

**ASSIGNMENT OF
THE AVAILABLE RADIO SPECTRUM IN
THE 900 MHz AND 1800 MHz BANDS**

Consultation Paper

INTRODUCTION

To increase the transparency of spectrum supply, the Telecommunications Authority (“TA”) published on 26 April 2007 a Spectrum Release Plan (“SRP”) to inform the industry of the potential supply of spectrum which might be made available to the market in the following three years through an open bidding or tendering process. The SRP will be updated annually on a rolling basis taking into account the latest technology and market developments. The SRP¹ for 2007/08 – 2009/10 can be downloaded from OFTA’s website.

2. In the SRP, it is indicated that frequencies in the 885 - 890/930 – 935 MHz band (“900 MHz band”) and 1780.1 – 1785/1875.1 – 1880 MHz band (“1800 MHz band”) are available for assignment. According to the SRP, these frequencies may be allocated for the provision of public mobile service. The statutory consultation as required under sections 32G(2) and 32H(2) of the Telecommunications Ordinance (Cap. 106) to release the bands is planned to be held in 2008/2009.

3. Since the publication of the SRP, the TA has received a request from an existing mobile network operator (“MNO”) urging for the release the spectrum in the 900 MHz and 1800 MHz bands as soon as possible. The Director of Highways also indicated that there is a need to use part of the 900 MHz band to support the operation of the Express Rail Link (“XRL”), which is a new railway system connecting Hong Kong and the Guangdong Province targeted for completion in 2014/15.

4. In this consultation paper, the TA would like to solicit views from the industry and interested parties on the demand for the 900 MHz and 1800 MHz bands and how the demand may be met.

¹ The document is available at <http://www.ofta.gov.hk/en/freq-spec/plan2007.pdf>

5. For avoidance of doubt, the preliminary views and the proposed approaches expressed in this paper in relation to various issues on the subject matter are solely for the purpose of consultation and do not represent the decision of the TA on the issues. These issues remain to be the subject of consideration by the TA. Nothing in this paper shall be construed as indicating that the TA has formed any final opinion or decision on these issues.

AVAILABLE SPECTRUM IN THE 900 MHz and THE 1800 MHz BANDS

Available frequencies subject to shared use with MNOs in country parks

6. To encourage MNOs to improve mobile coverage in the country parks and remote areas², the Government took pro-active measures in 2006 to provide additional spectrum and to allow MNOs to use hill-top sites at a nominal rental of HK\$1 per year. The TA assigns radio spectrum in the 900 MHz and the 1800 MHz bands to the existing MNOs for this purpose. The assigned spectrum is restricted to serving the country parks and remote areas and each project is to be approved on a case-by-case basis. The use of the frequencies is not subject to Spectrum Utilization Fee (“SUF”).

7. To date, a total of 18 base stations have been installed by the MNOs to serve the country parks and remote areas. Relevant spectrum in the 900 MHz and 1800 MHz bands has also been assigned to the MNOs to serve the country parks and remote areas. A list of these base stations together with the details of the assigned frequencies is given in Appendix I. In 2006 and 2007 alone, five base stations were set up at Shek Uk Shan (Sai Kung East Country Park), Robin’s Nest, Cloudy Hill (Pat Sin Leng Country Park), Long Ke (Sai Kung East Country Park) and Nga Ying Shan (Lantau South Country Park). Three new base stations are being constructed. It is anticipated that more base stations will be installed by the mobile operators to serve the country parks and remote areas in the coming years. The TA will give priority to and

² The country park areas and boundaries are defined in the Country Parks Ordinance, Cap208. The relevant areas are shown in Lands Department’s website: http://www.landsd.gov.hk/mapping/en/download/download/map/small_hm200le.pdf. For remote areas, they are generally far away from developed areas with few inhabitants whom are not “economical” or commercially viable to serve.

continue to assign spectrum to base stations providing radio coverage to these areas.

8. The frequencies which the TA has assigned to MNOs for coverage in the country parks and remote areas are:

885.1 – 889.9 MHz paired with 930.1 – 934.9 MHz; and
1780.9 – 1784.9 MHz paired with 1875.9 – 1879.9 MHz

Since the assignments are restricted to serving the country parks and remote areas, further assignment of the same frequency spectrum to the same or another operator to provide service outside the country parks and remote areas is possible but coordination among the users for using the same spectrum will be required.

