

**Assignment of the Available Spectrum
in the 800 MHz and 1800 MHz Bands
to the Existing Mobile Network Operators**

Consultation Paper

28 February 2005

INTRODUCTION

The Telecommunications Authority (the “TA”) issued a TA Statement on 29 November 2004 (the “TA Statement”) setting out OFTA’s view on how OFTA will handle the licensing arrangement upon the expiry of the existing licences for the second generation mobile services. The TA Statement also mentions the availability of the unassigned spectrum in the 1800 MHz band and the spectrum that will become available by refarming the spectrum vacated by an existing mobile network operator in the 800 MHz band by July 2005.

2. The TA Statement further indicates that the services of some mobile network operators have been restricted by spectrum shortage problems and that additional spectrum will be required by these operators for coping with their business growth. The TA sees a need to consider allocating the available spectrum to eligible licensees as soon as possible. According to sections 32G(2) and 32I(1) of the Telecommunications Ordinance (the “Ordinance”), the TA may, after consultation with the industry and such other persons who may be directly affected, divide the radio spectrum into frequency bands and channels, specify the general purpose for which frequency bands and channels may be used and designate frequency bands in which the use of spectrum is subject to payment of spectrum utilization fee (the “SUF”). Accordingly, the TA would like to consult in this document the industry and other interested persons on these matters.

3. In this document, the term “Mobile Network Operators (MNOs)” will be used to denote collectively the existing operators of the second generation mobile services using GSM 900 (referred to hereafter simply as “GSM”) and/or GSM 1800 (referred to hereafter as “PCS”) standards. Currently we have three MNOs who use both the GSM and the PCS standards (the “Dual-Band Operators”) and three MNOs who use only the PCS standard (the “Single-Band

Operators”). The terms “GSM licence”, “PCS licence”, “CDMA licence” and “TDMA licence” will be used to denote the existing Public Radiocommunications Service (PRS) licences deploying GSM 900, GSM 1800, IS-95 CDMA and IS-136 TDMA standards respectively.

4. Preliminary views on and proposed approaches to various issues relating to the subject are expressed in this paper for the purpose of consultation only and do not represent the decision of the TA on the issues. Those issues remain the subject of consideration by the TA. Nothing in this paper should be construed as indicating that the TA has formed any opinion or decision on those issues.

SPECTRUM AVAILABLE FOR ASSIGNMENT

5. As mentioned in the TA Statement, the TA has taken the view that the available spectrum in the 800 MHz and 1800 MHz bands should be allocated for capacity expansion by the existing MNOs. The decision is made in due regard of the spectrum shortage problems encountered by the MNOs and their need for introducing more advanced, bandwidth intensive multimedia services. The frequency ranges of the available spectrum are stipulated in the subsequent paragraphs.

Unallocated PCS Spectrum

6. The following spectrum in the 1800 MHz band is immediately available for assignment:-

- 1780.1 – 1785 MHz / 1875.1 – 1880 MHz (Bandwidth = 4.9 MHz x 2)

Vacation of the Spectrum Assigned to the TDMA Licensee

7. According to the TA Statement, both the CDMA and the TDMA licensees will not be granted the “right of first refusal” but they will be given a 3-year migration period after their respective licence expiry dates for the purpose of migrating their existing subscribers to other networks. During the migration period, the CDMA and the TDMA licensees will deploy one-third of the original assigned spectrum i.e. 2.5 MHz x 2. For this purpose, the TDMA

licensee will deploy the frequencies 835 – 837.5 MHz / 880 – 882.5 MHz during the 3-year migration period.

8. As a result, a portion of the TDMA spectrum will be vacated by the TDMA licensee after its current licence expires on 23 July 2005.¹ Having considered the views and comments made by the respondents to the previous two rounds of consultations which led to the publication of the TA Statement, the TA has decided that the spectrum vacated from the TDMA licence should be re-farmed for the Extended GSM (EGSM) service. The spectrum that will be available is

- 885 – 890 MHz / 930 – 935 MHz (Bandwidth = 5 MHz x 2)

The re-farmed 800 MHz band plan during the 3-year migration period is shown in the figure below. A 2.5 MHz guard band will be retained for separating the TDMA system and the EGSM system.

