Joint Statement of the Communications Authority and the Secretary for Commerce and Economic Development

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

2 May 2023

PURPOSE

This Statement promulgates the decision of the Communications Authority ("CA") on the arrangements for re-assignment of 10 MHz of spectrum in the 832.5 – 837.5 MHz paired with the 877.5 – 882.5 MHz band ("850 MHz band") and 10 MHz of spectrum in the 885.0 – 890.0 MHz paired with the 930.0 – 935.0 MHz band ("900 MHz band") (collectively "850/900 MHz bands"), and 90 MHz of spectrum in the 2300 – 2390 MHz band ("2.3 GHz band") upon expiry of the existing assignments on 31 May 2026 and 29 March 2027 respectively for the provision of public mobile services, as well as the decision of the Secretary for Commerce and Economic Development ("SCED") on the arrangements for the related spectrum utilisation fee ("SUF").

EXECUTIVE SUMMARY

S1. The CA decides to adopt a market-based approach for re-assignment of a total of 110 MHz of spectrum consisting of 20 MHz of spectrum in the 850/900 MHz bands and 90 MHz of spectrum in the 2.3 GHz band upon expiry of the existing assignments on 31 May 2026 and 29 March 2027 respectively for the provision of public mobile services.

S2. The 20 MHz of spectrum in the 850/900 MHz bands will be divided into two paired frequency blocks with a bandwidth of 2 x 5 MHz each. A spectrum cap of 10 MHz (i.e. 2 x 5 MHz) will be imposed on each bidder in the auction for the spectrum in the 850/900 MHz bands.

S3. The 90 MHz of spectrum in the 2.3 GHz band will be divided into nine frequency blocks with a bandwidth of 10 MHz each. A spectrum cap of 50 MHz will be imposed on each bidder in the auction for the spectrum in the 2.3 GHz band.

S4. The 20 MHz of spectrum in the 850/900 MHz bands and 90 MHz of spectrum in the 2.3 GHz band will be put to auction together in the simultaneous multiple round ascending ("SMRA") format. Subject to the connected bidder restriction, all interested parties, including incumbent mobile network operators ("MNOs") and new entrants, may apply for participation in the auction.

S5. A technology neutral approach will be adopted for the re-assignment of the 20 MHz of spectrum in the 850/900 MHz bands and 90 MHz of spectrum in the 2.3 GHz band for a term of 15 years. An assignee may freely use any technology of a widely recognised standard for service provision, subject to compliance with the licence conditions of the unified carrier licence ("UCL") to be granted for use of the spectrum and the electromagnetic compatibility with the use of spectrum by other assignees in the same and adjacent frequency bands. Frequency swapping of any frequency assignment in the 850/900 MHz and 2.3 GHz bands within the first five years of the frequency assignment will generally not be considered.

S6. Same as the restriction imposed under the current assignment, the use of the 10 MHz of spectrum in the 900 MHz band to be re-assigned will be restricted to the provision of mobile services in areas away from the cross-border rail link(s) including the Hong Kong Section of the Guangzhou-Shenzhen-Hong Kong Express Rail Link and outside designated country parks and remote areas as specified by the CA ("Designated Areas") to avoid harmful interference with the use of frequency channels in the 900 MHz band by the railway operator along the cross-border rail link(s) and MNOs in the Designated Areas.

S7. Within the first five years of spectrum re-assignment, each successful bidder of the spectrum in the 850/900 MHz and 2.3 GHz bands will be required to provide a minimum coverage of 90% of population and lodge a performance bond as a guarantee of its compliance with the network and service rollout obligations. If an incumbent spectrum assignee in any of the 850/900 MHz (including spectrum in the nearby ranges) and 2.3 GHz bands successfully acquires spectrum in the same band, it may choose to provide network coverage figures demonstrating that its network operating with the spectrum re-assigned has already fulfilled the 90% minimum population coverage requirement for the band concerned, without the need to provide a performance bond in respect of the re-assignment.

S8. The SUF of the 20 MHz of spectrum in the 850/900 MHz bands and 90 MHz of spectrum in the 2.3 GHz band will be determined through auction to be held in 2024. The auction reserve price will be specified nearer

the time of the auction. In terms of the method of payment, spectrum assignees will be given a choice to pay the SUF either by lump sum payment upfront or by annual instalments, with the first instalment equivalent to the lump sum payment divided by 15 and with subsequent instalments increased every year by 2.5% to reflect the time value of money to the Government.

INTRODUCTION

A total of 20 MHz of spectrum in the 850/900 MHz bands was assigned on 1 June 2011 for the provision of public mobile services, and the existing assignments are due to expire on 31 May 2026. The assignments have been made to two assignees, each with an amount of 2 x 5 MHz of spectrum[1].

2. Further, 90 MHz of spectrum in the 2.3 GHz band was assigned on 30 March 2012 for the provision of public mobile and fixed services[2], and the existing assignments are due to expire on 29 March 2027. The assignments have been made to three assignees, each with an amount of 30 MHz of spectrum[3].

3. Against the above background, the CA and SCED jointly issued a consultation paper on 17 November 2022 ("Consultation Paper")[4] to seek views and comments of the telecommunications industry and other affected persons on the proposed arrangements for the re-assignment of the 20 MHz of spectrum in the 850/900 MHz bands and 90 MHz of spectrum in the 2.3 GHz band upon the expiry of the existing assignments on 31 May 2026 and 29 March 2027 respectively, and the methods for setting the related SUF.

4. By the close of the consultation, four submissions from the four major MNOs, namely China Mobile Hong Kong Company Limited, Hong Kong Telecommunications (HKT) Limited, Hutchison Telephone Company Limited and SmarTone Mobile Communications Limited were received. Having carefully considered their views and comments, the CA and SCED set

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[1] The assignments have been made to two assignees, viz. SmarTone Mobile Communications Limited ("SmarTone"), assigned with 2 x 5 MHz of spectrum in the 850 MHz band; and Hutchison Telephone Company Limited ("Hutchison"), assigned with 2 x 5 MHz of spectrum in the 900 MHz band.

[2] The spectrum in the 2.3 GHz band is predominantly deployed for the provision of mobile services while one of the assignees has deployed a minority portion of the spectrum for the provision of fixed wireless services.

[3] China Mobile Hong Kong Company Limited ("CMHK"), Hutchison and VNET Group Limited ("VNET") (formerly 21 ViaNet Group Limited) are the incumbent assignees of the spectrum in the 2.3 GHz band.

[4] The Consultation Paper is available at: https://www.coms-auth.hk/filemanager/en/content_711/cp20221117.pdf and https://www.cedb.gov.hk/assets/resources/cedb/consultations-and-publications/cp20221117_e.pdf.

out in this Statement their respective decisions on the arrangements for the re-assignment of the spectrum in the 850/900 MHz and 2.3 GHz bands and the related SUF. Salient views and comments of the respondents, as well as the respective responses of the CA and SCED, are summarised in the **Annex**.

LEGISLATIVE AND POLICY FRAMEWORK

5. Under section 32G(1) of the Telecommunications Ordinance (Cap. 106) ("TO"), the CA has the statutory duty to promote the efficient allocation and use of the radio spectrum as a public resource of Hong Kong. Sections 32H(2) and 32I(1) of the TO empower the CA to assign radio frequencies and to designate the frequency bands in which the use of spectrum shall be subject to the payment of the SUF, following consultation with the telecommunications industry and other affected persons in accordance with section 32G(2) of the TO. Sections 32I(2) and 32I(4) of the TO empower SCED to prescribe the level of the SUF or the method for determining the SUF.

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

7. The Radio Spectrum Policy Framework ("Spectrum Policy Framework")[5] promulgated by the Government in April 2007 sets out the policy objectives and the guiding principles in spectrum management which the CA should take into account in discharging its spectrum management responsibilities under the TO. By a statement issued in April 2007, the former Telecommunications Authority ("TA") explained that, in exercising his statutory powers under the TO, he would, in addition to all relevant considerations as required by law, give due regard to the Spectrum Policy

[5] The Spectrum Policy Framework is available at: https://www.cedb.gov.hk/assets/resources/ccib/policies/spectrum.pdf.

Framework to the extent that there would be no inconsistency with the objectives and provisions of the TO[6].

8. The Spectrum Policy Framework makes it clear that there is no legitimate expectation that there will be any right of renewal or right of first refusal upon the expiry of a spectrum assignment under the TO. The decision whether a new spectrum assignment, with the same or varied radio frequencies, should be given to the spectrum assignee would be made and notified to the spectrum assignee within a reasonable time before the expiry of its spectrum assignment. In considering assignment of spectrum in general, the policy inclination is that a market-based approach will be used in spectrum management wherever the CA considers that there are likely to be competing demands from providers of non-Government services for the spectrum, unless there are overriding public policy reasons to do otherwise.

