

**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**

Consultation Paper

17 November 2022

PURPOSE

This paper is jointly issued by the Communications Authority (“CA”) and the Secretary for Commerce and Economic Development (“SCED”) to seek views and comments of the telecommunications industry and other affected persons on the proposed arrangements for re-assignment of a total of 110 MHz of spectrum including –

- (a) 10 MHz of spectrum in the 832.5 – 837.5 MHz paired with the 877.5 – 882.5 MHz band, and 10 MHz of spectrum in the 885.0 – 890.0 MHz paired with the 930.0 – 935.0 MHz band (the “850/900 MHz bands”) upon expiry of the existing assignments on 31 May 2026; and
- (b) 90 MHz of spectrum in the 2300 – 2390 MHz band (the “2.3 GHz band”) upon expiry of the existing assignments on 29 March 2027,

and the methods for setting the related spectrum utilisation fee (“SUF”).

BACKGROUND

2. A total of 20 MHz of spectrum in the 850/900 MHz bands was assigned in May 2011 for the provision of public mobile services, with the assignments due to expire on 31 May 2026. The assignments have been made to two assignees, namely SmarTone Mobile Communications Limited (“SmarTone”), assigned with 2 x 5 MHz of spectrum in the 832.5 – 837.5 MHz paired with the 877.5 – 882.5 MHz band (“850 MHz band”); and Hutchison Telephone Company Limited (“Hutchison”), assigned with 2 x 5 MHz of

spectrum in the 885.0 – 890.0 MHz paired with the 930.0 – 935.0 MHz band (“900 MHz band”).

3. Further, 90 MHz of spectrum in the 2.3 GHz band was assigned in March 2012 for the provision of public mobile and fixed services¹, with the assignments due to expire on 29 March 2027. The assignments have been made to three assignees, namely China Mobile Hong Kong Company Limited (“CMHK”), Hutchison and VNET Group Limited (“VNET”) (formerly 21 ViaNet Group Limited). Each has been assigned with 30 MHz of spectrum in the 2.3 GHz band.

4. The CA sets out in the consultation paper its proposal on the arrangements for re-assignment of the aforementioned 110 MHz of spectrum, i.e. 20 MHz in the 850/900 MHz bands and 90 MHz in the 2.3 GHz band upon expiry of their existing assignments in May 2026 and March 2027 respectively. SCED also sets out in the consultation paper his proposal on SUF for the use of spectrum in these bands. The CA intends to make its decision and inform the parties concerned on the re-assignment arrangements no later than May 2023 after taking into account views and comments of the industry, thus giving a notice period of three years or more to the incumbent assignees before expiry of the existing assignments².

LEGAL AND REGULATORY 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 allocate and assign radio frequencies and to designate which of them shall be subject to the payment of SUF following consultation with the telecommunications industry and other affected persons. Section 32I(2) of the TO empowers SCED to prescribe the method for determining the SUF. Before exercising the respective statutory powers conferred on them by the TO, the CA and SCED jointly conduct the present public consultation.

¹ 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.

² See the Statement issued by the former Telecommunications Authority (“TA”) in January 2008 on minimum notice periods for variation or withdrawal of spectrum assignments, which is available at: <https://www.coms-auth.hk/filemanager/common/ta20080131.pdf>.

6. Section 4(4) of the Communications Authority Ordinance (Cap. 616) stipulates that the CA, in performing its functions, must have regard to the following matters which appear to the CA 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 promulgated by the Government in April 2007 ("Spectrum Policy Framework")³ sets out the policy objectives and the guiding principle 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 TA (now the CA) 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 Framework to the extent that there would be no inconsistency with the objectives and provisions of the TO⁴.

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 CA shall inform the parties concerned about the arrangements for spectrum re-assignment within a reasonable time before expiry of the assignments as mentioned in paragraph 4 above. In addition, under the guiding principle in spectrum management, a market-based approach will be used in spectrum management, including both assignment and re-assignment of spectrum, wherever the CA considers that there are likely to be competing demands from providers of non-Government services, unless there are overriding public policy reasons to do otherwise.

³ The Spectrum Policy Framework is available at: <https://www.cedb.gov.hk/assets/resources/ccib/policies/spectrum.pdf>.

