Spectrum Utilization Fee for
Spectrum Assigned Administratively

Consultation Paper
26 November 2010

Foreword

This paper sets out our preliminary view and proposals on the principles and methodology for setting Spectrum Utilization Fee ("SUF") for spectrum assigned administratively at various frequency bands and on how the SUF charging scheme should be implemented. We invite views and comments on this subject, in particular on the issues specifically raised in this consultation paper. For the avoidance of doubt, all the views expressed in this consultation paper are for the purpose of discussion and consultation only. Nothing in this consultation paper represents or constitutes any decision made by the Secretary for Commerce and Economic Development ("SCED") or the Telecommunications Authority ("TA"). The consultation contemplated by this consultation paper is without prejudice to the exercise of the powers by the SCED or the TA under the Telecommunications Ordinance (the "Ordinance") or any subsidiary legislation.

All persons who wish to submit to the SCED and the TA their views and comments on this consultation paper and its Appendices must do so on or before 25 February 2011. They should be aware that we may publish all or any part of the views and comments received, and disclose the identity of the source in such manner as we see fit. They should also clearly mark and draw to our attention all parts of their submissions which they consider

commercially confidential. We will consider and decide whether or not to disclose such information. All submissions should be addressed to –

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29/F, Wu Chung House
213 Queen's Road East
Wanchai, Hong Kong
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An electronic copy of the submission should be provided by email to the address indicated above.

Part 1 - Introduction

Background: Radio Spectrum Policy Framework

Radio spectrum is a scarce public resource. Good management of spectrum for possibly competing uses among members of the community requires careful planning and efforts towards efficiency. In this respect, in April 2007, the Administration issued the Radio Spectrum Policy Framework[1] (the "Framework") which reflects its policy position and key issues in relation to the management of radio spectrum in Hong Kong. The Framework has set out, *inter alia*, the guiding principles in managing spectrum, i.e. a market-based approach in spectrum management would be used for spectrum wherever the TA considers that there are likely to be competing demands from providers of non-Government services, unless there are overriding public policy grounds to do otherwise. In this connection, SUF will in principle be applicable to all non-Government uses of spectrum[2]. Charging SUF has the important function of ensuring that the use of spectrum is economically, socially and technically efficient, thus safeguarding the benefits of other spectrum users in the community.

Rationale of Applying SUF to Spectrum Assigned Administratively

2. The Government has been collecting SUF through auctions in return for allocating spectrum for public mobile communications services[3]. These bands of spectrum include (with the time when SUF was first applied):

[1] The Framework is available at: http://www.cedb.gov.hk/ctb/eng/legco/pdf/spectrum.pdf.

[2] However, in case the frequency band is assigned wholly or significantly to support public interest purposes agreed by or at the request of the Government, SUF may be adjusted at the sole discretion of the Secretary for Commerce and Information Technology (now the Secretary for Commerce and Economic Development) to reflect the nature of such use. Paragraph 7.2 of the Framework refers.

[3] However, spectrum for 2G services was assigned through administrative assignment prior to the introduction of the Framework in 2007.

spectrum for Third Generation ("3G") services (in 2001 through auction); spectrum for CDMA2000 services (in 2007 through auction); spectrum for Broadband Wireless Access ("BWA") services (in 2009 through auction); the 1800 MHz spectrum for the expansion of public mobile telecommunications services (in 2009 through auction); and spectrum for broadcast-type Mobile TV Services (in 2010 through auction). Given the obligation to pay for harnessing the spectrum to provide services, mobile operators have been careful in assessing their spectrum requirements before they would make bids in an auction of spectrum. SUF, in this case, has proved itself to be an effective market tool to achieve spectrum efficiency.

3. Radio spectrum that has competing demand has invariably been auctioned since the launch of the Framework. Radio spectrum for Government services, for non-Government services required for overriding public policy grounds (like terrestrial broadcasting service and public mobile service provision in country parks), and spectrum without congestion are all assigned administratively. Except for spectrum for Second Generation ("2G") mobile services on which SUF has been levied on an annual basis since 2005, all of these bands of spectrum are **not** subject to any forms of SUF. This indicates that, unlike bands assigned through auction, commercial users of spectrum administratively assigned do not have to pay for occupying spectrum resources. In addition to the issue of equity, whether users have the incentive to put spectrum assigned to them to effective use is questionable. In frequency bands that have become congested, this will diminish the Government's ability to assign spectrum to potential users which require the same frequencies to provide services.

4. The challenge is not remote. For example, with further development in the television industry, there is likely to be a surge of demand for spectrum now designated for Electronic News

Gathering/Outside Broadcast ("ENG/OB") links[4]. Another example is the surge of spectrum demand for fixed links by mobile network operators to cater for the traffic increase (about 3.5 times during 2009 as compared to 2008) for their mobile broadband services. It will form an entry barrier to the incoming users if their use of spectrum is restrained because the relevant frequencies are occupied in a manner not necessarily efficient.

5. The reservation of necessary spectrum to ensure the provision of essential Government services (e.g. communications systems of emergency services, radars for detecting aircraft locations and movement) is an important policy of spectrum management under the Framework. While SUF will not be applicable to spectrum under Government use, the Framework provides that the efficiency of the spectrum use will be subject to a regular review by the TA every three years. Following the completion of the first corresponding review in early 2010[5], the Office of the Telecommunications Authority ("OFTA") has taken steps to implement a number of administrative and technical measures whenever possible to promote the efficient use of Government spectrum. These measures include use of less congested bands, use of more spectrally efficient radio technologies, increased sharing of Government spectrum and increased reliance on commercial services. As a result, over ten frequency bands which were previously reserved for Government use only have been made accessible to non-Government users and guidelines have been drawn up for spectrum assignments for land mobile systems and fixed links deployed by Government users.

6. Applying SUF to spectrum administratively assigned would serve as a price signal to trigger spectrum users to revisit the need for spectrum.

