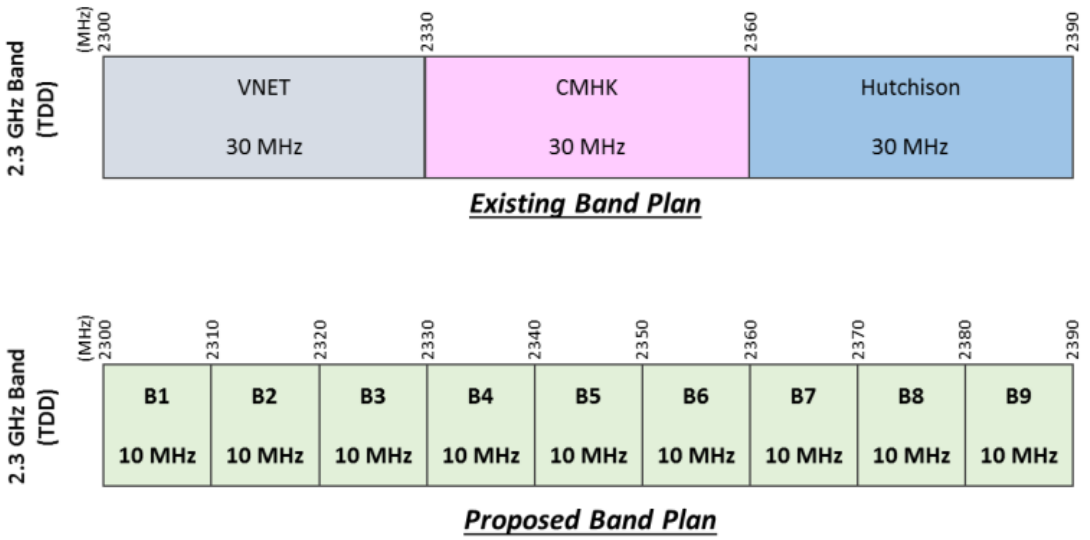


*Figure 2: Existing/Proposed band plan for the 2.3 GHz band (Source: Consultation Paper)*

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| ***Question 3:*** | *Do you have any views on the proposal that 90 MHz of spectrum in the 2.3 GHz band be divided into nine frequency blocks with a bandwidth of 10 MHz each?* |

26. Given that the CA's proposal satisfies the minimum technical requirements for 5G NR TDD and, at the same time, gives spectrum assignees the maximum flexibility to combine blocks of spectrum to achieve higher spectrum efficiency when deploying the spectrum to provide either 4G or 5G mobile services, HKT considers it appropriate to divide the 2.3 GHz band into 9 blocks of 10 MHz each for re-assignment in the new term.

## Spectrum Cap

27. In deciding whether caps should be imposed on the amount of spectrum in the 850/900 MHz and 2.3 GHz bands that can be acquired by operators, the CA proposes to take into consideration the existing spectrum holdings of the four major mobile operators (CMHK, HKT, SmarTone, Hutchison) as well as the potential impact on competition that may arise from any undue concentration of spectrum being held by a single operator.

*850/900 MHz Band*

28. Despite the two blocks of spectrum under consideration in the 850/900 MHz band being in close proximity to each other, they in fact belong to two discrete bands which require different sets of radio network equipment, including radio units and other accessories for the operation of radio base stations.[3] The CA therefore considers that there is no technical merit to be gained by a single operator acquiring both blocks of spectrum in the 850/900 MHz band that would outweigh any competition concerns arising from a single operator holding both blocks.

29. On this basis, the CA considers it acceptable to impose a spectrum cap of 2 x 5 MHz in the 850/900 MHz band, representing 50% of the spectrum to be re-assigned in this band.