⁴ 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.

DEMAND FOR SPECTRUM IN THE 850/900 MHz AND 2.3 GHz BANDS

9. In recent years, the mobile telecommunications market has continued to grow rapidly as driven by customer demand for mobile data connectivity. The per capita monthly mobile data usage reached 18.5 gigabytes as of July 2022, which is about five times of that five years ago in 2017. This growth trend is expected to continue in view of the developments of new innovative mobile broadband applications riding on the fourth generation mobile (“4G”) and fifth generation mobile (“5G”) networks.

10. Whilst spectrum in the 850/900 MHz and 2.3 GHz bands is currently deployed by the spectrum assignees mainly for the provision of 4G services using Long Term Evolution technology, which is a mature mobile broadband technology with abundant supply of network equipment and user devices, these bands have also been specified by the industry standardisation body 3rd Generation Partnership Project (“3GPP”) as frequency bands that can be used for deployment of 5G services based on 5G New Radio (“NR”) technology. Coupled with the technology neutral approach for assignment of spectrum by the CA, there is both potential and flexibility for assignees to refarm spectrum in these bands for meeting future demand for 5G services.

11. Further, spectrum in the low-band below 1 GHz, including the 850/900 MHz bands, has superb radio propagation characteristics allowing mobile network operators (“MNOs”) to deploy mobile services with extensive coverage and high building penetration, and therefore is among the favourite frequency bands of the industry for the provision of public mobile services. As for spectrum in the 2.3 GHz band, it belongs to the mid-band spectrum within the 1 – 6 GHz range. While it provides comparatively longer range propagation than the high-band spectrum above 6 GHz, it usually has a wider bandwidth than the low-band spectrum below 1 GHz. Therefore, the mid-band spectrum is very suitable for supporting cost effective provision of mobile broadband services to meet both coverage and capacity demands.

12. Having regard to the factors mentioned above and with reference to the competition for the low-band and mid-band spectrum during the last spectrum auction held in October 2021, **the CA considers that there are likely to be competing demands for spectrum in the 850/900 MHz and 2.3 GHz bands.**

PROPOSED RE-ASSIGNMENT APPROACH

Considerations for a Market-Based Approach

13. In accordance with the guiding principle in spectrum management in the Spectrum Policy Framework, since the CA considers that there are likely to be competing demands for spectrum in the 850/900 MHz and 2.3 GHz bands, a market-based approach should be used for re-assignment unless there are overriding public policy reasons to do otherwise. The CA has taken into account the policy objectives for spectrum re-assignment of ensuring customer service continuity, efficient spectrum utilisation, promotion of effective competition, and encouragement of investment and promotion of innovative services⁵ when evaluating whether there are any overriding public policy reasons for not adopting a market-based approach for re-assignment of spectrum in these bands. The CA's assessment is set out in the following paragraphs.

Ensuring Customer Service Continuity

14. At present, a total of over 1 100 MHz of spectrum below 6 GHz has been assigned to MNOs for providing public mobile services. For the three MNOs who are existing assignees in the subject frequency bands (viz. SmarTone in the 850 MHz band, Hutchison in the 900 MHz and 2.3 GHz bands, as well as CMHK in the 2.3 GHz band), their shares of spectrum in the 850/900 MHz and 2.3 GHz bands only account for 4% to 19% of their own total amount of assigned spectrum below 6 GHz, as shown in Table 1 below. As such, even assuming that any of them fails to acquire any spectrum in the 850/900 MHz and 2.3 GHz bands in this re-assignment exercise, their current holdings of spectrum below 6 GHz will still enable them to provide public mobile services by using the remaining spectrum to ensure service continuity. The CA therefore considers that re-assignment of spectrum in the 850/900 MHz and 2.3 GHz bands should not give rise to any concern about continuity of customer services in respect of these three incumbent MNOs. Indeed, a number of spectrum re-assignment exercises have been successfully completed since 2016 demonstrating that service continuity issue is not a concern.

⁵ These are the four policy objectives that the CA has adopted when evaluating the proposed options for re-assignment of the spectrum in the 1.9 – 2.2 GHz band, 900 MHz and 1800 MHz bands, as well as 2.5/2.6 GHz band upon expiry of the assignments in 2016, 2021 and 2024 respectively.