THE CA'S DECISION ON ARRANGEMENTS FOR RE-ASSIGNMENT OF THE SPECTRUM IN THE 850/900 MHZ AND 2.3 GHZ BANDS

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

9. In the Consultation Paper, the CA expressed the view that there would likely be competing demands for the spectrum in the 850/900 MHz and 2.3 GHz bands, given its current extensive deployment by the incumbent spectrum assignees for the provision of the fourth generation mobile ("4G") services using Long Term Evolution technology, and that there would be both feasibility and flexibility for assignees to refarm spectrum in these bands for meeting future demand for the fifth generation mobile ("5G") services based on 5G New Radio ("NR") technology.

10. As the CA stated in the Consultation Paper, spectrum in the low-band below 1 GHz, including the 850/900 MHz bands, has superb radio propagation characteristics enabling MNOs to provide mobile services with extensive coverage and high building penetration. The bands in question are therefore among the favourite frequency bands of the industry for the provision of public mobile services. On the other hand, spectrum in the mid-band within the 1 – 6 GHz range, including the 2.3 GHz band, has comparatively longer range propagation compared to high-band spectrum above 6 GHz and would usually have a wider bandwidth compared to the low-band spectrum below 1 GHz. Therefore, the mid-band spectrum is considered very suitable for

[6] The former TA Statement on the Spectrum Policy Framework is available at: https://www.coms-auth.hk/filemanager/common/policies_regulations/ca_statements/ta20070424_en.pdf.

supporting cost effective provision of mobile broadband services to meet both coverage and capacity demands.

11. In their submissions to the consultation, the respondents either agree or do not dispute that there are likely to be competing demands for the spectrum in the 850/900 MHz and 2.3 GHz bands. **Accordingly, the CA maintains its view that there are likely to be competing demands for spectrum in the 850/900 MHz and 2.3 GHz bands**.

Re-assignment of Spectrum by Auction

12. In accordance with the guiding principle in the Spectrum Policy Framework for the management of spectrum for which there are likely to be competing demands, the CA proposed in the Consultation Paper to adopt a market-based approach for the re-assignment of the spectrum in the 850/900 MHz and 2.3 GHz bands upon expiry of the existing assignments in May 2026 and March 2027 respectively. In this regard, auction was considered the most appropriate means of market-based approach for the re-assignment since it would allow the fair value of the spectrum to be determined in an open and transparent way and ensure that the successful bidders would be those who would both value the spectrum the most and be expected to put it to the most efficient use during the term of assignment. Auction is also commonly used by both the CA and overseas administrations in the assignment of spectrum for providing public mobile services.

13. Whilst the respondents have no adverse comment on the proposal to re-assign the spectrum in the 850/900 MHz and 2.3 GHz bands by way of auction in general, two of them who are incumbent assignees of the spectrum in the 2.3 GHz band consider that a right of first refusal ("RFR") should be offered to the incumbents of the band in order to maintain customer service continuity and minimise service degradation.

14. The CA has evaluated the options of adopting a full market-based approach to assign the spectrum by way of auction, as proposed in the Consultation Paper, and of offering RFR in respect of spectrum in the 2.3 GHz band (or part thereof) to the incumbent assignees, as proposed by some of the respondents, based on the multiple policy objectives of spectrum re-assignment, viz. ensuring customer service continuity, efficient spectrum utilisation, promotion of effective competition, as well as encouragement of investment and promotion of innovative services. The CA's assessment is set out in the paragraphs below.

Ensuring Customer Service Continuity

15. The CA stated in the Consultation Paper that customer service continuity was unlikely to be a concern for the 850/900 MHz and 2.3 GHz bands even if any of the incumbent MNOs (viz. SmarTone in the 850 MHz band, Hutchison in the 900 MHz and 2.3 GHz bands, and CMHK and Hutchison in the 2.3 GHz band) failed to acquire any spectrum in the 850/900 MHz and 2.3 GHz bands in the re-assignment exercise, as their shares of spectrum in these bands would only account for 4% to 19% of their total amount of assigned spectrum below 6 GHz, as shown in Table 1 below. Accordingly, it was likely that they would still be able to provide public mobile services using the other spectrum assigned to them to ensure service continuity.

Table 1: Distribution of sub-6 GHz spectrum assigned (in MHz) to major MNOs as of 31 March 2024[7]

	Sub-6 GHz spectrum		**Spectrum due to expire for re-assignment**			
	[A] Total (MHz)	Share	850/900 MHz bands (MHz)	2.3 GHz band (MHz)	**[B] Total (MHz)**	**[B]/[A] Share (%)**
CMHK	319.6	28.7%	0	30	**30**	**(9%)**
HKT	294.6	26.5%	0	0	**0**	**(0%)**
SmarTone	254.6	22.9%	10	0	**10**	**(4%)**
Hutchison	214.6	19.3%	10	30	**40**	**(19%)**
VNET	30	2.7%	0	30	**30**	**(100%)**
Total	**1113.4**	**100%**	**20**	**90**	**110**	**(10%)**

16. As for the other incumbent assignee of the spectrum in the 2.3 GHz band, i.e. VNET, which predominantly uses its assigned spectrum for providing public mobile services via other MNO(s) on a wholesale basis, while also serving very few end-customers of fixed wireless services in rural areas, the CA stated in the Consultation Paper that even if VNET failed to acquire any spectrum in the 2.3 GHz band in the re-assignment exercise, the MNO(s) who would be affected by the inability to access spectrum capacity in the 2.3 GHz band currently offered by VNET would still be able to ensure service continuity of public mobile services by using its/their own assigned spectrum in the other

[7] Distribution of the spectrum in Table 1 is based on the status as of March 2024, including the re-assignment of 90 MHz of spectrum in the 2.5/2.6 GHz band to be effective in March 2024. Also, it is assumed that 10 MHz of spectrum in the 2.5/2.6 GHz band held by Genius Brand Limited (a joint venture of HKT and Hutchison) which is due to expire in May 2028 is split 50:50 between HKT and Hutchison.

frequency bands. Regarding the fixed wireless services of VNET, the CA considered that the potential service impact would likely be minimal, as only very few end-customers would be affected, and there would be other service alternatives available to these customers, as a result of the extension of fibre-based networks to villages in remote areas during 2021 to 2026 under the Government's subsidy scheme[8], as well as market competition.

17. Two MNO respondents have proposed that RFR should be offered to incumbent assignees of the 2.3 GHz band, either to minimise the risks of service degradation and disruption, or more generally on the basis that existing spectrum assignees would have made substantial investments in their current use of the spectrum, and noting that the CA had previously offered RFR to incumbent assignees to ensure service continuity. In that connection, the CA considers that, in the circumstances of this re-assignment exercise, there is no overriding public policy reason justifying any deviation from the market-based approach. In particular, on the basis that even if the incumbent MNOs fail to acquire any spectrum in the auction, they would likely be able to provide public mobile services by making use of the other spectrum assigned to them, ensuring service continuity is unlikely to be an issue. Based on these considerations, the CA maintains its view that a market-based approach should be adopted in the re-assignment of the spectrum in the 850/900 MHz and 2.3 GHz bands and there is no need to offer any RFR to any of the incumbent assignees.

Efficient Spectrum Utilisation

18. In the Consultation Paper, the CA stated that re-assignment of the spectrum in the 850/900 MHz and 2.3 GHz bands by a market-based approach would put the spectrum into the hands of those operators and new entrants (if any) which would value it the most and be expected to put it to the most efficient use during the term of the assignment. It would also provide an opportunity for MNOs to optimise their spectrum holdings, including by acquiring additional spectrum to enhance their network capacity and transmission speed or form contiguous blocks of wider bandwidth to attain higher spectral efficiency. The CA notes that the submissions do not put forth any justification that offering RFR to the incumbent assignees would contribute to promoting efficient spectrum utilisation in the band.

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[8] Information about the subsidy scheme and the key milestones is available at – https://www.ofca.gov.hk/en/industry_focus/infrastructures/subsidy_scheme_to_extend_fibre_based_networks/index.html and https://www.ofca.gov.hk/filemanager/ofca/en/content_1151/table.pdf.