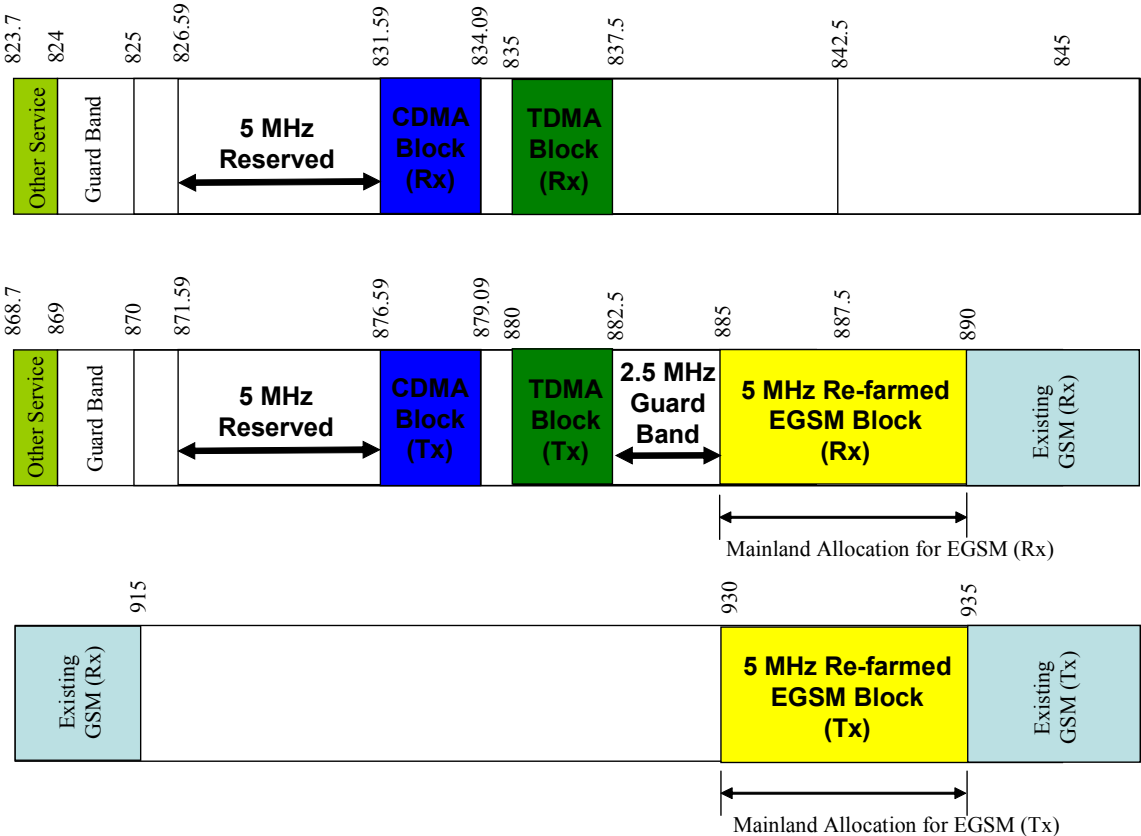


Figure 1 800 MHz Band Plan During the 3-Year Migration Period

¹ Spectrum vacated from the CDMA licence will be reserved and its deployment will be subject to the future spectrum policy review. Please refer to paragraphs 39 to 42 of the TA Statement.

9. At the end of the 3-year migration period, the spectrum occupied by the TDMA system i.e. 835 – 837.5 MHz / 880 – 882.5 MHz will be vacated. One possible scenario is to further extend the EGSM band downwards to cover 883 – 885 MHz / 928 – 930 MHz and to reserve 880 – 883 MHz as the guard band². This arrangement will however require further frequency coordination with the Mainland authorities.

PROMOTION OF EFFICIENT ALLOCATION AND USE OF RADIO SPECTRUM

10. Under section 32G of the Ordinance, the TA shall promote the efficient allocation and use of the radio spectrum as a public resource in Hong Kong. To ensure efficient allocation and use of the radio spectrum and fair and equitable treatment to the existing MNOs, the TA is minded to take into account a number of performance factors to assess the eligibility of individual MNOs for assignment of the unused spectrum. These performance factors include³:

- Frequency re-use factor, which is the average number of times the frequency carriers within the assigned spectrum are re-used;
- Size of the subscriber base; and
- Achieved spectral efficiency, in terms of the amount of carried traffic per unit bandwidth per unit area (i.e. in unit of Erlangs / MHz / km²) in the central business district of Hong Kong.

11. Based on the submitted monthly statistics, the performance of individual MNO against the eligibility criteria has been assessed. In the assessment, the size of the subscriber base of individual MNO has included the subscribers of the Mobile Virtual Network Operators that it hosts.

12. As a result of the assessment, the TA observes that all Dual-Band Operators (having taken into account their GSM and PCS operations together)

² Further extension downwards will not be feasible because the Radio Frequency Identification (RFID) equipment operates in the 920 – 925 MHz band.

³ These are the same factors that the TA had taken into account when he assigned the unused spectrum in the 800-900 MHz and 1800-1900 MHz bands to PMRS and PCS mobile network operators in 2002.

and all Single-Band Operators have achieved a high level of frequency re-use and spectral efficiency. They have also supported a large amount of subscribers with their assigned frequency spectrum.