[4] Spectrum for ENG/OB links support telecommunications needs of broadcasters. Hence, ENG/OB spectrum is not considered as spectrum allocated for broadcasting services.

[5] A summary of the review is available at : http://www.ofta.gov.hk/en/freq-spec/govt_review.pdf

To reduce SUF payable, spectrum users are encouraged to make more efficient use of spectrum and return excessive spectrum to the Government for reassignment to potential users who value spectrum most. The community in general will also benefit from charging SUF as it will encourage spectrum users to introduce or deploy innovative and spectrum efficient technologies.

Consultancy Study

7. With the rationale above, the Administration sees a case for further studying the application of SUF for administratively assigned spectrum so as to encourage more efficient use of the scarce frequency resource. In this connection, OFTA has commissioned a consultant ("our Consultant") to develop a generic system for setting SUF for non-Government uses of administratively assigned spectrum and to give advice on implementation issues. A copy of the consultancy report on Radio Spectrum Pricing System (the "Consultancy Report") may be downloaded at the website of the OFTA:
(http://www.ofta.gov.hk/en/report-paper-guide/report/rp20101126.pdf).

Who to Pay SUF

8. Based on the recommendations of our Consultant, we propose to apply SUF to **spectrum administratively assigned that is congested (i.e. 75% occupied) and anticipated to become more congested in the future**. This is subject to exceptions where –

(a) **the uses of spectrum carry significant public interest.** These include (i) spectrum used to provide terrestrial broadcasting (including both radio and television) services; and (ii) spectrum

assigned to mobile network operators for provision of radiocommunications services in country parks and remote areas. Broadcasting services play a unique role to inform, educate and entertain the community. Almost all overseas jurisdictions are practising the "public trustee" model whereby broadcasting spectrum is allocated to the broadcasters with public interest obligations imposed, and SUF-like charges are **not** collected. This also takes note of the essential function of terrestrial broadcasters to widely disseminate messages to the mass free of charge in case of emergency. As for spectrum assigned to mobile network operators for provision of radiocommunications services in country parks and remote areas, we have sound policy reasons to exempt SUF on such use as we seek to encourage coverage of mobile services in these areas; and

(b) **frequencies are under temporary assignment.** The TA receives applications for temporary assignment of frequencies for the purpose of technical trials, field tests or special events for a short period, which typically last for less than six months. Use of spectrum in these cases is necessary for testing of new technologies in the specific environment of Hong Kong, demonstration of innovative applications and services. We are of the preliminary view that such temporary uses of spectrum should be exempted from payment of SUF.

9. We also need to make clear we **do not propose to apply SUF to the use of frequencies under a "commons approach"**. This refers to frequencies designated as a common resource which can be accessed by anyone subject to certain rules, and rely on users of a spectrum to come up

with their own solutions to resolve potential interference problem. This approach allows an unlimited number of unlicensed users to share frequencies with usage rights governed by technical standards and/or etiquette. Spectrum will be available to all users who are willing to comply with the technical standards or to follow the established etiquette where those standards and etiquette help ensure that interference problems would be mitigated. As one of the best-known examples, the industrial, scientific and medical ("ISM") frequency bands[6] designated for Wi-Fi are currently allocated for such use world-wide on a licence-exempt basis using the "commons approach". Cordless phone is another example the spectrum usage of which is based on the "commons approach" and is exempted from the licensing requirement. It is clear that collecting SUF for spectrum used under the "commons approach" is both impractical and difficult.

10. Along the principles set out in paragraphs 8 and 9 above, we have identified the following services at congested bands to which we propose to apply SUFs –

(a) **Fixed links**, which have been assigned to (i) local fixed carriers and broadcasters under the Fixed Telecommunications Network Services ("FTNS") licence / fixed carrier ("FC") licence / unified carrier ("UC") licence; (ii) mobile carriers under the UC licence and the Wide-band Link and Relay Station ("WBLRS") licence; and (iii) utility service operators under the WBLRS licence;

(b) **Electronic News Gathering / Outside Broadcast (ENG/OB) links**, which have been assigned to broadcasters under the FC/UC licence; and

[6] ISM frequency bands were originally reserved internationally for industrial, scientific and medical applications other than communications. In general, communications equipment must accept any interference generated by ISM equipment.

(c) **Selected satellite links**, which have been assigned to providers and users of fixed satellite services under the FC/UC licence, Space Station Carrier ("SSC") licence and Self-provided External Telecommunications ("SPET") licence.

How to Determine the Level of SUF

11. In accordance with the Framework, for spectrum not released through auction or other market mechanisms, SUF may be set to reflect the opportunity cost of the spectrum, unless the spectrum is assigned wholly or significantly to support public interest purposes. For spectrum to which we propose to apply SUF as in paragraph 10, based on the recommendations of our Consultant, we propose to use **the Least Cost Alternative ("LCA") approach** in ascertaining the opportunity cost of the relevant means. This methodology is based on the lowest cost a user will necessarily incur in using alternative means to provide the same service assuming that the spectrum it currently utilizes were to be taken away. **The SUF will be set at the difference between the lowest priced alternative means and the costs of the current means so that the cost of providing the same service with two different means will become essentially the same.** This has the benefit of encouraging certain spectrum users to migrate to the alternative means of providing service and thus release the spectrum bands that are congested.

Implementation Arrangements

12. If the Administration eventually decides to apply SUF to bands of spectrum mentioned in paragraph 10 above, we propose that the SUF will be

payable annually as many administratively assigned frequency bands are granted to users under telecommunications licences with a validity period of one year. We also propose **a transitional period of five years** before the SUF charging scheme will be fully in force so that spectrum users will be given reasonable time to adjust their spectrum usage. Out of these five years, the first two years will be a grace period granted to users for them to evaluate their spectrum use and consider whether they wish to continue using the spectrum at the proposed SUF. In this period, no SUF will be charged. They may choose to return all or part of the spectrum to the TA before the introduction of SUF. Thereafter, we propose to adopt a three-year phase-in arrangement for the payment of SUF, with 30% of the SUF applied at the beginning of the third year, 70% at the beginning of the fourth year, moving on to the full payable amount for the fifth year and beyond. This aims at minimizing the possible adverse impact of introducing SUF on the licensees.

