

**ASSIGNMENT OF THE AVAILABLE RADIO SPECTRUM  
IN THE 2.5/2.6 GHz BAND  
FOR WIRELESS BROADBAND SERVICES**

**Consultation Paper**

**29 December 2011**

**INTRODUCTION**

In accordance with the Radio Spectrum Policy Framework (“RSPF”)<sup>1</sup> promulgated by the Government in 2007, the Telecommunications Authority (“TA”) will publish annually a Spectrum Release Plan (“SRP”)<sup>2</sup> to inform the industry the potential supply of radio spectrum to the market for competitive bidding in the following three years.

2. On 19 December 2011, the Office of the Telecommunications Authority (“OFTA”) published the updated SRP<sup>3</sup> for spectrum expected to be available in the 2012 – 2014 timeframe. According to the SRP, a total of 50 MHz of radio spectrum in the 2515 – 2540 MHz band and 2635 – 2660 MHz band (the “2.5/2.6 GHz Band”) will be available for assignment.

3. Under sections 32G, 32H and 32I of the Telecommunications Ordinance (Cap. 106) (the “Ordinance”), if the TA is to release radio spectrum for assignment subject to payment of spectrum utilization fee (“SUF”), he shall carry out consultation with the telecommunications industry and parties affected by the exercise. In this regard, this consultation paper solicits views from the industry and interested parties about the arrangements of spectrum assignment in the 2.5/2.6 GHz Band and related licensing matters.

4. For the avoidance of doubt, the views and the proposed approaches expressed in this paper are for the sole purpose of consultation. Nothing in this paper shall be construed as indicating that the TA has formed any final

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<sup>1</sup> The RSPF is published at <http://www.cedb.gov.hk/ctb/eng/legco/pdf/spectrum.pdf>.

<sup>2</sup> The plan will be updated every year on a rolling basis or as required taking into account the latest developments.

<sup>3</sup> The SRP is available at <http://www.ofta.gov.hk/en/freq-spec/plan2012.pdf>.

opinion or decision on the issues set out herein.

## THE EXISTING FREQUENCY ASSIGNMENTS IN THE 2500 – 2690 MHz BAND

5. In January 2009, the TA conducted an auction of radio spectrum for the provision of Broadband Wireless Access (“BWA”) services in Hong Kong (the “2009 Auction”)<sup>4</sup>. The TA made available then inter-alia 105 MHz of radio spectrum in the 2500 – 2690 MHz band for assignment. The spectrum consisted of 90 MHz of paired spectrum (2500 – 2515 MHz paired with 2620 – 2635 MHz; 2540 – 2555 MHz paired with 2660 – 2675 MHz; and 2555 – 2570 MHz paired with 2675 – 2690 MHz) and 15 MHz of unpaired spectrum (2600 – 2615 MHz). The frequency band of 2615 – 2620 MHz was reserved as guard band.

6. As a result of the 2009 Auction, the 90 MHz of paired spectrum were assigned to Genius Brand Limited (“GB”), CSL Limited (“CSL”) and China Mobile Hong Kong Company Limited (“CM”), whilst the 15 MHz of unpaired spectrum were left unassigned. The situation is depicted pictorially in Figure 1 below.

Figure 1: The assigned frequencies in the 2500 – 2690 MHz band



7. The three successful bidders in the 2009 Auction have either launched or planned to launch soon fourth generation mobile services using the long term evolution (“LTE”) technology<sup>5</sup>.

8. In the 2009 Auction, the 2.5/2.6 GHz Band and the unpaired spectrum

<sup>4</sup> The details of the 2009 Auction can be found at <http://www.ofta.gov.hk/en/industry/broadband/main.html>.

<sup>5</sup> CSL has launched its LTE network since November 2010 whilst GB and CM are expected to launch their LTE networks soon.

in the 2570 – 2600 MHz band were put in reserve. While the 2.5/2.6 GHz Band may, subject to this consultation, be made available for assignment, the unpaired spectrum in the 2575 – 2615 MHz band will be kept in reserve for Government use with the frequency bands 2570 – 2575 MHz and 2615 – 2620 MHz reserved as guard bands.

## **ASSIGNMENT OF THE AVAILABLE RADIO SPECTRUM**

### **Method of Assignment**

9. Pursuant to the RSPF, the policy direction is that a market-based approach<sup>6</sup> should be used for spectrum assignment wherever the TA 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. Auction is regarded as the most appropriate market means for the assignment of spectrum resources as it provides a fair, transparent, objective and economically efficient means to determine to whom the spectrum should be assigned.