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| ***Question 4:*** | *Do you have any views on the proposal of imposing a spectrum cap of 2 x 5 MHz on each bidder for the re-assignment of 2 x 10 MHz of spectrum in the 850/900 MHz bands?* |

30. Generally speaking, HKT agrees with the CA that minimal constraints should be placed on spectrum acquisition in an auction. Any constraints should only be imposed to the extent necessary to address a specific and clearly identified competition concern arising from an undue concentration of spectrum falling within the hands of any single spectrum assignee.

31. In this particular case, it would seem that the CA has decided to impose a spectrum cap, not because of any competition concerns, but simply because it is unlikely that an operator would wish to acquire both blocks of spectrum due to the technical incompatibility issues discussed earlier.

32. HKT would suggest that it is up to each operator to decide for itself whether it is commercially viable to acquire both blocks of spectrum if this entails the operator having to invest in two different

[3] Paragraph 28 of the Consultation Paper.

sets of radio network equipment. This decision should not be made by the CA on behalf of the operators.

33. On this basis, if there are no specific and clearly identified competition concerns arising from the acquisition of both blocks of spectrum in the 850/900 MHz band by the same operator (as demonstrated from the spectrum holding figures in Table 2 of the Consultation Paper), it would not be appropriate for the CA to bar an operator from acquiring both blocks of spectrum simply on the grounds that it would not appear to make any commercial sense. This decision should be left to the operators who wish to acquire the spectrum concerned.

### *2.3 GHz Band*

34. The CA proposes to allow an operator to acquire up to 50 MHz of the spectrum in the 2.3 GHz band, which represents over 50% of the amount of spectrum being re-assigned (90 MHz). In so doing, each of the incumbent spectrum assignees would be in a position to re-acquire their existing holding and, if so desired, even extend their holding in order to achieve higher spectrum efficiency.

35. Based on the existing distribution of spectrum amongst the major mobile operators (per Table 2 in the Consultation Paper), the CA considers that imposing a cap of 50 MHz on each operator would not give rise to any competition concerns.

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| ***Question 5:*** | *Do you have any views on the proposed spectrum cap of 50 MHz to be imposed on each bidder for the re-assignment of 90 MHz of spectrum in the 2.3 GHz band?* |

36. Again, as a matter of principle, HKT agrees with the CA that minimal constraints should be placed on spectrum acquisition in an auction. Any constraints should only be imposed to the extent necessary to address a specific and clearly identified competition concern arising from an undue concentration of spectrum falling within the hands of any single spectrum assignee.

37. In paragraph 30 of the Consultation Paper, the CA has recognized that the four major mobile operators have already been assigned "hundreds of megahertz of spectrum across various frequency bands" and hence allowing a single operator to acquire 50 MHz of the 2.3 GHz band would not give rise to competition concerns, since this amount of spectrum forms a very small proportion of the total amount of spectrum already assigned.

38. HKT would, nevertheless, question whether setting a cap of 50 MHz and allowing a single operator to acquire more than half (i.e., 56%) of the 90 MHz of spectrum being made available for re-assignment within the 2.3 GHz band would not result in an undue concentration of spectrum in the hands of a single spectrum assignee with the effect of restricting competition. This is particularly a concern given the importance of this band for the provision of emerging and innovative 5G mobile services.

39. On this basis, perhaps the CA should consider imposing a slightly lower cap on the 2.3 GHz band, say 40 MHz, which would prevent a single operator from acquiring the majority of the spectrum in this band and yet still allow incumbent assignees to acquire more than their current holding of 30 MHz of spectrum if they so desire.

## Eligible Bidders

40. The CA is considering imposing the following minimal qualification requirements on an operator who is interested in bidding for the spectrum in the 850/900 MHz or 2.3 GHz bands:

(a) Lodge a specified amount of deposit, which may be forfeited if the operator fails to comply with the rules imposed by the CA/SCED; and

(b) Demonstrate its technical and financial capability to provide services in fulfilment of the licensing obligations and provide any other relevant supporting information as necessary.

