Consultation Paper on
Proposed Spectrum Policy Framework

Foreword

This document sets out the Government's proposals on a policy framework for radio spectrum.

Please send your comments on the proposals to the Communications and Technology Branch of the Commerce, Industry and Technology Bureau by 24 January 2007 by any of the following means:

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Executive Summary

Radio spectrum is a finite public resource. Its availability is important to the operation of radiocommunications networks and services. Radio spectrum needs to be managed to manage demand and to contain interference to acceptable levels.

2. With fast technological advancements and dynamic market developments, there is a need to review the spectrum policy with a view to formulating a responsive and transparent policy that enables the community to reap maximum benefits from the deployment of spectrum. This consultation paper sets out the proposed high-level spectrum policy framework.

3. In developing a spectrum policy framework, the Government should have regard to a number of considerations. These considerations include the ability to accommodate the future shape of radiocommunications, international developments in spectrum policy and management frameworks, clarification of spectrum allocation and assignment procedures that could encourage investment by the industry, the flexibility to support wider strategic policy objectives for the overall benefit of Hong Kong, the ability to serve policy objectives that support social needs, and the provision of fair return to the community for the use of spectrum for commercial purposes.

4. Having regard to the above considerations, the consultation paper proposes a spectrum policy framework that covers six aspects – spectrum policy objectives, guiding principles in spectrum management, spectrum rights, spectrum supply (including spectrum trading and liberalisation), spectrum for government services and spectrum pricing.

5. The proposed spectrum policy objectives, set out in paragraph 31 of the consultation paper, would provide guidance for the Telecommunications Authority (TA), the statutory spectrum manager in Hong Kong, in formulating his spectrum strategy and management arrangements. In particular, one of the policy objectives is to strengthen Hong Kong's strategic position as a world city and the gateway between the Mainland and the world by facilitating the provision of key services in Hong Kong which are deployed, or will be deployed, globally or in the Mainland. This provides a new dimension in the TA's management of spectrum in order to cater for the increasing economic integration between Hong Kong and the Mainland and the potential wider economic benefits that may be brought about through spectrum management

decisions.

6. Drawing on the practice of some overseas regulators, the consultation paper proposes that the spectrum policy framework should set out a guiding principle that the TA should use market-based approach in spectrum management when there are competing commercial demands, unless there are overriding public policy reasons to do otherwise, which should be published for transparency to the industry. The publication of this guiding principle in spectrum management will provide transparency to and predictability of regulatory decisions in spectrum management.

7. Because some radiocommunications equipment and receivers can have an economic life of at least 5 to 10 years, the lack of predictability of how the TA may exercise his statutory powers to vary or withdraw spectrum assignment could deter investment. The proposed spectrum policy framework clarifies that the TA should not vary or withdraw frequencies assigned to a licensee before the expiry of the spectrum assignment except in circumstances where public interest, or government policy or international obligation, or where interference between legitimate spectrum users, renders it necessary to exercise the statutory powers. The TA should also give minimum notice periods to affected spectrum assignees to enable them to plan ahead.

8. On the other hand, the spectrum policy framework re-affirms that there is no legitimate expectation for spectrum rights after the end of a spectrum assignment, but for licences where substantial investment in the underlying infrastructure is required, a sufficiently long notice period should be given before the expiry of the spectrum assignment. The TA will draw up the appropriate notice periods for different types of spectrum assignments.

9. For spectrum refarming exercises, which is a significant regulatory intervention to introduce new spectrum use for the benefit to consumers and new spectrum users by vacating existing spectrum users, the spectrum policy framework will require the TA to undertake an appraisal of the impacts of different options, including an option of “do nothing”, so as to provide a firm and transparent basis for his consideration in the exercise of statutory powers for spectrum management purposes.

10. The possibility of according spectrum rights for non-licensees under the TO is raised in the consultation paper, but we do not propose that this issue needs to be covered in the spectrum policy

framework at this juncture. If there is strong demand for the introduction of some form of spectrum rights for non-licensees, the TA could consider this possibility.

11. Spectrum supply for specific applications could potentially come from three sources – the TA, other spectrum users whose assignment permits the use of spectrum for those applications, and the existing users' own spectrum if the use of spectrum could be changed to those applications.

12. On spectrum supply from the TA, the spectrum policy framework proposes that the TA should publish a spectrum release plan for the supply of spectrum to the market through an open, competitive bidding process in the following three years. The plan should be updated annually on a rolling basis taking into account the latest developments. This plan should give the industry a three-year horizon of likely spectrum supply from the TA, in order to facilitate them to make informed choices about infrastructure investment, service development, and which bands to bid for.

13. On spectrum supply from other spectrum users, this can be facilitated through permitting secondary trading of spectrum in Hong Kong. While spectrum trading can be a significant market mechanism to provide financial incentives for spectrum assignees to put spectrum to the most efficient use, there are substantial implementation issues to be resolved, most significantly the licensing arrangements to facilitate spectrum trading, the question of trading gains from sale of spectrum obtained, and the regulatory measures to prevent anti-competitive practices such as hoarding of spectrum by operators with means. The consultation paper proposes, as a broad direction under the spectrum policy framework, that consideration should be given to introducing secondary trading of spectrum in the longer term future, subject to a study on the feasibility of this proposal in Hong Kong.

14. On spectrum supply through allowing a spectrum user to change the technology and/or use of the assigned spectrum without the need to obtain consent from the regulators (generally called "spectrum liberalisation"), there are constraints on the degree of flexibility that could be introduced, particularly from interference management angle. Since spectrum liberalisation is not yet proven in a small, densely populated place like Hong Kong, we intend to monitor its development in other jurisdictions and consider further study for its general introduction in Hong Kong.

15. Because of the nature of government services, the consultation proposes that spectrum will continue to be reserved by the TA for government spectrum users, but they should be subject to a regular administrative review every three years on how efficiently spectrum assigned to them has been put to use, their future spectrum requirements and ways to improve the efficiency of spectrum usage.

16. Spectrum utilisation fee (SUF) is currently only applicable to spectrum for second and third generation mobile services. It can be a useful financial tool to manage competing commercial demands for spectrum and enable the community to reap financial benefit from the commercial use of spectrum as a public resource. The consultation paper proposes that SUF should be generally applicable to commercial use of spectrum unless there are public policy considerations. However, we note that most spectrum users currently do not have to pay SUF. If the proposal is implemented, careful consideration would be given to detailed arrangements and adequate lead time would be allowed for parties concerned to get prepared for it.

17. For spectrum with competing commercial demands, the auction process should be able to determine the appropriate SUF. For spectrum which is not auctioned, the SUF should be administratively set to reflect the opportunity cost of the spectrum, which may be determined by taking reference from outcome of a similar spectrum auction in Hong Kong or elsewhere conducted recently, or by considering the lowest cost of alternative methods that could meet the spectrum user's communications needs without using the spectrum.

Part I Introduction

Spectrum Use

Radio spectrum, referred in this consultation paper as "spectrum", is an important, intangible and scarce public resource for telecommunications, broadcasting and other purposes. By modulating electromagnetic waves at certain radiofrequencies, radiocommunications equipment can send messages from one place to another without the need for any physical wiring linking the two places.