Frequencies reserved for Hong Kong Express Rail Link

9. There is a plan to construct the XRL³ to provide high speed railway services between Guangzhou, Shenzhen and Hong Kong. It is likely that the construction will commence in 2009 and the project should be completed by 2014/15. In the proposed XRL project design, it is planned to use a railway telecommunications system based on the GSM-R standard. GSM-R is a wireless communication standard for railway network based on the GSM standard. The mainland of China has adopted the GSM-R standard and allocated 4 MHz x 2 (885-889 MHz paired with 930-934 MHz) for its railway telecommunication system. Adopting the same standard in both the mainland and Hong Kong sections of the XRL will ensure compatibility and seamless radiocommunications along the entire route. The issue has been considered and the TA is of the view that the frequencies of 4 MHz x 2 in the 900 MHz band (885 – 889 MHz paired with 930 – 934 MHz) should be made available for XRL operations inside Hong Kong. **Due to the importance of the GSM-R communication system to the XRL and because the design of the XRL has yet to be finalized, the TA intends to assign the required spectrum to the future XRL operator through an administrative process and proposes that this 4 MHz x 2 spectrum will not be made available and assigned to other users except for use by MNOs for provision of radio coverage for country parks and remote areas.**

³ The tentative plan of the XRL route is at <http://www.hyd.gov.hk/eng/major/road/rail/erl/index.htm>

10. As stated in the Radio Spectrum Policy Framework⁴ (“RSPF”), SUF is applicable to all non-government use of spectrum. The XRL operator will have to pay SUF. The exact amount of the SUF payable by the future XRL operator would be subject to further study and assessment made nearer the time of the assignment.

Other available frequencies

11. Within the 900 MHz and the 1800 MHz bands, the spectrum at 1780.1 – 1780.9 MHz paired with 1875.1 – 1875.9 MHz (0.8 MHz x 2) have not been assigned to or reserved for any operators. These frequencies are available for assignment.

PROPOSED USE OF THE 900 MHz AND THE 1800 MHz BANDS

12. Under the SRP, radio spectrum in the 900 MHz and 1800 MHz bands is to be allocated for public mobile service. Hong Kong’s mobile service has demonstrated continuous growth. By allocating the additional spectrum to public mobile service, additional capacity may be made available to satisfy increasing demand for both existing and innovative services. The issue that has to be addressed is whether or not the available spectrum is to be assigned to (a) new entrants only; (b) existing MNOs only; or (c) both existing MNOs and new entrants.

13. There is altogether only 9.9 MHz x 2 of spectrum available in the two frequency bands. Most of the available spectrum has already been assigned and used for providing mobile coverage in country parks and remote areas, and 4 MHz x 2 of spectrum in the 900 MHz band has to be reserved for the XRL. As such, the available spectrum is not sufficient for a new entrant to build a network that can compete with the incumbent MNOs in terms of system capacity, coverage or quality of service. Taking this factor into account and considering that incumbent MNOs have indicated a need for additional spectrum for service expansion, the TA does not propose to assign the relevant spectrum to a new entrant. Rather, **the TA proposes to assign the**

⁴ The document is available at <http://www.cedb.gov.hk/ctb/eng/legco/pdf/spectrum.pdf>

concerned spectrum only to existing 2G mobile carrier licensees⁵. The scope of service to be provided under the concerned spectrum will be the same as that stated in their existing mobile carrier licences.

14. Given the importance of mobile coverage in country parks and remote areas, the TA will give priority to and continue to assign the relevant spectrum in the 900 MHz and 1800 MHz band for use by base stations serving these areas. Assignment of the same spectrum to operators to provide service outside the country parks/remote areas should be subject to the condition that the use shall not interfere with the operation of the base stations serving the country parks/remote areas. To avoid unnecessary dispute over the use of the concerned spectrum, while successful bidders for the concerned spectrum will be free to deploy the assigned spectrum in the Golden Bowl area and some other major urban/densely populated areas (e.g. Tsuen Wan, Kwai Chung and Tsing Yi), the TA proposes that they will be required to obtain prior approval of OFTA for deployment of the concerned frequencies outside these areas and approval will be granted on a case-by-case basis. MNOs need to take this into account when they consider bidding for the spectrum.