10. The spectrum in the 2.5/2.6 GHz Band is in the same frequency range as the 90 MHz of radio spectrum assigned in the 2009 Auction, and it can be used to deploy similar technology (notably LTE) for the provision of wireless broadband services. Taking into account the encouraging results of the TA’s recent spectrum auctions of radio spectrum suitable for wireless broadband services and the rapid growth of the mobile data service, **the TA believes that there will be competing demands for the 2.5/2.6 GHz Band and he proposes to assign the concerned radio spectrum by auction.**

***Question (1): Do you agree that an auction should be conducted to determine to whom the 2.5/2.6 GHz Band should be assigned?***

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<sup>6</sup> “Market-based approach” for spectrum management means methods relying on market forces to ensure the efficient use of spectrum as a public resource.

### Eligibility of Bidders

11. A total of 50 MHz of paired spectrum is proposed to be released in this exercise. With this amount of spectrum, it is feasible for a new entrant to acquire enough spectrum for setting up an entirely new territory-wide public mobile network and for existing mobile network operators (“MNOs”) to expand their network capacity to meet the booming market demand for mobile data service<sup>7</sup>. **Following the time-proven pro-competition and pro-market policy, the TA proposes that the available radio spectrum should be open for bidding by all interested parties, including new entrants and existing MNOs.**

*Question (2): Do you agree that the radio spectrum in the 2.5/2.6 GHz Band should be open for bidding by all interested parties, including new entrants and existing MNOs?*

### Qualification Requirements

12. Similar to the previous spectrum auctions, **the TA considers that there should only be minimal qualification requirements for registering bidders’ interest and for demonstrating the financial capability of the bidders.** The TA preliminarily considers to impose the following requirement on a bidder before it is to be qualified, i.e. for it to -

- (a) lodge with the Government a specified amount of deposit which may be forfeited if the bidder violates the auction rules or fails to take up the licence after winning the auction; and
- (b) submit any other relevant supporting information that the TA may deem necessary.

*Question (3): Do you agree that the qualification requirements for participation in the auction should be kept to the minimal, as per paragraph 12 above?*

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<sup>7</sup> The local mobile data service market has continued to flourish. In October 2011, local mobile data usage reached a total of 3,568 terabytes, or an average of 463 megabytes per 2.5G/3G mobile user. This represents 1.2 and 5.8 times the mobile data usage over the same month in 2010 and 2009 respectively.

### **Band Plan**

13. To cater for different amounts of radio spectrum that may be required by new entrants and existing MNOs and having taken into account the potential technology that may be deployed, **the TA proposes to divide the available spectrum into five frequency bands, each with a bandwidth of 5 MHz x 2**, as shown in Figure 2 below -

Figure 2: Frequency bands and bandwidths

<b>Frequency bands</b>	<b>Frequency range ( in MHz)</b>	<b>Bandwidth</b>
A1	2515 – 2520 paired with 2635 – 2640	10 MHz
A2	2520 – 2525 paired with 2640 – 2645	10 MHz
A3	2525 – 2530 paired with 2645 – 2650	10 MHz
A4	2530 – 2535 paired with 2650 – 2655	10 MHz
A5	2535 – 2540 paired with 2655 – 2660	10 MHz

*Question (4): Do you agree that the radio spectrum in the 2.5/2.6 GHz Band should be divided into five frequency bands, each with a bandwidth of 5MHz x 2, as shown in Figure 2 above for assignment?*

### **Spectrum Cap**

14. The mobile market in Hong Kong is one of the most competitive in the world, with keen competition among the operators on price, customer device bundled with the offer, service and innovation. Apart from the BWA services, the four existing third generation (“3G”) MNOs who have acquired the radio spectrum in the 2 GHz band in an auction exercise held in 2001 are providing mobile broadband services in competition with the BWA services. There is also no regulatory barrier for any of the incumbent 2G/3G MNOs to upgrade their networks using the state-of-art technologies for providing high capacity

mobile communications services in competition with the BWA services. Indeed, technical solutions are commercially available today for this purpose.

15. At present, about a total of 470 MHz of the radio spectrum has been assigned for the provision of mobile services by five major MNOs, and over 95% of the radio spectrum is assigned on a technology and service neutral basis<sup>8</sup>. The total spectrum available for auction this time is 50 MHz and this represents about 10% of the existing pool of assigned spectrum for mobile services. Even if all available radio spectrum in this exercise were acquired by one bidder (which may be an incumbent MNO), there should not be significant impact on the competition landscape. In case any potential anti-competitive issues may rise, it can be adequately dealt with by the competition provisions in the Ordinance. **The TA is therefore of the preliminary view that it is not necessary to impose any restriction on the amount of spectrum that a bidder can acquire.** In other words, a bidder (irrespective of whether it is an incumbent MNO or a new entrant) can choose to bid for one or more frequency bands, or all of them.

