Licensing of Mobile Services on Expiry of Existing Licences for Second Generation Mobile Services

Consultation Paper

1 August 2003

BACKGROUND

At present, eleven public radiocommunications service (PRS) licences issued under the Telecommunications Ordinance (Cap 106) are held by six operators[1] for the provision of second generation (2G)[2] mobile services, using cellular communications technology operating in the frequency bands 825 – 960 MHz and 1710 – 1880 MHz.

2. Of the eleven 2G licences, five operate in the 825 - 960 MHz band and had original expiry dates between July 2002 and January 2003. On 22 October 2001, the Telecommunications Authority (TA) exercised his discretion[3] to extend these 2G licences for three years, bringing the expiry dates to between July 2005 and January 2006. On the other hand, the remaining six 2G licences, which operate in the 1710 - 1880 MHz band, will expire in September 2006, subject to the discretion of the TA to extend the licences for up to three years.

3. Although the first 2G licence will not expire until July 2005, some industry players have suggested that a decision on future licensing arrangements should be made as early as practicable. The TA agrees that the future licensing arrangements should be addressed as early as possible to provide the greatest regulatory certainty. This will enable industry players, including actual and potential mobile network operators (MNOs) and mobile virtual network operators (MVNOs) to make their long term investment and business plans. An early decision on the future licensing framework will also be in the interest of the consumers. At present, there are over six million customers of 2G services. Any change of the licensing framework should cause as little disruption of services to these customers as possible. Ample time should therefore be allowed for the 2G licensees to plan for transitional or migration

[1] Hong Kong CSL Limited, Hutchison Telephone Company Limited, Mandarin Communications Limited, New World PCS Limited, Peoples Telephone Company Limited and SmarTone Mobile Communications Limited.
[2] In this paper, "2G" services include 2.5G services.
[3] Section 2(2A) of the Telecommunications Regulations provides that "[A] public radiocommunications service licence … shall be valid for 10 years from the day on which it is granted, and, subject to the discretion of the

arrangements that may be occasioned by the award of new licences, whether they are awarded to existing 2G operators and/or new entrants (hereafter collectively known as new licences). Finally, the award of new licences may involve legislative procedures, such as the making of subsidiary legislation under section 32I of the Telecommunications Ordinance[4]. Sufficient time should be allowed for the making of such subsidiary legislation before the licensing process actually takes place.

4. The TA considers that the following considerations are relevant for deciding the future licensing arrangements for mobile services:

- to ensure choice of services
- to provide stable investment environment
- to ensure efficient use of spectrum
- to ensure continuity to customer service
- to maintain technology neutrality.

5. The TA initiates this consultation to solicit views from the industry and all interested parties on the future arrangements for the allocation of spectrum and issue of licences for mobile services after the current 2G licences expire. In this Consultation Paper, the TA will give an overview of the spectrum availability and the relevant technical constraints. The TA considers that how the existing 2G spectrum and the additional 2G/3G spectrum would be allocated among existing 2G operators and/or new entrants in future is an important matter which will have vast impact on the mobile industry as well as the customers. At this stage, the TA has no preconceived views. The TA would like to invite submission of proposals by the industry and interested parties for further deliberation. In the paper, the TA will also discuss his preliminary thinking on the licensing arrangements, the issue relating to spectrum utilization fee (SUF), and the licensing conditions to be imposed on the new licences.

SPECTRUM AVAILABILITY

6. In this section, the considerations on the spectrum availability for mobile services are described. Factual information on the available spectrum and global development of the frequency plans for 2G and 3G mobile systems will be discussed,

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Authority, may be extended for a further period of up to 3 years."

[4] If the TA decides at the conclusion of the consultation that the use of spectrum is subject to the payment of spectrum utilization fee. See section 32I of the Telecommunications Ordinance.

together with some of the specific technical constraints in the current Hong Kong frequency plan.

Existing 2G Spectrum

7. The existing frequency allocations for the 2G mobile services (existing 2G spectrum) are shown in **Annex 1**. At present, the 2G licensees are using the 900 MHz and 1800 MHz frequency bands to provide 2G mobile services supporting more than 6.3 million subscribers. The licences will expire in around 2005 to 2006[5].

8. There are a number of different ways to re-deploy the existing 2G spectrum for mobile services. For instance, the GSM system can now be deployed in a wider range of frequencies in the 800 MHz range instead of the conventional 900 MHz. At the same time, 3G mobile services can also be deployed in the 2G spectrum as the operating frequency ranges for the 3G radio interface standards have been extended to cover the frequencies in the 900 MHz and 1800 MHz bands. The detail of the global development in the deployment of the 2G spectrum is given in **Annex 2**.

Other Available Spectrum

9. In addition to the existing 2G spectrum, there are a number of bands which could potentially be deployed for mobile services. These include the following bands:

(a) Unallocated 3G spectrum for Time Division Duplex (TDD) Operation - 1900 - 1904.9 MHz and 2010 - 2019.7 MHz bands;

(b) Additional ITU allocations for 3G services - 1980 - 2010 MHz paired with 2170 - 2200 MHz and 2500 - 2690 MHz.

These bands may be considered for actual services under the new licences or as "seed spectrum" for migration purpose if necessary in the implementation of the spectrum allocation under the new licences. However the use of these bands is subject to the technical constraints of equipment availability in the market. The details of these bands are given in **Annex 3**.

[5] See Annex 1 for the exact date of expiry of each 2G licence.