13. It is worth noting that each of the Single-Band Operators is only assigned with 11.6 MHz x 2, as compared to 19.9 MHz x 2 that each Dual-Band Operator has in their possession. Given that all of the Dual-Band Operators have implemented integrated network operations, the larger amount of frequency spectrum in their possession therefore provides the Dual-Band Operators with a much larger network capacity than the Single-Band Operators. The Single-Band Operators therefore need to utilize their relatively smaller amount of assigned spectrum to a fuller extent as they are also serving a comparably large customer base and providing similar range of mobile services with a comparable grade of service in competition with the Dual-Band Operators.

14. As a result, while the TA is of the view that all MNOs have operational needs for extra spectrum to cope with their business need, the difficulties faced by the Single-Band Operators in dimensioning their networks to meet future growth should also be given due considerations.

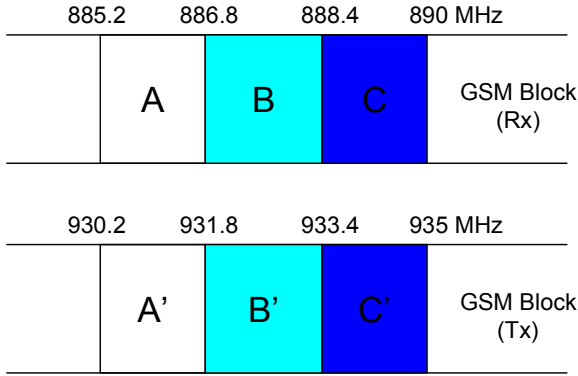
15. Given the above considerations, the TA is of the view that equal treatment should apply to the Dual-Band Operators and the Single-Band Operators in this exercise and that the assignment of equal amount of frequency spectrum to the six Dual-Band Operators and the Single-Band Operators would ensure a more balanced playing field for the mobile industry.

PROPOSED ASSIGNMENT METHOD

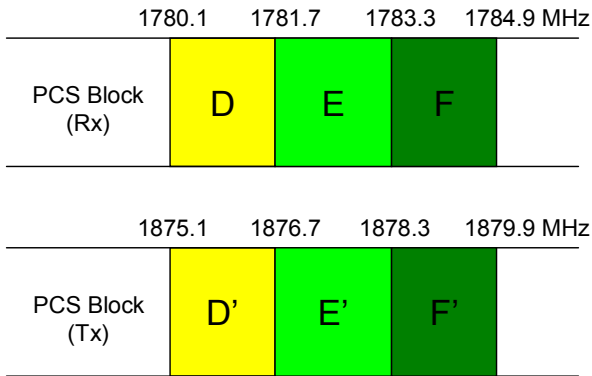
Proposed Frequency Assignment

16. With a view to affording equal treatment to the six MNOs, the TA considers it appropriate to divide the available spectrum in the 800 MHz and 1800 MHz bands into six equal portions. For GSM or PCS system, the carrier spacing is 200 kHz. Hence, the available spectrum can be divided into six equal blocks with bandwidth of 1.6 MHz x 2, three of which will be in the 800 MHz band and three in the 1800 MHz band. Each block can be used to

accommodate eight GSM or PCS carriers. The proposed frequency assignments are illustrated in the following figure. The band boundaries shown are tentative only and there will be minor adjustments as a result of the exact carrier placement.



Available Blocks in the 800 MHz Band



Available Blocks in the 1800 MHz Band

Figure 2 Tentative Frequency Allocations of the Available Spectrum

Proposed Assignment to the Mobile Network Operators

17. The TA has maintained dialogues with the MNOs on their views on the assignment of the available spectrum. It is understood that if the frequency blocks in 800 MHz band are to be assigned to the three Single-Band Operators, they may need to revamp their frequency planning and procure additional hardware/software in order that their radio networks can be upgraded to cater for dual-band operation. Other than technical concerns and requirement of additional capital investment, a lead-time may also be required for such

upgrades. These problems can be minimized if the Single-Band Operators are assigned with frequency blocks in the 1800 MHz band. As a matter of fact, some Single-Band Operators have indicated that they are interested in the 1800 MHz band only. Referring to Figure 2, it therefore appears to be logical and sensible that blocks A/A', B/B' and C/C' should be assigned to the three Dual-Band Operators whereas blocks D/D', E/E' and F/F' should be assigned to the three Single-Band Operators.

