

**Frequency Swap between  
China Mobile Hong Kong Company Limited and  
Hong Kong Telecommunications (HKT) Limited  
in the 2600 MHz Band**

**Statement of the Communications Authority**

**19 January 2016**

**INTRODUCTION**

China Mobile Hong Kong Company Limited (“CMHK”) and Hong Kong Telecommunications (HKT) Limited (“HKT”) are currently each assigned 2 x 20 MHz frequency spectrum in the 2600 MHz band. HKT has a single contiguous frequency block of 2 x 20 MHz, while CMHK has two separate frequency blocks of 2 x 15 MHz and 2 x 5 MHz<sup>1</sup> respectively in the same band. On 4 July 2014, CMHK and HKT submitted a joint request for approval by the Communications Authority (“CA”) to swap with each other the following frequency blocks of 2 x 5 MHz each (“Proposed Swap”), after which both of them would have a contiguous frequency block of 2 x 20 MHz in the 2600 MHz band –

- (a) 2550 - 2555 MHz paired with 2670 - 2675 MHz (2 x 5 MHz) currently assigned to HKT (“Block A”); and
- (b) 2530 - 2535 MHz paired with 2650 - 2655 MHz (2 x 5 MHz) currently assigned to CMHK (“Block B”).

2. CMHK and HKT proposed that the Proposed Swap last for the period from the effective date of the Proposed Swap until 30 March 2024, being the expiry date of the assignment of Block A, and after that date, the rights and obligations attached to Block B would revert to CMHK (please refer to the **Annex**).

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<sup>1</sup> In the 2600 MHz band, HKT is now holding a frequency block of 2 x 15 MHz (2540 – 2555 MHz paired with 2660 – 2675 MHz acquired in 2009) and another block of 2 x 5 MHz (2535 – 2540 MHz paired with 2655 – 2660 MHz acquired in 2013). CMHK is holding a frequency block of 2 x 15 MHz (2555 – 2570 MHz paired with 2675 – 2690 MHz acquired in 2009) and another block of 2 x 5 MHz (2530 – 2535 MHz paired with 2650 – 2655 MHz acquired in 2013).

3. As the concerned frequency blocks are of equal bandwidth, the Proposed Swap will not result in any change in the total amount of spectrum assigned to the two mobile network operators (“MNO”). According to the two MNOs, the Proposed Swap would remove the fragmentation of CMHK’s assigned spectrum in the 2600 MHz band and as a result, they would derive technical benefits, including a more flexible use of the spectrum, increased spectral efficiency, improved service quality to customers, and reduced technical complexity for network deployment.

## **THE CA’S CONSIDERATIONS**

### **Assessment Criteria**

4. Under section 32G(1) of the Telecommunications Ordinance (Cap. 106), the CA has the statutory duty to “*promote the efficient allocation and use of the radio spectrum as a public resource of Hong Kong*”. In exercising its statutory powers of spectrum management, the CA also gives due regard to the spectrum policy objectives set out in the Radio Spectrum Policy Framework<sup>2</sup> promulgated by the Government in April 2007, particularly “*to achieve technically efficient use of spectrum to facilitate the introduction of advanced and innovative communications services in Hong Kong*”. General Condition 2.1 of the Unified Carrier Licences (“UCLs”) held by the MNOs provides that “[t]he licensee may, only with the prior written consent of the Authority, and subject to such reasonable conditions as the Authority thinks fit, transfer this licence or any permission, right or benefit under the licence”.

5. When evaluating the Proposed Swap, the CA has considered the following factors –

- (a) Whether the proposed frequency swap involves any monetary exchange between the parties;
- (b) Whether there is any technical benefit as a result of the proposed frequency swap (e.g. reduction of radio interference, improvement

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

in spectral efficiency, or the introduction of new or innovative services);

- (c) Whether the proposed frequency swap will affect the licence obligations and commitments applicable to the holder of the concerned spectrum, including the expiry date of the frequency assignments, payment of spectrum utilization fee (“SUF”) and licence fees, and rollout commitment;
- (d) Whether the proposed frequency swap will result in the transfer of licence obligations and conditions applicable to the concerned spectrum between the parties;
- (e) Whether there will be significant impact on customers during the swap (e.g. interruption to services provided by the parties to customers, or to services provided by other MNOs to customers); and
- (f) Whether the parties have given their consent to the swap.