PARTITIONING THE SPECTRUM FOR ALLOCATION

10. For the additional spectrum referred to in paragraph 9, and the existing 2G spectrum which is not allocated under the "right of first refusal" proposed under paragraph 21 below, there is a need to decide how to partition them for allocation among the new licences. The TA does not have any pre-conceived idea as to how the existing 2G spectrum and the additional spectrum should be partitioned. The TA has identified some of the relevant considerations in designing the spectrum plan that would best serve the future needs of the market.

Minimum Bandwidth Requirement for Each Operator

11. The TA notes that one of the future mobile systems, the Universal Mobile Telecommunications System (UMTS) Frequency Division Duplex (FDD) system, makes use of carriers with 5 MHz bandwidth, thus requiring a frequency allocation with bandwidth in multiples of 2 x 5 MHz. For the cdma2000 system, the signal carriers can have a bandwidth of 1.25 MHz or 3.75 MHz. These carriers can be fitted into channels of width in the multiples of 2 x 5 MHz[6]. In order to give the licensees the flexibility in choosing the technology to be deployed, it is considered that the future frequency plan for mobile services should be compatible with the requirements of different technologies. Hence, one solution is to partition the available spectrum into frequency blocks with bandwidth in multiples of 2 x 5 MHz, which will be sufficient to accommodate both the UMTS FDD system and the cdma2000 system.

Need for Rationalizing the Existing Frequency Allocations

12. As shown in **Annex 1**, the existing frequency allocations for the 2G licensees are fragmented and not contiguous. For instance, in the 900 MHz band, the existing 2G licensees occupy frequency blocks with bandwidth of either 2 x 7.5 MHz or 2 x 8.3 MHz. The frequency allocations for the operators of GSM systems are also non-contiguous. In order to make available frequency blocks with bandwidth in multiples of 2 x 5 MHz as described in above paragraph, it may be advisable for the TA to consider the merging of the existing frequency allocations. To avoid adverse impact on the subscribers, the detailed migration procedures may need to be established.

Technology Constraints

[6] For example, in a spectrum width of 2 x 10 MHz, each block can accommodate one 1.25 MHz and two 3.75 MHz carriers.

13. The TA will adopt a technology-neutral approach in the issue of the new licences. The future replacement technology will be decided by the market subject to a number of basic ground rules being met - the standard must be a widely accepted international or regional standard, the standard must be an open one so as to ensure supply of wide range of commercial products in the market and the consumer convenience in roaming should be maximized. However, in the design of the future spectrum plans, the TA will have to take into account the practical constraints imposed by the operating bands of the commonly available technologies in the foreseeable future.

14. The TA expects that the GSM systems operating in the existing 900 MHz spectrum will continue to operate for a number of years to come. In order to meet the requirement of allocating spectrum in multiples of 2 x 5 MHz blocks, it may be necessary to extend the lower limit of the GSM bands downwards to the 880 - 890 MHz/925 - 935 MHz range to make use of the Extended GSM band.

15. As regards the 825 - 835 MHz/870 - 880 MHz band, it may have to be retained for technologies compatible with this band as the GSM 850 band plan cannot be deployed simultaneously with the Extended GSM band. This technology may be deployed in the 835 - 845 MHz/880 - 890 MHz band if the Extended GSM band is not deployed.

Guard Band Requirement

16. In the current frequency plan for 2G services, the downlink (base station transmit) frequencies of the TDMA System ranges from 880.0 - 887.5 MHz, whereas the uplink (base station receive) frequencies of one GSM system lies in the adjacent 890 - 915 MHz. The two blocks are only separated by 2.5 MHz. At present, there are reports of interference between the two systems. The necessary guard band should be retained if the deployment of technologies in the 800 MHz and 900 MHz bands would continue to require adjacent blocks to be used as downlink and uplink frequencies respectively.

Allocation of Seed Spectrum for Service Migration

17. At expiry of the existing 2G licensees, it is expected that new licences will be issued to continue the provision of mobile services to the customers in Hong Kong.

The method of awarding the licences will be further discussed in the subsequent sections of this Consultation Paper. Under the technology neutral licensing regime, the new licensees will be given the flexibility to select the mobile technology to be deployed. One of the options for the new licensees may be to continue the provision of 2G mobile systems in the beginning, and then gradually migrate to 3G systems in a well coordinated manner. In this regard, additional seed spectrum may be necessary for these licensees to migrate the existing customers to the new system. The additional spectrum may come from the frequency band 2500 - 2690 MHz as described in paragraph 9 above. The detailed frequency plan for the seed spectrum will be determined subject to the relevant development in Europe and elsewhere.

Views Sought

18. In summary, additional spectrum is identified in the foregoing paragraphs for allocation to mobile services. The TA considers that these additional spectrum can be deployed together with the existing 2G spectrum. In addition, the relevant technical constraints affecting the frequency re-planning will need to be addressed.

19. The TA notes that the future band plan for the mobile services will depend on many factors, including the migration arrangement for the existing 2G operators, future business plan of the 2G operators, availability of base station equipment and customer equipment supporting the additional spectrum, availability of multi-mode handsets, etc. Hence, **the TA would like to invite comments and proposals from interested parties on the method to partition the frequency spectrum for allocation to the new licensees.**

LICENSING ARRANGEMENTS

20. Any detailed proposal on the licensing arrangements will need to take into account the number of licences that are eventually available for issue as a result of spectrum constraints. This in turn depends on how the spectrum will be partitioned. Pending any views to be formed on spectrum partitioning, the TA sets out below some preliminary thinking on the basic licensing approach.