13. Spectrum users on which SUF are chargeable may delay the return of the spectrum to the Government until the end of the grace period, within which they are not required to pay SUF. To provide an additional incentive for the early return of spectrum and to subsidize the costs involved (such as procuring new equipment in other frequency bands or moving to other alternatives) for users to migrate to other means of providing their services, we propose a one-off grant to be provided to spectrum users returning the spectrum. The grant will be offered only to users upon their return of spectrum within the grace period in the first two years, and would amount to 10% of the annual SUF applicable to the spectrum use, or the actual cost incurred in migrating to other means of providing the services, whichever is the less.

14. In addition, we propose to **review the bands that are subject to SUF as well as the level of SUF every five years** to take into account the changing trends of spectrum utilization (e.g. whether congestion persists in a particular band) and to keep pace with the rapidly changing technological landscape and thus the updated cost estimates for setting the SUF.

This Consultation Paper

15. The main purpose of this consultation paper is to seek public comments on the designated frequency bands to be subject to SUF, the recommended approach in setting the SUF level, and the recommended SUF level for congested frequency bands in order to achieve the most economically and socially efficient use of spectrum. This paper is divided into three major parts to discuss the issues in more details as set out in the preceding paragraphs. They include (a) the principles on which we establish the SUF charging scheme for bands that are administratively assigned (Part 2); (b) the frequency bands subject to SUF and the proposed actual level of SUF (Part 3); and (c) the implementation arrangements (Part 4).

Way Forward

16. We welcome the trade and members of the public to submit views and comments on our proposal. We will carefully consider views received to contemplate the way forward and adjust our proposal if necessary. If the Administration decides to proceed with implementing a charging scheme for spectrum assigned administratively, amendments to the subsidiary legislation under the Telecommunications Ordinance (Cap. 106) would be required in order to allow the Administration to impose SUF on the concerned frequencies of spectrum.

Part 2 – Principles for Setting SUF for Administratively Assigned Spectrum

Applying SUF to Congested Bands Only

17. We have indicated in Part 1 that we intend to apply SUF to spectrum administratively assigned to non-Government users that is congested (except uses which carry significant public interests, under the "commons approach" or under temporary assignment for technical trials or special events). The rationale for charging congested bands only are set out in the ensuing paragraphs.

18. The Framework stipulates that the SUF for administratively assigned spectrum may be determined by the SCED to reflect its opportunity cost. Consistent with this, our Consultant recommends that SUF for administratively assigned spectrum should be set at a level which reflects opportunity cost.

19. Opportunity cost is defined as "the value of an asset or resource in the next best alternative that is foregone by virtue of its actual use"[7]. The opportunity cost of a block of spectrum is the value of the opportunity foregone by its current use, i.e. it is the forgone value of the next best alternative use of the spectrum.

20. When the spectrum supply in a frequency band is plentiful, it is unlikely that spectrum could be assigned at a positive price via auction. Under such circumstances, the opportunity cost of spectrum in this frequency band is zero. It would therefore be meaningful to apply SUF to spectrum in congested frequency bands only.

[7] M. Cave, "Review of Radio Spectrum Management", for Department of Trade and Industry and H M Treasury", March 2002.

21. The application of SUF solely to congested bands is also consistent with the international best practice. For example, in the UK and Australia, spectrum fee that exceeds the costs of managing spectrum is applied only to congested bands. It also conforms to the policy objective of facilitating the most economically and socially efficient use of radio spectrum with a view to attaining maximum benefit for the community, which has been set out in the Framework.

22. Accordingly, in determining whether SUF should be applied to a particular frequency band, it is first necessary to establish whether it is congested. In general, a band could be considered as congested when further assignments for current use might cause harmful interference to existing users. Alternatively, a band could also be conceived as congested when the demand for the frequency band in question for uses other than the current one is expected to be high. Adopting one definition is not sufficient: defining a congested frequency band based on the current state of use may fail to cover situations where frequency bands the demand for which is expected to grow but are not yet fully occupied. As such, after due consideration of our Consultant's recommendations, we are of the preliminary view that the following criteria should be used in defining a congested frequency band –

(a) the frequency band is currently congested, the threshold of which being at least 75% occupied; and

(b) the demand for using the frequency band associated with its current use is expected to grow over time (for instance, in the next three to five years); or a high potential demand for the frequency band for alternative use is expected.

Question 1:

Do you agree that SUF for administrative assigned spectrum should only be applicable to the congested frequency bands based on the criteria of congestion given in paragraph 22?

How to Set the Level of SUF

23. To work out models that reflect the spectrum's opportunity cost, our Consultant has examined the options that may be used to derive opportunity cost estimates. Two approaches, namely the "market benchmarks" and "directly calculated value", have been considered.

(a) Market benchmarks approach

24. The "market benchmarks" approach refers to the finding of a reference point in the market to reflect the value of the spectrum. Under this approach, market information such as spectrum prices in auctions or trades, sales price of capacity[8] and market value of companies[9] may be used to estimate the full market value of the spectrum. Such "market benchmarks" approach has its appeal because of its simplicity, objectivity and transparency. Despite the apparent appeal of the "market-benchmarks" approach, however, implementation difficulties severely limit the actual applicability of such an approach. One example is the difficulty involved in making like-for-like comparisons between frequency bands and between market values obtained in different economies and at different points in time.

[8] Spectrum is an input of the capacity. The spectrum value can thus be estimated by deducting the value of other inputs from the capacity price.