2. We use spectrum every day. For example, our mobile telephones use spectrum to establish wireless connections to "mobile base stations" so that we can make voice calls, or send text messages, from anywhere within the coverage of such mobile base stations. We receive our satellite television broadcast signals and sound broadcast signals through spectrum. So are the popular local terrestrial wireless television programmes. Our contactless stored value smartcards, such as the Octopus cards, are activated by electromagnetic waves sent from the card readers and use spectrum to transmit data between the cards and the card readers. Our microwave ovens generate electromagnetic waves at certain radiofrequencies that cause water molecules in the food to vibrate, thereby heating up the food.

3. Spectrum is also used for supporting the delivery of public services and the operations of utilities and private businesses. For example, the Hong Kong Observatory's weather radars emit and receive electromagnetic waves to detect rain bands. Similarly, the Civil Aviation Department's radars use spectrum to track aircraft movements. Emergency services such as the Police and Fire Services use radiocommunications equipment to communicate with their frontline staff. Electricity companies and other utilities companies set up "point-to-point" radio links to establish data communications channels between different facilities and support their operations. Furthermore, different types of radiocommunications equipment are used to support business operation in various trades, including the transportation and estate management businesses.

4. Thus, the availability of spectrum is important to the operation of many radiocommunications networks, services and equipment. Spectrum can be considered as a medium in which many wireless applications are run and many day-to-day activities are supported. It can be considered a critical input for future innovation and growth in the

communications sector. Communications, as a part of the information and communications technology sector, is one of the key drivers of productivity and hence long-term economic growth.

Spectrum Management

5. Spectrum is a finite resource, in that spectrum cannot be produced using other resources such as capital or labour. Unlike land or other tangible public resources, spectrum can be accessed by anyone, anywhere, and would not exclude others from using the same resource[1] (although interference may occur in some situations). Unless there is some form of control or management arrangements, there is no economic incentive for a spectrum user to optimize the use of this public resource. This will naturally lead to the inefficient use of the resource and thus reduce its potential benefit to the community.

6. Spectrum also has a negative "externality" property[2], in that the use of this resource by one party may adversely affect another party. In particular, electromagnetic waves know no geographic or national boundaries. Electromagnetic waves generated at a particular location can affect another party's use of spectrum of certain radiofrequencies if the emission power generated by the original source is sufficiently strong. If there were no consensus or control over who can use which part of the spectrum at what geographic location for what purposes, each spectrum user will try to increase his transmission power so that his transmission would overpower other competing transmissions. Such behaviours would lead to unacceptable levels of radio interference.

7. Because of these characteristics, the use of spectrum cannot be left entirely unregulated. There is a need to manage spectrum use to manage demand and to contain interference to acceptable levels for all spectrum users.

8. Since the advent of radiocommunications in the 19th century, the use of spectrum has always been managed by the Government. The Government designates the use of particular radiofrequencies (so-called "spectrum allocation"), grants the right to use certain radiofrequencies to individual users (so-called "spectrum assignment"), and prescribes the terms and conditions for the use of spectrum, such as the transmission characteristics of radiocommunications equipment.

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[1] In economics, this is called a "common access" property of resource.

[2] In economics, an "externality" is the effect of a transaction between two parties on a third party who is not involved in that transaction.

9. The current spectrum management arrangement in Hong Kong dates back to the 1970s, with updates from time to time. Essentially, it is a so-called "command and control" approach[3], based on centralised planning and administration by the spectrum manager. Under the Telecommunications Ordinance (TO) (Cap. 106), the Telecommunications Authority (TA) is the spectrum manager in Hong Kong[4]. In discharging his spectrum management responsibilities, the TA decides how much spectrum each broad use would have, allocates spectrum for those uses, releases the available spectrum and assigns the spectrum to users accordingly.

10. Spectrum allocation decisions are guided by international rules and regulations. The International Telecommunication Union[5] (ITU) promulgates broad types of use for each band of spectrum and related rules and regulations. The TA then plans the spectrum allocation in accordance with the rules and regulations of the ITU, decides the specific use for each band of spectrum[6] and, through coordinating with neighbouring regions, prevents cross-border interference.

Need for Review

11. The command and control approach is increasingly strained by rapid developments in radiocommunications technologies and services. With fast technological advancement and dynamic market development, the command and control approach may become reactive, inefficient and unresponsive to the needs of the market. Although the total supply of spectrum is finite[7], the actual utilisation efficiency of spectrum can improve as technology advances. For example, digital broadcasting makes more efficient use of the available spectrum. The same

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[3] "Command and control" approach for spectrum management is one where
(a) the Government, or its agency, makes (or accepts from an international body) the allocation of a frequency band for a particular purpose;
(b) spectrum within the band is assigned to a licensee or licensees via an administrative process;
(c) a charge may be levied on licensees, normally to cover administrative costs; and
(d) the licence usually authorises the licensee to utilise spectrum-using equipment specified as to location, power and other variables, the restrictions being designed to avoid interference with other licensees in adjoining geographical areas or frequency bands.

[4] Section 32H of the Telecommunications Ordinance vests in the Telecommunications Authority the power to allocate and assign spectrum in Hong Kong.

[5] The International Telecommunication Union (ITU) is an international organisation within the United Nations system where governments and the private sector coordinate global telecommunications networks and services.

[6] The current "Hong Kong Frequency Allocation Chart" may be downloaded from OFTA's website at *http://www.ofta.gov.hk/en/freq-spec/freq_chart_0202.pdf*.

[7] According to a definition by the ITU, radiocommunications is the use of radio waves at frequencies arbitrarily lower than 3000 GHz for telecommunications purpose.

bandwidth for transmitting one analogue programme channels can accommodate at least four digital standard definition television programme channels with improved television reception, thereby theoretically reducing the amount of spectrum required for providing the same service and making more spectrum available for expanding the capacity of existing services or for the deployment of new services. On the other hand, the demand for spectrum is invariably connected to the demand for the services that use spectrum as an input. Advanced technologies may bring new and innovative services that could generate additional demand for spectrum. There are also emerging radiocommunications technologies which allow different users to use same frequencies at the same location and at the same time without causing interference with each other. Thus, the demand and supply situation of spectrum can be very dynamic.

12. To make the "right" decisions under the command and control approach, the spectrum manager should have full and timely knowledge of the technologies, their applications, their market potentials, their consumer acceptance, and the commercial considerations in the use of such spectrum, in order to decide what is the best use of different bands of spectrum and who would make the most efficient use of such spectrum that could reap the maximum benefit for the community. In reality, it is extremely unlikely that a spectrum manager has all the information and market data he needs to make the "right" decisions in determining the highest value use of spectrum from time to time. Therefore, some advanced economies[8] have in recent years moved towards adopting market-based approaches for spectrum management, on the belief that the market is more capable of making the "right" decisions regarding spectrum use than the spectrum manager, and that any "wrong" decisions would similarly be "remedied" by market forces.

13. In terms of allocating spectrum for public radiocommunications services, the TA generally adopts a market-led and technology neutral approach, allowing spectrum users to decide on the technical standard. For spectrum assignment, the TA has also adopted market-based means of assigning spectrum for 3G mobile services in 2001 by using an auction for assigning the four blocks of spectrum. The TA is required under section 32G of the TO to promote the efficient allocation and use of spectrum as a public resource. However, other than this statutory requirement, there is no further guidance on how the TA should manage spectrum.