Promotion of Effective Competition

19. Similarly, there is no elaboration of how effective competition can be promoted from respondents who advocate offering RFR to the incumbent assignees. The CA therefore maintains its view (as set out in the Consultation Paper) that re-assigning spectrum by a market-based approach would encourage MNOs to value their newly acquired spectrum in the band and make good use of it to improve coverage, data speed and quality of service, thus promoting effective competition that would benefit consumers.

Encouragement of Investment and Promotion of Innovative Services

20. In the Consultation Paper, the CA stated that re-assignment of the spectrum by a market-based approach would encourage investment and promote the introduction of innovative services, as MNOs acquiring additional spectrum would need to invest in the network infrastructure to enable them to deploy the spectrum effectively, and MNOs assigned with a right mix of spectrum through a market-based mechanism would be in a better position to introduce innovative services in the 5G era. The CA notes that the submissions supporting the offer of RFR to the incumbent assignees of the 2.3 GHz band fail to illustrate in what way investment can be encouraged and innovative services can be promoted should there be any RFR offer.

21. Having considered the comments of the respondents, the CA has not identified any public policy reason that would override the adoption of a full market-based approach for re-assignment of spectrum in either or both of the 850/900 MHz and 2.3 GHz bands. Accordingly, **the CA decides to maintain its view to re-assign the spectrum in the 850/900 MHz and 2.3 GHz bands by way of auction upon expiry of the existing assignments**.

Scope of Service

850/900 MHz Bands

22. In the Consultation Paper, the CA proposed that the spectrum in the 850/900 MHz bands should remain to be used for the provision of mobile services only in Hong Kong. None of the respondents expresses any contrary view to the proposal.

2.3 GHz Band

23. At present, the spectrum in the 2.3 GHz band is allocated to fixed services and mobile services in Hong Kong on a co-primary basis. While the 90 MHz of spectrum in the band under the current assignment term is predominantly used for the provision of mobile services, a minority portion of it is used by one assignee for the provision of fixed wireless services serving very few end-customers. Given the far from satisfactory use of the spectrum for fixed wireless services, and in order to promote more efficient use of spectrum which is a scarce public resource, the CA proposed in the Consultation Paper that in the next assignment term, the spectrum in the 2.3 GHz band be confined to the provision of mobile services only. The respondents generally support the proposal.

24. Having considered the above, the **CA decides to maintain its view to confine the scope of service for the 850/900 MHz and 2.3 GHz bands to the provision of mobile services only** in the next term of spectrum assignment.

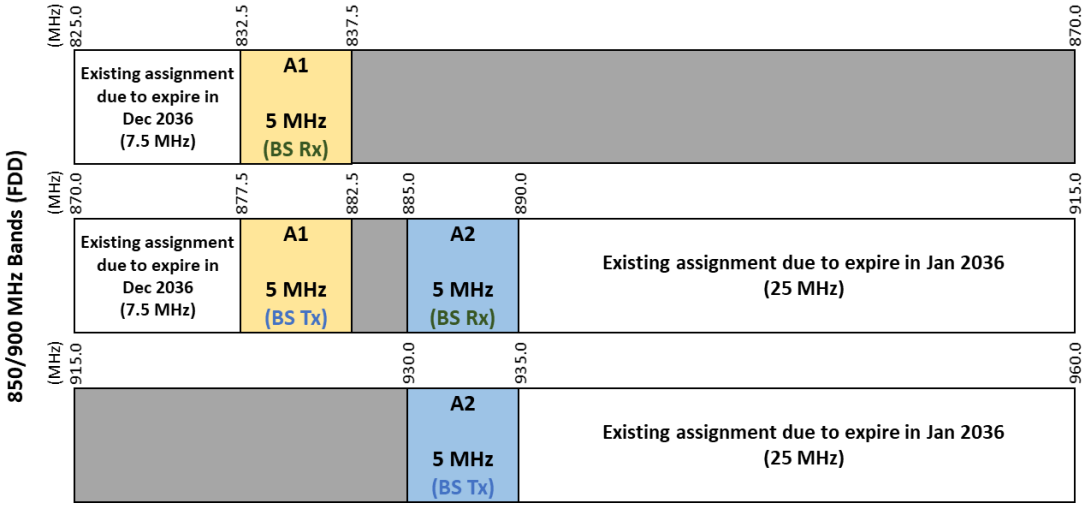
Band Plan

25. Currently in Hong Kong, spectrum in the 850/900 MHz bands is mainly deployed for 4G services based on the Frequency Division Duplex ("FDD") mode of operation, while spectrum in the 2.3 GHz band is deployed for 4G services based on the Time Division Duplex ("TDD") mode of operation. With the advent of 5G technology, the 850/900 MHz and 2.3 GHz bands can also be deployed for 5G services based on 5G NR FDD and 5G NR TDD respectively.

850/900 MHz Bands

26. The CA proposed in the Consultation Paper to maintain the existing band plan for the 850/900 MHz bands consisting of 20 MHz of spectrum divided into two blocks of 2 x 5 MHz. The respondents generally support or express no adverse comment on the proposed band plan. Thus, **the CA decides to maintain its view to divide the spectrum in the 850/900 MHz bands into two frequency blocks with a bandwidth of 2 x 5 MHz each** (Frequency Blocks A1 and A2), as depicted in Figure 1 below.

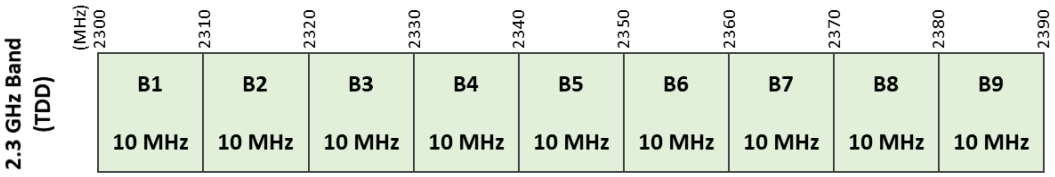
Figure 1: Band plan for the spectrum in the 850/900 MHz bands



2.3 GHz Band

27. The CA proposed in the Consultation Paper to divide the 90 MHz of spectrum in the 2.3 GHz band into nine frequency blocks of 10 MHz each, such that bidders might acquire and aggregate multiple blocks to form carriers of larger bandwidths to attain higher spectral efficiency in accordance with their technical and commercial considerations. The respondents generally support or express no adverse comment on the proposed band plan. Having considered the above, **the CA decides to maintain its view to divide the spectrum in the 2.3 GHz band into nine frequency blocks with a bandwidth of 10 MHz each** (Frequency Blocks B1 to B9), as depicted in Figure 2 below.

Figure 2: Band plan for the spectrum in the 2.3 GHz band



Spectrum Cap

28. Taking into account the overall spectrum holdings of the four major MNOs in various frequency bands (excluding spectrum in the 26/28 GHz

bands[9]) as shown in Table 2 below, the CA proposed in the Consultation Paper to impose spectrum caps for the amount of spectrum which may be acquired by a bidder in the 850/900 MHz and 2.3 GHz bands respectively.

Table 2: Distribution of spectrum below 6 GHz band (in MHz) by major MNOs as of 31 March 2024

	700 MHz	850 MHz	900 MHz	1800 MHz	1.9 - 2.2 GHz	2.3 GHz	2.5/ 2.6 GHz[1,2]	3.3 GHz	3.5 GHz	4.9 GHz	**Total**	**Share in Total**
CMHK	20		10	40	19.6	30	40	20	60	80	**319.6**	**28.7%**
HKT	20		20	40	29.6		65	30	50	40	**294.6**	**26.5%**
SmarTone	10	25	10	40	39.6		20	20	50	40	**254.6**	**22.9%**
Hutchison	20		20	30	29.6	30	15	30	40		**214.6**	**19.3%**
VNET						30					**30**	**2.7%**
Total	70	25	60	150	118.4	90	140	100	200	160	**1113.4**	**100%**

Note: 1 Distribution of 90 MHz of spectrum in the 2.5/2.6 GHz band is based on the arrangements for re-assignment of the spectrum concerned to be effective in March 2024.

2 Assuming that 10 MHz of spectrum in the 2.5/2.6 GHz band held by Genius Brand Limited due to expire in May 2028 is split 50:50 between HKT and Hutchison.