[9] The market value of companies holding spectrum rights consists of the value of the spectrum plus the value of other assets. The spectrum value can thus be estimated by deducting the value of other assets from the company's value.

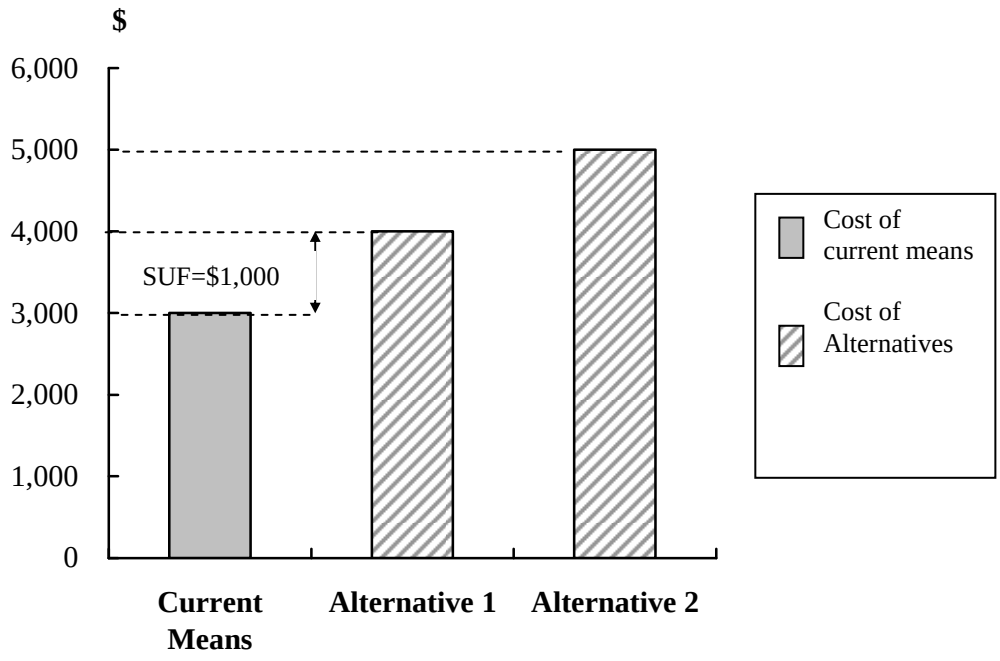
This problematic aspect of the "market benchmarks" approach is apparent in cases where the spectrum is used for private applications like fixed links and private mobile radio.

(b) Directly calculated value approach

25. Given the difficulties of adopting the "market benchmarks" approach for coming up with estimated spectrum value, an alternative way of finding spectrum value considered by our Consultant as more appropriate in Hong Kong's context is the "directly calculated" approach. Under this "directly calculated" approach, the value of spectrum is estimated through the method of finding the "least cost alternative" ("LCA"). For the LCA method, it starts from the position of a spectrum user whose current operation involves the utilization of a congested frequency band. It then goes on to consider what the same user might do in order to deliver the same service if the existing spectrum currently utilized by the user were to be taken away. The identification of the LCA thus entails the construction of an imaginary scenario where the existing user of a congested spectrum is made to choose the lowest priced alternative for delivering the same service. SUF based on LCA would act as an incentive for at least some users of the congested band to migrate to the other means for delivering a service formerly provided through using spectrum in the congested frequency band. The user's migration to the LCA for service delivery would help shift demand away from the congested frequency band, thereby relieving the congestion problem. Box 1 explains the setting of SUF using the LCA approach.

Box 1: Setting SUF using the least cost alternative (LCA) approach

The figure below shows the cost of the current means and the costs of two alternative means of delivering a service. Under the LCA approach, SUF is to be set at the difference between the cost of the lowest alternative means (i.e. Alternative 1) and the cost of current means (i.e. SUF = $4,000 – $3,000 = $1,000).



26. In determining the appropriate approach to be adopted, it is important to consider the characteristics of the frequency bands concerned. According to the discussion in paragraphs 17 to 22 which culminate in the proposal raised in Question 1, the scope of this consultation exercise is limited to the congested frequency bands, including frequency bands allocated for fixed links, ENG/OB links, and selected satellite links.

27. For the congested frequency bands referred to in paragraph 26, the "market benchmarks" approach has limited applicability because such frequency bands tend not to be auctioned, their capacity not traded and their share of the companies' values small. We note that spectrum prices in the

UK levied on congested frequency bands are based on opportunity costs estimates obtained through calculation of LCA. In New Zealand, a similar procedure is followed in estimating the relevant opportunity cost. Given the characteristics of the congested frequency bands as described and following the international best practice, we are of the preliminary view that the "directly calculated" approach is the more appropriate way to estimate the opportunity cost.

Adopting the LCA Approach

28. Taking into account the advice of our Consultant, we are of the preliminary view that the level of SUF for administratively assigned spectrum should be based on the estimation of the opportunity cost of the spectrum obtained through identification of the LCA and should be set at the difference between the cost of the current means of spectrum and the cost of the LCA.

Question 2:
Do you agree that SUF levied on the administratively assigned spectrum should be based on the LCA approach?

Part 3 – Frequency Bands Proposed to be Subject to SUF and Proposed Level of SUF

29. In Part 2, we have explained the use of congestion as the criterion for charging SUF on spectrum administratively assigned. Under this arrangement, the frequency bands of spectrum subject to SUF will include those allocated for fixed links, ENG/OB links and selected satellite links. This part of the consultation paper will examine in greater detail each of these congested frequency bands and the proposed level of the SUF associated with them.

Fixed Links

30. At present, fixed links are assigned to –

(a) local fixed carriers and broadcasters under FTNS/FC/UC licence;
(b) mobile carriers under UC licence and WBLRS licence; and
(c) utility service operators under WBLRS licence.