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[8] Notably the United States, Canada, United Kingdom, Australia and New Zealand.

14. We have received the view from some quarters in the industry that there should be more clarity and predictability in the TA's decisions in spectrum management, in particular, in the rights of spectrum assignees and the potential spectrum supply, so that they could make better-informed investment decisions in radiocommunications facilities and services. Without such clarity and predictability, they may be hesitant to commit resources to bid for spectrum for providing new services or invest in new or updated technologies for their existing networks because of the risk of unforeseeable future regulatory decisions adversely affecting their investments.

15. Spectrum management decisions nowadays may have significant economic and/or social impacts. For example, spectrum is a necessary input to the provision of mobile telecommunications services. The ability to obtain spectrum suitable for such purpose is a *de facto* barrier to market entry by potential service providers, irrespective of whether there is any restriction on the number of licences for those services. Therefore, the TA's decisions in whether or not to release certain spectrum to the market, and the ability of potential service providers to acquire spectrum from other sources, are factors that would have important influence on the shape of the mobile telecommunications market. On the other hand, there are low transmitting power devices, such as cordless telephones and remote controls for model aircrafts, which are popular in Hong Kong as well as other economies. If spectrum for such devices are not reserved for their use but are released for other competing uses, the community would be deprived of the opportunity to benefit from such use.

16. Having regard to the above, we consider it opportune to undertake a fundamental review of the spectrum policy, with a view to formulating a responsive and transparent policy that enables the community to reap maximum economic benefits from the deployment of spectrum. However, in considering the spectrum policy, we need to bear in mind its relationship with the telecommunications policy and broadcasting policy. As an important resource and a critical input in the production of telecommunications and broadcasting services, the policy of spectrum should play the role of supporting the wider telecommunications and broadcasting policies and objectives.

17. A consultant was engaged in January 2006 to assist the Commerce, Industry and Technology Bureau (CITB) in the review. A copy of the consultancy report on spectrum policy review ("Consultancy

Report") may be downloaded at the website of the Communications and Technology Branch of CITB[9]. Apart from high-level policy advice, the Consultancy Report also covers the current spectrum usage and suggestions on the detailed spectrum management arrangements. Such information could be used by the TA for developing specific spectrum management arrangements once the high-level spectrum policy framework is established.

[9] *http://www.citb.gov.hk/ctb/eng/paper/index.htm*

Part II Considerations for a Spectrum Policy Framework

Future Shape of Radiocommunications

18. The consultant has outlined in Chapter 2 of the Consultancy Report the market conditions affecting future communications service development scenarios in Hong Kong, how they will impact on the future spectrum requirements, and indicative scenario forecasts of spectrum demand. Relevant international situations and trends are contained in Annex 2 of the Consultancy Report.

19. In particular, the consultant highlighted the likely developments in the communications market that will affect the future supply and demand of spectrum, including –

(a) the continued global shift from 2G to 3G mobile services in the next few years. The ongoing and future developments for Super 3G or fourth generation (4G) mobile services will also have impact on current spectrum policy, allocation and management;

(b) the rollout of digital TV services and mobile multimedia services (e.g. mobile TV services);

(c) the rollout of services in relation to fixed-mobile convergence[10] and telecommunications-broadcasting convergence.;

(d) the need for different radiocommunications systems, whether they are of the same type or whether different services are involved, to share the same band of spectrum because of strong demand. For example, in 10 to 15 years' time, cognitive radio technologies[11] should be able to improve the degree to which spectrum sharing is possible; and

(e) the possible introduction of "underlay" [12] or "overlay" [13]

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[10] Convergence of fixed and mobile telecommunications services enables a customer to use telecommunications service using a single device, irrespective of whether he is connected to a fixed or mobile network.

[11] Cognitive radio technology enables a radiocommunications device to adapt its transmission or reception characteristics in real-time to avoid interference with other radiocommunications systems using the same band of spectrum.

[12] Underlay operations are based on transmission at very low powers (at or near the surrounding "noise" levels) so that, in theory, they should not cause interference to existing users of spectrum.

operations of radiocommunications devices. These operations can allow spectrum to be more efficiently utilised, but may still have the potential to cause interference unless rules and procedures are in place to manage their introduction.

20. The above developments mean that traditional approaches for the spectrum manager to predict the market and to make provisions accordingly is not sustainable for much longer, in particular for spectrum bands where the demand outstrips supply. The new spectrum policy framework needs to be sufficiently forward looking and flexible to accommodate these foreseeable developments.

International Developments

21. Most jurisdictions face similar spectrum policy and management problems, although their specific circumstances would differ. For example, jurisdictions with less land border with neighbouring jurisdictions (e.g. UK, Australia and New Zealand) should face less potential interference problem than other jurisdictions such as those in continental Europe. It would be useful to learn from others how they tackle their problems and draw on their experience in formulating Hong Kong's spectrum policy and management frameworks. A summary of the important recent initiatives in spectrum management in selected jurisdictions is given in section 3.5 of the Consultancy Report. The general trend is to increasingly rely on market forces.

Encourage Investment

22. In Hong Kong, the Government does not invest in facilities for the provision of public telecommunications services. Instead, the private sector makes the investments and provides the services in accordance with commercial principles. Because telecommunications facilities are capital intensive, service providers prefer a stable investment environment to make such investment. While service providers generally accept the inevitable technology risks and market risks that they would face in investing in the fast evolving telecommunications market, they consider that policy and regulatory risks should be minimised by the Government in order to allow them to plan ahead and make informed investment decisions. We consider that an open, transparent, objective and non-discriminatory policy and regulatory framework could result in

[13] Overlay operations are based on using spectrum on an opportunistic basis when the spectrum is not being used by others in time and/or geography.

consistency and predictability of regulatory decisions, thereby reducing the policy and regulatory risks that service providers could face.

23. In particular, the consultant identified that the following matters are not well defined within the current spectrum allocation and assignment procedures[14] –

(a) what spectrum is potentially available for release to the market;

(b) how the TA will make spectrum allocation and re-allocation decisions;

(c) when the TA will decide to release additional spectrum into the market;

(d) what factors will determine how spectrum released will be packaged;

(e) how much notice the TA will give in the case of variation or withdrawal of spectrum assignments; and

(f) which bands a spectrum utilisation fee will be applied to, other than those auctioned, and how it will be determined.

A spectrum policy framework and the supporting regulatory arrangements should aim to clarify these matters as far as practicable.

Strategic Considerations

24. There are strategic considerations in spectrum management decisions. For example, with increasing economic integration with the Mainland of China, spectrum allocation and release decisions may need to take into account the wider benefits that may be brought about through harmonisation with the Mainland's use of spectrum for certain popular services. As another example, there may be circumstances where the small number of existing competitors are content with the current state of the market competition and do not see a business case to upgrade their networks to further compete on innovation or quality of service. Such gaming behaviour in the market may not be to the benefit of consumers and Hong Kong as a whole, as Hong Kong may lag significantly behind the world in the deployment of advanced technologies or new services.

[14] See section 3.3 of the Consultancy Report

In such circumstances, it may be justified, on a case-by-case basis, for the spectrum manager to intervene in the market if the outcome would further policy objectives. The spectrum policy framework should retain the discretion for the spectrum manager to depart from the technology neutral principle or full market-based approaches if there is sufficient justification.