Offer of Licences to the Existing 2G Licensees vs Award of Licences to New Licensees

21. The TA is prepared to consider offering the existing 2G licensees the "right of first refusal" for new licences operating on the existing 2G spectrum. It is only when an existing licensee declines to obtain the new licence that the spectrum to be allocated to the licence will be made available for new entrants to apply. Arguments in favour of this option include that the existing 2G licensees are likely to utilize the allocated spectrum more efficiently than new entrants, especially in the near term, given the significant sunk investments in constructing a mobile network for operation. It will also provide a stable investment environment. Besides, direct offer of new licences to the existing 2G licences would minimize the potential disturbance to existing consumers of 2G mobile services. On the other hand, direct offer of new licences to the existing 2G licensees may be viewed as denying the more competitive new entrants of market entry, as it is only when the existing licensees give up the licences before new applicants will be considered. The counter-argument is that there is no domestic or foreign investment restrictions for the telecommunications sector in Hong Kong. Interested parties are free to enter the market through acquisition.

22. The argument for the "right of first refusal" would be considerably weakened for those bands, namely the bands in the 800 MHz, which have not been actively developed and have the services not actively marketed. Customer subscription is consistently below 50 000 since May 2002 for one of the two 2G licences operating in the 800 MHz band, and below 100 000 since October 2002 for the other. The efficiency of utilization, in terms of the number of subscribers supported per unit bandwidth, is considerably lower than any of the nine systems operating in the 900 MHz and 1800 MHz bands. As spectrum is scarce and valuable resources, it should be efficiently utilized so as to derive the maximum benefit to the community. In the interest of efficient utilization of the scarce spectrum, it would not be unreasonable for the TA to consider **not** to make the "right of first refusal" offer to the two licences in the 800 MHz band. Competitive bidding could be considered for the selection of the licensees instead.

23. In offering the "right of first refusal" to the existing 2G licensees, the TA may consider requiring the existing 2G licensees to accept new licence conditions. Refusal to accept the new conditions would be tantamount to rejection of the offer of licences. The new conditions that are being considered by the TA are discussed in the latter part of this paper.

Alignment of the Date of New Licences

24. The current 2G licences will expire at different times, and some of these licences may be extended for a further period of three years if the TA exercises his discretion. For the purpose of effective and unhindered re-allocation of the frequency spectrum, the TA considers it desirable that all the existing licences should cease operation and the new licences commence operation at the same time. This means, for example, if the TA offers the right of first refusal to the existing 2G licensees (and the licensees all agree to obtain the new licences), the licensees may be required to surrender their existing licences to the TA at a designated date earlier than the natural expiry dates of the licences, and be issued new licences at the same time.

25. **The above is the preliminary thinking of the TA in relation to the basic approach in awarding the new licences. The TA welcomes comments and proposals from interested parties on the licensing arrangements.**

SPECTRUM UTILIZATION FEE (SUF)

Whether to Impose SUF

26. All 2G and 3G licensees are required to pay licence fees based on the number of customers and base stations set up by the licensees[7]. The future new licensees for mobile services will likewise be required to pay the licence fees prescribed by the law.

27. The 3G licensees are also required to pay SUF at the royalty percentage of 5% of the network turnover, with a minimum fee prescribed for each year[8]. This level of fees was determined as a result of the 3G auction held in September 2001.

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[7] The 2G licences were issued in the form of PRS licences whereas the 3G licences were issued in the form of mobile carrier licences. The licence fee level and structure of these two types of licences are the same. See Part II Schedule 1 of the Telecommunications Regulations and Part 3 Schedule 3 of the Telecommunications (Carrier Licences) Regulation.

[8] The minimum fee of the spectrum utilization fees shall be:

Year of the Licence	*Minimum Fee(HK$'000)*
1-5th	50,000 each year
6th	60,124
7th	70,249
8th	80,373
9th	90,497
10th	100,622
11th	110,746
12th	120,870
13th	130,995
14th	141,119
15th	151,243

On the other hand, the 2G licensees are currently not required to pay any spectrum utilization fee. The TA will need to consider whether, on the issue of new licences for 2G and / or 3G mobile services, the new licensees should be required to pay any SUF, and if so, the level of the fee.

28. One argument is that the new licensees will be able to provide 3G services or similar advanced mobile services under the new licences. As the 3G licensees are required to pay SUF, it is only fair for the new licensees to pay the same level of fee to maintain a level playing field in the market. There is logic in this argument. However, it is important to bear in mind that the new licences will not only allow the licensees to provide 3G services. There is a need to maintain the 2G services offered to the existing 2G customers. If a 5% royalty is imposed on the new licensees irrespective of whether 2G or 3G services are to be provided, the licensees as well as 2G customers may be concerned about the financial burden and the impact on retail price to customers.

29. The TA envisages that all the existing 2G licensees will continue to offer 2G services but may not offer 3G services immediately after the issue of the new licences. However their networks may eventually be upgraded to become 3G networks and customers migrated to the 3G platform. If the decision is to impose SUF on 3G services or similar advanced mobile services only and not on 2G services the following options are worth exploring:

(a) specifying a cut-off date from which 3G services are expected to be provided. From that date SUF will be levied. The cut-off date can be, say, three years from the issue of the new licences;

(b) levying SUF upon the occurrence of an event, such as when the licensee upgrades its 2G network to 3G network; or

(c) a combined approach of (a) and (b), i.e. levying SUF from the cut-off date or upon the occurrence of a specified event, whichever is earlier.

30. Alternatively, if the decision is to levy SUF on the new licences irrespective of whether 2G or 3G services are being provided, then SUF shall be payable upon the new licences becoming effective.