31. Starting from 1 August 2008, the UC licence regime is promulgated and FTNS/FC licence and Mobile Carrier ("MC") licence are no longer issued[10]. Existing FTNS/FC licence and MC licence will be replaced by UC licence upon renewal. Recently, the licence period of a number of FTNS/FC licences have expired and any fixed links, if any, operated by these fixed carriers are now licensed under the UC licence. Fixed links operated by mobile carriers are licensed under the WBLRS licence before the introduction of the UCL regime. After the UCL regime is introduced,

[10] For details, please refer to the TA Statement on Licensing Framework for Unified Carrier licence at http://www.ofta.gov.hk/en/tas/others/ta20080509.pdf and the Guidelines for Submission of Proposals for Applying Unified Carrier licence at : http://www.ofta.gov.hk/en/report-paper-guide/guidance-notes/gn_201022.pdf

newly assigned fixed links to mobile carriers are licensed under the UC licence.

32. Frequency bands that are commonly assigned for fixed links are listed in Annex 1, which also sets out the congestion status of the various frequency bands using the criteria proposed in paragraph 22. The frequency bands which are identified as congested bands[11] according to such criteria are –

6440 – 7100 MHz

7421 – 7900 MHz

7900 – 8000 MHz

8275 – 8500 MHz

10700 – 11700 MHz

33. Our Consultant identifies a number of alternatives to the use of the fixed links for service delivery. The alternatives are –

(a) use of more efficient technology (e.g. higher modulation state);
(b) use of alternative (higher and uncongested) frequencies;
(c) use of alternative services (e.g. leased line or satellite link); and
(d) self provision of fibre / cable

34. Our Consultant has estimated the differences between cost of the current means and costs of different alternative means of delivering the same service and these are reported in Table 1 below. Given the difference in the licence fees payable under FTNS/FC/UC licence and those payable under WBLRS licence, the cost estimates of the various alternative means relative

[11] Apart from frequency bands listed in paragraph 31, the 5850 – 5950 MHz band is a congested band for provision of fixed link services. However, the 5850 – 5950 MHz band overlaps with 5850 - 6425 MHz for C-band satellite uplinks. Fixed links using this band is therefore required to share the spectrum with satellite uplinks on an uncoordinated basis. In view of this arrangement, SUF for fixed links in the 5850 – 5950 MHz band will be addressed in paragraph 47.

to the cost of current means are not the same for the two classes of licences.[12]

Table 1: Summary of Costs of Alternatives to a Fixed Link

Alternatives	Cost of Alternatives relative to Cost of Current Means (HK$ per MHz per annum)		Remarks
	(under FTNS/FC/UC licence)	(under WBLRS licence)	
More efficient technology	-4,045	-528	Negative value implies use of more efficient technology is cheaper than the current means of spectrum
Higher and uncongested frequencies	2,936	5,086	Additional cost to current spectrum fees in congested bands
Public services – leased line	2,947	6,464	Inclusive of additional fibre installation costs
Public services – satellite link	351,000 – 655,200	351,000 – 655,200	Based on substituting a satellite link for a single fixed link hop
Self provision of fibre / cable	34,662	38,179	Based on high capacity 10 km link

35. Our Consultant advises that alternatives with negative values should not be used to set the SUF as incentives exist already in the form of cost

[12] For WBLRS licence, the licence fee is $0.15 per kHz. For FTNS/FC/UC licence, the fee for the management of spectrum is $50 for every 1 kHz or part thereof for spectrum below 1 GHz; $(50-4 x the relevant GHz band used) for every 1 kHz or part thereof for spectrum from 1-10.999 GHz; $(20-the relevant GHz band used) for every 1 kHz or part thereof for spectrum from 11-18.999 GHz and $1 for every 1 kHz or part thereof for spectrum above 19 GHz. For example, if the user is using spectrum in 2 GHz, the spectrum management fee would be $(50 – 4 x 2) = $42 per every 1 kHz. Where the spectrum is assigned on a non-exclusive or shared basis, the fee shall be proportionally reduced by a reduction factor equal to the number of users authorized.

saving and such alternatives are thus likely to be taken up by the operator in the normal course of events. Rather, the SUF should be based on the lowest positive value, as this should provide incentives for current user of the congested frequency band to take up the alternative means of service delivery associated with the lowest positive value thereby vacating spectrum for higher value users and relieving congestion. In case that the setting of SUF based on the lowest positive value is insufficient for relieving the congestion problem, the SUF should then be increased using the next highest positive value and so on.

36. Having considered the advice of our Consultant, we are of the preliminary view that the SUF for a fixed link should be set at the calculated value of the alternative of moving to higher and uncongested frequencies, i.e. HK$3,000 (rounded up from HK$2,936) per MHz per annum for fixed links operated under FTNS/FC/UC licence and HK$5,000 (rounded down from HK$5,086) per MHz per annum for fixed links operated under WBLRS licence. Of note is that for a bi-directional fixed link, the amount paid is twice the amount of fee times the bandwidth assigned in each direction.

37. It is important to note that fixed links are used to provide radio linkage between two specified fixed locations. In general, a fixed link is directional and the frequency assigned to such a link can be reassigned to more than one operator for use at different locations. A frequency channel could typically be assigned for reuse for six times in the congested bands for fixed links in Hong Kong[13]. As such, the costs of the alternative of moving to higher uncongested frequencies (i.e. HK$2,936 and HK$5,086) are calculated with the reduction factor taken into account. In the circumstance

[13] The use of a reduction factor of six has been used for the calculation of the annual fee for the management of spectrum as part of the annual licence fee payable by the fixed carriers since the inception of the FTNS licence in 1995.

where a block of frequency is assigned on an exclusive basis[14], the reduction factor should be disregarded and the SUF payable should be set at HK$18,000 (rounded up from HK$17,616) per MHz per annum (i.e. HK$2,936 x 6 = HK$17,616) for FTNS/FC/UC licence and HK$30,000 (rounded down from HK$30,516) per MHz per annum (i.e. HK$ 5,086 x 6 = HK$30,516) for WBLRS licence.

