

For discussion
on 4 February 2013

**Legislative Council Panel on
Information Technology and Broadcasting**

**Arrangements for the Frequency Spectrum in the
1.9 – 2.2 GHz Band upon Expiry of the
Existing Frequency Assignments for 3G Mobile Services**

Purpose

This paper briefs Members on the second consultation launched by the Commerce and Economic Development Bureau and the Office of the Communications Authority (“OFCA”) on 28 December 2012 concerning the proposed arrangements for re-assignment of the frequency spectrum in the 1.9 – 2.2 GHz band upon expiry of the existing frequency assignments for 3G mobile services in October 2016 (the “Second Consultation Paper”).¹

Background

2. Hong Kong has five mobile network operators (“MNOs”). They deploy frequency spectrum in the 800 - 900 MHz, 1800 MHz, 1.9 – 2.2 GHz, 2.3 GHz, and 2.5 - 2.6 GHz bands to provide mobile telecommunications services.

3. Currently, the third generation (“3G”) mobile services are primarily provided using a total of 2 x 60 MHz of paired spectrum in the 1.9 – 2.2 GHz band (i.e. 1920 – 1980 band paired with the 2110 – 2170 band, hereinafter referred to as “3G spectrum”). The spectrum was assigned in 2001 through auction to four MNOs (hereinafter referred to as “3G operators”), each with 2 x 15 MHz, for a tenure of 15 years, which will expire on 21 October 2016. The four incumbent 3G operators are CSL Limited, Hong Kong Telecommunications (HKT) Limited, Hutchison Telephone Company Limited and SmarTone Mobile Communications Limited. Another MNO, China Mobile Hong Kong Company Limited, does not have any 3G frequency assignment.

¹ The Second Consultation Paper is available at <http://www.coms-auth.hk/filemanager/en/share/cp20121228.pdf>.

Currently it is providing 3G services by deploying the 3G network capacity of some of the incumbent 3G operators under commercial agreements.

Considerations

4. In formulating the options for re-assignment of the 120 MHz of frequency spectrum in the 1.9 – 2.2 GHz band upon expiry of the existing frequency assignments, the Secretary for Commerce and Economic Development (“SCED”) and the Communications Authority (“CA”) are guided by the principles in spectrum management as stipulated in the Spectrum Policy Framework² promulgated by the Government in April 2007 (“the Policy Framework”). These include in particular the following –

- A market-based approach in spectrum management will be used for 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;
- There is no legitimate expectation that there will be any right of renewal or right of first refusal of any licence or spectrum assignment upon the expiry of a licence or spectrum assignment; and
- If a spectrum assignment is to be renewed with different radio frequencies assigned, or not renewed upon the expiry of an assignment, notification would be given to the spectrum assignee within a reasonable time before expiry.

5. In regard to notification to be given to the spectrum assignees, according to a Statement issued by the former Telecommunications Authority (“former TA”) in January 2008³ on minimum notice periods for variation or withdrawal of spectrum assignments upon and before their expiry, insofar as it is practicable in the circumstances, the decision of the

² The Spectrum Policy Framework is available at <http://www.cedb.gov.hk/ctb/eng/legco/pdf/spectrum.pdf>.

³ The TA Statement is available at http://tel_archives.ofca.gov.hk/en/tas/others/ta20080131.pdf.

CA on whether to renew the frequency assignment with different frequencies assigned, or not to renew the assignment at all upon its expiry, should be notified to the incumbent operators at least three years in advance. Therefore, for the current frequency re-assignment exercise, the Government and the CA will endeavor to notify the incumbent 3G operators of the decision by October 2013 at the latest. This is to facilitate the incumbent operators to make the necessary technical and commercial arrangements to cope with the possible change in the amount of radio spectrum holding.

6. Sections 32H and 32I of the Telecommunications Ordinance empower the CA to assign the radio frequency and to designate the frequency bands for the payment of spectrum utilisation fee (“SUF”) following consultation with the industry and interested parties. Section 32I of the Ordinance empowers the SCED to prescribe the method for determining the SUF and to specify the minimum fee of the SUF. In this connection, the SCED and the former TA jointly issued the first consultation paper on the subject in March 2012 (the “First Consultation Paper”).⁴

The First Consultation

7. On the basis of the principles in spectrum management as mentioned in paragraph 4 above, the following three options for spectrum re-assignment were proposed in the First Consultation Paper to seek views and comments of the industry and interested parties –

- Option 1 : An administratively-assigned approach – right of first refusal to be offered to the incumbent 3G operators;
- Option 2 : A full-fledged market-based approach – re-auctioning all the spectrum; and
- Option 3 : A hybrid between administratively-assigned and market-based approach – right of first refusal to the incumbent 3G operators for them to retain part of the spectrum (“RFR Spectrum”), while part of the spectrum will be returned to the CA for re-auction (“Re-auctioned Spectrum”)

⁴ The First Consultation Paper is available at http://www.coms-auth.hk/filemanager/common/policies_regulations/consultations/papers/cp20120330.pdf.