850/900 MHz Bands

29. The spectrum in the 850/900 MHz bands consists of two blocks each with a bandwidth of 2 x 5 MHz. The 850 MHz band and the 900 MHz band are not contiguous to each other. Based on the technical information available, they belong to two discrete bands which require different sets of radio network equipment, including radio units and other accessories for operation of radio base stations ("RBSs")[10]. Accordingly, there would be no technical merit such as higher spectral efficiency that would justify re-assigning these two blocks of spectrum to one single assignee. Rather, as stated in the Consultation Paper, the proposal to impose a spectrum cap of 2 x 5 MHz, i.e. 50% of the total

[9] Assessment on spectrum holdings by MNOs does not include spectrum assignments in the 26/28 GHz bands, as this millimetre-wave spectrum is of different radio propagation characteristics and serves different purposes as compared to the low- and mid-band frequencies in the provision of mobile services.

[10] According to the technical specifications adopted by the industry standardisation body 3rd Generation Partnership Project ("3GPP"), spectrum in the 850 MHz band belongs to Band 5 (824 – 849 MHz paired with 869 – 894 MHz) or Band 26 (814 – 849 MHz paired with 859 – 894 MHz), while that in the 900 MHz band belongs to Band 8 (880 – 915 MHz paired with 925 – 960 MHz). Subject to the solutions offered by equipment vendors and the configuration of MNOs, the network equipment supporting Band 5 or Band 26 may not be able to support Band 8, and vice versa.

2 x 10 MHz of spectrum in the 850/900 MHz bands, is to avoid any undue concentration of the spectrum in the hands of any single assignee.

30. Three respondents support the CA's proposal. The remaining respondent, on the other hand, considers that it should be up to each operator to decide whether it is commercially viable to acquire both blocks of spectrum in the 850 MHz band and 900 MHz band as well as to invest in two different sets of radio network equipment. It also suggests that the CA has proposed a spectrum cap of 2 x 5 MHz in the 850/900 MHz bands solely based on technical incompatibility issues, as opposed to competition concern. It is of the view that barring an operator from acquiring both blocks in the 850/900 MHz bands is inappropriate unless there is a specific and clearly identified competition concern arising from an undue concentration of spectrum held by any single spectrum assignee.

31. There is a general scarcity of spectrum below 1 GHz. Furthermore, as mentioned in paragraph 10 above, the spectrum in both the 850 MHz band and the 900 MHz band has superb radio propagation characteristics to enable MNOs to provide mobile services with extensive coverage and high building penetration. Accordingly, the proposed imposition of a spectrum cap is to ensure that the valuable spectrum will be in the hands of more than one assignees, which will put the scarce spectrum to the optimal use. This is in line with the CA's duty to promote competition in the telecommunications market. Therefore, in the absence of any suggestion that assigning both blocks of spectrum to the same assignee would lead to higher spectral efficiency (as explained in paragraph 29 above), and taking into account the support from the majority of respondents, **the CA decides to maintain its view to impose a spectrum cap of 2 x 5 MHz on each bidder for re-assignment of the spectrum in the 850/900 MHz bands**.

2.3 GHz Band

32. The CA proposed in the Consultation Paper to impose a spectrum cap of 50 MHz out of the total 90 MHz of the spectrum in the 2.3 GHz band, which would allow the incumbent assignees, if they so wish, to acquire more spectrum than their current holdings of 30 MHz of spectrum to achieve higher spectral efficiency.

33. All respondents generally agree with the CA that a spectrum cap should be imposed in the re-assignment of spectrum in the 2.3 GHz band, but their views on the level of spectrum cap differ. Two respondents who are the

incumbent assignees suggest a spectrum cap of 60 MHz to enable formation of larger contiguous blocks in achieving higher spectral efficiency, whilst the other two respondents who currently do not hold spectrum in the 2.3 GHz band suggest a spectrum cap of at most 40 MHz in order to prevent any bidder from acquiring more than half of the spectrum in the band, which may result in over-concentration of spectrum. In addition, one of the two respondents who have suggested imposing a spectrum cap of 60 MHz further elaborates that, from a technical perspective, the spectral efficiency of a single 10 MHz TD-LTE block is much lower than that of a single 20 MHz TD-LTE block in the 2.3 GHz band (which is currently used for 4G service based on TD-LTE technology). Accordingly, a spectrum cap of 60 MHz would allow the assignees to achieve higher spectral efficiency by bidding for a maximum of three blocks of 20 MHz of spectrum.

34. On the aspect of achieving higher spectral efficiency by using larger channel bandwidths, the CA notes that various channel bandwidths ranging from 10 MHz to 100 MHz (including 40 MHz, 50 MHz and 60 MHz) can be supported in the 2.3 GHz band if it were to be deployed for 5G NR TDD[11], as opposed to a maximum channel bandwidth of 20 MHz supported for 4G TD-LTE[12], which is the technology currently adopted by the incumbent operators for the band. As the spectrum in the 2.3 GHz band will be re-assigned for 15 years from March 2027 (see paragraph 47 below), the CA has to take into account the potential of deploying the spectrum for more advanced technologies in the next assignment term. In this regard, the CA notes that as of December 2022, 4G subscriptions have decreased by around 17.5% on a year-on-year basis, whereas 5G subscriptions have increased by 62% during the same period[13]. Such trends are likely to continue given the increasing uptake of 5G services by end customers. On the equipment side, there is also more ample supply supporting deployment of the 5G NR TDD in the 2.3 GHz band. Accordingly, the CA sees that it will be likely that the prospective spectrum assignees will use the spectrum in the 2.3 GHz band for provision of 5G services in the beginning of the next assignment term, or refarm it for 5G/6G deployment at some point during the term to satisfy the increasing market demand for advanced telecommunications services.

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[11] According to the technical specifications adopted by 3GPP, the supported channel bandwidths for the 2.3 GHz band (n40) in 5G NR are 10 MHz, 15 MHz, 20 MHz, 25 MHz, 30 MHz, 40 MHz, 50 MHz, 60 MHz, 70 MHz, 80 MHz, 90 MHz and 100 MHz.

[12] According to the technical specifications adopted by 3GPP, the supported channel bandwidths for the 2.3 GHz band (Band 40) in 4G TD-LTE are 5 MHz, 10 MHz, 15 MHz and 20 MHz.

[13] Information is available at: https://www.ofca.gov.hk/en/news_info/data_statistics/mobile_services/wireless_services/index.html.

35. Where the 2.3 GHz band is deployed for 5G, a single carrier with flexible bandwidths of, inter alia, 40 MHz, 50 MHz or 60 MHz can be used. The loss of spectral efficiency consideration in adopting spectrum caps of 50 MHz or 60 MHz becomes insignificant for 5G deployment. On the other hand, from a competition perspective, if the spectrum cap were to be set at 60 MHz out of the total 90 MHz of spectrum in the 2.3 GHz band, a bidder might acquire up to two-thirds or 67% of the spectrum in the band, which is higher than the spectrum cap percentages generally allowed in previous auctions. This may result in concern of over-concentration of spectrum in the hands of a single assignee, and this concern has been raised by two of the respondents.

36. Based on the considerations given in paragraphs 34 and 35 above, on balance, the CA considers that the imposition of a spectrum cap of 50 MHz on the spectrum to be re-assigned in the 2.3 GHz band as proposed in the Consultation Paper would be appropriate. Accordingly, **the CA decides to maintain its view to impose a spectrum cap of 50 MHz on each bidder for re-assignment of the spectrum in the 2.3 GHz band**.

Eligible Bidders

37. Three respondents support the proposal of allowing all interested parties to apply for participation in the auction, whilst the remaining respondent considers that only established mobile service providers or their affiliates should be allowed to participate in the auction, as a new entrant without previous experience in the mobile service market would unlikely make efficient use of the assigned spectrum, citing an example of the current inefficient use of spectrum in the 2.3 GHz band for fixed wireless services by an incumbent assignee.

38. The CA considers that in implementing the market-based approach, all interested parties, be they incumbents or new entrants (provided that they meet the minimal qualification requirements), should be allowed to participate in the auction such that the spectrum will go into the hands of those who value it the most and will make the most efficient use of it. Confining participation in the auction to the incumbent MNOs or their affiliates only will undermine the principle of the market-based approach.

39. One respondent also raises the issue of connected bidders[14], suggesting that the restriction on connected bidders should apply as in previous auctions to safeguard against any bypass of the spectrum cap, while another respondent suggests that if the spectrum in the 850/900 MHz and 2.3 GHz bands is auctioned altogether, connected bidders should be allowed to participate in the auction as long as the effective amount of spectrum acquired by an individual bidder does not exceed the spectrum cap.

40. The restriction on connected bidders participating in the same spectrum auction, which the CA consistently adopted in the past auctions has a vital role to play, not just in safeguarding against any bypass of the spectrum cap, but also in upholding the integrity of the auction by preventing potential collusion among bidders. The CA considers that the connected bidder restriction should continue to apply in the auction of the spectrum in the 850/900 MHz and 2.3 GHz bands.