### **Assessment of the Proposed Swap**

#### No Monetary Exchange

6. CMHK and HKT confirmed that there neither has been, nor would there be any monetary exchange between them in effecting the Proposed Swap. The parties added that, subject to the approval of the Proposed Swap by the CA, CMHK would reimburse HKT for the actual expenditure incurred by HKT with respect to the necessary network implementation work that HKT needs to undertake in order to give effect to the Proposed Swap. The expenditure is deemed necessary as HKT has already fulfilled the rollout obligation associated with its frequency block, to effect the Proposed Swap would require HKT to modify its established base stations and hence additional costs would be incurred for making changes to the network. The CA notes that without the Proposed Swap, there is no need for HKT to undergo the relevant site equipment modification work and to incur any expenditure arising there from. The CA therefore considers it reasonable for CMHK to provide reimbursement to HKT based on the actual expenditure incurred by HKT for its network implementation work which arises from, and is attributable to the Proposed Swap directly. The CA accepts that there is a justifiable reason for the

reimbursement to be effected, and that it should not be regarded as a form of monetary exchange between CMHK and HKT.

### Technical Benefits

#### *Flexibility in the Use of the Assigned Spectrum by CMHK*

7. The frequency spectrum in the 2600 MHz band is primarily deployed by MNOs for providing 4G Long Term Evolution (“LTE”) services. LTE carriers can have a bandwidth of 1.4, 3, 5, 10, 15 or 20 MHz. Using its existing frequency assignments, CMHK has deployed one “5 MHz carrier” and one “15 MHz carrier” in the 2600 MHz band for such purpose. For CMHK to balance the traffic loading on these carriers, it will have to build in additional intelligence in its network to enable load-balancing and handover between the two carriers. If the Proposed Swap were approved by the CA, with a single carrier of 20 MHz in the 2600 MHz band, it would obviate the need for CMHK to have to undertake load-balancing and handover between the two carriers. **With the Proposed Swap, CMHK will benefit from having a greater flexibility in the use of spectrum and achieving better user throughput.** Based on the supporting information submitted by CMHK and HKT, the CA agrees that such benefits would be realised after effecting the Proposed Swap.

#### *Gain in Spectral Efficiency for CMHK*

8. CMHK submitted that it expected that there would be a gain in spectral efficiency comparing a “20 MHz carrier” to a “5 MHz carrier” based on the typical throughput of the existing mobile networks.

9. While the CA agrees that it is likely that an efficiency gain would result from the Proposed Swap, it considers that CMHK in its submissions may have over-estimated the available efficiency gain, as it only directly compares the spectral efficiency of a “20 MHz carrier” with that of a “5 MHz carrier”. In CA’s view, it would be more reasonable to compare the spectral efficiency of a “20 MHz carrier” against the weighted spectral efficiency achieved by one “15 MHz carrier” and one “5 MHz carrier”. By applying this weighted approach, the CA estimates that **the Proposed Swap would lead to slightly improved spectral efficiency which in turn would lead to increased network capacity and user throughput for CMHK.**

### *Improved Service Quality for CMHK*

10. CMHK and HKT submitted that the Proposed Swap would result in improved service quality for CMHK as a “20 MHz carrier” could achieve faster maximum download/upload speeds, less congestion and a lower occurrence of dropped or interrupted sessions for CMHK.

11. The CA agrees that a contiguous “20 MHz carrier” could achieve such results. **It will provide consumers with a choice of another competitive 4G network operator offering a high speed data service.**

### *Improved Integrated Radio System Design*

12. CMHK and HKT submitted that the Proposed Swap would remove one level of signal combining at the Point of Interconnection (“POI”) at the shared Integrated Radio System (“IRS”) and its ancillary network. If the Proposed Swap takes effect, CMHK would no longer need to use an additional stage of signal combiners that would otherwise be required to combine the two carriers from its non-contiguous spectrum before feeding into the POI, thus reducing about 1dB signal degradation for all the signals carried by the IRS and leading to better uplink and downlink performance. This would benefit the industry in a number of ways, namely less complexity of IRS design leading to reduced shared project cost of IRS for all participating MNOs, reduction in the time and effort of MNOs in discussing shared project costs, and acceleration of deployment of 2600 MHz IRS for indoor/underground coverage.

13. The CA observes that such a technical benefit is more of a qualitative assessment than a quantitative one. The claimed cost savings are marginal and the reduced operational complexity and deployment time have not been quantified by the parties. **In this regard, the CA does not attach much weight to this supposed technical benefit of the Proposed Swap.**

### *Summary*

14. To conclude, CMHK and HKT have identified in their application, and substantiated with relevant technical details, a number of technical benefits arising from the Proposed Swap. Not all of the claimed benefits are accepted as valid ones after the CA’s assessment. **The CA accepts that the Proposed Swap is likely to provide CMHK with such tangible technical benefits in terms of a more flexible use of spectrum, increased spectral efficiency and improved service quality to customers.** The CA agrees that the Proposed

Swap would, to a certain extent, bring about genuine benefits to CMHK and its customers because CMHK can make use of a contiguous 2 x 20 MHz of spectrum for service provision, **thereby providing consumers with an additional choice of a competitive 4G network operator offering high speed data service.** The CA also considers that the Proposed Swap will in general **contribute to a more efficient use of the radio spectrum.**

### Licence Obligations and Commitments

15. The licence obligations and commitments of the two MNOs that will specifically be affected as a result of the Proposed Swap include network rollout requirements, the provision of performance bond, and compliance with auction rules. The SUF payable for the concerned frequency blocks has been fully settled by the parties through upfront lump sum payments.