8. The First Consultation Paper sets out a list of objectives in spectrum re-assignment, viz. ensuring customer service continuity, efficient spectrum utilisation, promotion of effective competition, and encouragement of investment and promotion of innovative services. It also provides an analysis of the pros and cons of each of the three options in meeting these objectives.

9. The first consultation was originally scheduled to close on 15 June 2012. Upon the request of the industry, the deadline for submission of views and comments was extended by one month to 15 July 2012. Altogether a total of three and half months have been allowed for the industry and interested parties to submit their views. In response to the First Consultation Paper, submissions were received from 12 respondents, including the five MNOs, a business partner of an MNO, three equipment vendors/works contractors, and three members of the public. Subsequently, the five MNOs and two members of the public also made supplementary submissions.⁵

10. There was a clear alignment of interest in the submissions. On the one hand, all the incumbent 3G operators, as well as their business partners, equipment vendors/works contractors, supported Option 1, which would offer the right of first refusal to the incumbent 3G operators to acquire their original frequency holdings. On the other hand, the non-incumbent 3G operator supported Option 2, which would put out all the 3G spectrum for auction.

11. In view of the complexities and importance of the subject and the controversy that it might generate, the First Consultation Paper already foreshadowed the need for a further round of public consultation before a decision is made on the re-assignment of the frequency spectrum in the 1.9 – 2.2 GHz band.

Second Consultation Paper: Issues for Consultation

12. The second consultation aims to devise an arrangement for re-assignment of the 120 MHz of spectrum in the 1.9 – 2.2 GHz band that would best meet the multiple objectives in spectrum re-assignment.

⁵ The submissions and supplementary submissions are available at http://www.coms-auth.hk/en/policies_regulations/consultations/completed/index_id_132.html.

Proposed Adoption of Option 3 for Further Consultation

Competing Demands

13. Mobile data usage per customer surged from just 11 megabytes (“MB”) per month at end 2007 to 667 MB per month in September 2012. The total volume of mobile data traffic carried doubled each year in 2011 and 2012, having gone through upsurges of three to five times every year in the preceding three years. While all the MNOs have launched fourth generation (“4G”) mobile services, it is expected that the 3G service platforms will continue to play an important role in the mobile market when the existing frequency assignments expire in 2016. China Mobile Hong Kong Limited has also repeatedly indicated both in its submissions to the First Consultation Paper and publicly before the media that it is strongly interested in acquiring some of the 3G spectrum. The CA therefore considers that there are clear competing demands for the frequency spectrum in the 1.9 – 2.2 GHz band. The CA’s view is also reinforced by the fact that in the auction conducted in February 2012 for bidding the 2.3 GHz band spectrum, a new entrant (21 ViaNet Group Limited) had emerged and successfully acquired 30 MHz of the spectrum. This testifies that while the mobile market is already very competitive, it can still attract new entrants and new investments.

14. According to the Policy Framework, since there are competing demands for the frequency spectrum in the 1.9 – 2.2 GHz band, a market-based approach should be adopted for spectrum re-assignment, unless there are overriding public policy reasons to do otherwise. Option 2, by re-auctioning all the 3G spectrum, is a full-fledged market-based approach and should be adopted.

Impact Assessment on Option 2

15. However, with all the spectrum in the 1.9 – 2.2 GHz band put to auction under Option 2, the auction outcome may lead to reduction of individual incumbent operator’s network capacity. According to OFCA’s assessment, this will cause degradation of customer services in the form of slower data download speed and a greater number of drop calls, and also weakening or even complete loss of indoor mobile coverage (notably in the MTRC premises, the airport and major shopping malls) for 3G services. This will occur after the spectrum changes hand in

October 2016 and will continue during the transitional period, which may last for two to three years, until the affected customers have eventually moved to the operators which possess more spectrum.

16. In light of the potentially severe and long lasting effect on service quality and reception especially in indoor areas under Option 2 during the transitional period, the SCED considers that there are overriding public policy reasons for the Government to deviate from the full-fledged market-based approach in re-assigning the frequency spectrum in the 1.9 – 2.2 GHz band.

Option 1 vs. Option 3

17. After deciding that there are overriding public policy reasons for the Government to deviate from the full-fledged market-based approach, the SCED and the CA have to evaluate which of the two remaining options (i.e. Option 1 and Option 3) may better meet the objectives in spectrum re-assignment as discussed in paragraph 8 above.