41. Based on the above considerations, **the CA decides that as in all the past spectrum auctions and subject to the connected bidder restriction, all interested parties may apply to participate in the auction of the spectrum in the 850/900 MHz and 2.3 GHz bands**, provided that they fulfil the following minimum qualification requirements –

(a) lodging of a specified amount of deposit which may be forfeited if the bidder violates the auction rules and/or fails to take up the licence after winning the auction; and

(b) demonstration of its technical and financial capability to provide services in fulfilment of the licensing obligations to the satisfaction of the CA and submit any other relevant supporting information which the CA may deem necessary.

Auction Format and Timing

42. The CA proposed in the Consultation Paper to adopt the SMRA auction format for the re-assignment of the spectrum in the 850/900 MHz and 2.3 GHz bands. The submissions in general support or indicate no adverse

[14] Spectrum auctions in Hong Kong are invariably subject to the connected bidder restriction that a bidder must not be a connected bidder in relation to another bidder. A company ("Company A") is treated as a connected bidder with another company ("Company B") if -
(a) Company A holds a material interest (e.g. holding 25% or more of shares) in Company B;
(b) Company B holds a material interest in Company A; or
(c) a person holds a material interest in both Company A and Company B.

comment on the adoption of the SMRA auction format. In view of the support from respondents, **the CA maintains its view that the SMRA auction format will be adopted in the auction for the re-assignment of the spectrum in the 850/900 MHz and 2.3 GHz bands.**

43. Two respondents suggest that both the spectrum in the 850/900 MHz bands and the 2.3 GHz band be made available for bidding in the same auction, while one respondent suggests that two separate auctions should be held.

44. The CA considers that putting the spectrum in the 850/900 MHz bands and 2.3 GHz band in the same auction in the SMRA format will enable bidders to switch their bids between different frequency bands during the bidding process based on their business needs and taking into account the actual bidding situation for all the available frequency blocks, thus allowing maximum flexibility for bidders to devise their bidding strategy in a holistic manner. Holding a single auction for the above spectrum will also save the administrative burden of both the bidders and the CA. **The CA therefore decides that the spectrum in the 850/900 MHz and 2.3 GHz bands will be put to auction at the same time using the SMRA format**. The CA targets to conduct the auction in 2024, and will provide details of the auction in the information memorandum to be issued nearer the time of the auction.

Licensing Arrangements

45. The respondents are in general supportive of the proposed licensing arrangements, except for some comments on the proposed validity period of the frequency assignment and restriction of frequency swap which will be discussed below.

<u>Licensing and Validity Period</u>

46. Three respondents either support or indicate no adverse comment on the proposed validity period of 15 years for re-assignment of the spectrum in the 850/900 MHz and 2.3 GHz bands. The remaining respondent, on the other hand, suggests shortening the next assignment periods for the spectrum in the 850 MHz and 900 MHz bands subject to this re-assignment exercise in order to align with the expiry dates of the existing assignment of the adjacent

spectrum in the 850 MHz and 900 MHz bands[15], thus opening up opportunity for an operator to acquire a wider contiguous block of spectrum in the same band with the same assignment period in one go upon expiry of the assignment terms in 2036.

47. The CA considers that a term of 15 years for spectrum assignment, which is coterminous with the validity period of the UCL[16] granted to the spectrum assignee to effect the spectrum assignment, and has been consistently adopted by the CA previously for spectrum assignment or re-assignment exercises under a market-based approach, provides certainty and predictability to facilitate operators' long term network resource planning. Under the SMRA auction format, it is up to each operator's considerations and commercial decisions to acquire frequency block(s) it desires to form contiguous blocks with spectrum already assigned to it, and different assignment periods of these blocks would not hinder the ability of the operator to do so. Given the considerations above, **the CA decides to maintain its view that the spectrum in the 850/900 MHz and 2.3 GHz bands will be re-assigned for a term of 15 years.** A new UCL will be issued to each successful bidder to effect the re-assignment of the spectrum with a validity period of 15 years. For incumbent licensees who successfully acquire spectrum in the auction, they may apply to the CA for combining their existing UCLs with the new UCL to be issued.

Restriction on Frequency Swap

48. Three respondents either support or do not object to the CA's proposal that swapping of any frequency assignment in the 850/900 MHz and 2.3 GHz bands within the first five years of the frequency assignment would generally not be considered, while one respondent suggests that frequency swapping shall be allowed if it could promote and generate higher spectral efficiency and efficacy.

49. The CA considers that the restriction on frequency swapping within the first five years of spectrum assignment strikes a balance between promoting competitive bidding to reflect the full market value of each individual frequency block on the one hand and facilitating efficient spectrum utilisation on the other. Therefore, **the CA decides to maintain its view that**

[15] The adjacent spectrum in the 850 MHz band will expire on 29 December 2036 whereas the adjacent spectrum in the 900 MHz band will expire on 11 January 2036.

[16] The period of validity of a UCL shall be 15 years from the day on which it is issued as prescribed in Schedule 2 to the Telecommunications (Carrier Licences) Regulation (Cap. 106V).

frequency swapping within the first five years of assignment of the spectrum in the 850/900 MHz and 2.3 GHz bands will generally not be considered.

Technology Neutrality

50. In the Consultation Paper, the CA proposed to adopt a technology neutral approach whereby spectrum assignees would be free to use whatever technology they would choose based on widely recognised standards for service provision. With no objection to the proposal from the respondents, **the CA decides to maintain its position to adhere to this technology neutral approach in assigning and licensing the spectrum in the 850/900 MHz and 2.3 GHz bands**, unless there is any circumstance worth technical coordination (such as any electromagnetic compatibility issue with the use of spectrum by other assignees in the same and adjacent frequency bands). The CA further reiterates that the assignees should use the spectrum in accordance with the band plans proposed in paragraphs 26 – 27 above for providing mobile services under their UCLs.

Control of Interference in the 900 MHz Band

51. Within the spectrum in the 900 MHz band (i.e. 885.0 – 890.0 MHz paired with 930.0 – 935.0 MHz), 2 x 4 MHz of spectrum in the frequency range of 885 – 889 MHz paired with 930 – 934 MHz is currently assigned and used for the operation of the GSM-R system[17] within the Hong Kong Section of the Guangzhou-Shenzhen-Hong Kong Express Rail Link ("XRL")[18]. The same frequency range is reserved to be used in any other future cross-border railways. In addition, since 2006, some frequency channels in the 900 MHz band have been assigned to MNO(s) for provision of public mobile services in the Designated Areas as specified by the CA[19]. With no objection from the respondents, **the CA decides to maintain its view set out in the Consultation Paper that the spectrum in the 900 MHz band to be re-assigned will be restricted for the provision of mobile services in areas away from the cross-**

[17] GSM-R is a wireless communication standard for railway network based on the European GSM standard.

[18] Information of the XRL is given in G.N. 8022 of 2008.

[19] The Designated Areas have been specified by the CA in G.N. 4475 of 2010 for the purpose of section 3A(1) of the Telecommunications (Determining Spectrum Utilization Fees by Auction) Regulation (Cap. 106AC) and may be amended by the CA as and when necessary.

border rail link(s) including the XRL and outside the Designated Areas, in order to avoid harmful interference between different systems.

52. In the above connection, it is necessary for the successful bidder of spectrum in the 900 MHz band to coordinate closely and resolve any co-channel and adjacent channel interference issues with the railway operator and MNOs using frequency channels in the 900 MHz band in the Designated Areas. In case of unresolved interference, use of the spectrum in the 900 MHz band will generally be given in the following descending order of priority: GSM-R system(s) for railway operation including the XRL, RBSs for public mobile services within the Designated Areas and last of all, RBSs for public mobile services in areas away from the cross-border rail link(s) and outside the Designated Areas.

Network and Service Rollout Obligations

53. With no objection from the respondents, **the CA decides to maintain its view to require each successful bidder of the spectrum in the 850/900 MHz and 2.3 GHz bands to roll out its network and services with use of the assigned spectrum to provide a minimum coverage of 90% of the population of Hong Kong within five years from the date of the spectrum re-assignment**, as proposed in the Consultation Paper.