### *Network Rollout Requirements*

16. The network rollout requirements associated with the concerned frequency blocks<sup>3</sup> will continue to apply to the two MNOs after the Proposed Swap. Although HKT has already provided network and service coverage for Block A in accordance with the network rollout requirement by the rollout fulfillment date (i.e. 31 March 2014), there is still a need for the spectrum assignee to ensure the continued provision of network and service using Block A. CMHK, as the new spectrum assignee for Block A after the Proposed Swap, shall therefore be required to continue to meet this requirement in respect of Block A starting from the effective date of the Proposed Swap. At the same time, the CA will require 31 May 2018 to remain as the rollout fulfillment date for Block B and the requirement is imposed on HKT, as the new spectrum assignee for the period from the effective date of the Proposed Swap until 30 March 2024. As Block B will be assigned back to CMHK after 30 March 2024, CMHK will be required to maintain its network so that it will continue to fulfil its network rollout obligations in respect of Block B for the period from 30 March 2024 when it will be assigned back to CMHK until 31 May 2028.

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<sup>3</sup> Under the UCL held by HKT, the network rollout requirement associated with Block A is that coverage of the network and service shall be provided on or before 31 March 2014 and maintained thereafter, to an area where at least 50% of the population of Hong Kong live from time to time. Under the UCL held by CMHK, the network rollout requirement associated with Block B is that coverage of the network and service shall be provided on or before 31 May 2018 and maintained thereafter, to an area where at least 50% of the population of Hong Kong live from time to time.

### *Provision of Performance Bond*

17. In order to guarantee compliance with the network rollout requirement for Block B after the Proposed Swap, HKT will be required to lodge a new performance bond in respect of Block B and the bonded sum will be calculated based on the same rate of \$25 million per 5 MHz adopted for the assignment of the spectrum in the 2600 MHz band.

### *Compliance with Auction Rules*

18. It is noted that both MNOs have the licence obligation to comply with the respective rules promulgated for the auctions at which the concerned frequency blocks were assigned. Accordingly the CA may cancel, withdraw or suspend the assignment of the relevant frequency blocks if the licensee is found to have breached the relevant auction rules. For the avoidance of doubt, after the Proposed Swap is effected, the frequency blocks relevant to CMHK's obligation to comply with the auction rules (according to the terms and conditions of the Notice dated 21 December 2012<sup>4</sup> issued by the CA) will be Block A for the period from the effective date of the Proposed Swap until 30 March 2024, and Block B for the period from when it will be handed back to CMHK after 30 March 2024 until 31 May 2028. Similarly, the frequency blocks relevant to HKT's obligation to comply with the auction rules (according to the terms and conditions of the Notice dated 3 October 2008<sup>5</sup> issued by the CA) will include Block B from the effective date of the Proposed Swap until 30 March 2024.

### Impact on Customers

19. CMHK and HKT assured the CA that the Proposed Swap would unlikely cause any observable disruptions to their existing services as they would take all reasonable and necessary measures to minimize service impact on customers. The migration would be carried out during the network maintenance windows (i.e. at midnight) when there is low network traffic to

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<sup>4</sup> The Notice dated 21 December 2012 is that issued by the CA in exercise of its powers conferred by section 32I of the Telecommunications Ordinance and the Telecommunications (Determining Spectrum Utilization Fees by Auction) Regulation (Cap. 106AC) and all other powers enabling it to specify the terms and conditions of the auction and the payment of Spectrum Utilization Fees.

<sup>5</sup> The Notice dated 3 October 2008 is that issued by the then-Telecommunications Authority in exercise of his powers conferred by section 32I of the Telecommunications Ordinance and the Telecommunications (Determining Spectrum Utilization Fees by Auction) Regulation (Cap. 106AC) and all other powers enabling him to specify the terms and conditions of the auction and the payment of Spectrum Utilization Fees.

minimize the disturbance to customers and it would be completed in ten days followed by a monitoring period of 14 days. For most outdoor sites and small scale indoor sites, the migration would only involve frequency carrier re-tuning and the period of interruption of the affected cells would be around 30 seconds per cell causing service impact within five minutes. For sites using POI, swapping of the signal feeds for the POI would normally be completed within two hours. In addition, both CMHK and HKT would use 4G networks in the 1800 MHz band and also 3G networks in the 2.1 GHz band as the fallback alternative to their 4G services in case of any disruption. Both parties would monitor the network traffic and performance statistics so as to spot any abnormality and carry out necessary remedial action in a timely manner.