Question 3: Do you agree with the approach on setting the SUF for congested frequency bands for fixed links[15] mentioned in the above paragraphs?

ENG/OB Links

38. ENG/OB links are assigned for use by broadcasters under FC/UC licence. Frequency bands that are commonly assigned as ENG/OB links are those listed in Annex 2. Annex 2 also sets out the congestion status of the various frequency bands for ENG/OB links based on the criteria proposed in paragraph22. The frequency bands identified as congested bands according to such criteria are -

2055 – 2095 MHz

2200 – 2290 MHz

39. Since ENG/OB links are essentially fixed links even though many of them are transportable, our Consultant advises that SUF for ENG/OB links should be set with reference to the SUF recommended for fixed links. In this connection, it is important to note that ENG/OB links operate at unspecified points and the spectrum assigned to these links is in general

[14] For the avoidance of doubt, the TA may authorize other users to use the spectrum assigned to the licensee provided that such other users shall be obliged under the relevant authorization not to cause harmful interference to the telecommunications service of the licensee.

[15] Fixed links assigned under FTNS/FC/UC licence and WBLRS licence.

exclusive in nature. Our Consultant thus recommends that SUF for ENG/OB links assigned for exclusive use should be set at a level of HK$18,000 (rounded up from HK$17,616) per MHz per annum (i.e. HK$2,936 x 6 = HK$17,616).

40. Of the total 130 MHz spectrum in the two congested bands identified in paragraph 38, 120 MHz has been assigned to four domestic TV broadcasters for ENG/OB link applications. To allow flexibility in accommodating more TV broadcasters in the congested bands, the use of the 20 MHz spectrum in the 2065 – 2085 MHz sub-band is now assigned on a sharing basis and the user is required to share the spectrum with other authorized users should the need arise in the future. Owing to the nomadic nature of ENG/OB systems, the number of sharers for the spectrum will as far as possible be limited to two. We propose that the ENG/OB links using shared spectrum in the congested bands (i.e. spectrum for non-exclusive use) should adopt a sharing factor of two and therefore be subject to an SUF of HK$9,000 (rounded up from HK$17,616/2 i.e. HK$8,808) per MHz per annum.

41. Having considered the recommendation of our Consultant, we are of the preliminary view that SUF for the congested frequency bands for the ENG/OB links should be set at levels of HK$18,000 and HK$9,000 per MHz per annum for exclusive and non-exclusive uses respectively.

Question 4: Do you agree with the approach on setting the SUF for congested frequency bands for ENG/OB links[16] mentioned in the above paragraphs?

[16] ENG/OB links assigned under FTNS/FC/UC licence.

Selected Satellite Links

42. Over the past decades, fixed satellite service ("FSS") has been providing a number of telecommunications applications, such as TV broadcasting, very small aperture terminals and external satellite links. Satellite stations include those licensed under the FC/UC licence, SSC licence, SPET licence and the Satellite Master Antenna Television ("SMATV") licence. Apart from these licensed stations, television receive-only ("TVRO")[17] stations are licence-exempt under section 8(4) of the Ordinance.

43. FSS in Hong Kong mostly operates in C-band while the other satellite bands are not so heavily used. C-band is divided into downlink spectrum in the 3400 – 4200 MHz band for space-to-earth transmissions, and uplink spectrum in the 5850 – 6425 MHz band for earth-to-space transmissions.

44. The C-band spectrum may also be allocated for fixed links, because according to the Radio Regulations published by the International Telecommunication Union ("ITU"), the spectrum in question is allocated to both FSS and fixed services on a co-primary basis. The advice of our Consultant is that if the C-band spectrum is allocated solely to the use of FSS, the SUF for fixed links on the basis of exclusivity (i.e. HK$17,616 per MHz) should be applied to C-band satellite links. This is because the spectrum concerned has been assigned solely for satellite links usage, and such spectrum cannot therefore be assigned for fixed links usage, i.e. the denial of fixed link usage. This contributes to the congestion of the bands for fixed links, and the proposed SUF level for fixed links bands should apply to the C-band spectrum.

[17] A TVRO system is a standalone system for receiving TV signals in single premises.

(a) C-band Satellite Downlink (3400 – 4200 MHz band)

45. At present, there are a large number of satellite stations using the C-band downlink spectrum and a great majority of these stations are SMATV and TVRO deployed for receiving satellite TV signals. OFTA's record shows that over 1,700 SMATV systems are now licensed for distribution of satellite TV programmes to individual households of multi-storey buildings. TVRO stations for use by single premises are also commonplace in Hong Kong. Arising from the discussion in paragraph 9, we are of the view that the "commons approach" would be more appropriate for this case, i.e. SUF should not be imposed on the spectrum used by satellite downlinks.

46. It should also be highlighted that there are practical difficulties in imposing SUF on satellite downlink spectrum. As OFTA does not maintain records of TVRO stations due to the nature of their licence-exempt use, imposing SUF on such stations is virtually impossible. It would not be fair if SUF is imposed only on the licensed stations listed in paragraph 42, but not the licence-exempt TVRO stations. However, even if we are minded to impose the SUF on the TVROs too, then substantial administrative costs will have to be incurred to identify the locations and users of these licence-exempt stations.

(b) C-band Satellite Uplink (5850 – 6425 MHz band)

47. In Hong Kong, the 5725 – 5875 MHz band is designated for ISM applications. It is noted that 25 MHz of the ISM spectrum (i.e. 5850 – 5875 MHz band) falls within the C-band satellite uplink band. In general, radio services using the ISM spectrum should accept any interference

generated by ISM equipment and operate in an uncoordinated manner and there is no restriction on the number of radio users that can access to the ISM spectrum. Following the discussion in paragraph 9, we are of the view that the "commons approach" should be adopted and SUF should not be imposed on the spectrum in the 5850 – 5875 MHz band used by FSS or fixed links.