Level of SUF

31. If SUF is to be levied on the grounds of equity (see paragraph 28 above), an option for determining the level of fee payable is to follow the same level of SUF currently paid by the existing 3G licensees. The current SUF level for 3G services is imposed at 5% royalty of the network turnover, with a minimum fee for each year. This level is set to cover the 2 x 14.8 MHz (paired) + 5 MHz (unpaired) bandwidth assigned to each 3G licensee. To ensure efficient use of spectrum, the TA considers that, in respect of the level of SUF for the new mobile services licences, it may be set either at

(a) the same fixed level of 5% with a minimum fee irrespective of the amount of spectrum to be assigned to each licensee; or

(b) at a level that is based on the 5% rate with a minimum fee and with adjustment directly proportional to the amount of spectrum to be assigned to each new licensee. The more spectrum to be assigned the more SUF the licensee will pay. The reference is the 34.6 MHz (2 x 14.8 MHz + 5 MHz) assigned to a 3G licensee.

32. For the additional spectrum referred to in paragraph 9, or the existing 2G spectrum which is not allocated under "right of first refusal", there is also the option of determining the level of SUF payable for these spectrum by auction or some kind of competitive bidding.

Performance Bond

33. Under the 3G regime, each licensee must provide a performance bond to guarantee the payment of a minimum level of SUF for the upcoming five years. In the 3G licensing exercise, the minimum level of SUF was determined by the TA based on the anticipation of gradual takeup of 3G mobile services. The performance bond mechanism serves to protect the government against serious default by a licensee and discourage any inefficient utilization of allocated spectrum resources. The TA would consider whether a performance bond will be necessary and appropriate for the new licences to guarantee a minimum level of SUF, in light of the fact that the existing 2G licensees are already operating in a mature market with stable revenue streams.

34. **The TA would like to invite comments from interested parties on the**

issues relating to the levying of SUF, in particular:

(a) whether and if so under what circumstances should SUF be levied on the new licensees;

(b) the level or method of determining the SUF (if it should be levied); and

(c) whether a performance bond is needed to guarantee payment of the SUF.

LICENCE CONDITIONS

Special Conditions in Mobile Carrier Licences

35. Mobile carrier licences will be issued to the new licensees of mobile services. The general conditions of mobile carrier licences are prescribed by the Telecommunications (Carrier Licences) Regulation and are applicable to all mobile carrier licences. For the special conditions, the TA considers that the special conditions set out in the mobile carrier licences issued on 22 October 2001 to the four 3G licensees should largely be adopted, except for those conditions relating to auction, payment of SUF or performance bond, which shall be settled when the TA completes the consultation and decides on the licensing arrangements.

36. One important special condition is the requirement to provide open network access. The existing 3G licensees are required to open at least 30% of their network capacity for access by non-affiliated MVNO or content providers. The TA expects content service will continue to play an important role in the future mobile services. The TA therefore considers that it is essential to provide an open environment for access by content providers to future mobile networks and that this condition should apply to the new licensees.

37. The TA also considers that the following special conditions shall, inter alia, apply:

(a) Disposal of assets – prior written consent of the TA is required if the licensee disposes of more than 10% of its assets;

(b) Interconnection – the licensee shall, upon the TA's direction, interconnect its service and network with the other telecommunications services and networks;

(c) Accounting practices – the licensee is required to prepare separate accounts for different services or business activities;

(d) Numbering plan and number portability – the licensee shall comply with the numbering plan made or approved by the TA and facilitate the portability of numbers of customers of mobile services;

The list is not exhaustive. In general, other than the conditions relating to auction, payment of SUF and performance bond, which shall be decided at a later stage, the existing special conditions imposed on the 3G licensees shall be applicable. Interested parties are advised to download a copy of the Mobile Carrier Licence issued to any one of the 3G licensees from OFTA's website for the full terms and conditions.

New Conditions to be Imposed on the Existing 2G Licensees.

38. As mentioned in paragraph 23 above, where the TA offers a right of first refusal to the existing 2G licensees, he may consider requiring the 2G licensees to commit taking up some additional licence obligations in return for the offer.

Obligation to Provide Coverage to Specified Locations

39. Under the 2G licences, the licensees are not under any continuing obligation to expand or provide coverage or services to any specific parts of Hong Kong. Whilst competition in the market will ensure that the operators will strive to expand or maintain its services in populated area where demands for mobile services are high, this may not be the case for the less populated parts of Hong Kong like the country parks. Without licence obligations, operators are even re-considering coverage in some strategic parts of Hong Kong like certain tunnels, parts of the airport and MTRC and KCRC extensions for cost reasons. Adequate mobile coverage in country parks will enable effective communications in emergency situations, whereas adequate mobile coverage in the airport and major transport systems is necessary in view of the huge volume of the commuters that have to rely on these transport facilities on a daily basis. The TA is inclined to impose a special licence condition to those 2G operators

who wish to take up the offer of first right of refusal to obtain new licences that they have to provide service coverage to certain locations specified by the TA.

Compliance with Mandatory Codes of Practice

40. In the interest of the public, and in order to protect consumer interest, the TA considers it desirable to issue codes of practice to regulate certain aspects of the operation or conduct of the operators. Depending on the nature and conduct to be regulated, the TA is of the view that some codes of practices may need to be made mandatory to ensure effective compliance and enforcement.