Performance Bond for Rollout Obligations

54. In the Consultation Paper, the CA proposed to require each of the successful bidders of spectrum in the 850 MHz, 900 MHz and 2.3 GHz bands to lodge a performance bond to guarantee compliance with the network and service rollout obligations as mentioned in paragraph 53 above. The CA also proposed that in the circumstances where an incumbent assignee of spectrum in the 850 MHz and 900 MHz bands (including spectrum in the nearby ranges[20]) as well as 2.3 GHz band successfully acquired frequency block(s) in the **same** band, it might choose to provide network coverage figures demonstrating that its network operating with the spectrum re-assigned had already fulfilled the 90% minimum population coverage requirement in the respective bands, without the need to provide a performance bond for the frequency block(s).

[20] The spectrum in the 850 MHz band belongs to Band 5 (824 – 849 MHz paired with 869 – 894 MHz) or Band 26 (814 – 849 MHz paired with 859 – 894 MHz), while that in the 900 MHz band belongs to Band 8 (880 – 915 MHz paired with 925 – 960 MHz) in accordance with the technical specifications adopted by 3GPP. Please also refer to footnote 10 above.

55. With no objection from the respondents, **the CA decides to maintain its view to require each of the successful bidders of spectrum in the 850 MHz, 900 MHz and 2.3 GHz bands to lodge a performance bond to guarantee compliance with the network and service rollout obligations** as mentioned in paragraph 53 above, **except for an incumbent assignee** in the following circumstances where –

(a) an incumbent assignee of spectrum in the frequency range of 825.0 MHz – 837.5 MHz paired with 870.0 MHz – 882.5 MHz (see Figure 1 above) successfully acquires the spectrum in the 850 MHz band (i.e. Frequency Block A1);

(b) an incumbent assignee of spectrum in the frequency range of 885.0 MHz – 915.0 MHz paired with 930.0 MHz – 960.0 MHz (see Figure 1 above) successfully acquires the spectrum in the 900 MHz band (i.e. Frequency Block A2); and/or

(c) an incumbent assignee of spectrum in the 2.3 GHz band (see Figure 2 above) successfully acquires any of the spectrum in the 2.3 GHz band (i.e. Frequency Blocks B1 to B9),

the successful bidder may choose to provide network coverage figures demonstrating that its network operating with the spectrum re-assigned has already fulfilled the 90% minimum population coverage requirement in the respective bands, without the need to provide a performance bond for the frequency block(s). The CA will specify the amount of the performance bond and details of the performance bond requirements in the information memorandum to be issued for the auction of the spectrum in the 850/900 MHz and 2.3 GHz bands.

56. More detailed responses of the CA to the views and comments received in the public consultation on matters in relation to the arrangements for re-assignment, auction and licensing of the spectrum in the 850/900 MHz and 2.3 GHz bands are given at the **Annex**.

THE DECISION OF SCED ON THE RELATED SPECTRUM UTILISATION FEE

Level of the SUF

57. Given that radio spectrum is a scarce public resource, it is incumbent upon the Government to ensure that the SUF of spectrum is set to reflect as closely as possible its full market value so that spectrum assignees, which run their commercial operation in a fully liberalised market, would put the spectrum so acquired to its most efficient use.

58. In paragraphs 11 and 21 above, the CA concludes that there are likely to be competing demands and that auction as a market-based approach should be used for the re-assignment of the spectrum in the 850/900 MHz and 2.3 GHz bands. The SUF would therefore naturally be determined through auction whereby the bidders would determine the level of their bids based on clear information on the supply of spectrum and their assessment of the business potential and opportunities. The auction results would reflect the full market value of the spectrum. **SCED decides to prescribe that the SUF of the spectrum in the 850/900 MHz and 2.3 GHz bands will be determined by auction in accordance with section 32I(2) of the TO, with the auction reserve price to be specified nearer the time of the auction.**

59. Noting the prevailing global and local economic and investment environment, as well as the objective to continue encouraging the promotion of 5G development, SCED does not intend to set the auction reserve price at a high level which might discourage competition and bidders' eagerness to participate in the auction. Rather, SCED considers that it should be set at a level that represents the minimum base value of the spectrum for the purpose of kick-starting the competitive bidding process, while balancing the need to forestall non-serious bidders. This coincides with the MNOs' views received from the consultation that the auction reserve price should not be set at a high level.

Method of Payment

60. To allow for greater flexibility for spectrum assignees to make financial arrangement for the payment of the SUF having regard to their individual circumstances, SCED proposed in the Consultation Paper that spectrum assignees would be given a choice to pay the SUF either by lump sum payment upfront or annual instalments.

61. As all MNOs welcome the flexibility to choose between two payment options as aforementioned, **SCED decides to propose a regulation**

under section 32I(2) of the TO to prescribe that all spectrum assignees (which may include the MNOs and new entrants into the market) **will be given a choice to pay the SUF either by** –

(a) lump sum payment upfront, which is the lump sum amount determined in auction; or

(b) annual instalments, with the first instalment equivalent to the lump sum amount obtained in (a) above divided by 15 (i.e. the number of years of assignment), and subsequent instalments increased every year by 2.5%, the latest medium-range underlying inflation forecast, to reflect the time value of money to the Government.

IMPLEMENTATION OF THE ARRANGEMENTS FOR SPECTRUM RE-ASSIGNMENT

62. The CA and SCED will make the necessary arrangements to enable the re-assignment of the spectrum in the 850/900 MHz and 2.3 GHz bands to proceed as per their respective decisions in this Statement, including the necessary legislative amendments. Subject to the completion of the legislative process, the CA targets to conduct a single auction for the spectrum in the 850/900 MHz and 2.3 GHz bands in 2024.

63. For the avoidance of doubt, nothing in this Statement will affect, limit or prejudice the exercise of the powers of the CA and SCED under the CAO, TO or its subsidiary legislation.

Communications Authority
Secretary for Commerce and Economic Development
2 May 2023

Annex

Summary of Submissions to the Consultation Paper and the Responses of the Communications Authority and the Secretary for Commerce and Economic Development

INTRODUCTION

On 17 November 2022, the Communications Authority ("CA") and the Secretary for Commerce and Economic Development ("SCED") jointly issued a consultation paper to seek views and comments of the industry and other affected persons on the proposal in relation to arrangements for re-assignment of 2 x 10 MHz of spectrum in the 850/900 MHz bands[1] and 90 MHz of spectrum in the 2.3 GHz band[2] for the provision of public mobile services and the related spectrum utilisation fee ("SUF") ("Consultation Paper")[3].

2. At the close of the public consultation on 5 January 2023, submissions were received from the following four mobile network operators ("MNOs") (listed in alphabetical order) –

(a) China Mobile Hong Kong Company Limited ("CMHK")
(b) Hong Kong Telecommunications (HKT) Limited ("HKT")
(c) Hutchison Telephone Company Limited ("Hutchison")
(d) SmarTone Mobile Communications Limited ("SmarTone").

3. The CA and SCED set out in this Annex their respective responses to the views and comments received in the public consultation. The CA and SCED have taken into account and given thorough consideration to all the submissions which are relevant to the arrangements for re-assignment of the spectrum in the 850/900 MHz and 2.3 GHz bands for the provision of public mobile services and the related SUF, though, for practical reasons, not all of the issues raised are specifically mentioned or addressed herein. Please refer to the

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[1] "850/900 MHz bands" refers to 10 MHz of spectrum in the 832.5 – 837.5 MHz paired with the 877.5 – 882.5 MHz band ("850 MHz band") and 10 MHz of spectrum in the 885.0 – 890.0 MHz paired with the 930.0 – 935.0 MHz band ("900 MHz band").

[2] "2.3 GHz band" refers to 90 MHz of spectrum in the 2300 – 2390 MHz band.

[3] The Consultation Paper is available at: https://www.coms-auth.hk/filemanager/en/content_711/cp20221117.pdf and https://www.cedb.gov.hk/assets/resources/cedb/consultations-and-publications/cp20221117_e.pdf.

Statement to which this Annex is attached for the respective decisions made by the CA and SCED after the public consultation on the matter.

4. The responses set out in this Annex are without prejudice to the exercise of the powers by the CA or SCED under the Communications Authority Ordinance (Cap. 616), the Telecommunications Ordinance (Cap. 106) ("TO") or any other relevant legislation.

ARRANGEMENTS FOR RE-ASSIGNMENT OF THE SPECTRUM IN THE 850/900 MHZ AND 2.3 GHZ BANDS

Re-assignment of Spectrum by Auction

5. After giving due regard to the Radio Spectrum Policy Framework ("Spectrum Policy Framework")[4] and considering that there would likely be competing demands for the spectrum in the 850/900 MHz and 2.3 GHz bands, the CA proposed in the Consultation Paper to re-assign 20 MHz of spectrum in the 850/900 MHz bands and 90 MHz of spectrum in the 2.3 GHz band for the provision of public mobile services by way of auction.