*Question (5): Do you agree that there should be no spectrum cap imposed upon any bidder in the auction to be conducted for the 2.5/2.6 GHz Band?*

### Technology Neutrality

16. In line with the established technology neutral policy, **the TA will not mandate any specific technology to be adopted for provision of services with the use of the frequency bands A1 to A5.** The only licensing requirement is that the technology to be used should be a recognised open standard and it should not cause any harmful interference to legitimate services operating in the adjacent frequency bands. Bidders that are successful in obtaining this spectrum may opt for the technology which best meets their business plans. This policy will enable bidders to deploy the state-of-the-art technology in a timely and flexible manner.

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<sup>8</sup> The exceptions are the 825 – 832.5 MHz paired with 870 – 877.5 MHz band assigned for CDMA2000 services in November 2008, and the 678 – 686 MHz band assigned for broadcast-type mobile TV services in August 2010.

***Question (6): Do you agree that there should be no technical restriction on the use of the frequency bands A1 to A5, provided that the technical standards to be adopted conform to widely recognized open standards and no harmful interference is caused to legitimate services operating in the adjacent frequency bands?***

**Technical Consideration**

17. As mentioned in paragraph 6 above, the 90 MHz of paired spectrum in the 2500 – 2690 MHz band has been assigned. All parties using spectrum in the 2500 – 2690 MHz band should take effective measures to prevent their radiocommunications facilities from causing interference to other legitimate telecommunications facilities installed in and close to the border of Hong Kong.

18. The 2.5/2.6 GHz bands shall be used on a coordinated basis with the Mainland. The following arrangements for coordinated use of the bands are in force:

- (a) in the Mainland, the band 2535 – 2570 MHz is allocated for multichannel multipoint distribution system, which is deployed for distribution of television programs. Agreement has been reached such that spill-over signals to and from the Mainland shall be less than 35 dB $\mu$ V/m/5MHz in the band 2540 – 2570 MHz along the boundary areas between Hong Kong and the Mainland. Attempt is being made to extend this level of protection to the band 2535 – 2540 MHz;
- (b) the channel plan adopted by the Mainland allows space-to-Earth transmissions from a satellite for broadcasting services in the 2635 – 2660 MHz band. The power flux-density at the Earth's surface produced by the transmission from the satellite shall not exceed the limit given in Section V of Article 21 of the Radio Regulations; and
- (c) there is currently no specific coordination requirement for the

band 2515 – 2535 MHz.

19. For more information about the Mainland’s use of spectrum between 2500 and 2690 MHz band, please refer to the relevant document(s) published by the Mainland authority<sup>9</sup>.

***Question (7): Do you have any view about the interference control measures to be applied to the successful bidders of spectrum in the frequency bands A1 to A5?***

### **Auction Format**

20. As there is more than one band of frequency available for bidding, **the TA is of the preliminary view that the 2.5/2.6 GHz Band should be assigned by way of a single auction using Simultaneous Multi-Round Ascending (“SMRA”) format.** Under this format, all bands will be auctioned simultaneously over multiple rounds with price changing on each frequency band independently. Bidders may bid for one or more bands, or all of them. Bidders may also switch their bids among bands from round to round, and withdraw highest bid submitted in the immediately preceding round subject to a potential withdrawal liability. The SMRA auction format has been adopted by the TA in a number of previous radio spectrum auctions in Hong Kong<sup>10</sup> and this auction format should be well accepted by and familiar to the industry.

***Question (8): Do you have any view on the proposed SMRA auction format?***

### **Auction Timing**

21. Subject to the outcome of this consultation exercise, amendments will be made to the subsidiary legislation under the Ordinance to enable the auction to proceed and SUF to be imposed. The current timetable indicates that the

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<sup>9</sup> 工信部无〔2010〕428号《关于2.6吉赫兹（GHz）频段时分双工方式国际移动通信系统频率规划问题的通知》(<http://wj.miit.gov.cn/n11293472/n11295310/n11297382/13456467.html>)

<sup>10</sup> The TA adopted SMRA format in the auction of radio spectrum in the 2.3 GHz and 2.5/2.6 GHz band in January 2009, 1800 MHz band in June 2009, 850MHz, 900 MHz and 2 GHz bands in February/March 2011.

auction may be conducted in the first quarter of 2013 at the earliest.