41. One possible application of a mandatory code of practice is a code which obliges the licensees to provide Cell Broadcast Service (CBS) for the dissemination of messages in public interest. The CBS is one of the features provided by the GSM900 or DCS1800 system. The service is able to send text messages at the same time to all mobile users connected to the whole mobile network and any specific parts of the network. In 3G networks, similar cell broadcast service is likely to be provided. For instance, the Universal Mobile Telecommunications System (UMTS) standard also provides a feature called Multimedia Broadcast/Multicast Service (MBMS)[9], which is an upgraded version of CBS and provides similar functionalities. The TA notes that CBS is an attractive infrastructure for the customers and also government departments to disseminate important messages.

42. The TA also contemplates making the current voluntary Code of Practice on Mobile Service Contract mandatory, in view of the consistent number of customer complaints received by OFTA in relation to mobile service contracts, averaging at some 700 complaints per year according to the 2001 and 2002 figures.

43. On 17 June 2002, the Consumer Council, Independent Commission Against Corruption, Office of the Privacy Commissioner for Personal Data and OFTA jointly issued a voluntary Code of Practice on Protection of Customer Information for Fixed and Mobile Service Operators. Given the importance of personal data protection, the TA considers that the code should be made mandatory.

44. To make obligations to comply with the codes of practice a mandatory one,

[9] The Multimedia Broadcast/Multicast Service is defined in the standard 3GPP TS 122 146 version 5.2.0 Release 5 entitled "Universal Mobile Telecommunications System (UMTS); Multimedia Broadcast/Multicast Service (MBMS); Stage 1".

the TA is inclined to impose a special condition in the new licences for 2G operators specifying that the licensees are required to comply with the codes.

45. **The TA would like to invite comments on his proposals in relation to the licence conditions to be imposed on the new licensees for mobile services.**

TIMING

46. Given the extensive nature of the review, the TA considers that this will be the first round of consultation, in which views will be solicited from interested parties on the issues in connection with the arrangements of allocation of licences upon the expiry of the current 2G licences. This first consultation will last for two months and end on **2 October 2003**. The comments received will be posted on OFTA's website for information of the public. After consideration of the comments received, the TA will issue a further consultation paper listing his proposals for further comments. The TA would expect to conclude the consultation exercise and make a decision in the first quarter of 2004.

INVITATION OF COMMENTS

47. Views and comments on this consultation paper should reach the Office of the Telecommunications Authority on or before **2 October 2003**. Any person who submits the views and comments should be aware that the TA may publish all or any part of the views and comments 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 marked. The TA would take such markings into account in making his decision as to whether or not to disclose such information. Submissions should be addressed to

Office of the Telecommunications Authority
29/F Wu Chung House
213 Queen's Road Central
Wanchai
Hong Kong
Attention: Senior Regulatory Affairs Manager (Economic Regulation) 3
Fax: 2803 5112

E-mail: ecchui@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
1 August 2003

Annex 1

Existing Frequency Allocations for 2G Mobile Services

In Hong Kong, the licensees make use of a number of different technical standards for the provision of 2G mobile services. The GSM900 and DCS1800 systems, being deployed by six operators in Hong Kong, support the largest number of subscribers. The GSM900 systems at present occupy the frequency band 890 - 915 MHz for mobile transmit and 935 - 960 MHz for base transmit. The DCS1800 systems occupy the frequency band 1710.5 - 1780.1 MHz for mobile transmit and 1805.5 - 1875.1 MHz for base transmit.

2. One of the operators also implements the IS-95B CDMA system which occupies the frequency band 826.59 - 834.09 MHz for mobile transmit and 871.59 - 879.09 MHz for base transmit. In the meantime, there is also an IS-136 TDMA system occupying the frequency band 835 - 842.5 MHz for mobile transmit and 880 - 887.5 MHz for base transmit.