Table 1: Distribution of sub-6 GHz spectrum assigned (in MHz) to major MNOs as of 31 March 2024⁶

	Sub-6 GHz spectrum		Spectrum due to expire for re-assignment			
			850/900 MHz band (MHz)	2.3 GHz band (MHz)	[B] Total (MHz)	[B]/[A] Share (%)
	[A] Total (MHz)	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%)

15. Regarding the remaining incumbent assignee of spectrum in the 2.3 GHz band, i.e. VNET, as the CA notes, its assigned spectrum in the band is predominantly used for the provision of public mobile services solely on a wholesale basis to other MNO(s) for serving the latter’s end-customers. Even if VNET fails to acquire any spectrum in the 2.3 GHz band in this re-assignment exercise, the MNO(s) affected can make use of its/their own assigned spectrum in the other frequency bands to ensure service continuity. As for the fixed wireless services offered by VNET, the CA notes that VNET only deploys a minority portion of the spectrum to serve only very few end-customers in rural areas. The CA considers that any service impact upon VNET’s end-customers will be minimal as there are many service alternatives to VNET’s fixed wireless services as a result of extension of fibre-based networks to villages in remote areas during 2021 to 2026 under the Government’s subsidy scheme⁷ as well as market competition. Taking into account such considerations, the CA is of the view that re-assignment of spectrum in the 2.3 GHz band should not give rise to any concern about service continuity in respect of the small number of VNET’s end-customers.

⁶ 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, assuming that 10 MHz of spectrum in the 2.5/2.6 GHz band held by Genius Brand Limited due to expire in 2028 is split 50:50 between HKT and Hutchison.

⁷ 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.

Efficient Spectrum Utilisation

16. Re-assignment of spectrum in the 850/900 MHz and 2.3 GHz bands by a market-based approach will put the spectrum into the hands of those operators and new entrants (if any) which value it the most and are 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, taking into account other low-band and mid-band spectrum acquired and having regard to their own commercial and technical considerations. On the other hand, 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 spectral efficiency.

Promotion of Effective Competition

17. Hong Kong's mobile telecommunications market is highly competitive, with four major MNOs serving a population of around 7.3 million. Re-assignment of the spectrum by a market-based approach would encourage MNOs to value their newly acquired spectrum and make good use to improve coverage, data speed and service offerings, thus promoting further competition that will benefit consumers.

Encouragement of Investment and Promotion of Innovative Services

18. Past spectrum re-assignment exercises have led to spectrum changing hands among the incumbent MNOs. MNOs which acquire additional spectrum would need to invest in the network infrastructure to enable them to deploy the spectrum effectively. Further, it is expected that MNOs assigned with a right mix of spectrum through a market-based mechanism will be in a better position to introduce innovative services in the 5G era. Therefore, re-assignment of the spectrum by a market-based approach is expected to encourage investment and promote the introduction of innovative services.

Re-assignment of Spectrum by Auction

19. The CA's evaluation in paragraphs 13 to 18 above has not identified any public policy reason that would override the adoption of a market-based approach for spectrum re-assignment. On the contrary, there are economic benefits which support the adoption of a market-based approach for re-assigning the spectrum. **The CA therefore considers that a market-based approach**

should be adopted for the re-assignment of spectrum in the 850/900 MHz and 2.3 GHz bands.

20. Of the various market-based approaches⁸, it is considered that auction is the most appropriate for the re-assignment of spectrum in the 850/900 MHz and 2.3 GHz bands. Auction allows the fair value of the spectrum to be determined in an open and transparent way and ensures that the successful bidders will be those who both value the spectrum most and are expected to put it to the most efficient use during the term of assignment. Use of an auction approach is also consistent with practices adopted by both the CA and many overseas administrations for handling similar cases. **The CA therefore considers that spectrum in the 850/900 MHz and 2.3 GHz bands should be re-assigned by way of auction.**

PROPOSED RE-ASSIGNMENT ARRANGEMENTS

Scope of Service

21. The spectrum in the 850/900 MHz bands is allocated to mobile services only in Hong Kong. As such, the CA considers that the scope of service for the 850/900 MHz bands shall remain to be the provision of mobile services only.