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| ***Question 6:*** | *Do you have any views on re-assigning the spectrum in the 850/900 MHz and 2.3 GHz bands by allowing all interested parties to apply for participation in the auction?* |

41. HKT agrees that only minimal qualification requirements should be imposed on interested applicants and that it would be appropriate to include the above items specified by the CA as part of the bidder's application to take part in the spectrum auction. However, given that the CA has already expressed its intention to restrict the use of the 850/900 MHz and 2.3 GHz bands to mobile services[4], it would be proper to also include a requirement that applicants are established mobile service providers or affiliated to mobile service providers.

42. This is because it is highly unlikely that a new entrant, with no experience in the establishment of mobile networks or provision of mobile services would be able to successfully establish a mobile network from scratch or make efficient use of the limited amount of spectrum that is being made available for re-assignment in the 850/900 MHz and 2.3 GHz bands given the time and cost required.

43. In fact, the case of VNET is a prime example of the dangers of allowing a non-mobile affiliated operator to apply to participate in the bidding for spectrum. The consequences are now clear. In all these years since spectrum in the 2.3 GHz band was assigned to VNET (since March 2012), VNET has failed to establish any meaningful presence in the mobile telecommunications market and has, instead, focused on the provision of fixed wireless services to a very limited number of customers. This is not just "far from satisfactory"[5] from a spectrum efficiency perspective, but also represents a huge opportunity which has been lost by society due to the spectrum resting in the hands of a mobile operator that could have made much better use of this limited resource.

[4] Per paragraph 23 of the Consultation Paper.

[5] As described by the CA in paragraph 22 of the Consultation Paper.

## Auction Format

44. For the spectrum auction of the 850/900 MHz and 2.3 GHz bands, the CA proposes to adopt the Simultaneous Multiple-Round Ascending ("**SMRA**") auction format in which participants bid on specific blocks whose prices are set by the auctioneer for each round of the auction. This auction format has been used extensively in past spectrum auctions in Hong Kong.

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| ***Question 7:*** | *Do you have any views on the adoption of the SMRA auction format for the re-assignment of the spectrum in the 850/900 MHz and 2.3 GHz bands?* |

45. Given that the SMRA auction format has been adopted in several spectrum auctions in Hong Kong in the past, the industry is already well familiar with this auction format. Accordingly, HKT considers it appropriate to use the SMRA auction format to determine the re-assignment of the 850/900 MHz and 2.3 GHz bands.

46. In the interests of efficacy, HKT would also suggest that both the 850/900 MHz and 2.3 GHz bands be made available for bidding in the same auction.

## LICENSING ARRANGEMENTS

47. The CA proposes to impose the following licensing requirements on the 850/900 MHz and 2.3 GHz bands:

| | 850/900 MHz Band | 2.3 GHz Band |
|---|---|---|
| Licensing and Validity Period | New Unified Carrier Licence ("**UCL**") for 15 years. Incumbent licensees who successfully acquire spectrum in the proposed auction may apply to the CA to combine their existing UCL with the new UCL to be issued | |
| Restriction on Frequency Swap | Swapping within each band generally not permitted within the first 5 years of assignment | |
| Technology Neutrality | No restrictions on technology as long as based on widely recognized standards for mobile services | |
| Control of Interference | Block A2 can only be used away from the cross-border rail links[6] and outside the Designated Areas[7] | N/A |
| Network and Service Rollout Obligations | Network and service rollout covering at least 90% of the Hong Kong population within 5 years of spectrum assignment | |
| Performance Bond for Rollout Obligations | Performance bond to be lodged with the CA to guarantee fulfilment of the network and service rollout obligations. Network coverage figures demonstrating fulfilment of the network and service rollout obligations may be provided in lieu of a performance bond by the successful bidder of spectrum in the 850 MHz, 900 MHz or 2.3 GHz bands if they are an incumbent assignee of frequency blocks in the **same band**[8] | |

[6] Part of the 850/900 MHz band is currently being used for operation of the wireless communication system within the Hong Kong section of the Guangzhou-Shenzhen-Hong Kong Express Rail Link.