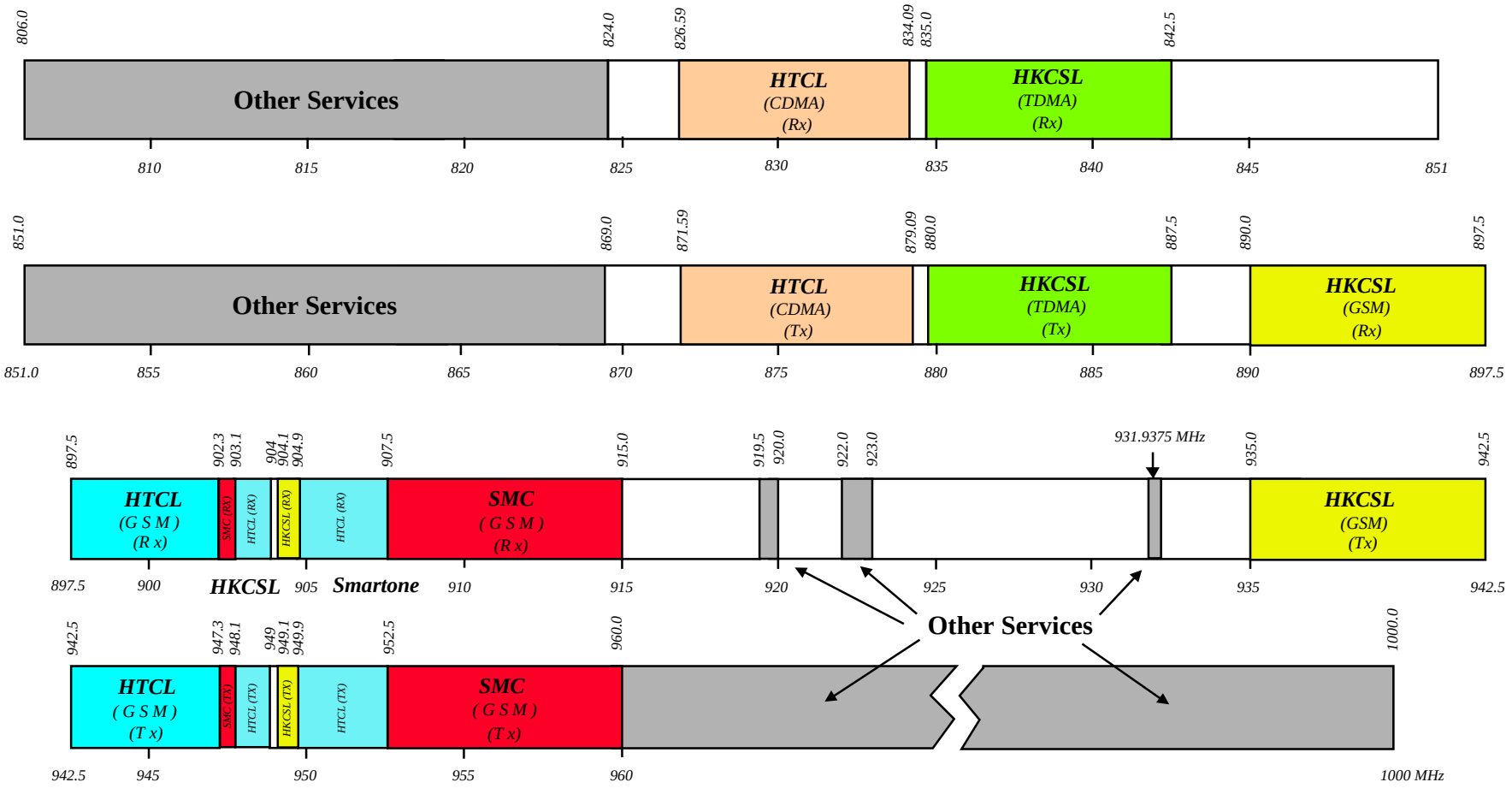
3. In summary, the total frequency spectrum resource allocated to the 2G mobile services amounts to around 110 x 2 MHz. The following tables summarize the frequency allocations for 2G mobile services in Hong Kong as well as the expiry dates of the individual licences.

2G Systems Implemented in Hong Kong	Mobile Station Transmit Frequency (MHz)	Base Station Transmit Frequency (MHz)
IS-95B CDMA System	826.59 - 834.09	871.59 - 879.09
IS-136 TDMA System	835.0 - 842.5	880.0 - 887.5
GSM 900 System	890 - 915	935 - 960
DCS1800 System	1710.5 - 1780.1	1805.5 - 1875.1

Licensee	System	Licence Expiry Date (inclusive)	Bandwidth of Assigned Spectrum (MHz)
Hong Kong CSL Limited	GSM900	11 Jan 2006	2 x 8.3
	DCS1800	29 Sept 2006	2 x 11.6
	TDMA	22 July 2005	2 x 7.5
	3G	21 Oct 2016	2 x 14.8 (paired) + 5 (unpaired)
Hutchison Telephone Company Limited	GSM900	19 Nov 2005	2 x 8.3
	DCS1800	29 Sept 2006	2 x 11.6
	CDMA	19 Nov 2005	2 x 7.5
	3G	21 Oct 2016	2 x 14.8 (paired) + 5 (unpaired)
SmarTone Mobile Communications Limited	GSM900	3 Jan 2006	2 x 8.3
	DCS1800	29 Sept 2006	2 x 11.6
	3G	21 Oct 2016	2 x 14.8 (paired) + 5 (unpaired)
New World PCS Limited	DCS1800	29 Sept 2006	2 x 11.6
Peoples Telephone Company Limited	DCS1800	29 Sept 2006	2 x 11.6
Mandarin Communications Limited	DCS1800	29 Sept 2006	2 x 11.6
	3G	21 Oct 2016	2 x 14.8 (paired) + 5 (unpaired)

4. In addition, certain frequency spectrum adjacent to the 2G spectrum is reserved for future use and is now vacant. It includes 842.5 - 851 MHz, 923 - 935 MHz and 1785 - 1805 MHz. The current frequency allocations to individual 2G systems in the 900 MHz and 1800 MHz bands are illustrated in the following figures.