22. 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. From the perspective of efficient use of spectrum, the CA considers that the current use of spectrum for fixed wireless services is far from satisfactory. To promote more efficient use of spectrum which is a scarce public resource, the CA considers it appropriate to confine the spectrum in the 2.3 GHz band for the provision of mobile services only in the next assignment term.

23. Further, fixed broadband services offered by fixed network operators (“FNOs”) and mobile broadband services offered by MNOs would be likely substitutes for the fixed wireless services provided by the 2.3 GHz band. Indeed, with the expected completion of various projects under the

⁸ Footnote 1 to paragraph 3.1 of the Spectrum Policy Framework explains that a “market-based approach” refers to “methods relying on market forces to ensure the efficient use of spectrum as a public resource”.

Government's subsidy scheme as illustrated in paragraph 15 above, and the MNOs continuing to roll out networks using the new 5G spectrum assigned to them (especially spectrum in the 700 MHz band which has superb radio propagation characteristics), by the time the spectrum in the 2.3 GHz band is re-assigned in March 2027, the capability of both FNOs and MNOs to extend the reach of their fixed and mobile network services to the small number of customers of fixed wireless services being served by the spectrum in the 2.3 GHz band will be significantly enhanced. Having considered the above, the CA proposes to confine the scope of service for the 2.3 GHz band to mobile services only in the next term of spectrum assignment.

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?

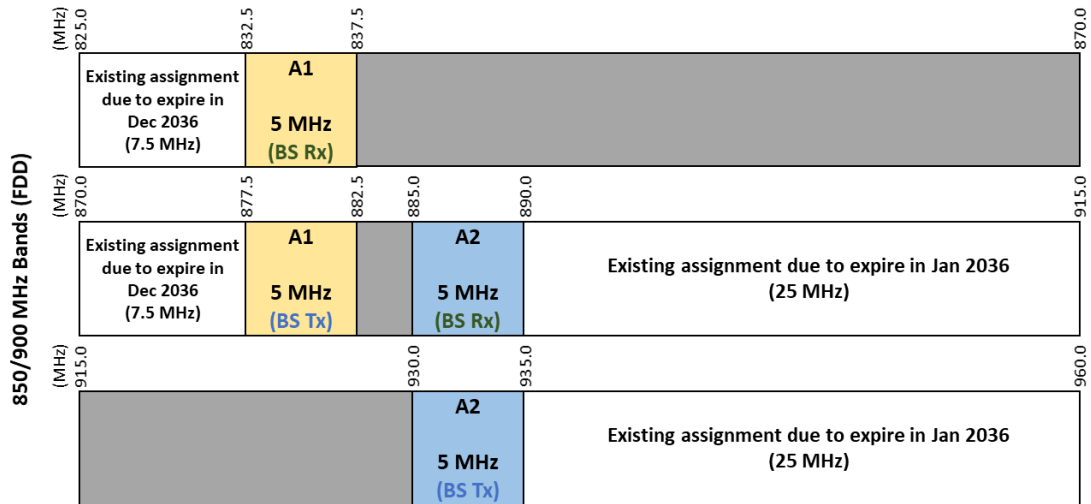
Band Plan

24. In Hong Kong, spectrum in the 850/900 MHz bands is currently deployed for 4G services based on the Frequency Division Duplex ("FDD") mode of operation, while spectrum in the 2.3 GHz band is currently 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

25. The 850/900 MHz bands under consultation consist of 20 MHz of spectrum separated into two blocks of 2 x 5 MHz (Frequency Blocks A1 and A2) which are not contiguous to each other. Taking also into account that if the 850/900 MHz bands are to be deployed for 5G services based on 5G NR FDD, the minimum allowable channel bandwidth would be 2 x 5 MHz as specified by 3GPP, the CA proposes to maintain the current band plan for the 850/900 MHz bands, as shown in Figure 1 below.