25. Such market interventions are not necessarily unwarranted. For example, the European Commission has issued a directive to its Member States on the coordinated introduction of a 3G system in the European Community[15]. According to that directive, such coordinated approach includes, among others, the harmonisation of spectrum for such a system. With increasing economic integration between Hong Kong and the Mainland, the spectrum policy framework should allow for flexibility to take into account similar strategic considerations for supporting Hong Kong's continued economic development.

Fair Compensation for the Community

26. Spectrum is a valuable public resource. It may be argued that any party who makes use of spectrum for commercial purposes should, as a matter of principle, be required to compensate the community for the use of such resource. On the other hand, spectrum lying idle and not put to valuable use would not generate any economic benefits for the community and could thus be considered as public resource wasted.

27. Section 32I of the TO empowers the TA to designate the radio frequency bands in which the use of spectrum is subject to the payment of spectrum utilisation fee (SUF) by the users of the spectrum. The same section also empowers the Secretary for Commerce, Industry and Technology (SCIT) to prescribe, among others, the level of SUF. At present, the only bands of radio frequency where SUF is applicable are the spectrum auctioned in 2001 for the provision of 3G mobile services and the spectrum assigned to mobile carriers for 2G mobile services. There is no stated policy on the applicability of SUF.

[15] Decision No. 128/1999/EC of the European Parliament and of the Council of 14 December 1998 on the coordinated introduction of a third-generation mobile and wireless communications system (UMTS) in the Community

Do you agree that the above considerations, i.e. future shape of radiocommunications, international developments, encourage investment, strategic considerations and fair compensation for the community, should be factored in Hong Kong's spectrum policy framework and the supporting spectrum management arrangements? Are there any other factors or considerations that should be taken into account?

Part III Proposed Spectrum Policy Framework

28. Having regard to the considerations set out in Part II, and drawing on the findings in the Consultancy Report, we propose to promulgate a high-level spectrum policy framework covering the following aspects –

(a) Spectrum policy objectives
(b) Guiding principles in spectrum management
(c) Spectrum rights
(d) Supply of spectrum (including spectrum trading and liberalisation)
(e) Spectrum for government services
(f) Spectrum pricing

Spectrum Policy Objectives

29. Under section 32G the TO, the TA "shall promote the efficient allocation and use of the radio spectrum as a public resource of Hong Kong". While this has provided the general principle or policy objective based on which the TA shall manage the spectrum, the consultant considered that this objective needs elaboration if it is to be useful in guiding specific policy decisions. Specifically, the consultant considered that the absence of a stated spectrum strategy may create unnecessary misunderstanding or confusion, thereby increases the uncertainty faced by businesses investing in wireless services and so potentially reduces investment in the sector[16]. The consultant was of the view that those issues would become more acute as telecommunications and broadcasting converge, and if the telecommunications and the broadcasting regulators are merged, which has indeed been proposed[17]. Establishing explicit spectrum policy objectives may serve the following purposes[18] –

(a) increase the clarity and predictability of spectrum management decisions by the TA, since those decisions must be guided by the stated objectives;

(b) increase the scope for regulatory commitment by the TA, thereby reducing the possibility of different spectrum

[16] Section 3.2 of the Consultancy Report
[17] See the consultation paper on the establishment of the Communications Authority at http://www.citb.gov.hk/ctb/eng/paper/pdf/CA_consultation_paper.pdf
[18] Section 4.1 of the Consultancy Report

management decisions at different timeframe for similar circumstances;

(c) act as a focus for the development of an alignment within the regulatory organisation; and

(d) increase the understanding of the purposes of regulation by consumers and businesses.

30. We accept the views of the consultant. We note that the industry had been calling for greater clarity, consistency and predictability of the spectrum management decisions. By facilitating a better understanding of the guiding spectrum policy objectives by all stakeholders, the industry could have more confidence that their regulatory risks could be minimised and they could make informed investment decisions.

31. We propose to develop and publish for the information of all stakeholders a set of high-level spectrum policy objectives. The TA can then formulate his spectrum strategy and management arrangements having regard to those objectives. Drawing on the recommendations from the consultant in section 4.1 of the Consultancy Report, **we propose to adopt the following spectrum policy objectives for Hong Kong –**

(a) To facilitate the most economically and socially efficient use of spectrum with a view to attaining maximum benefit for the community;

(b) To achieve technically efficient use of spectrum to facilitate the introduction of advanced and innovative communications services and strengthen Hong Kong's position as a telecommunications and broadcasting hub;

(c) To fulfil Hong Kong's regional and international obligations relating to the use of spectrum;

(d) To strengthen Hong Kong's strategic position as a world city and the gateway between the Mainland of China and the world by facilitating the provision of key services in Hong Kong which are deployed, or will be deployed, globally or in the Mainland of China; and

(e) To ensure that necessary spectrum is reserved for government services.

32. In particular, it should be noted that the policy objective in paragraph 31(d) above will provide a new dimension in the TA's management of spectrum. Hitherto, spectrum management decisions in Hong Kong would take into account the Mainland's spectrum management decisions primarily on the ground that there is a need to coordinate spectrum use to prevent cross-boundary radio interference. For example, in respect of mobile services using different technical standards under which different bands of spectrum are used for transmission from the handsets to the mobile base stations (generally called "base station receive") and for transmission from the mobile base stations to the handsets (generally called "base station transmit"), there could be serious interference problems if the same bands of radiofrequencies are used for "base station transmit" in Hong Kong but "base station receive" in the Mainland. The TA needs to prevent such scenarios from occurring by coordinating with the Mainland's spectrum management authorities and by controlling spectrum uses in Hong Kong.

33. With Hong Kong's economy increasingly integrated with the Mainland's economy as the latter continues to grow strongly, we consider that, apart from interference prevention, there may be a case for spectrum allocation and release decisions in Hong Kong to take into account the wider benefits that may be brought about through harmonisation with the Mainland's use of spectrum for certain popular services. Such decisions may mean that, to facilitate harmonisation, we need to ensure that spectrum which enables the use of certain technical standards for strategic reasons is made available to the market. For example, the Mainland is poised to issue 3G mobile service licences shortly, with media speculation that at least one licence will be required to adopt the Mainland developed "Time Division Synchronous Code Division Multiple Access" (TD-SCDMA) standard. It is desirable and indeed essential that the TA should ensure that Hong Kong's spectrum allocation would enable 3G mobile services adopting TD-SCDMA standard to be provided in Hong Kong, in order to facilitate voice and data roaming services for the large number of Mainland business visitors and tourists. In the event that the existing assignees of spectrum that could launch such mobile services decide not to do so because of their commercial considerations, there may be a case for the TA to release additional spectrum to the market that can be used for such services in order to enable other interested parties to roll out the network in Hong Kong. Similarly, with some 30 million mobile subscribers in the Mainland on

CDMA2000 network, there should be a justifiable case for the TA to facilitate release of spectrum to the market to enable the provision of CDMA2000 voice and data roaming service in Hong Kong. A separate consultation on the release of spectrum usable for CDMA2000 service would be launched in due course.

Do you agree with the proposed spectrum policy objectives? Are there other spectrum policy objectives that the TA should take into account when making spectrum management decisions?