15. At present, each incumbent MNO is granted a 2G mobile carrier licence that has a common expiry date on 29 September 2021. **For administrative convenience, the TA proposes that the period for the frequency assignment of this exercise should be coterminous with the remaining period of validity of these licences i.e. until the expiry date of these licences on 29 September 2021.**

Question (1): Do you agree that the available spectrum in the 900 MHz and 1800 MHz band be made available to the incumbent 2G MNOs only?

Question (2): Do you agree that the frequency assignment should be valid until 29 September 2021?

PROPOSED METHOD OF ASSIGNMENT

16. According to the RSPF, the policy inclination is that a market-based

⁵ The existing GSM/PCS mobile carrier licensees are China Mobile Peoples Telephone Co. Ltd., the consortium of Hong Kong CSL Ltd. and New World PCS Ltd., Hutchison Telephone Co. Ltd., PCCW Mobile HK Limited and SmarTone Mobile Communications Ltd.

approach⁶ will be used for spectrum assignment wherever the TA considers that there are likely to be competing demand from providers of non-Government services, unless there are overriding public policy reasons to do otherwise. In other words, radio spectrum will be assigned through auction or other market mechanism and SUF will be applicable to all non-Government use of radio spectrum.

17. As far as the 900 MHz and 1800 MHz bands are concerned, competing demand from providers of non-Government services are anticipated. Consistent with the RSPF, **the TA proposes to assign the spectrum in the 900 MHz and 1800 MHz bands by auction.**

Question (3): Do you agree that auction be used to determine to whom the concerned spectrum should be assigned?

PROPOSED BAND PLAN

18. If the proposal to assign the frequencies to incumbent MNOs for service expansion is adopted, it is considered that the spectrum assignment should follow the standard GSM 200 kHz channel plan and that the following spectrum is to be made available for auction:

- (a) 889.1-889.9 MHz / 934.1-934.9 MHz (Bandwidth = 0.8 MHz x 2); and
- (b) 1780.1-1784.9 MHz / 1875.1-1879.9 MHz (Bandwidth = 4.8 MHz x 2)

19. Currently, the available spectrum in the 900 MHz and 1800 MHz bands have been divided into five and six blocks respectively for frequency assignment in the country parks. The frequency blocks in the 900 MHz and 1800 MHz bands are shown in Figures 1 and 2 respectively. **It is proposed to divide the available spectrum in the 900 MHz and 1800 MHz bands in the same manner such that there will be one (1) frequency block in the 900 MHz band (designated as E1 having 0.8 MHz) and six (6) frequency blocks in the 1800 MHz band (designated as P1 – P6 having 0.8 MHz**

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

each) that will be made available for bidding in the auction.

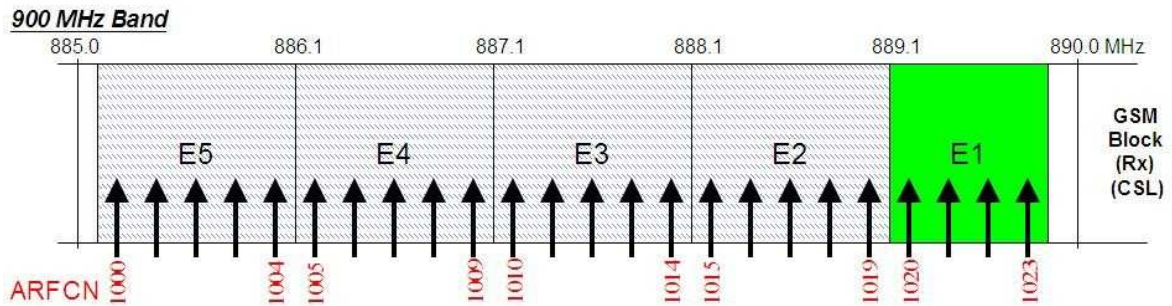


Figure 1 shows the 900 MHz band



- Only the Uplink Frequencies are shown here for clarity purpose.