Figure 1: Existing/Proposed band plan for the 850/900 MHz bands of spectrum

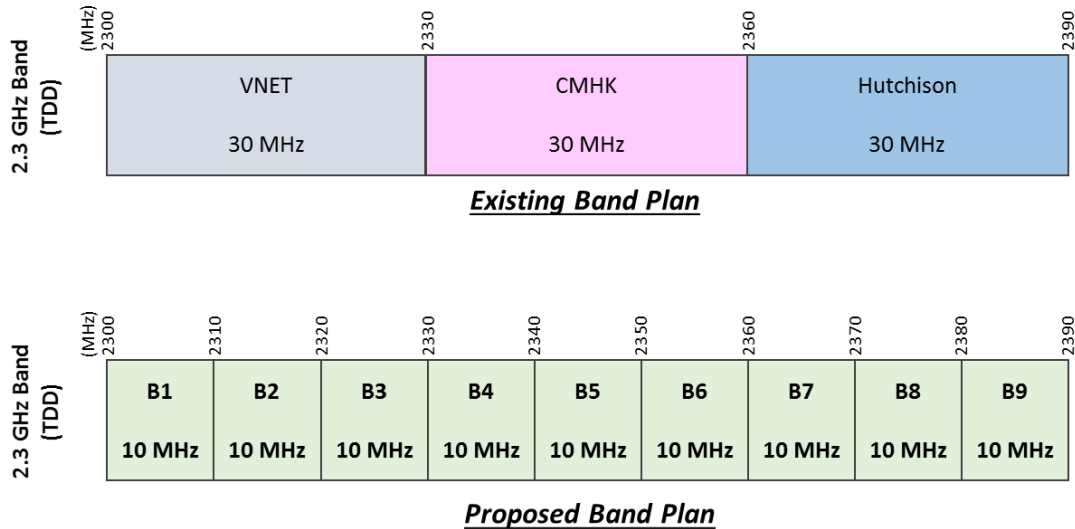


Question 2: Do you have any views on the proposal that 20 MHz of spectrum in the 850/900 MHz bands be divided into two paired frequency blocks with a bandwidth of 2 x 5 MHz each?

2.3 GHz Band

26. The existing 2.3 GHz band consists of three equal sized frequency blocks each of 30 MHz. In order to provide flexibility for an interested party to bid for an optimal amount of spectrum to meet its business needs, the CA proposes to divide the band plan into nine frequency blocks of 10 MHz each, as shown in [Figure 2](#) below, having considered that 10 MHz is an allowable channel bandwidth for 4G based on TDD as well as the minimum allowable channel bandwidth for 5G NR TDD to operate on a standalone basis as specified by 3GPP. 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.

Figure 2: Existing and Proposed band plans for the 2.3 GHz band of spectrum



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?

Spectrum Cap

27. While the CA intends to impose minimal constraints on spectrum acquisition in an auction, in exercising its spectrum management powers, the CA is also mindful of the need to prevent an undue concentration of spectrum in the hands of any single spectrum assignee which may have the effect of restricting competition. Having considered the overall spectrum holdings of four major MNOs in various frequency bands (excluding spectrum in the 26/28 GHz bands) as shown in Table 2 below, the CA proposes to impose spectrum caps for the amount of spectrum which may be acquired by a bidder in the 850/900 MHz and the 2.3 GHz bands.

**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 2028 is split 50:50 between HKT and Hutchison.

850/900 MHz Bands

28. The spectrum in the 850/900 MHz bands consists of two blocks each with a bandwidth of 2 x 5 MHz. Based on the technical information available, the 850 MHz band and the 900 MHz band 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”)⁹. The CA therefore considers that there is no technical merit such as higher spectral efficiency that would override competition considerations to allow a single bidder to acquire all two blocks. As such, the CA proposes a **spectrum cap of 2 x 5 MHz**, which is 50% of the total 2 x 10 MHz of spectrum in the 850/900 MHz bands.

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?

⁹ According to the technical specifications adopted by 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.

2.3 GHz Band

29. Following the proposal in paragraph 26 above to divide the band plan into nine frequency blocks of 10 MHz each, the CA proposes **a spectrum cap of 50 MHz** out of the total 90 MHz of the spectrum in the 2.3 GHz band. The proposed spectrum cap would allow the incumbent assignees, if they so wish, to acquire more spectrum than their current holdings of 30 MHz of spectrum in the band to achieve higher spectrum efficiency.