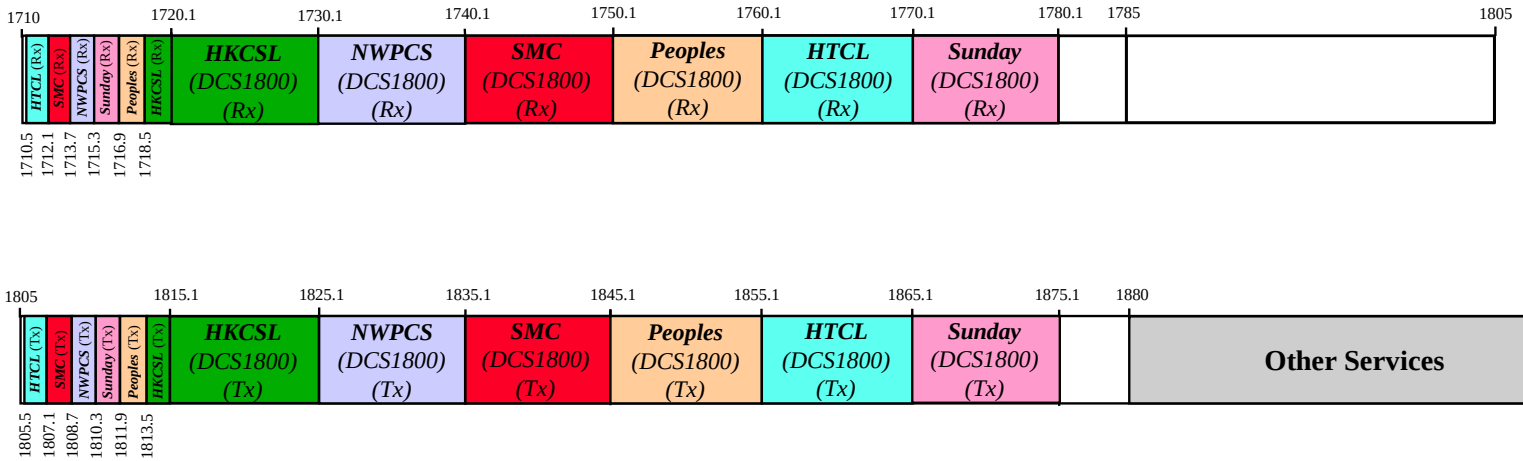
Current Frequency Allocations in the 900 MHz Band



Legend: ***HTCL - Hutchison Telephone Company Limited*** ***HKCSL - Hong Kong CSL Limited*** ***SMC - Smartone Mobile Communications Limited***

(Rx) - Base Station Receive Frequency ***(Tx) - Base Station Transmit Frequency***

Current Frequency Allocations in the 1800 MHz Band



Legend: ***HKCSL - Hong Kong CSL Limited***
NWPCS - New World PCS Limited
SMC - Smartone Mobile Communications Limited
Peoples - Peoples Telephone Company Limited
HTCL - Hutchison Telephone Company Limited
Sunday - Mandarin Communications Limited

(Tx) - Base Station Transmit Frequency
(Rx) - Base Station Receive Frequency

Annex 2

Global Development in the Deployment of the 2G Spectrum

This annex describes the global development in the deployment of the 2G spectrum.

Additional Frequency Allocations for GSM System

2. The frequency band allocated for GSM service in Hong Kong is known as the standard or primary GSM band as designated by the European Telecommunications Standards Institute (ETSI). The GSM standard is being updated continuously by the ETSI and the operation of the GSM system can now be extended to other frequency bands like the GSM 850 Band (824 - 849 MHz for mobile transmit, 869 - 894 MHz for base transmit), the Extended GSM 900 Band (880 - 915 MHz for mobile transmit, 925 - 960 MHz for base transmit), etc[10]. It is up to individual administrations to determine the most suitable frequency spectrum for the provision of the GSM services in accordance with their specific frequency planning requirements.

3G Services in 2G Spectrum

3. In order to identify additional frequency spectrum for longer term implementation of 3G mobile services, the International Telecommunication Union (ITU) has resolved during its World Radiocommunication Conference 2000 (WRC-2000) that the frequency bands 806 - 960 MHz, 1710 - 1885 MHz originally designated for the 2G mobile services can also be deployed for the terrestrial services of the International Mobile Telecommunications-2000 (IMT-2000, the ITU's term for 3G mobile services). In this regard, more frequency spectrum resource is dedicated to the 3G services and the allocation will also provide an alternative path for the deployment of 3G services through migration from the legacy 2G systems at the same frequency band.

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[10] The frequency bands and channel arrangement for the GSM system are specified by the ETSI in the specification 3GPP TS 05.05 Release 1999 entitled "Digital cellular telecommunications system (Phase 2+); Radio Transmission and Reception".

4. The terrestrial radio interface standards approved for IMT-2000 are updated accordingly to cover these additional frequency allocations. Those changes relevant to the 2G spectrum in Hong Kong for each of the radio interface standards are detailed as follows:-

UMTS FDD Standard

5. The 3rd Generation Partnership Project (3GPP) recommends in the Universal Mobile Telecommunications System (UMTS) Frequency Division Duplex (FDD) standards[11] that the system can also be deployed in the frequency band allocated for the DCS1800 services as shown in the following table:-

2G Spectrum for UMTS FDD	Mobile Station Transmit Frequency (MHz)	Base Station Transmit Frequency (MHz)
1800 MHz Band	1710 - 1785	1805 - 1880

CDMA2000 Standard

6. According to the latest release of the technical standards[12] by the 3rd Generation Partnership Project 2 (3GPP2), the cdma2000 system can be deployed on a number of additional frequency bands including:-

2G Spectrum for CDMA2000	Mobile Station Transmit Frequency (MHz)	Base Station Transmit Frequency (MHz)
800 MHz Band	824.025 - 848.985	869.025 - 893.985
900 MHz Band	880.00 - 914.95	925.00 - 959.95
1800 MHz Band	1710.00 - 1784.95	1805.00 - 1879.95

[11] The frequency bands and channel arrangement for the UMTS Frequency Division Duplex (FDD) system are specified in the specification 3GPP TS 125 101 version 5.5.0 Release 5 entitled "Universal Mobile Telecommunications System (UMTS); UE Radio Transmission and Reception (FDD)".

[12] The frequency bands and channel arrangement for the cdma2000 system are specified in the specification 3GPP2 C.S0002-C entitled "Physical Layer Standard for cdma2000 Spread Spectrum Systems - Release C".

UMTS TDD Standard

7. This radio interface standard consists of the UMTS Time Division Duplex (TDD) system and the TD-SCDMA system. The technical standards of these systems describe the operation in the frequency band around 2 GHz, and also specify that deployment in other frequency band is also possible[13].