48. Regarding the satellite uplink spectrum in the 5875 – 6425 MHz band, it is noted that certain fixed links using spread spectrum or other mitigation techniques can coexist with satellite uplinks. On 18 May 2001, the TA issued a statement announcing his decision to allocate a common block of 100 MHz in the 5850 – 5950 MHz band for shared use by both fixed links and C-band satellite uplinks on an uncoordinated basis. Unlike those operating in the bands allocated exclusively for fixed services, fixed links in the 5850 – 5950 MHz band are not protected against the transmissions from satellite uplinks and other fixed links. Based on the frequency reuse by satellite stations with geostationary orbital separation and the spectrum sharing by fixed links operated by prospective telecommunications operators, we are of the view that a sharing factor of 50 should be adopted for the shared use of spectrum in the 5850 – 5950 MHz band. We therefore propose that the C-band satellite uplink in the 5875 – 6425 MHz band should be subject to an SUF of HK$350 (rounded down from HK$352) per MHz per annum (i.e. HK$17,616/50 = HK$352). This same level of SUF at HK$350 per MHz per annum is also applicable to fixed links that share the C-band uplink spectrum on an uncoordinated basis.

(c) Satellite Uplink (6425 – 7075 MHz band)

49. According to the Radio Regulations of the ITU and the Hong Kong

Table of Frequency Allocation[18], satellite uplinks may be operated in the 6425 – 7075 MHz band in addition to the C-band. In Hong Kong, the spectrum in this band is mainly used by fixed links with frequency assignments in the band for FSS made only on an individual basis. Unlike those operating in the 5850 – 5950 MHz band, fixed links in the 6425 – 7075 MHz band are protected against the FSS transmissions. At present, there are only a handful of FSS earth stations using the 6425 – 7075 MHz band for uplink transmissions. Following the arguments on denial of fixed link usage in paragraph 44 and the proposed SUF for non-exclusive use of fixed link, it would be logical that satellite uplink in the 6425 – 7075 MHz band should be subject to the SUF at HK$3,000 (rounded up from HK$2,936) per MHz per annum (i.e. HK$17,616/6 = HK$2,936), the same level as that for fixed links.

Question 5: Do you agree with the approach on setting the SUF for congested frequency bands for satellite uplinks mentioned in the above paragraphs?

[18] The Hong Kong Table of Frequency Allocation is available at: http://www.ofta.gov.hk/en/freq-spec/FreqTable.pdf

Part 4: Implementation Issues

SUF in Lump Sum or Annual Fee Payment

50. Many administratively assigned frequency bands under consideration are granted to users under telecommunications licences with a validity period of one year, such as the WBLRS licence and SPET licence. In these cases, the SUF should be payable in the form of annual payment. For telecommunications licences with a validity period exceeding one year, such as FTNS/FC/UC licence and SSC licence[19], the SUF can either be paid as a lump sum payment (as is often the case for an auction) or as an annual fee paid over the duration of the licence.

51. Our Consultant advises that annual payment of SUF has advantages over lump sum payment. Annual charges provide a better on-going incentive for efficient spectrum use as the user is regularly reminded of the cost of using spectrum. Unlike large upfront lump sum payment, annual charges will minimize the impact on the cash flows of the operators. For the sake of consistency, it is also reasonable to charge FTNS/FC/UC licensees on an annual basis, as in the case for other annual licences. Having considered the advice of our Consultant, we are of the preliminary view that SUF should be imposed as annual payment regardless of the validity period of the licence.

Question 6: Do you agree that SUF should be imposed as annual payment regardless of the valid duration of the licence?

[19] The period of validity for FTNS/FC/UC licence and SSC licence is 15 and 20 years respectively.

SUF for Fixed Links Assigned to Mobile Carriers under WBLRS Licence

52. As explained in paragraph 31, prior to the introduction of the UCL regime, fixed links operated by mobile carriers are licensed under the WBLRS licence. Currently, there are substantial differences in licence fees for the use of identical frequency bands under the two classes of licences. For example, the annual licence fee / fee for the management of spectrum for a 7 GHz fixed link under the WBLRS licence and the UC licence are $150 per MHz and $3,667 per MHz respectively.

53. To be equitable to the fixed carriers who operate their fixed links under their UC licence, it was the TA's intention that fixed links will be assigned to mobile carriers under UC licence instead of WBLRS licences. Subsequent to the implementation of the SUF scheme, mobile carriers who are now operating fixed links under WBLRS licences may apply for assignment of fixed links under their UC licences upon expiry of their relevant WBLRS licences. As recommended by our Consultant, the SUF would be determined having regard to the licence fee paid to OFTA. In this connection, the total fee (i.e. SUF plus licence fee) payable would be normalized to a fairly similar level under both the UC licences and WBLRS licences.

54. Given the analysis above, we are of the preliminary view that fixed links operated by mobile carriers should be assigned under UC licence, instead of WBLRS licence, and thus be charged with the relevant SUF accordingly. Any existing WBLRS licence holders who are mobile carriers should be replaced with an updated UC licence. The arrangements will be implemented as the charging scheme is in place.

Question 7:

Do you agree that fixed links operated by mobile carriers should be assigned under UC licence (instead of WBLRS licence) and thus be charged with the relevant SUF accordingly?

Transitional Arrangements

55. The Administration has earlier indicated its intention not to impose new SUF on a telecommunications licensee when its existing licence is still valid. On review, it is noted that some frequency bands concerned are assigned to users under annual telecommunications licences (e.g. WBLRS licence) and to users under FTNS/FC/UC licences with a validity period of 15 years. SSC licences have licence periods of up to 20 years each. If the existing users under FTNS/FC/UC licences are not required to pay SUF because their licences will be renewed only many years later, this would give rise to concerns over fairness between operators who use the frequency bands under different licences.