Figure 2 shows the 1800 MHz band

Question (4): Do you agree that the radio spectrum in the 900 MHz bands (889.1 – 889.9 MHz paired with 934.1 – 934.9 MHz) and the 1800 MHz bands (1780.1 – 1784.9 MHz paired with 1875.1 – 1879.9 MHz) be divided into one (1) and six (6) blocks respectively as shown in Figures 1 and 2 above for assignment?

SPECTRUM UTILIZATION FEE

SUF – Annual Variable Component

20. According to the RSPF, SUF will be applicable to all non-Government use of spectrum. When the 2G licensees received their replacement licences in 2006, it was determined that the SUF payable per annum by 2G licensees

for the first 5-year period was to be calculated on the basis of HK\$145 per kilohertz (kHz) of spectrum assigned. For the sixth year and thereafter, the annual SUF is \$1,450 per kHz of radio spectrum assigned, or 5% of the Network Turnover⁷, whichever is greater.

21. There is merit to base the SUF payable by the successful bidder on the SUF formula stated in paragraph 20 above. This is because the spectrum to be released in this exercise will be incorporated in the 2G licences held by the incumbent MNOs and integrated with the existing spectrum for system expansion. Such an arrangement will be easier to administer because it would otherwise be very difficult to segregate the Network Turnover due to the existing spectrum and the Network Turnover due to the newly assigned spectrum. The TA therefore proposes that the SUF payable by the successful bidder(s) shall consist of a variable component based on the SUF calculation formula for the 2G spectrum i.e. HK\$145 per kHz for each year from the date of assignment to 29 September 2011 (pro rata as respects the first incomplete year from the date of assignment to 29 September 2009); and HK\$1,450 per kHz or 5% of the Network Turnover (whichever is higher) for each year from 30 September 2011 to 29 September 2021.

22. As the SUF calculation method given in paragraph 20 was determined in 2004, there may be doubts that it may be outdated and should therefore be re-visited and adjusted to reflect the latest market situation. The TA has compared the proposed SUF in paragraph 20 with the SUF in the recent auction exercise for the CDMA2000 spectrum. It was found that the discounted SUF payable as proposed in paragraph 20 is commensurate with that of the SUF for CDMA2000 spectrum in terms of dollars per kHz of radio spectrum. The TA therefore considers that the proposed SUF reflects the updated market situation.

SUF – One-Off Lump Sum Component

23. As mentioned in paragraph 17, the TA proposes to assign the frequencies by auction. For the purpose of the auction, the TA proposes to assign the frequencies to the successful bidder(s) who has/have offered the highest additional one-off lump sum SUF on top of the annual variable SUF

⁷ For the purpose of the SUF calculation, Network Turnover is defined as the revenue arising from or attributable to the provision of any telecommunications services over any telecommunications network using the frequency bands to which the SUF relates.

described in paragraph 20 above. Such additional component of the SUF will also be used to determine the respective priority rights of the successful bidders in choosing preferred set(s) of frequency bands. The bid will have to be equal to or greater than the reserve price set by the Secretary for Commerce and Economic Development (“SCED”) for each frequency block. The reserve prices for all frequency blocks will be set at the same amount and it will be determined and announced nearer to the time of auction.

24. Following the approaches outlined above, the TA proposes that a two-tier SUF payment arrangement be adopted. **The SUF will consist of two components: (a) an annual variable component based on the SUF calculation formula for the 2G spectrum under the existing 2G licences as described in paragraph 21 above and (b) a one-off lump sum component based on a sum committed by the successful bidder(s) in the forthcoming auction as described in paragraph 23.**

25. As stated in paragraph 6 above, the existing use of radio spectrum in the 900 MHz band and 1800 MHz band in country parks and remote areas is not subject to SUF. Such areas are typically uneconomical to serve. Under the RSPF, where a frequency band is assigned to a spectrum assignee wholly or significantly to support public interest purposes agreed by or at the request of the Government, SUF may be adjusted to reflect the nature of such use. In this particular case, there is sufficient public interest for the Government to continue encouraging the provision of adequate service coverage to country parks and remote areas. To provide the necessary incentive to MNOs to provide services to country parks and remote areas and in line with the RSPF, it remains the Government’s policy that the use of the relevant spectrum in country parks and remote areas should not be subject to SUF.