Guiding Principles in Spectrum Management

34. After establishing a set of high-level spectrum policy objectives, the consultant considered that the TA should draw reference to the practice of some regulators such as those in the UK[19] and Canada in publishing the regulatory principles for their statutory objectives and express clearly his regulatory principles in spectrum management that could give effect to the policy objectives. Having regard to the proposed policy objectives under which both market and public policy factors may influence spectrum management decisions, the consultant suggested that, as a guiding principle, the TA should consider first whether a market-based approach to spectrum management could achieve the objectives, and then make adjustments or interventions to accommodate any constraints implied by the policy objectives. To achieve the most economically and technically efficient use of spectrum, market-based approach would be more effective if there are competing commercial demands for spectrum, as market forces should generally be able to lead to the most valuable use of spectrum. The requirement of considering market-based approach first before considering adjustments or interventions would impose a discipline on the regulator to justify their interventions more rigorously. The requirement to publish justifications for departure from the market-based approach is to align with the principle of transparency in regulatory decision-making.

35. We accept the consultant's views which will further provide transparency to and predictability of regulatory decisions. Spectrum is a resource in the production process for the provision of other services, which may or may not be a public communications service. A market-based approach with financial incentives for stakeholders would

[19] See Page 67 of the Consultancy Report for the regulatory principles of the UK Office of Communications

be most appropriate to ensure the most productive use of this resource, with economic agents making judgements about the value in the use of spectrum and the alternatives open to them to meet their organisation goals. For example, a commercial user of spectrum for "point-to-point" radio links should compare the costs and benefits of acquiring the spectrum in the market and setting up the links vis-à-vis the costs of leasing landlines from fixed carriers or using public telecommunications services instead. The user would then form his considered view whether the use of spectrum for "point-to-point" radio link is necessary and desirable to meet his organisational goal.

36. Having regard to Recommendation 4.2 in the Consultancy Report, we propose, as a published guiding principle under the spectrum policy framework, that the TA should use market-based approach in spectrum management when there are competing commercial demands for the spectrum, unless there are overriding public policy reasons to do otherwise. Those public policy reasons should be published for transparency to the industry.

37. In the context of spectrum assignment, this guiding principle would mean that auctions should always be used when there are competing commercial demands for spectrum. Non-market mechanisms, such as direct assignment of spectrum by the TA, or selection of the most suitable spectrum assignees by the merits of proposals[20], should be considered only if there are overriding policy justifications.

Do you agree with the proposed guiding principle in spectrum management, especially that market-based approaches should be considered first for spectrum where there are competing commercial demands?

Spectrum Rights

38. A spectrum assignment gives the assignee the right to use the prescribed spectrum for specified purposes over a period stated in the assignment instrument (currently the service licence). In the case of carrier licences, such spectrum assignment normally lasts for the full duration of such licences, currently at 15 years. In the case of other

[20] Generally referred to as "beauty contests" in spectrum assignment approaches.

licences which are annual in nature, the corresponding spectrum assignment is only for one year.

39. Section 32H of the TO empowers the TA to vary or withdraw assigned spectrum. The TA could exercise his powers by giving the spectrum assignee a reasonable period of notice. The consultant noticed that there is at present no explicit policy on what constitutes a reasonable notice period or on what conditions would assigned spectrum be varied or withdrawn, though OFTA, in general, gives a prior notice of more than a year. Because radiocommunications equipment and receivers generally have an economic life of at least 5 to 10 years, the lack of predictability on how the statutory power might be exercised by the TA during, or at the end of, a licence, could deter investment by spectrum assignees.

Spectrum Rights Before Expiry of Assignment

40. Varying or withdrawing spectrum assignment during the licence period effectively cut short the original expectation that the spectrum assignee may have on their legitimate right to use the assigned spectrum. This could potentially render investments made by the spectrum assignee worthless. Even if alternative bands of spectrum are offered by the TA, there may still be costs involved in changing the radiocommunications equipment to work in the alternative bands. It could also affect the confidence of other spectrum assignees in making their investments, as they may fear that they could face the same treatment in future. Thus, the exercise of such powers should be limited as far as is absolutely necessary and only in exceptional circumstances where there is important public benefit at stake. A sufficient notice period should be given to enable the affected spectrum assignee to take the necessary measures to adjust their business plans or equipment. The consultant pointed out that the practice varies in different jurisdictions, from one or two years in Denmark to five years or more in the UK[21].

41. Having regard to the recommendations of the consultant[22], **we propose to state explicitly under the proposed spectrum policy framework that the TA should not vary or withdraw frequencies assigned to a licensee before the expiry of the spectrum assignment except in circumstances where public interest, or government policies and international obligations so require, or where interference between legitimate spectrum users, render it necessary to exercise**

[21] See section 4.6 of the Consultancy Report.
[22] Recommendations 4.12 and 4.13 in the Consultancy Report.

such powers. We also propose to make clear under the spectrum policy framework that there should be minimum notice periods to be given to affected spectrum assignees to enable them to plan ahead. The TA should have regard to the practices in other jurisdictions and the duration of the service licences and publish the appropriate notice periods for different types of spectrum assignments.

Do you agree with the proposal to prescribe the circumstances under which spectrum assignment may be varied or withdrawn before the assignment expires? Are there other circumstances for variation or withdrawal of spectrum assignment before expiry that should be taken into account? What are your suggestions on the appropriate minimum notice periods?

Spectrum Rights at the End of Assignment

42. It is debatable whether a spectrum assignee should have any right, or legitimate expectation, for continued access to the previously assigned spectrum after the assignment expired. On the one hand, the consultant pointed out that there is an unwritten presumption by licensees in many countries that if they are behaving lawfully then their rights to use the assigned spectrum will be renewed unless there are good reasons not to[23]. This presumption is particularly so in the case of annual licences (with spectrum assignment). But the case for longer duration licences of 10 years or more (e.g. carrier licences) is less clear internationally.

43. There are economic justifications for giving renewal rights for spectrum assignments. A more certain and renewable spectrum right should help spectrum assignees to avoid facing the uncertainty whether or not to make new investments for facilities or services close to the expiry of their current spectrum assignments when there is a justifiable need to do so. It would also help them to secure financing for the investments. Spectrum with renewable rights should be able to fetch higher prices when auctioned. In addition, renewable spectrum rights would promote the secondary trading of spectrum (discussed in paragraphs 57 to 64 below), particularly towards the end of spectrum assignment periods, as there are likely to be few, if any, takers of spectrum assignment with only a short tenure left. This factor would also be reflected in the spectrum price in the original auction.

[23] See section 4.6 of the Consultancy Report.

44. On the other hand, there are arguments that the TA should have the discretion at the end of a spectrum assignment to re-allocate the spectrum to more valuable use or to re-assign it to another user who is willing to put in resources to invest in advanced facilities or services. It would thus avoid the "hold-out problem" caused by the incumbent spectrum assignee refusing to move to another band of spectrum, or seeking excessively high prices from the new spectrum users for their spectrum rights if spectrum trading is allowed, in the process of a "band clearance" to make way for the introduction of new uses or technologies. A perpetual renewal right might also hinder the TA in reviewing and adjusting the spectrum allocation.