18. To conclude, the TA proposes to divide the available spectrum in the 800 MHz and 1800 MHz bands into six 1.6 MHz x 2 blocks. These blocks will then be directly assigned to the six MNOs. The blocks in the 800 MHz band will be assigned to the Dual-Band Operators while the blocks in the 1800 MHz band assigned to the Single-Band Operators. On the choice of frequency blocks, the TA has no objection if the MNOs can coordinate and reach mutual agreement among themselves. Otherwise, the TA will have to formulate an assignment method that is transparent and fair.

PAYMENT OF SPECTRUM UTILIZATION FEE

19. The Government has already decided that the MNOs will pay SUF for the spectrum which they have been assigned when they are granted the new Mobile Carrier Licences after the expiry of their existing licences. The TA is of the view that the extra spectrum allocated to the MNOs pursuant to this assignment exercise should also be subject to the payment of SUF.

20. The TA further proposes that the level of SUF should be the same as that applicable to the existing spectrum assigned to the MNOs, as stipulated in the Telecommunications (Level of Spectrum Utilization Fees) (Second Generation Mobile Services) Regulation. That is, an annual fee of HK\$ 145,000 per MHz for the first five licence years will be payable. From the sixth licence year and onwards, an annual fee of 5% of network turnover subject to a minimum fee of HK\$ 1,450,000 per MHz will be payable. Should the spectrum be made available prior to the expiry of the existing licences and the issue of the new Mobile Carrier Licence, no SUF will be levied.

21. The TA notes that the proposed assignment to the MNOs is only an incremental addition to their existing assigned spectrum. The increased

amount of the assigned spectrum will serve to expand the capacity of the MNOs' networks and improve the quality of their existing mobile services and the new and innovative services to be launched in the future. The prices of these services in the market are expected to cover the cost of the spectrum as reflected in the level of SUF stipulated in the Telecommunications (Level of Spectrum Utilization Fees) (Second Generation Mobile Services) Regulation. As the additionally assigned spectrum will be used to provide the same set of services at the same prices, the cost of spectrum, in terms of cost per unit bandwidth, covered by the prices should be the same as that of the existing spectrum. Therefore the level of the SUF under the aforementioned Regulation should represent a fair assessment of the economic value of the additionally assigned spectrum to the MNOs.

ALTERNATIVE ASSIGNMENT METHOD

22. The TA has revisited the approach adopted in the assignment exercise in March 2002. At that time, the available spectrum consisted of 2.4 MHz x 2 in the 900 MHz band and 9.6 MHz x 2 in the 1800 MHz band. The assignment method adopted was that,

- The GSM licensees equally shared the available GSM spectrum (i.e. 0.8 MHz x 2 each); and
- The PCS licensees equally shared the available PCS spectrum (i.e. 1.6 MHz x 2 each).

If the same approach is adopted for the current exercise, this will result in each GSM licensee getting 1.6 MHz x 2 while each PCS licensee will only get 0.8 MHz x 2. This would imply that each Dual-Band Operator will get 2.4 MHz x 2 while each Single-Band Operator will only get 0.8 MHz x 2.

23. Based on the eligibility criteria stated in paragraph 10, the TA has not found that the Dual-Band Operators have a greater need for additional spectrum than the Single-Band Operators. Assigning each of the Dual-Band Operators three times more additional spectrum than each of the Single-Band Operators would not promote efficient allocation and use of the radio spectrum. The TA

is of the view that the 2002 approach should not be adopted for the current exercise as it would not be in the best interest of the public to do so.

PROVISION OF ADVANCED MOBILE SERVICES

24. In the last spectrum assignment exercise conducted in March 2002, the TA imposed as a condition of assignment that the additional spectrum to be assigned should not be used to provide 3G services. In this context, the term “3G services” means those services operating at a minimum of 144 kbps for an individual customer, being the speed at which information is transferred across the air interface from the base station to the customers’ apparatus connected to the network of the operator and vice versa.

25. The TA considers that the above restriction is no longer relevant in the present market environment. In this regard, the TA considers it timely to remove the restriction on the provision of higher speed mobile services making use of the spectrum assigned back in March 2002. The TA proposes that when extra spectrum is assigned to the MNOs, the TA will take the opportunity to amend the relevant GSM and PCS licences to remove the restriction on the provision of 3G services. Also, at the expiry of the existing GSM and PCS licences, the new Mobile Carrier Licences to be granted will not contain such a restriction.

FUTURE STEPS

26. Upon the completion of this consultation exercise and subject to the views and comments received, the TA will proceed to finalize the band plan and the detailed arrangement for assigning the available spectrum. The relevant subsidiary legislation will also be prepared to designate the extra spectrum subject to the payment of SUF. The TA has in mind that the available spectrum would be assigned as soon as possible.

INVITATION OF COMMENTS

27. Views and comments on this consultation paper should reach OFTA on or before **29 March 2005**. 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:-

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

Office of the Telecommunications Authority
28 February 2005