Question (5): Do you have any comments on the proposed SUF calculation methods as stated above?

THE AUCTION

A single round sealed bid auction

26. Due to the nature of the bidding as described from previous

paragraphs, it would not be justified to deploy a complicated auctioning arrangement. **The TA proposes that a simple bidding mechanism in the form of a single round sealed bid auction be adopted in this exercise.**

27. A single round sealed bid auction is simple, quick and less costly to administer and participate. There is no need to provide a special auction venue and to set up complex procedures for the submission and processing of bids. The duration of the auction is predictable and short. A single round sealed bid auction is therefore considered appropriate for this exercise.

28. Considering that competition of the mobile service market will not be significantly lessened even if one of the operators acquires all the available spectrum offered for auction in this exercise, **the TA proposes not to impose any restriction or cap on the amount of spectrum that a bidder can acquire during the auction.**

29. **The TA intends to make available the seven (7) frequency blocks as mentioned in paragraph 19 in a sealed bid auction.** Each bidder may apply for 1 to 7 frequency blocks. If a bidder applies for 1 frequency block, it should submit 1 bid; if it applies for 2 frequency blocks, it should submit 2 bids; and so on and so forth. When submitting a bid, the bidder is not required to indicate its preference to a specific frequency block. In other words, the bid is not specific to a particular frequency block. The amount of a bid submitted by a bidder must be equal to or higher than the unified reserve price for all frequency blocks available for auction.

30. All bids received by the TA will be compared together. The bidding prices are used for determining the right of priority of the bidders to choose their preferred frequency blocks. The priority rights of the bidders to select the frequency blocks shall be assigned in descending order, starting with the bidder who offers the highest bid. Only one frequency block can be selected each time and the SUF payable for the selected frequency block will be the bidding price offered by the bidder. The bidder who has submitted the highest bid will be the first permitted to select one block. The bidder with the next highest bid will be the second permitted to select a frequency block from the remaining frequency blocks. The process shall continue so on and so forth until all frequency blocks are assigned or until there is no bidder to select the spectrum, as the case may be.

31. For example, if a bidder intends to take five (5) frequency blocks, it should submit five (5) bids. The amount of each bid may be identical or different at the bidder's choice. Depending on the priority ranking of its bids in comparison with all the bids submitted by the other bidders, it may be entitled to have five chances of selecting the frequency blocks it wants according to the bid price it places. A bidder is only allowed to withdraw its bid subject to the auction rules (e.g. penalty). Detailed rules, such as conditions of withdrawal and the mechanism to resolve tied bids, will be specified in the terms and conditions of the auction.

Question (6): Do you agree that a single round sealed bid auction as described above be adopted in the auctioning of the frequency blocks?

Question (7): Do you agree that there will not be any restriction or cap on the amount of spectrum that a bidder can acquire during the auction?

INVITATION FOR COMMENTS

32. Views and comments on this consultation paper should reach OFTA **on or before 15 February 2008**. 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: Telecommunications Engineer (R22)1
Fax: 2834 1501
E-mail: consult900-1800@ofta.gov.hk

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

Office of the Telecommunications Authority
18 January 2008

Base station sites for improving country parks and remote areas coverage
(as of 31 Dec 2007)

1. The following base station sites are using frequencies within the 889.1 – 889.9 MHz / 934.1 – 934.9 MHz and 1780.1– 1784.9 MHz / 1875.1 – 1879.9 MHz bands

	Site	Frequency	Coverage Area
1	Shek Uk Shan	889.3–889.9 MHz paired with 934.3- 934.9 MHz 1784.3-1784.9 MHz paired with 1879.3-1879.9 MHz	Sai Kung West Country Park, Cheung Sheung, Pak Sha O, Lai Chu Chong, Hoi Ha Wan Marine Park
2	Robin's Nest	889.1–889.3 MHz paired with 934.1- 934.3 MHz 1784.1-1784.5 MHz paired with 1879.1-1879.5 MHz	Pat Sin Leng Country Park, Luk Keng
3	Long Ke	889.3–889.5 MHz paired with 934.3- 934.5 MHz 1781.7-1781.9 MHz paired with 1876.7-1876.9 MHz 1782.3-1782.5 MHz paired with 1877.3-1877.5 MHz 1783.3-1783.5 MHz paired with 1878.3-1878.5 MHz 1783.9-1784.1 MHz paired with 1878.9-1879.1 MHz	Long Ke Wan, MacLehose Trail 2
4	Nga Ying Shan	1781.7-1781.9 MHz paired with 1876.7-1876.9 MHz 1782.3-1782.5 MHz paired with 1877.3-1877.5 MHz	Lantau South Country Park, Lantau Trail 7