*Question (9): Do you have any view on the time frame for conducting the auction?*

## LICENSING ARRANGEMENT

### Licensing and Validity Period

22. Following the implementation of the unified carrier licensing regime from August 2008, the TA issues unified carrier licences (“UCL”) with a term of 15 years for the provision of fixed, mobile and/or converged services. The successful bidders, be they new entrants or incumbents, will be issued with a new UCL. The validity period of the frequency assignment will last for 15 years and be coterminous with the term of the newly issued licence. For an incumbent licensee, if it is a successful bidder in the proposed auction, it may apply to the TA for combining its existing UCL with the new UCL subsequent to the grant of the new licence.

### Network and Service Rollout Obligation

23. In order to prevent spectrum hoarding and to ensure that the auctioned spectrum will be put to use for the timely provision of advanced telecommunications services for the benefit of the general public, network and service rollout obligations are in general imposed on the successful bidders of the radio spectrum in auctions.

24. In this connection, having regard to the roll-out requirements prescribed for the successful bidders of previous auctions, **the TA proposes to require each successful bidder to roll out its network and service in order to provide a minimum coverage of 50% of population as regards its mobile services, or a minimum coverage of 200 commercial and/or residential buildings as to its fixed services within five years from the issue of the licence<sup>11</sup>.**

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<sup>11</sup> The same requirement has been imposed for the 2.5/2.6 GHz band licensed in March 2009.

25. While a new entrant may need to build an entirely new network, an incumbent licensee may deploy the newly acquired spectrum in existing or new base stations for the purpose of expanding the existing network capacity. **The TA is inclined to mandate each successful bidder, be new entrant or incumbent licensee alike, to lodge a performance bond of the same amount for safeguarding its compliance with the same rollout obligation.** In case the successful bidder is an incumbent licensee, it may make use of its existing network (instead of establishing a completely new network) to fulfill the proposed network rollout requirement if it can demonstrate that the newly acquired spectrum has been deployed in the network. The amount of the performance bond will be specified by the TA nearer the time of the auction. Once the roll-out obligation is fulfilled, the performance bond will be discharged.

*Question (10): Do you agree that the licensee assigned with frequency bands A1 to A5 should be subject to the network and service rollout obligation to provide a minimum coverage of 50% of population as regards mobile services, or a minimum coverage of 200 commercial and/or residential buildings as to fixed services within five years from the grant of the licence?*

*Question (11): Do you agree that each successful bidder for frequency bands A1 to A5 shall lodge a performance bond as a guarantee of its compliance with the aforesaid network and service rollout obligation?*

## **SUF**

26. Under the RSPF, SUF will in principle be applicable for all non-Government use of radio spectrum. Therefore, SUF should be paid by the successful bidders making use of the 2.5/2.6 GHz Band for commercial applications.

27. Regarding the payment method of SUF payable for commercial use, the TA notes that an upfront lump sum payment was adopted in CDMA2000

auction, the 2009 Auction, the UHF band auction, and the 850MHz, 900MHz, 2GHz bands auction. This method has the merit of being simple and easy to administer. The TA is inclined to adopt the same payment method for the successful bidders of the frequency bands A1 to A5. While the exact amount of SUF will be determined by auction, each frequency band will be subject to a reserve price which will reflect the economic value of the radio spectrum as a scarce public resource and which will be specified by the Secretary for Commerce and Economic Development nearer the time of the auction.

*Question (12): Do you have any comment on adopting a one-off SUF payment for frequency bands A1 to A5?*

## **INVITATION FOR COMMENTS**

28. Views and comments on the issues raised in this consultation paper are invited and should reach the OFTA on or before **29 February 2012**. Any person who submits views and comments should note that the TA may publish all or any part of the submissions received and disclose the identity of the source in such manner as the TA sees fit. Any part of the submission which is considered commercially confidential should be clearly marked. The TA would take such markings into account in making his decision as to whether or not to disclose such information. Submission should be addressed to:

Office of the Telecommunications Authority  
29/F Wu Chung House  
213 Queen's Road East  
Wanchai  
Hong Kong  
Attention: Principal Regulatory Affairs Manager (ST2)  
Fax: (852) 2834 1501  
E-mail: [consult2500-2600MHz@ofta.gov.hk](mailto:consult2500-2600MHz@ofta.gov.hk)

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

**Office of the Telecommunications Authority**  
**29 December 2011**