30. In other words, a bidder may acquire up to 56% of the 90 MHz spectrum in the 2.3 GHz band. The proposed spectrum cap should not give rise to competition concerns as each of the four major MNOs has been assigned with hundreds of megahertz of spectrum across various frequency bands as shown in Table 2 above.

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?

Eligible bidders

31. The CA considers that there should only be minimal qualification requirements for registering bidders' interest and for demonstrating their capability to provide satisfactory services. The CA preliminarily proposes to impose the following qualification requirements on a bidder who is interested in participating in the auction of spectrum in the 850/900 MHz and 2.3 GHz bands. In short, an eligible bidder should –

- (a) lodge 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) demonstrate 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.

32. Subject to fulfilment of the above qualification requirements, the CA proposes that all interested parties may apply for participation in the auction to be conducted for the re-assignment of spectrum in the 850/900 MHz and 2.3 GHz bands.

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?

Auction Format

33. For the re-assignment of spectrum in the 850/900 MHz and 2.3 GHz bands, the CA proposes to adopt the **simultaneous multiple-round ascending** (“SMRA”) auction format. This auction format has been widely used in auctions conducted for the past years including the auctions of the spectrum in the 850/900 MHz and 2.3 GHz bands held in 2011 and 2012 for the current assignment terms respectively, and hence the industry is familiar with it.

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?

LICENSING ARRANGEMENTS

Licensing and Validity Period

34. The CA proposes to grant a new unified carrier licence (“UCL”) to each successful bidder of the spectrum in the 850/900 MHz and/or 2.3 GHz bands. According to Schedule 2 of the Telecommunications (Carrier Licences) Regulation (Cap. 106V), UCLs are issued with a period of validity of 15 years from the day on which they are issued. The validity period of the frequency assignment will last for 15 years and be coterminous with the term of the newly issued licence. For incumbent licensees who successfully acquire spectrum in the proposed auction, they may apply to the CA for combining their existing UCLs with the new UCL to be issued.

Restriction on Frequency Swap

35. In order to facilitate competitive bidding in the auction and realise the full market value of each individual frequency block, the CA proposes 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 will generally not be considered.

Technology Neutrality

36. In the assignment of spectrum for provision of public mobile services, the CA in general adopts a technology neutral approach whereby assignees are free to use whatever technology they choose based on widely recognised standards for service provision. Unless there is any overriding reason worth special consideration (such as radio interference to other existing services), the CA will adhere to this technology neutral approach in assigning and licensing the spectrum in the 850/900 MHz and 2.3 GHz bands. Having said that, the assignees should use the spectrum in accordance with the band plans proposed in paragraphs 25 and 26 above for providing 4G or 5G or other generations of mobile services under their UCLs.

Control of Interference in the 900 MHz Band

37. 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 system¹⁰ within the Hong Kong Section of the Guangzhou-Shenzhen-Hong Kong Express Rail Link (“XRL”)¹¹. The same frequency range is reserved to be used in any other future cross-border railways (e.g. Hong Kong-Shenzhen Western Express Line). 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 country parks and remote areas as specified by the CA (the “Designated Areas”)¹². To avoid radio interference between the different systems, the spectrum in the 900 MHz band to be re-assigned will be restricted for the provision of mobile services away from the cross-border rail link(s) including the XRL and outside the Designated Areas.

38. 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, priority of use will generally be given in the following descending order: GSM-R system(s) for railway operation including the XRL, RBSs for

¹⁰ GSM-R is a wireless communication standard for railway network based on the European GSM standard.

¹¹ Information of the XRL is given in G.N. 8022 of 2008.

¹² 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).

public mobile services within the Designated Areas and last of all, RBSs for public mobile services away from the cross-border rail link(s) and outside the Designated Areas.

Network and Service Rollout Obligations

39. In order to prevent spectrum hoarding and to ensure that the auctioned spectrum will be put into efficient use for the timely provision of advanced telecommunications services for the benefit of the general public, the CA will in general impose network and service rollout obligations on successful bidders in a spectrum auction.