18. From the perspective of maintaining customer service continuity, Option 1 has the obvious advantage in being able to maintain a more or less seamless transition, but it fares less well in terms of meeting the other objectives in spectrum re-assignment. By October 2016, it is foreseen that many 3G customers will have migrated to the 4G-long term evolution (“LTE”) services. Besides, the MNOs will continue to deploy the spectrum in the 850 - 900 MHz band to support the provision of 3G services. Under Option 3, while the incumbent 3G operators may stand to lose at most one-third of the spectrum in the 1.9 – 2.2 GHz band, they can maintain an acceptable level of customer service continuity given that they are allowed to retain at least two-thirds of the original 3G spectrum.

19. In comparison, Option 3 is superior to Option 1 in enhancing spectral efficiency, as it allows the assignment of at least part of the 3G spectrum to whoever (which may be the existing MNOs or newcomers) which value it the most. Option 3 also enables the incumbent 3G operators to build up a contiguous band of 2 x 20 MHz spectrum thereby reaping the full potential of the LTE-Advanced technology. By providing an opportunity for both existing MNOs and newcomers to attain their desired amount of frequency holding in the 1.9 – 2.2 GHz band through a market mechanism, Option 3 will encourage further investment and stimulate competition in the mobile market, noting that the number of 3G operators in the market may or may not change after the auction. As a

result of this deliberation, the SCED has come to the view that Option 3 should be adopted for further consultation with the industry and interested parties.

Amount of RFR Spectrum and Re-auctioned Spectrum under Option 3

20. Under Option 3, it is proposed that each of the four incumbent 3G operators will be offered the right of first refusal (RFR) for two-thirds of their existing frequency holding in the 1.9 – 2.2 GHz band, i.e. 2 x 10 MHz of RFR spectrum each, and the remaining one-third will be put to auction. The proposal of re-assigning two-thirds of the original frequency holding to the incumbents through right of first refusal will enable the current peak data download speed of 42 Mbps to be maintained, and this will in turn enable the incumbent 3G operators to maintain an acceptable level of service quality in respect of most of the existing 3G services.

21. If all the incumbent 3G operators exercise the right of first refusal to acquire the RFR Spectrum, a total of 2 x 20 MHz of 3G spectrum can be made available for auction as the Re-auctioned Spectrum. If any incumbent 3G operator decides not to exercise the right of first refusal, the spectrum that it will relinquish will be pooled together with the Re-auctioned Spectrum and put to auction.

Spectrum Utilisation Fee

22. The SUF of the Re-auctioned Spectrum will be determined by auction. As to the SUF of the RFR Spectrum, having taken into account the submissions to the proposals in the First Consultation Paper, two new market-based methods have been proposed in the Second Consultation Paper for further views and comments of the industry and interested parties.

23. The first proposed method is to make reference to the annual royalty payment payable by the incumbents under their existing licences for the right to use the 3G spectrum in 2015/16. This royalty payment will be \$5.1 million per MHz or \$77 million per MHz after multiplying it by 15 to reflect the value for a usage period of 15 years under the new term of frequency assignment. In order to reflect the full market value of the spectrum, the SUF of the RFR Spectrum is proposed to be set at \$77 million per MHz or the SUF of the Re-auctioned Spectrum as determined by auction, whichever is higher. The amount of \$77 million is considered to be a reasonable minimum as this will be the minimum level of SUF

which the incumbent 3G operators are obliged to pay in 2015/16 under the terms and conditions of their existing licences.

24. The second proposed method is to set the SUF of the RFR Spectrum as the average of the SUF of the Re-auctioned Spectrum and the weighted average of the past market benchmarks. The weighted average of the past market benchmarks is calculated at around \$80 million per MHz, taking into account the royalty payment payable by the incumbents in 2015/16 (converted to a 15-year usage value), the SUF of the 2.5 - 2.6 GHz spectrum and the 850 - 900 MHz spectrum as determined by the auctions conducted in January 2009 and March 2011 respectively. The SCED has made it clear in the Second Consultation Paper that account would not be taken of the SUF in the upcoming auction of the spectrum in the 2.5 - 2.6 GHz band scheduled to be held in March 2013. This is to prevent any strategic bidding behaviour from distorting the outcome of the 2013 auction.

Auction Design

Eligible Bidders

25. It is proposed that all interested parties would be allowed to join the spectrum re-auction to be conducted, including the incumbent 3G operators irrespective of whether or not they have exercised the right of first refusal for the RFR Spectrum.