56. It is our intention to introduce SUF to all affected users at the same time regardless of when the validity of the licence period ends. To allow a reasonable period for spectrum users to adjust their spectrum usage and by making reference to the notification period that the TA will give in case of withdrawal of spectrum[20], a grace period of two years is proposed for the spectrum users to evaluate their spectrum use and to consider whether they wish to continue using the spectrum at the proposed SUF after two years or to return all or part of the spectrum to the TA before the introduction of SUF. In addition to the two-year grace period, we intend to adopt a three-year

[20] See the statement on Minimum Notice Periods for Variation or Withdrawal of Spectrum Assignments by the Telecommunications Authority issued in January 2008 at http://www.ofta.gov.hk/en/tas/others/ta20080131.pdf

phase-in arrangement in payment of SUF in order to minimize the possible adverse impact of introducing SUF on the licensees. Our preliminary view on this matter is consistent with the advice of our Consultant.

57. We propose the following transitional arrangements for implementing the SUF charging scheme -

(a) For the sake of fairness, where a given frequency band is designated to be subject to payment of SUF[21], all users of that frequency band should be charged from the same date, irrespective of the time at which the licence is due for renewal;

(b) SUF would be introduced two years after the announcement of the SUF charging scheme. Such two-year grace period would allow spectrum users sufficient time to evaluate their spectrum use and to consider whether they wish to make use of other alternatives and to return part or all of the spectrum to the TA;

(c) After the two-year grace period, SUF would be introduced by a three-year phase-in approach, with 30% of the SUF imposed at the beginning of the third year, 70% at the beginning of the fourth year, moving on to the full payable amount for the fifth year and beyond; and

(d) To provide a financial incentive for users to return the spectrum subject to SUF at an early stage, a one-off grant amounting to 10% of the annual SUF applicable to the spectrum use, or the actual cost incurred in migrating to other means of providing the services, whichever is the less, will be granted to these users if

[21] For avoidance of doubts, a Summary Table listing the designated congested frequency bands and proposed level of SUF is in Annex 3.

the spectrum is returned within the two-year grace period.

Question 8:
Do you agree that SUF should be applied to all users of the designated congested frequency bands irrespective of the time when the licence of the user is due for renewal?

Question 9:
Do you agree with the transitional arrangements for implementing the SUF charging scheme (i.e. the grace period, the phase-in introduction of the SUF and the one-off grant arrangement) as proposed in paragraph 57 above?

Periodic Review of SUF Charging Scheme

58. Given that the technological landscape is changing rapidly in the telecommunications industry, which may render the cost estimates for setting SUF to become obsolete equally fast, we are mindful of the need to conduct periodic reviews of the SUF charging scheme. Our Consultant considers that licence duration is not a relevant factor in considering the frequency of review. Instead, specific factors such as the administrative costs, time needed for undertaking a pricing review, the time needed for a useful series of data on changes in spectrum use to be collected, the volatility of spectrum demand and the need to give licensees certainty on the level of SUF in planning spectrum use as well as making investment decisions should be taken into account in deciding on the frequency of the SUF charging scheme review. Taking into account these factors and relevant overseas experiences, our Consultant advises us to **review the SUF charging scheme every five years**.

59. Frequency bands may become more congested (or less so) due to shifting economic conditions in between reviews. Our Consultant advises that a change in the level of use of a frequency band over the short term, say one to two years, may not warrant a policy change in between reviews.

60. Having considered the advice of our Consultant, we are of the preliminary view that the designation of congested bands and the level of SUF imposed on the designated frequency bands should be adopted for a period of five years. They are subject to review every five years and following the conduct of public consultation by the Administration if required.

Question 10: Do you agree that SUF charging scheme should be reviewed every five years?

Commerce and Economic Development Bureau
(Communications and Technology Branch) and
Office of the Telecommunications Authority
26 November 2010

Annex 1

Congestion Level of frequency bands for provision of fixed services

From (MHz)	To (MHz)	Congestion
30	300	No
300	3000	No
4400	4990	No
5850	5950	Yes
6440	7100	Yes
7421	7900	Yes
7900	8000	Yes
8000	8275	No
8275	8500	Yes
10150	10300	No
10500	10680	No
10700	11700	Yes[1]
12500	13250	No
14400	15350	No
17700	19700	No
21200	23600	No
24450	31300	No
37000	39500	No

[1] At the time when the consultancy report was prepared, there were some changes in the occupancy level of 11 GHz band (i.e. 10.7-11.7 GHz). Requests for assignment of the band for deployment as fixed links were received. As a result of the assignment, the band has become congested.

Annex 2

Congestion Level of frequency bands for provision of ENG/OB services

From (MHz)	To (MHz)	Congestion
2055	2095	Yes
2200	2290	Yes
7100	7421	No
11700	12200	No
12500	13250	No
14400	15350	No

Annex 3

Summary Table on designated frequency bands subject to SUF and the amount of SUF payable

Designated Frequency Bands (MHz)	SUF (in HK$/MHz/annum)	
	Exclusive Use	Non-Exclusive Use
2055 – 2095	$18,000	$9,000
2200 – 2290		
5875 – 6425[1]	N.A.	$350
6425 – 7100[2]	$18,000 ($30,000 for WBLRS licence)	$3,000 ($5,000 for WBLRS licence)
7421 – 7900		
7900 – 8000		
8275 – 8500		
10700 – 11700		

[1] As mentioned in Footnote 11, the 5850 – 6425 MHz band for satellite uplinks overlaps with the 5850 – 5950 MHz band for fixed links. SUF would not be imposed on the 5850 – 5875 MHz band under the "commons approach".

[2] As mentioned in paragraph 32, the 6440 – 7100 MHz band is a congested band for fixed link. This band partly overlaps with the 6425 – 7075 MHz band for satellite uplinks. The 6425 – 7100 MHz band showed in this table includes the boundaries of these two overlapped bands.