[7] Country parks and remote areas as specified by the CA.

[8] For the purposes of the rollout performance bond, successful bidders of spectrum in the 850 MHz, 900 MHz and 2.3 GHz bands will be treated as having acquired spectrum in the same band if they are incumbent assignees of frequency blocks in following respective ranges: (a) 825.0 – 837.5 MHz paired with 870.0 MHz – 882.5 MHz; (b) 885.0 MHz – 915.0 MHz paired with 930.0 MHz – 960.0 MHz; and (c) any frequency block within the 2.3 GHz band.

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| ***Question 8:*** | *Do you have any views on the proposed licensing arrangements as specified in paragraphs 34 to 42 above? In particular, do you have any views on the network and service rollout obligations proposed to be imposed on the successful bidders of spectrum in the 850 MHz, 900 MHz and 2.3 GHz bands, and the associated performance bond or network coverage statistics as the case may be proposed for ensuring compliance?* |

48. HKT would like to comment on the following specific licensing arrangements:

*Licensing and validity period*

49. The CA proposes to assign the spectrum in the 850/900 MHz and 2.3 GHz bands for the standard period of 15 years in the new assignment term. However, doing so may result in sub-optimal use of the 850/900 MHz band given that the spectrum in this band expires on a different date to their adjacent frequency blocks. This misalignment of assignment periods prevents an operator from ever being able to acquire a contiguous block of spectrum of wider bandwidth within this frequency range in one go:

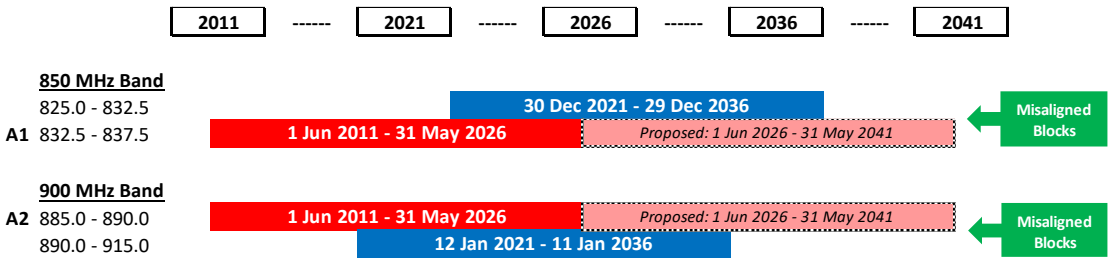


*Figure 3: Misaligned assignment periods for contiguous spectrum blocks (Note: Only the lower range of the paired blocks shown)*

50. Indeed, the CA recognizes the importance of facilitating contiguous spectrum blocks to enhance network capacity and transmission speed. In the Consultation Paper, the CA states:

*[…] some MNOs may want to acquire additional spectrum to enhance their network capacity and transmission speed or to form contiguous blocks of wider bandwidth to attain higher spectrum efficiency.*[9]

*Bidders may acquire and aggregate multiple blocks to form carriers of larger bandwidths to attain higher spectral efficiency in accordance with their technical and commercial considerations.*[10]

51. Accordingly, in order to increase the spectral efficiency of the 850/900 MHz band, it is suggested that the CA align the expiry dates of the frequency blocks in the 850/900 MHz band (i.e., A1 and A2) with the expiry dates of their adjacent frequency blocks. In this way, upon expiry of the spectrum, operators will be given an opportunity to acquire a wider contiguous block of spectrum whose assignment period starts and finishes on the same date:

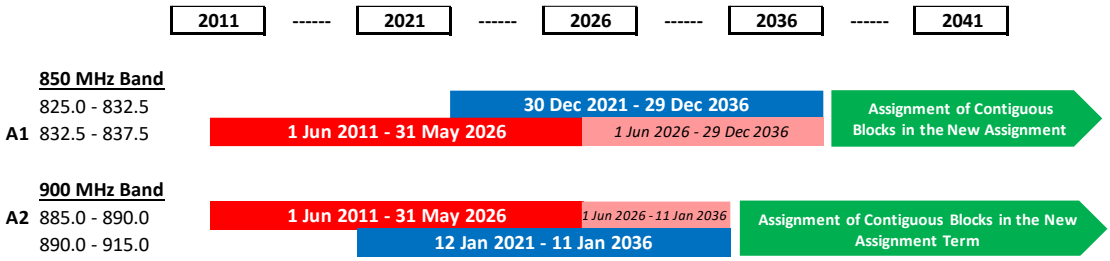


*Figure 4: Aligned assignment periods for contiguous spectrum blocks*
*(Note: Only the lower range of the paired blocks shown)*

52. While this would result in blocks A1 and A2 having an assignment period of less than the standard 15 years, this would be fairly reflected in the bidding during the spectrum auction and the final price that is determined by the auction.

53. Unless this issue concerning the misaligned assignment periods for blocks A1 and A2 is addressed in the forthcoming assignment arrangements, this problem will persist and the frequency blocks in the 850/900 MHz band will never be able to be assigned in the most optimal manner from a spectral efficiency viewpoint.

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[9] Paragraph 16 of the Consultation Paper.

[10] Paragraph 26 of the Consultation Paper.

54. The CA has a duty to assign spectrum in such a way as to maximize spectral efficiency. Shortening the assignment period of the new spectrum assignments to match the expiry date of the adjacent frequency blocks eliminates the historical problem concerning the misaligned assignment periods and ensures optimal efficiency when assigning the frequency blocks.

*Performance bond for rollout obligations*

55. As an operator who already holds spectrum in the same band as the spectrum it has acquired at auction is likely to have already established a network that meets the 90% population coverage requirement, HKT agrees with the CA that, in lieu of providing a performance bond to guarantee meeting the coverage requirements, the incumbent assignee of such spectrum simply be required to furnish network coverage figures demonstrating that it has already fulfilled the coverage requirements using the assigned spectrum.

56. In any event, should an operator be required to provide a network and service rollout performance bond, HKT would urge the CA/SCED to set the amount of the bonded sum at no higher than previous levels for such bonds.

## SPECTRUM UTILISATION FEE

57. As the CA intends to use a spectrum auction to determine assignment of the spectrum in the 850/900 MHz and 2.3 GHz bands, the Spectrum Utilisation Fee ("**SUF**") that is to be paid by the successful bidder for each block of spectrum will be determined via the final bidding price of each frequency block.

58. The SCED proposes to allow successful bidders of the spectrum to settle the SUF either in one lump sum upfront or in 15 annual instalments, with each instalment to be increased by a fixed percentage each year which aims to reflect the time value of money to the Government (i.e., the interest rate).

59. The opening (reserve) price of each frequency block for the spectrum auction is to be set by the SCED.

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| ***Question 9:*** | *Do you have any views on the proposal in relation to the setting and collection of SUF as specified in paragraphs 43 and 44 above?* |

60. HKT supports the SCED giving successful bidders a choice of two payment methods for the SUF as the annual instalment option helps to ease pressure on an operator's cashflow. HKT would, nevertheless, urge the SCED to set an interest rate to be applied to the annual instalments that is no higher than the latest rate which is being applied to SUF instalment payments, i.e. 2%.

61. As the purpose of the reserve price is simply to kick start the bidding in the spectrum auction, HKT would also urge the SCED to set this at as low a level as possible in order to allow the competitive bidding process to discover the true market value of the spectrum.

**Submitted by**
**Hong Kong Telecommunications (HKT) Limited**
**22 December 2022**