2. The following base station sites are using GSM/PCS frequencies outside the 889.1 – 889.9 MHz / 934.1 – 934.9 MHz and 1780.1– 1784.9 MHz / 1875.1 – 1879.9 MHz bands

	Site	Coverage Area
5	Cloudy Hill	Pat Sin Leng Country Park, Sha Lo Tung, Wilson Trail 8
6	Kowloon Hill	Kowloon Reservoir, Lion Rock Country Park, MacLehose Trail 6
7	Ma On Shan	Ma On Shan Country Park, MacLehose Trail 4

8	Shing Mun	Shing Mun Country Park, Shing Mun Reservoir, MacLehose Trail 7
9	Kei Ling Ha	Ma On Shan Country Park, Shap Sze Heung, Kei Ling Ha
10	Bride's Pool Rd	Bride's Pool Nature Trail
11	Golden Hill	Kam Shan Country Park, MacLehose Trail 6
12	Yuen Ng Fan	Sai Kung East Country Park, High Island Reservoir, MacLehose Trail 1
13	Woodside	Wilson Trail 2
14	Tsuen Kam Au	Twisk Nature Trail, MacLehose Trail 8
15	Lai Chi Wo	Lai Chi Wo, Kat O Hoi
16	Tai Wan Tau Village	Clear Water Bay Country Park, Tai Au Mun
17	Lung Shan Temple	Lau Shui Heung Reservoir, Hok Tau Wai
18	Wong Shek Sports Centre	Tai Tan, Tai Tan Hoi, Tung Sam Kei

3. The following base station sites are being constructed and will be implemented in 2008. These base stations may use frequencies within the 889.1 – 889.9 MHz / 934.1 – 934.9 MHz and 1780.1– 1784.9 MHz / 1875.1 – 1879.9 MHz bands

	Site	Coverage Area
19	Tai Long Au	Sai Kung East Country Park
20	Tai Lam Chung Reservoir	Tai Lam Country Park
21	Shek Pik Fire Lookout	Lantau South Country Park

2G and 3G licensees in Hong Kong

2G/3G Licensees	China Mobile Peoples Telephone Company Limited	Hutchison Telephone Company Limited	SmarTone Mobile Communications Limited & SmarTone 3G Limited	Hong Kong CSL Limited & New World PCS Limited	PCCW Mobile HK Limited & PCCW-HKT Telephone Limited	Total number of Licence(s) held
(a) 2G licences						
● No. of GSM licences held		1 ⁸ (8.3 MHz x 2)	1 (8.3 MHz x 2)	1 (8.3 MHz x 2)		3
● No. of PCS licences held	1 (11.6 MHz x 2)	1 (11.6 MHz x 2)	1 (11.6 MHz x 2)	2 (11.6 MHz x 2 + 11.6 MHz x 2)	1 (11.6 MHz x 2)	6
(b) 3G licence						
● No. of WCDMA licences held		1 (14.8 MHz x 2 + 5 MHz)	1 (14.8 MHz x 2 + 5 MHz)	1 (14.8MHz x 2 + 5 MHz)	1 (14.8 MHz x 2 + 5 MHz)	4
● No. of CDMA2000 licences held					1 ⁹ (7.5 MHz x 2)	1
Total	1 (23.2 MHz)	3 (74.4 MHz)	3 (74.4 MHz)	4 (97.6 MHz)	3 (72.8 MHz)	14

The spectrum assigned in each license is shown in bracket

⁸ The GSM licence held by Hutchison Telephone Company Limited covers the CDMA operation of the company as well. The CDMA spectrum assignment will expire in November 2008.

⁹ The licence will be issued in November 2008