45. The consultant noted that while there are economic benefits to make explicit that spectrum assignments are renewable unless there are good reasons to do otherwise, or publishing the conditions under which spectrum might be varied or withdrawn when their assignment expires, it is ultimately a policy choice. We also note that while the Productivity Commission of Australia has recommended in 2002 a statutory amendment to make clear that apparatus licence (with associated spectrum assignments) should be renewable except in specified circumstances[24], the Australian government has, to date, not yet accepted the recommendation.

46. We do not consider that there is a strong need to change the current arrangement (i.e. no legitimate expectation for spectrum right after the end of a spectrum assignment) and do not propose any change in this regard. However, for licences (in particular carrier licences) where substantial investment in the underlying infrastructure is required, we accept the consultant's recommendation that a sufficiently long notice period should be given before the expiry of the spectrum assignment, if the TA intends to change or not to renew the spectrum assignment. This should be stated explicitly under the spectrum policy framework. The TA should have regard to the practices in other jurisdictions and the duration of the service licences and draw up the appropriate notice periods for different types of spectrum assignments.

[24] Recommendation 6.4 of the Radiocommunications Inquiry Report of the Productivity Commission of Australia, 1 July 2002.

Do you agree with the proposal of status quo for spectrum right after the expiry of a spectrum assignment, i.e. no legitimate expectation for renewal? What is your suggestion of the minimum notice period for the intention to change or not to renew the spectrum assignment of a licence where substantial investment in the underlying infrastructure is required?

Spectrum Refarming

47. One of the reasons the TA may vary or withdraw spectrum assignment is to vacate existing spectrum users so that the vacated spectrum could be used more efficiently or allocated to another higher value or more important use (the whole process is commonly called "spectrum refarming"). Existing spectrum users, in particular those assigned with large blocks of spectrum, are invariably affected adversely by such decisions.

48. While the above clarification of spectrum rights before and upon the expiry of spectrum assignment should give more certainty to spectrum assignees, spectrum refarming is, after all, a significant regulatory intervention in which the TA decides that the benefits to the consumers and new spectrum users from the new use of spectrum outweigh the costs arising from the different options to accommodate the new use of spectrum, including discontinuing and loss of the existing use of spectrum, moving the existing spectrum users to another band of spectrum or a different technology platform, or protecting existing spectrum users from interference so that sharing the use of spectrum between the new and existing users would be feasible. As pointed out by the consultant[25], it is possible to appraise the costs and benefits for making a spectrum refarming decision.

49. We thus propose that the TA should be required to undertake an appraisal of the impacts of different options, including an option of "do nothing", so as to provide a firm and transparent basis for his consideration in the exercise of statutory powers for spectrum management purposes.

[25] Section 4.5 of the Consultancy Report.

Do you agree that the TA should be required undertake impact appraisals before initiating spectrum refarming exercises? What other arrangements should be put in place for spectrum refarming exercises?

Spectrum Rights for Non-licensees

50. Some spectrum uses are currently not subject to any licensing requirements. An example is telecommunications and broadcasting equipment that only receives signals from satellites but does not transmit signal back to the satellite. Although such equipment operates within the spectrum designated for such use, its users do not have any explicit spectrum rights. Some spectrum users have expressed their wish to acquire formal spectrum rights so that they could plan their operations and investments with more certainty.

51. The consultant pointed out that the UK regulator addresses such wishes through the creation of a "recognised spectrum access" (RSA)[26] for spectrum users who are legally not subject to licensing, for example, where the transmission comes from outside the licensing jurisdiction (such as a satellite). The users could weigh the benefits of obtaining RSA, which will offer them interference protection and trading opportunities by the UK regulator, vis-à-vis the costs involved. However, to a spectrum user who obtained the RSA, there is a possibility that once protection against interference is secured, other users of the spectrum would effectively be afforded the same interference protection by the regulator without any payment for the RSA. The consultant highlighted that in the UK, only the radioastronomy services have opted for the RSA but the satellite industry is in general opposed to its introduction.

52. We do not propose that this issue needs to be covered in the proposed spectrum policy framework at this juncture. If there is strong demand for the introduction of some form of spectrum rights for non-licensees, the TA could consider this possibility.

[26] Section 4.6 of the Consultancy Report.

For non-licensees under the TO, do you have demand for spectrum rights? If so, what kind of spectrum rights would you seek? For licensees under the TO, what are your views on our proposal not to cover spectrum rights for non-licensees in the spectrum policy framework?

Spectrum Supply

53. The ability to access spectrum is critical for entry into the relevant communications market by a new player or enhance existing service or deploy new technology by an existing player. Hence, the potential supply of spectrum can affect business decisions. Under the current command and control approach, all spectrum supply comes from the TA.

Spectrum Release Plan

54. One of the criticisms from the industry is that the lack of transparency in the future supply of spectrum hinders them from making informed investment decisions. The consultant pointed out that regulators in some advanced economies such as the UK, US and Australia have started to publish spectrum release plans for the next couple of years[27]. Such plans can give commercial users advance notice of what spectrum will be released for use over a given time period so that they can make informed choices about infrastructure investment, service development and which bands to bid for.

55. We propose that, under the proposed spectrum policy framework, the TA should publish a spectrum release plan for the supply of spectrum to the market through an open, competitive bidding process in the following three years. In drawing up the plan, the TA should have regard to a host of factors, including the availability of spectrum for assignment, the international spectrum allocation, technology and equipment availability, feedback and proposals from the industry as well as policy objectives and strategies. The plan should be updated by the TA annually on a rolling basis taking into account the latest developments, so that the industry will always have a three-year horizon of likely spectrum supply.

[27] See section 4.4 of the Consultancy Report.

56. However, it should be noted that the plan is for information of the industry only and does not in any way bind the TA in exercise of his discretion in the actual spectrum allocation and assignment, since there may be unforeseen developments which require the TA to deviate from the plan. Furthermore, the TA will conduct separate consultation exercises for the details concerning the release of individual frequency bands in the plan.

Do you support the proposal to publish 3-year rolling spectrum release plans for spectrum to be released to the market through open, competitive bidding processes? What types of information would you propose to include in the plans?

Secondary Trading of Spectrum

57. Secondary trading of spectrum refers to a situation where a spectrum assignee may, through bilateral negotiations, allow another party to use all or part of the spectrum for the duration of the spectrum assignment, possibly in exchange for financial benefits. Secondary trading of spectrum has been introduced in some frequency bands in Australia, Canada, Guatemala, New Zealand, the UK and the US. Some limited form of trading is also allowed in Austria, Germany, the Netherlands, Norway and Sweden. The consultant has described the international experience in secondary trading of spectrum in the Consultancy Report[28].