Views and Comments of the Respondents

6. Whilst the four respondents have no adverse comment on the proposal to re-assign the spectrum in the 850/900 MHz and 2.3 GHz bands by way of auction in general, CMHK and Hutchison, who are the incumbent assignees of the spectrum in the 2.3 GHz band, consider that right of first refusal ("RFR") should be offered on part of the spectrum being held by the incumbent spectrum assignees of the band in order to maintain customer service continuity and minimise service degradation.

Responses of the CA

7. According to the Spectrum Policy Framework, the policy inclination is that a market-based approach will be used in spectrum management wherever the CA considers that there are likely to be competing demands for the spectrum from providers of non-Government services, unless there are overriding public policy reasons to do otherwise. The Spectrum Policy Framework also makes it clear that there is no legitimate expectation that there

[4] For details of the relevance of the Spectrum Policy Framework, please refer to paragraphs 7 and 8 of the Statement.

will be any right of renewal or RFR upon the expiry of a spectrum assignment under the TO.

8. On the basis of the guiding principles of spectrum management set out in the Spectrum Policy Framework, the CA has assessed the market demands for spectrum in the 850/900 MHz and 2.3 GHz bands as elaborated in paragraphs 9 – 11 of the Statement, and concludes that there are likely to be competing demands for these bands. Accordingly, a market-based approach should be adopted for the re-assignment of the spectrum unless there are overriding policy reasons to do otherwise. While two incumbent assignees of the spectrum in the 2.3 GHz band suggest that RFR should be offered to the incumbent assignees of the band in order to ensure customer service continuity, they have only made a general claim without providing any substantive arguments or analysis to support that, in the absence of the offer of RFR, customer service continuity would be affected as claimed. In contrast, the CA has elaborated in paragraphs 15 – 17 of the Statement why it considers that there should not be concerns about continuity of customer services upon re-assignment of the spectrum in the 850/900 MHz and 2.3 GHz bands by way of auction. Taking into consideration the multiple policy objectives for spectrum re-assignment, viz. ensuring customer service continuity, efficient spectrum utilisation, promotion of effective competition, as well as encouragement of investment and promotion of innovative services, as discussed in paragraphs 15 – 21 of the Statement, the CA is of the view that there is no overriding public policy reason justifying deviation from a market-based approach for the re-assignment of the spectrum in the 850/900 MHz and 2.3 GHz bands.

Scope of Service

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

<u>Views and Comments of the Respondents</u>

9. All four respondents support the CA's proposed scope of service for the spectrum in the 2.3 GHz band for the provision of mobile services only.

<u>Responses of the CA</u>

10. With the support from all respondents and as explained in paragraph 23 of the Statement, the CA maintains its view to confine the scope

of service for the spectrum in the 2.3 GHz band to the provision of mobile services only in the next assignment term.

Band Plan

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?***

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?***

Views and Comments of the Respondents

11. All four respondents agree to the CA's proposed band plans for the spectrum in the 850/900 MHz and 2.3 GHz bands.

Responses of the CA

12. With the support from all the respondents and as explained in paragraphs 25 – 27 of the Statement, the CA maintains its view to divide the spectrum in the 850/900 MHz bands into two paired frequency blocks with a bandwidth of 2 x 5 MHz each, and that in the 2.3 GHz band into nine frequency blocks with a bandwidth of 10 MHz each.

Spectrum Cap

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?***

Views and Comments of the Respondents

13. Three respondents, viz. CMHK, Hutchison and SmarTone, support 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. SmarTone echoes the CA's view that the 850 MHz band and the 900 MHz band technically belong to two discrete bands which require different sets of radio network equipment. HKT, on the other hand, considers that instead of imposing a spectrum cap amongst these two bands, it should be up to each operator to decide whether it is commercially viable to acquire both blocks of spectrum in the 850 MHz band and 900 MHz band as well as to invest in two different sets

of radio network equipment. Further, it is of the view that barring an operator to acquire both blocks in the 850/900 MHz bands is inappropriate unless there is a specific and clearly identified competition concern arising from an undue concentration of spectrum held by any single spectrum assignee.

Responses of the CA

14. None of the respondents disputes that the 850 MHz band and the 900 MHz band belong to two discrete bands which require different sets of radio network equipment. HKT's acknowledgment of the need to avoid competition concern is in line with the CA's consideration to prevent undue concentration of spectrum holding by any single operator in these low-frequency bands. Taking into account the submissions received and as explained in paragraphs 29 – 31 of the Statement, the CA considers it appropriate to maintain its proposal to impose a spectrum cap of 2 x 5 MHz on each bidder for the re-assignment of the spectrum in the 850/900 MHz bands.

***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?**

Views and Comments of the Respondents

15. CMHK and Hutchison, both incumbent assignees of spectrum in the 2.3 GHz band, suggest a spectrum cap of 60 MHz to enable formation of larger contiguous blocks for the purpose of achieving higher spectral efficiency. Further, CMHK also explains that from a technical perspective, the spectral efficiency of a single 10 MHz TD-LTE block is much lower than that of a single 20 MHz TD-LTE block in the 2.3 GHz band (which is currently used for 4G service based on TD-LTE technology), as the uplink of one 10 MHz TD-LTE block with 3:1 downlink to uplink ratio can only provide less than 10 Mbps uplink data rate which may easily lead to congestion. Accordingly, the spectrum cap of 60 MHz proposed by the respondent will allow the assignees to achieve higher spectral efficiency by bidding for a maximum of three blocks of 20 MHz of spectrum. On the other hand, HKT, who currently does not hold spectrum in the 2.3 GHz band, suggests a spectrum cap of 40 MHz in order to prevent any bidder from acquiring more than half of the spectrum in the band, resulting in over-concentration of spectrum. SmarTone, another non-incumbent of the band, suggests a spectrum cap of 30 MHz, which is the same amount of spectrum currently assigned to each of the three incumbent assignees, and further states that if the CA is minded to allow the incumbent assignees to acquire more spectrum than their current holdings, the spectrum cap should be set at 40 MHz at most.

Responses of the CA

16. The CA is mindful to set a spectrum cap to prevent an undue concentration of spectrum in the hands of any single spectrum assignee which may give rise to competition concerns in the relevant telecommunications markets. All four respondents generally agree with the CA that a spectrum cap should be imposed for the 2.3 GHz band, but they have divergent views on the level of the spectrum cap.

17. As elaborated in paragraphs 32 – 36 of the Statement, taking into account the need to mitigate potential competition concerns arising from undue concentration of spectrum; and the technology for which the spectrum may likely be deployed in the next assignment term, the CA considers that its proposed spectrum cap of 50 MHz strikes a proper balance between preventing over-concentration of spectrum holding by any individual MNO, and providing an opportunity for interested parties to achieve higher spectral efficiency by acquiring more spectrum than that currently held by an incumbent assignee of spectrum in the band.

Eligible bidders

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?

Views and Comments of the Respondents

18. Three respondents, viz. CMHK, Hutchison and SmarTone, support the CA's proposal that all interested parties are allowed to participate in the auction for re-assignment of the spectrum in the 850/900 MHz and 2.3 GHz bands. On the other hand, HKT considers that only established mobile service providers or their affiliates should be allowed to participate in the auction, as a new entrant without previous experience in the mobile service market would unlikely make efficient use of the assigned spectrum, citing VNET Group Limited[5] ("VNET") as an example of the current inefficient use of spectrum in the 2.3 GHz band for fixed wireless services by an incumbent assignee.

[5] Formerly 21 ViaNet Group Limited.

19. Hutchison also raises the issue of connected bidders[6], suggesting that if the auction for the spectrum in the 850/900 MHz and 2.3 GHz bands is held together, connected bidders should be allowed to participate in the auction as long as the effective amount of spectrum acquired by an individual bidder does not exceed the spectrum cap. On the other hand, SmarTone suggests that the restriction on connected bidders should apply as in previous spectrum auctions so that connected bidders should not be allowed to participate in the auction to safeguard any bypass of the spectrum cap rule.