40. In view of the satisfactory radio propagation characteristics of spectrum in the 850/900 MHz and 2.3 GHz bands which facilitates the provision of broad geographical coverage in an economic way and the extensive deployment of RBSs using spectrum in these bands, the CA proposes 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. In fact, the same requirement has been imposed by the CA in the re-assignment of spectrum in the low and mid frequency bands in recent years.

Performance Bond for Rollout Obligations

41. To ensure compliance with the network and service rollout obligations as proposed in paragraphs 39 and 40 above, the CA proposes 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. The amount of performance bond will be specified by the CA in the information memorandum to be issued for the auction of spectrum in these bands.

42. The spectrum in the 850 MHz and 900 MHz bands (including spectrum in the nearby ranges¹³) as well as 2.3 GHz band has already been extensively deployed for provision of public mobile services. If an incumbent assignee of spectrum in any of the above bands successfully acquires frequency block(s) in the same band, it is likely that its mobile network will have already

¹³ 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 9.

met the 90% minimum population coverage requirement upon the re-assignment in the respective bands. As such, the CA proposes that 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;
- (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; and/or
- (c) an incumbent assignee of spectrum in the 2.3 GHz band successfully acquires any of the spectrum in the 2.3 GHz band,

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).

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?

SPECTRUM UTILISATION FEE

43. Since the CA proposes the adoption of an auction as the appropriate market-based approach for the re-assignment of spectrum in the 850/900 MHz and 2.3 GHz bands, the successful bidders should pay the final bidding price of the individual frequency block as SUF for use of the spectrum. For the purpose of kick-starting the competitive bidding process, there will be a reserve price for each of the frequency blocks in these bands which is set at a

level that represents the minimum base value of the spectrum. The auction reserve price will be specified by SCED nearer the time of the auction.

44. Regarding the method of payment of SUF, to afford greater flexibility to the spectrum assignee to make financial arrangements for the payment of SUF, SCED proposes that the spectrum assignee be given a choice to pay the SUF either by –

- (a) lump sum payment upfront, which is the lump sum amount determined in the auction; or
- (b) annual instalments, with the first instalment equivalent to the lump sum amount referred to in (a) above divided by 15 (i.e. the number of years of assignment), and subsequent instalments to be increased every year by a pre-set percentage which aims to reflect the time value of money to the Government.

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?

INVITATION OF COMMENTS

45. This consultation paper sets out preliminary views and proposals of the CA and SCED on the arrangements for the re-assignment of spectrum in the 850/900 MHz and 2.3 GHz bands and the related SUF. For the avoidance of doubt, all the information provided and views expressed in this consultation paper are for the purpose of discussion and consultation only. Nothing in this consultation paper represents or constitutes any decision made by the CA or SCED. The consultation contemplated by this consultation paper is without prejudice to the exercise of the powers by the CA and SCED under the TO or any subsidiary legislation thereunder.

46. The CA and SCED will carefully consider the submissions received in this consultation, and insofar as it is practicable in the circumstances announce their respective decisions on the arrangements for the re-assignment of spectrum in the 850/900 MHz and 2.3 GHz bands and the related SUF no later than May 2023, thereby giving a three-year or more advance notice to the incumbent spectrum assignees about the arrangements for spectrum re-

assignment. This will be followed by the necessary preparatory work including the making of relevant legislative amendments.

47. Any person who would like to respond to this public consultation should do so on or before **15 December 2022**. **Late submissions would not be considered.** The CA and SCED may publish all or part of the views and comments received, and disclose the identity of the source in such manner as they see fit. Any part of the submissions considered commercially confidential should be clearly marked. The CA and SCED would take such markings into account in making the decision as to whether such information will be disclosed or not. Submissions should be sent to –

Office of the Communications Authority
29/F., Wu Chung House
213 Queen's Road East
Wan Chai
Hong Kong

(Attention: Principal Regulatory Affairs Manager (R22))
Fax: 2803 5112
E-mail: consult-850-900MHz-2.3GHz@ofca.gov.hk

An electronic copy of the submission should be provided by e-mail to the e-mail address indicated above.

**Commerce and Economic Development Bureau and
Office of the Communications Authority
17 November 2022**