Auction Reserve Price

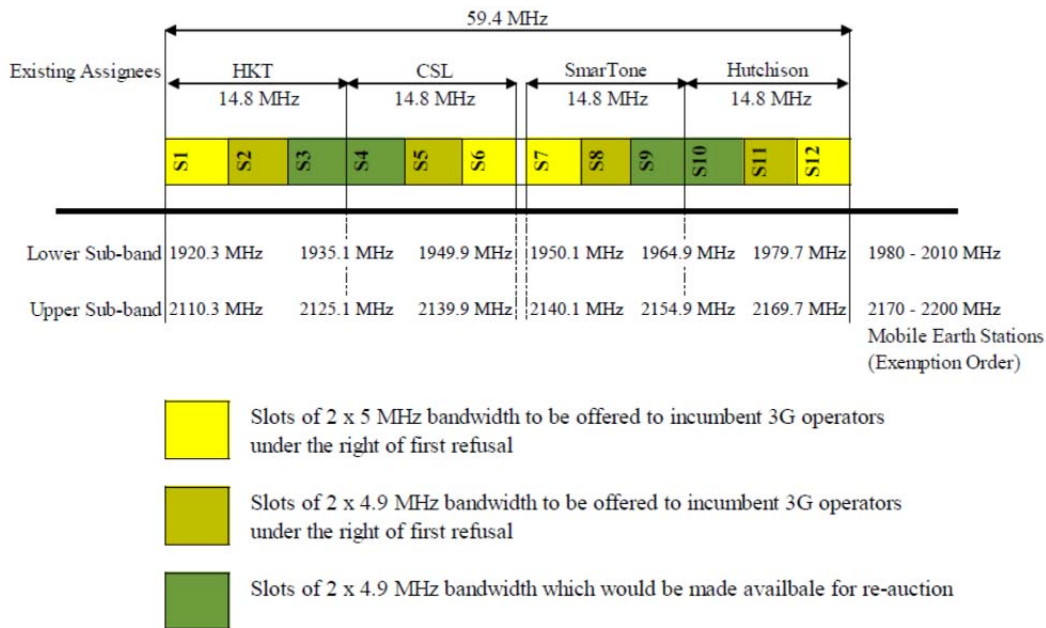
26. As the two methods proposed for setting the SUF of the RFR Spectrum are both tied to the outcome of the auction of the Re-auctioned Spectrum, there is a need to prevent the incumbents from strategically adjusting their demand for the Re-auctioned Spectrum so that they may pay less for the RFR Spectrum. Such strategic behaviour will distort the auction outcome and the resultant SUF will not be able to reflect the true market value of the spectrum. To discourage such kind of strategic behaviour, it is proposed to set the auction reserve price at a relatively high level, which is indicative of the true minimum value of the Re-auctioned Spectrum.

Auction Format

27. The Simultaneous Multi-Round Ascending (“SMRA”) auction format is proposed, where all the four spectrum slots (i.e. slots S3, S4, S9

and S10 in Figure 1 below) will be auctioned simultaneously over multiple rounds with price changing on each spectrum slot independently. The SMRA auction format has been adopted in all the spectrum auctions that OFCA has conducted since 2009, and will also be applied to the auction that OFCA will conduct in March 2013 for the 2.5 - 2.6 GHz spectrum. The industry is familiar with this auction format.

Figure 1: Proposed Band Plan for Re-assignment of the Frequency Spectrum in the 1.9 – 2.2 GHz Band



Spectrum Cap

28. If all the incumbents exercise the right of first refusal to acquire the RFR Spectrum and a total of 2 x 20 MHz spectrum is available for auction, the imposition of a spectrum cap is not recommended. The reason is even if all the Re-auctioned Spectrum were acquired by the MNO with the largest spectrum holding, it is unlikely to exert much impact on the competition landscape of the Hong Kong mobile market. However, in the unlikely situation that two or more of the incumbent 3G operators decide not to exercise the right to take up the RFR Spectrum, then at least 80 MHz of the spectrum in the 1.9 – 2.2 GHz band will be available for auction. In that case, a spectrum cap of 40 MHz of spectrum is proposed to be imposed. This means that the incumbent 3G operators that have exercised their right of first refusal to retain the RFR Spectrum of 2 x 10 MHz will be allowed to bid for at most 2 x 10 MHz of the Re-auctioned Spectrum, while all other parties (including those incumbent 3G operators which have decided not to

exercise their right of first refusal, MNOs which are not incumbent 3G operators and new entrants) will be allowed to bid for a maximum of 2 x 20 MHz.

Way Forward

29. The SCED and the CA will carefully consider the views and comments received in response to the Second Consultation Paper, before a decision is made on how the frequency spectrum in the 1.9 – 2.2 GHz band should be re-assigned. The SCED and the CA will insofar as it is practicable endeavour to announce the decision by October 2013 at the latest, thereby giving a three years' advance notice to the incumbent 3G operators on any possible variation to their frequency assignments in the 1.9 – 2.2 GHz band.

**Commerce and Economic Development Bureau
(Communications and Technology Branch) and
Office of the Communications Authority
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