20. There is no need for customers to make any change to their handsets or terminal equipment and there will be no impact on the customers of both MNOs. The Proposed Swap will not have any additional impact on the existing adjacent frequency blocks of other MNOs, and there should not be any harmful interference caused to other MNO. In case any suspected interference problem with other MNOs arises, it can be dealt with according to the established industry practice and procedures.

21. The CA considers that the above arrangement proposed by the two MNOs should not cause any service disruption or degradation to the customer service during the changeover. As an additional level of safeguard against any potential service disruptions resulting from the Proposed Swap, CMHK and HKT should be required, as a condition specified by the CA, to provide a comprehensive migration plan (including contingency measures) on a date to be specified by the Office of the Communications Authority (“OFCA”) prior to the actual frequency swap.

#### Consent of the Parties

22. This request is jointly submitted by CMHK and HKT. The CA notes that the parties have provided written consent to the Proposed Swap.

#### Other Considerations

##### *Safeguards for Hidden Monetary Exchange*

23. Given that the anticipated technical benefits available to the parties are found to be more favourable to CMHK (as discussed in paragraphs 7 – 14) above, the CA considers that there is a reasonable basis for being concerned as



to whether any hidden form of benefits may be exchanged between the two parties should the Proposed Swap be approved. To put the matter beyond doubt, an additional requirement is imposed on both parties. As a condition for the approval of the Proposed Swap, CMHK and HKT will be required to jointly submit to the CA a letter, in the form specified by the CA, by which they confirm and undertake that there is no and shall not be any monetary exchange between them for the Proposed Swap, and that all reimbursements made by CMHK to HKT are confined to settlement of all expenses wholly, necessarily, reasonably and exclusively incurred by HKT covering only the direct labour costs for network-wide implementation and optimization, on-site work required for about 100 cell sites, and the invoiced amounts due to equipment upgrades and relevant works to be charged by third parties in effecting the Proposed Swap. The two MNOs will be required to produce copies of all the invoices, books, records or any other relevant documents concerning the actual accountable expenses in connection with the Proposed Swap (as mentioned in paragraph 6 above), and the relevant audit reports as and when necessary, to the CA upon request for inspection and verification. The CA will have the power to cancel, withdraw or suspend the assignments of the swapped frequency blocks if it is discovered after its approval, if granted, that the Proposed Swap involves any monetary exchange between the parties. Such a requirement will also be specified in a new special condition to be added to the respective UCL held by the two MNOs.

## **THE CA'S DECISION**

24. Based on the above assessment, the CA is of the view that the Proposed Swap will result in more efficient use of the radio spectrum and therefore should be encouraged. Consumers will also benefit from improved service quality, a choice of another competitive 4G network operator, and the industry will marginally benefit from reduced technical complexity in IRS implementation. The CA therefore decides to approve the Proposed Swap, subject to the following conditions –

- (a) CMHK and HKT shall jointly submit to the CA a letter of undertaking and confirmation, in the form specified by the CA, to confirm and undertake that there is no and shall not be any monetary exchange between them for the Proposed Swap;
- (b) CMHK and HKT shall accept the imposition of a new special condition prohibiting monetary exchange for the Proposed Swap

and all the proposed consequential amendments to be made to the UCLs (including the relevant special conditions and schedules) held respectively by the two MNOs to give effect to the Proposed Swap;

- (c) HKT shall procure and lodge a new performance bond to guarantee fulfillment of the network rollout requirements in respect of Block B by 31 May 2018 as required in HKT's amended UCL to give effect to the Proposed Swap; and
- (d) CMHK and HKT shall comply with the condition imposed by the CA to provide OFCA with a migration plan (including contingency measures) and all the technical details in relation to the Proposed Swap.

25. The CA will amend the UCLs held by the two MNOs respectively to give effect to the Proposed Swap.

26. For the avoidance of doubt, nothing in the CA's approval of the Proposed Swap will fetter the Government's discretion in formulating its policy on spectrum trading in the future. Nothing in the CA's approval of the Proposed Swap will fetter the CA's discretion in handling similar requests from MNOs for frequency swap in the future. Each future request for frequency swap from MNOs will be considered by the CA based on the merits of each case.

**Communications Authority**  
**19 January 2016**

### Frequency Blocks Involved in the Proposed Swap