58. Secondary trading of spectrum can be an important market mechanism whereby spectrum assignees have financial incentives to put spectrum to the most efficient use. For example, a mobile operator with a relatively small customer base may choose to lease part of its underutilised spectrum assignment to another mobile operator running short of spectrum to support its larger customer base. Both operators will stand to gain from secondary trading in this case. At present, other than seeking additional spectrum from the TA, the only way a spectrum assignee may obtain additional spectrum from another spectrum assignee is by way of acquiring the entire company, thereby acquiring its assets including the spectrum assigned to the latter. This approach may not be able to deliver maximum benefits to the community as "subdivision" of spectrum rights is not possible under such an arrangement. The option

[28] See section 5.4 of the Consultancy Report.

of acquiring additional spectrum in the secondary market would also promote competition, since potential service providers can negotiate with existing spectrum assignees to use the desired amount of spectrum for the duration of their choice, instead of awaiting the release of spectrum from the TA, thereby lowering the barrier to enter the market. It should be stressed that allowing secondary trading of spectrum is not a means to benefit spectrum assignees by enabling them to generate financial gains from the spectrum assigned to them, but is a framework that releases market forces to improve the efficient use of spectrum as a public resource, a statutory responsibility of the TA under section 32G(1) of the TO.

59. The consumers will also gain from the option of acquiring additional spectrum in the secondary market. First, the customer may be able to enjoy cheaper prices for the more popular services because the mobile operator is potentially able to provide extra capacity more cheaply by acquiring rights to use additional spectrum in the secondary market. If additional spectrum can be obtained from the secondary market, the existing network equipment would be used even more efficiently, and the resulting economy of scale should result in lower prices for such popular services. Otherwise, the operator may require a larger investment for additional network equipment to support a larger customer base, and the higher costs may be passed on to its subscribers. Secondly, it provides consumers with greater choice of service providers as a potential service provider of popular service will be able to enter the market by negotiating with existing spectrum assignees in order to acquire spectrum rights of the amount of their choice. Thirdly, it enables consumers to have faster access to innovative services, since entrepreneurial service providers with more advanced innovative service could attempt to enter the market through acquiring spectrum rights in the secondary market as soon as the service is ready for offer to consumers.

60. The TO empowers the TA to withdraw spectrum already assigned provided reasonable notice is given. It may be argued that, instead of allowing spectrum assignees to trade spectrum in the secondary market, the TA should take back the spectrum for re-assignment by market mechanisms such as auctions, thereby retaining all the proceeds that could be generated from the higher value use of the spectrum. We do not consider this approach practicable. First, there is no incentive for an existing spectrum assignee to voluntarily return a piece of spectrum to the TA before the expiry of an assignment. Secondly, the assignee secures the right to use the spectrum for a specified period of time through a full market based mechanism by paying an auction fee. The

TA should not exercise its power of withdrawing spectrum already assigned for re-assignment by market mechanism as a matter of routine. We consider secondary trading of spectrum a more appropriate and effective means to encourage spectrum assignees to act to improve the efficient utilisation of spectrum, hence benefitting consumers as set out in paragraph 59 above.

61. We acknowledge that allowing secondary trading of spectrum may allow some spectrum assignees to gain financially from their spectrum assignment. However, in order to allow market forces to steer spectrum to the most efficient and highest value use, it would be necessary to accept that some spectrum assignees may be able to gain financially through trading spectrum which they paid a market price to secure a right to use for a specified period in the first place. It should also be borne in mind that some spectrum assignees may also stand to lose from its spectrum assignment if the market does not turn out to be as rosy as originally anticipated. The substantial decline in value of the spectrum for 3G mobile service throughout the world since the burst of the IT bubble in 2000 is a reminder that investors can also get over-optimistic in the pace of development of the technology and the market and therefore over-assess the value of the spectrum at a particular point in time. Therefore, the role of the Government in secondary trading of spectrum should be to set up a framework that enables market forces to work, thereby generating the wider consumer benefits (including potentially lower prices for popular services, greater choice of service providers and faster access to innovative services) described in paragraph 59 above, and also to impose sufficient safeguards to prevent anti-competitive behaviour that could affect adversely reduce the consumer benefits that may otherwise be derived from enhanced competition and reduced market entry barriers (see paragraph 63 below).

62. Secondary trading of spectrum has so far not been very active in most economies that have introduced it. The consultant considered that this could be caused by the lack of full property rights given to spectrum in some economies, and the abundance of spectrum supply from the governments in other economies. Nevertheless, on the basis of a previous study for the UK, the consultant estimated, on a conservative basis, that the net economic benefits of introducing secondary trading of spectrum in Hong Kong would amount to some $83 million over a 20-year time horizon[29]. In view of the likely net economic benefits for Hong Kong, the international trend, and that the industry are likely to

[29] See section 5.6 of the Consultancy Report.

welcome this flexibility, we consider that, as a broad direction, there may be a case for introducing secondary trading of spectrum in Hong Kong.

63. However, we note that there are substantial implementation issues to be resolved[30]. In particular, some industry members expressed concern on the possibility of anti-competitive behaviour in the spectrum market, such as spectrum hold-out or hoarding[31]. Additional competition safeguards may need to be put in place to prevent such behaviour. The consultant has suggested that the competition powers of the TA under the TO could be enhanced, or that spectrum caps could be imposed. Other potential measures include applying an annual spectrum fee to financially penalise spectrum hoarding, imposing licence conditions that would require unused or underutilised spectrum to be returned to the Government, or withdrawing the entire spectrum assignment altogether. These need to be further deliberated.

64. **We propose, as a broad direction under the proposed spectrum policy framework, that consideration should be given to introducing secondary trading of spectrum in the longer term future, subject to a study on the feasibility of this proposal in Hong Kong.** If there is support for this proposal during the consultation, the TA will undertake a feasibility study. If it is demonstrated in the study that the implementation issues could be resolved, the TA will develop an implementation plan for introducing secondary trading of spectrum in Hong Kong.

Do you agree that the introduction of secondary trading of spectrum in Hong Kong can improve the efficient use of spectrum? How should potential anti-competitive behaviour in the spectrum market be addressed? How should gains in spectrum trading be treated? What are your views on other implementation issues identified by the consultant?

[30] These implementation issues include scope of spectrum rights, duration and renewal, availability of information on spectrum use, possibility of spectrum hoarding, ex ante approval of trades, trading gains and interference management. See Annex 6 of the Consultancy Report for details.

[31] Spectrum hoarding means acquiring some spectrum and not using it with the purpose of preventing new entry into the market or reducing competition.

Spectrum Liberalisation

65. Under the current technology neutral approach adopted by the TA, licensees are allowed to select the technology and standard to be used; but the technical details of the system established and the standard adopted will be included in the schedule of licence. With the consent of the TA, the licensee may change the technical characteristics and standard taking into account its own commercial decision. However, the licensee cannot change the specified use of the spectrum assigned under the licence.

66. In overseas economies, spectrum liberalisation refers to allowing a spectrum user to change the technology and/or use of the assigned spectrum. Such liberalisation enables the spectrum assignee to adopt the latest technologies to improve spectral efficiency (and hence reduce its unit costs) without the need to obtain consent from the regulators. Thus, spectrum liberalisation can contribute to the policy objectives of encouraging the technically efficient use of spectrum. By allowing spectrum assignees to change the use of their assigned spectrum without the need to seek consent from the regulators, there would be incentive for them to use the spectrum for services where there is stronger demand from the community or which could generate higher returns for them, provided that radiocommunications equipment operating in those bands is available in the market. This will improve the economically efficient use of spectrum as well as increase the supply of spectrum for the more popular services.

67. The consultant highlighted the international experience in the introduction of spectrum liberalisation, most notably in Australia, Canada, New Zealand and the US[32]. The consultant estimated that the net economic benefits to Hong Kong for introducing both secondary trading of spectrum and spectrum liberalisation would amount to $149 million over a 20-year time horizon[33].