UWC-136 Standard

8. The technical standard[14] of the UWC-136 system enables the service deployment in the following 800 MHz frequency band:-

2G Spectrum for UWC-136	Mobile Station Transmit Frequency (MHz)	Base Station Transmit Frequency (MHz)
800 MHz Band	824.04 - 848.97	869.04 - 893.97

DECT Standard

9. According to the relevant standard[15], the DECT system will support TDD operation within the IMT-2000 spectrum in the ranges of 1900 - 1920 MHz, 1920 - 1980 MHz and 2010 - 2025 MHz. The deployment of DECT system in the 2G spectrum is currently not specified in the standard.

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13 For UMTS TDD standard, please refer to the standard 3GPP TS 25.102 version 5.3.0 Release 5 entitled "Universal Mobile Telecommunications System (UMTS); UTRA (UE) TDD; Radio Transmission and Reception". For TD-SCDMA standard, please refer to the specification TS C401 V3.0.0 entitled "China Wireless Telecommunication Standard (CWTS); Working Group 1 (WG1); TD-SCDMA (UE); Radio Transmission and Reception".

14 The frequency bands and channel arrangement for the UWC-136 system are specified by the Telecommunications Industry Association in the specification ANSI/TIA/EIA-136-110-B-2001 entitled "TDMA Third Generation Wireless - RF Channel Assignments".

15 The frequency bands for the DECT system are specified by the European Telecommunications Standards Insititute (ETSI) in the specification ETSI EN 300 175-2 entitled "Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 2: Physical Layer (PHL)".

Annex 3

Other Available Spectrum

Unallocated 3G Spectrum for TDD Operation

Pursuant to the 3G licensing exercise conducted in 2001, the frequency bands from 1900 - 1904.9 MHz and 2010 - 2019.7 MHz designated for Time Division Duplex (TDD) operation remain unallocated. The frequency bands can be made available for allocation to other TDD systems.

2. Apart from the above, other frequency bands may also be used for allocation to TDD systems. However, for those 3G standards which support TDD mode and can make use of unpaired frequency allocations, the relevant technical standards do not explicitly specify the exact range of 2G frequencies being supported. Therefore the possibility of allocating 2G spectrum for these systems remains uncertain and will depend on the availability of commercial products in future.

Additional ITU Allocations for 3G Services

3. The International Telecommunication Union (ITU) has allocated the following additional spectrum for 3G services:-

a) 1980 - 2010 MHz and 2170 - 2200 MHz
b) 2500 - 2690 MHz

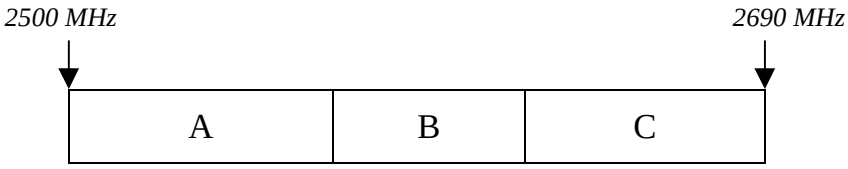
The TA considers that it may be worthwhile to consider whether these frequency bands can be allocated to the 2G operators for migration purpose. However, the existing technical standards for the various 2G or 3G systems do not cover operation in these frequency bands yet. Availability of base station equipment and handsets may pose a problem if these bands are to be used for migration purpose. However, as the expiry dates of the 2G licences are around 2006, this may give some time for relevant product to be developed by the manufacturers.

4. The frequency bands 1980 - 2010 MHz and 2170 - 2200 MHz are currently designated for use as the satellite component of the IMT-2000 systems by regional jurisdictions like Japan and the European Union, though the ITU has not precluded the terrestrial components of IMT-2000 from using these frequency bands. Hence, equipment manufacturers may not have business incentives to develop relevant terrestrial mobile equipment and handsets. As a result, the use of these frequency bands for terrestrial services may not be feasible in the years to come.

5. In Hong Kong, the frequency band 2500 - 2690 MHz is used by the broadcasters for Electronic News Gathering (ENG) links. OFTA has initiated the discussion with the broadcasters for migrating the ENG links to other frequency bands. It is expected that the frequency band will soon be available for allocation to 3G services.

6. Concerning the method to allocate the frequency band 2500 - 2690 MHz to individual operators, the European Conference of Postal and Telecommunications Administrations (CEPT) has recently conducted a relevant study and published its recommendations in a report entitled "Frequency Usage to Facilitate a Coordinated Implementation in the Community of Third Generation Mobile and Wireless Communication Systems Operating in Additional Frequency Bands as Identified by the WRC-2000 for IMT-2000 Systems" in November 2002.[16] In the report, CEPT has preliminarily identified some options for the frequency allocation. One option is to divide the 2500 - 2690 band into 3 parts, namely A, B and C as shown in the diagram below, such that Parts A and C will form the paired spectrum for supporting FDD systems whereas Part B will support TDD systems. However, the bandwidth of each part is not yet fixed at the moment. The exact boundaries of the frequency band can be designated later taking into account development in Europe and elsewhere. CEPT is still considering the options for the channelling arrangements and will postpone the decision to the end of 2004 after gaining more experience from the commercial operation of IMT-2000 systems.

[16] The report is available from the Internet home page of the European Radiocommunications Office (ERO) under the European Conference of Postal and Telecommunications Administrations (CEPT) at "*www.ero.dk*".


2500 MHz
2690 MHz
A
B
C