Responses of the CA

20. In the case of VNET, while its current deployment of spectrum in the 2.3 GHz band for fixed wireless services serves very few end-customers and seems to be an unsatisfactory use of the spectrum in terms of efficiency, VNET has in fact used its assigned spectrum predominantly for provision of public mobile services on a wholesale basis to other MNO(s). The CA considers that the appropriate way to address the current inefficient use of the spectrum in the 2.3 GHz band for fixed wireless services is to confine the scope of use of the spectrum in the 2.3 GHz band to the provision of mobile services only in the next assignment term, rather than to limit participation in the auction to established mobile service providers (such as incumbent MNOs) and their affiliates as proposed by HKT. As elaborated in paragraph 38 of the Statement, all interested parties, be they incumbents or new entrants, should be allowed to participate in the auction such that the spectrum will go into the hands of those who value it the most and hence can be expected to make the most efficient use of it.

21. As regards the connected bidder restriction, it has been consistently adopted in the past auctions and has a vital role to play in upholding the integrity of the auction by preventing potential collusion among bidders.

22. In view of the above, the CA maintains its views that all interested parties, be they incumbents or new entrants, should be allowed to apply for participation in the auction, subject to their meeting the minimal qualification requirements as stated in paragraph 41 in the Statement. The CA also considers that the connected bidder restriction should continue to apply in the auction of the spectrum in the 850/900 MHz and 2.3 GHz bands.

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[6] Spectrum auctions in Hong Kong are invariably subject to the connected bidder restriction that a bidder must not be a connected bidder in relation to another bidder. A company ("Company A") is treated as a connected bidder with another company ("Company B") if
(a) Company A holds a material interest (e.g. holding 25% or more of shares) in Company B;
(b) Company B holds a material interest in Company A; or
(c) a person holds a material interest in both Company A and Company B.

Auction Format

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?***

Views and Comments of the Respondents

23. All four respondents have no adverse comment 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. HKT and SmarTone support the adoption of a single auction for bidding of spectrum in both the 850/900 MHz band and the 2.3 GHz band in the interests of efficacy and flexibility for bidders. On the other hand, Hutchison suggests that two separate auctions should be held, given that the existing assignments of spectrum in the 850/900 MHz and 2.3 GHz bands are due to expire in May 2026 and March 2027 respectively, and therefore there is sufficient time for the CA to arrange and hold separate auctions.

Responses of the CA

24. The CA notes that the respondents generally support or have no adverse comment on the adoption of the SMRA auction format for re-assignment of the spectrum in the 850/900 MHz and 2.3 GHz bands. As to whether a single auction or two separate auctions should be held, as explained in paragraph 44 of the Statement, the CA considers a single auction in the SMRA format will be more appropriate, as it will allow maximum flexibility for bidders to devise their bidding strategy in a holistic manner and save the administrative burdens of both the bidders and the CA.

LICENSING ARRANGEMENT

Question 8: ***Do you have any views on the proposed licensing arrangements as specified in paragraphs 34 to 42 of the Consultation Paper? 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?***

Licensing and Validity Period

Views and Comments of the Respondents

25. Three respondents, viz. CMHK, Hutchison and SmarTone, generally support or indicate no adverse comment on the proposed validity period of 15 years for the re-assignment of the spectrum in the 850/900 MHz and 2.3 GHz bands. On the other hand, HKT suggests shortening the assignment periods for the spectrum in the 850 MHz and 900 MHz bands subject to this re-assignment exercise so as to align with the expiry dates of the existing assignment of the adjacent spectrum in the 850 MHz and 900 MHz bands on 29 December 2036 and 11 January 2036 respectively. HKT considers that the suggested alignment of expiry dates of the two bands could open up opportunity for an operator to acquire a wider contiguous block of spectrum in the same band with the same assignment period in one go upon expiry of the assignment term in 2036.

Responses of the CA

26. As elaborated in paragraph 47 of the Statement, the CA considers that a term of 15 years for spectrum assignment, which has been consistently adopted by the CA for spectrum assignment or re-assignment exercises under a market-based approach, provides certainty and predictability to facilitate operators' long term network resource planning. Under the SMRA auction format, it is up to each operator's considerations and commercial decisions to bid for frequency block(s) it desires to form contiguous blocks with spectrum already assigned to it, and different assignment periods of these blocks would not hinder the ability of the operator to do so. Taking into account the above and having regard to the support of the majority of the respondents, the CA considers that the spectrum in the 850/900 MHz and 2.3 GHz bands should be re-assigned for a term of 15 years. The CA will review the utilisation of different frequency bands from time to time and enhance efficiency of spectrum use through any necessary arrangement.

Restriction on Frequency Swap

Views and Comments of the Respondents

27. Three respondents, viz. HKT, Hutchison and SmarTone, have no adverse comment on the proposed restriction on frequency swap that swapping of any frequency assignment in the 850/900 MHz and 2.3 GHz bands within the first five years of assignment will generally not be considered. On the other

hand, CMHK suggests that frequency swapping shall be allowed if it could promote and generate higher spectral efficiency and efficacy.

Responses of the CA

28. While the CA recognises the possible enhancement of spectral efficiency through frequency swapping between MNOs, it is also of crucial importance to encourage competitive bidding of spectrum in the auction. The CA considers that the restriction of frequency swapping within the first five years of spectrum re-assignment will strike a proper balance between facilitating efficient spectrum utilisation and promoting competitive bidding to reflect the full market value of each individual frequency blocking in the auction. Hence, the CA maintains its view that frequency swapping within the first five years of assignment of the spectrum in the 850/900 MHz and 2.3 GHz bands will generally not be considered.

Control of Interference in the 900 MHz Band

Views and Comments of the Respondents

29. All respondents have no adverse comment on the proposal that the use of the spectrum in the 900 MHz band to be re-assigned will continue to be restricted to the provision of mobile services in areas away from the cross-border rail link(s) including the Hong Kong Section of the Guangzhou-Shenzhen-Hong Kong Express Rail Link ("XRL")[7] and outside the designated country parks and remote areas as specified by the CA ("Designated Areas")[8], i.e. subject to the same restriction under the current spectrum assignment.

30. Hutchison further suggests that a control measure like a guard band of 2.5 MHz between the 850 MHz and 900 MHz bands be introduced so as to prevent and tackle any potential interference.

Responses of the CA

31. As regards the restriction for control of interference in the 900 MHz band, the CA maintains its view that the use of the spectrum in the 900 MHz band to be re-assigned will be restricted to the provision of mobile services in areas away from the cross-border rail link(s) including the XRL and

[7] Information of the XRL is given in G.N. 8022 of 2008.

[8] The Designated Areas have been specified by the CA in G.N. 4475 of 2010 for the purpose of section 3A(1) of the Telecommunications (Determining Spectrum Utilization Fees by Auction) Regulation (Cap. 106AC) and may be amended by the CA as and when necessary.

outside the Designated Areas in order to avoid harmful interference between different systems.

32. With respect to the 2.5 MHz of spectrum between the 850 MHz and 900 MHz bands, i.e. 882.5 – 885 MHz referred to by Hutchison, according to the Hong Kong Table of Frequency Allocations[9], this piece of spectrum has been assigned for Government use. That notwithstanding, all users with spectrum assigned in the 850/900 MHz bands and the adjacent blocks are required to take reasonable measures to install, maintain and operate their services and networks in such a manner so as not to cause harmful interference to each other.

SPECTRUM UTILISATION FEE

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 of the Consultation Paper?***

Level of the SUF and Method of Payment

Views and Comments of the Respondents

33. All MNOs support SCED's proposal that each spectrum assignee will be given a choice of paying the SUF by lump sum upfront or by annual instalments. Hutchison proposes that the spectrum assignees should be given the permission and flexibility to subsequently alter their chosen payment method upon satisfying certain conditions set by the SCED. HKT suggests that the pre-set fixed percentage applied to SUF instalments should be no higher than the latest rate of 2%. In addition, CMHK has highlighted the industry wide concern about the nature of the SUF and its tax deductibility which may impact the costs of telecommunications services.

34. Regarding the level of the SUF, all MNOs consider that the reserve price should be set at a low or reasonable level.

Responses of SCED

35. SCED notes the support by MNOs for the choices provided for the payment method of the SUF. In response to the proposed arrangement to pay off the outstanding SUF after the first assignment year under the option of

[9] The Hong Kong Table of Frequency Allocations is available at: https://www.ofca.gov.hk/filemanager/ofca/common/Industry/broadcasting/hk_freq_table_en.pdf.

annual instalment payment, SCED sees the need to keep the payment mechanism simple, and considers that the current options have already provided operators the needed flexibility in payment of the SUF. The increment in the annual instalment payment will be set at 2.5%, which is in line with the latest lower medium range underlying inflation forecast.

Communications Authority
Secretary for Commerce and Economic Development
2 May 2023