68. However, even if spectrum liberalisation is introduced, there are constraints on the degree of flexibility of spectrum use that could be introduced. First, the new spectrum use must be confined to that allowed under the spectrum allocation plan decided by the TA after taking into account international allocations. Secondly, allowing a change of use of spectrum may cause harmful interference to other

[32] See section 5.5 of the Consultancy Report.
[33] See section 5.6 of the Consultancy Report.

spectrum users. This will require a clear framework of interference management responsibilities among the TA, the spectrum assignee that changed the use of spectrum and the affected spectrum users. Detailed interference issues with liberalised spectrum rights are set out by the consultant at Annex 7 of the Consultancy Report.

69. More importantly, the consultant advised that spectrum liberalisation is not yet proven in a small, densely populated place like Hong Kong. **Given the potential complication involved, we do not propose to introduce spectrum liberalisation under the proposed spectrum policy framework at this juncture, but to monitor its development in other jurisdictions and consider further study for its general introduction in Hong Kong.**

Do you agree that we should further monitor developments in other jurisdictions regarding spectrum liberalisation before considering whether we should introduce it to Hong Kong?

Spectrum for Government Services

70. Spectrum is currently reserved by the TA to enable government services (e.g., communications systems of emergency services, radars for detecting aircraft locations and movements) to be performed. For certain bands of reserved spectrum, there may be commercial demands. Thus, reserving those bands of spectrum means that the spectrum has been taken out of the pool of spectrum supply. The private sector would be deprived from the possibility of using the spectrum for other productive use and from the point of view of the public coffers, there will be revenue forgone.

71. The reservation of sufficient spectrum to ensure the provision of essential public service is an important policy objective of spectrum management (see paragraph 31). In meeting this objective, we consider that the current command and control approach should be maintained for the time being.

72. Having regard to the different approaches proposed by the consultant to create incentives for the efficient use of spectrum by government users[34], **we propose that the spectrum policy framework should include an element whereby spectrum reserved for**

[34] See section 6.3 of the Consultancy Report.

government spectrum users should be subject to a regular administrative review mechanism whereby the TA would review, once every three years and taking into account technological development and international best practices, with the users of spectrum reserved for government services how efficiently the spectrum assigned has been put to use, ways to improve the efficiency and the future spectrum requirements for such uses and users.

Do you agree that the command and control approach for spectrum management should continue to be applied to spectrum for government services?

Spectrum Pricing

73. Under section 32I of the TO, the TA may by order designate the frequency bands in which the use of spectrum is subject to the payment of SUF. Under the same section, SCIT may by regulation prescribe the level of SUF or the method for determining the SUF. At present, SUF is only applicable to the spectrum for 3G mobile services auctioned in 2001, and spectrum for second-generation mobile services when those licences were renewed in 2005 and 2006.

74. SUF can serve two purposes. First, it acts as a financial tool to manage competing commercial demands for spectrum. Spectrum that can create more value for spectrum users should be able to attract higher fees through an open, competitive process such as auction. Secondly, it enables the community to reap financial benefit from the commercial use of public resource.

75. From the point of view of making efficient use of spectrum for the benefit of the community, the consultant considered that, as a general principle, only bands of spectrum where there are competing uses or users (i.e. competing commercial demands) should SUF be charged[35]. The rationale is that for spectrum where there is no competing commercial demand, the market value for the use of this resource is arguably zero and the SUF should reflect this. Any other level of SUF may deter spectrum use, making it idle and rendering it virtually valueless to the community.

76. However, there is another perspective to the issue. It could be argued that spectrum users who have been bestowed the right to use the

[35] See section 5.3 of the Consultancy Report.

spectrum for a specified period of time, hence denying other users of access to that part of the spectrum (irrespective of whether there is existing competing commercial demand) should likewise pay for the use of the spectrum. This is more in line with the "user pays" principle in the use of public resources. It should also be noted that unlike licence fees which are set on a cost-recovery basis and paid to OFTA to cover the regulator's cost in administering the licence, SUF are charges imposed to ensure the optimal use of public resources and are paid to the General Revenue.

77. We are inclined to propose for consultation that users of spectrum should be required to pay SUF irrespective of whether there is competing commercial demand for the spectrum unless there are public policy considerations. As most spectrum users currently do not have to pay SUF, if the proposal is to be implemented, careful consideration would be given to detailed arrangements and adequate lead time would be allowed for parties concerned to get prepared for it.

78. For spectrum without competing commercial demand, since the market value is zero, SUF could be set administratively at a relatively low level so that valuable uses of spectrum would not be deterred. For spectrum with competing commercial demands, auction should generally be used to determine the appropriate SUF. However, in situations where it may not be appropriate to use auction (e.g. when a mobile service licence with large customer base is due for renewal), the SUF would still need to be determined administratively. In the UK, this fee is called the Administered Incentive Pricing. **We accept the consultant's recommendation[36] and propose that in the case where spectrum is not auctioned, under the spectrum policy framework, the SUF should be set to reflect the opportunity cost of the spectrum. Such opportunity cost may be determined by taking reference from outcome of a similar spectrum auction in Hong Kong or elsewhere conducted recently, or by considering the least cost alternative method to the use of spectrum[37].**

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[36] Recommendation 5.2 in the Consultancy Report.

[37] Using the Least Cost Alternative Method for setting SUF means that if there are alternative methods that could meet the communications needs without using the spectrum (e.g. the user may lease a land line from a fixed carrier between Point A and Point B instead of setting up a point-to-point radio link between the two points), the costs of the alternative methods could be relevant considerations for setting the SUF, so that the user would have the financial incentive to consciously compare the relative merits of those alternative methods vis-à-vis radiocommunications means with dedicated spectrum assignment.

Do you agree that SUF should be applicable to commercial use of spectrum irrespective of whether there is competing commercial demand? Do you agree that SUF for spectrum not released through auction should be set to reflect the opportunity costs of the spectrum?

Part IV Next Steps

79. The proposed spectrum policy framework would lay the foundation for improving the clarity, consistency and predictability of the regulator's decisions related to spectrum management. It should increase the confidence of the industry in making informed investment decisions, hence helping them to introduce new and innovative communications services in Hong Kong, for the overall benefit of the community.

80. Under the proposed spectrum policy framework, OFTA may need to expend more resources in conducting cost-benefit analysis before releasing spectrum, developing spectrum auction and trading frameworks and implementing these frameworks, determining spectrum utilisation fees for various frequency bands and meeting other requirements laid down in the policy framework. However, this should be a small price to pay for improving the confidence of the industry to invest.

81. It should be appreciated that consultations on and formulation of detailed implementation proposals under the proposed spectrum policy framework would take time. For realising some of the proposals, such as the introduction of secondary trading of spectrum, the TO may need to be suitably amended. Meanwhile, communications technologies and markets continue to develop. Similar to the arrangements adopted in the UK, where the spectrum policy and management framework were reviewed and implemented over several years, the TA should continue to discharge his statutory responsibilities and exercise his statutory powers in spectrum management, including spectrum allocation and assignment, while the review progresses.

82. The proposals contained in this consultation paper are our preliminary views only. We look forward to the submissions from all stakeholders to help us refine the proposals.

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