



Arrangements for the Frequency Spectrum in the 900 MHz and 1800 MHz Bands upon Expiry of the Existing Assignments for Public Mobile Telecommunications Services and the Spectrum Utilisation Fee

Consultation Submission

18 May 2016



INTRODUCTION

1. Hong Kong Telecommunications (HKT) Limited (“**HKT**”) welcomes the opportunity to provide its comments on the issues raised by the Commerce and Economic Development Bureau (“**CEDB**”) and the Office of the Communications Authority (“**OFCA**”) (collectively, the “**Administration**”) in its consultation paper dated 3 February 2016 concerning the *Arrangements for the Frequency Spectrum in the 900 MHz and 1800 MHz Bands upon Expiry of the Existing Assignments for Public Mobile Telecommunications Services and the Spectrum Utilisation Fee* (“**Consultation Paper**”).

2. This is an extremely important consultation for all consumers of mobile services as it involves the re-assignment of a very significant amount of spectrum; 198.6 MHz in total, representing 36% of the total amount of spectrum which has currently been assigned by the Communications Authority (“**CA**”). It is the largest amount of spectrum ever to be assigned in one go, and the frequency bands are critical blocks for the provision of 3G, 4G and in future, 5G services. Accordingly, this assignment exercise will have a direct bearing on what users of mobile services see in the future in terms of investment, innovation, efficiency and service quality.

3. As to future price levels, this approach merely reflects the Administration’s ability to extract billions of dollars in monopoly rents. It does nothing for consumers or the economy as these amounts will flow through to users. Specifically, HKT has estimated that the Administration’s proposals could raise monthly charges by as much as \$36 per household (or \$12 per subscription). This is a regressive tax, excessive, unnecessary and inconsistent with global best practices.

4. Given that the amount of spectrum involved is the largest ever to be assigned (or re-assigned), the Administration needs to be absolutely sure that when the current spectrum assignment period ends in 2020/21, service continuity is not disrupted. At the same time, the Administration must not disturb the operators’ incentives to invest, innovate and compete. If not, consumers and Hong Kong’s services based economy will be harmed, and Hong Kong will no longer be an advanced mobile telecommunications market. Before addressing each of the specific questions raised in the Consultation Paper, HKT would like

to deal with several very important matters which will directly affect the future operating landscape and consumers, and hence should be addressed in this consultation or in parallel.

5. In order to provide mobile operators with the appropriate environment in which to make their investment decisions, it is critical that as much information as possible is provided to them concerning the future availability and use of spectrum in order to minimize regulatory risk. This is particularly important given the amount of spectrum involved and the amount of money that is expected to be paid by the industry for use of the spectrum. While market risk is a risk operators must accept in the course of running their businesses, minimizing regulatory risk is an obligation that the Administration must constantly bear. All over-hanging and pending regulatory issues that can be resolved should be resolved now so that licensees who will be asked to pay billions of dollars will have as clear as possible a view of the future regulatory landscape.

6. A failure to provide clarity of the regulatory landscape to the industry carries significant adverse consumer consequences. This is illustrated in the recent spectrum auction in Thailand for the 900 MHz and 1800 MHz bands, which caused worldwide consternation over the failure of the regulator to provide a clear picture of the regulatory landscape. This lack of clarity resulted in excessive amounts being bid for spectrum and the subsequent forfeiture of the spectrum by a new entrant (Jasmine). In a commentary by OFCA's consultants, Plum Consulting London LLP ("**Plum**")¹, on the Thailand spectrum auction, Plum remarked that the reason for the auction prices far exceeding reasonable estimates was because there was no clarity provided to the mobile operators over the future landscape for spectrum.² Consumer interests were simply ignored.

¹ Plum has been engaged by OFCA to conduct a technical study in relation to the arrangements of re-assignment of spectrum in the 900 MHz band and the 1800 MHz band upon expiry of the existing assignments.

² In this particular case, no clarity over the future release of the 700 MHz, 2300 MHz and 2600 MHz bands was provided by the Thai regulatory authority to the mobile operators. This uncertainty meant that, in deciding on their spectrum acquisition plans, the mobile operators placed more weight on the need to acquire spectrum in

7. To this end, it is fundamental that certain related and important issues are resolved prior to, or at the same time, any decision is taken by the Administration as to how the assignment/re-assignment of the **900/1800 MHz Band**³ is to be dealt with. These are discussed below.

The spectrum landscape: surging demand and a spectrum deficit

Surging demand

8. It is an accepted fact that the consumption of mobile data services, whether it be for web browsing, accessing social media applications, gaming, IoT, watching videos or checking email on the go, is increasing year by year. These services place heavier and heavier demands on the spectrum resources of each mobile operator. The development of future mobile applications for 4G, 4.5G (and 5G later on) will put even greater strain on spectrum resources. While demand estimates vary, there is no doubt that demand is growing exponentially (i.e. “by leaps and bounds” as stated in the Consultation Paper) and this has been recognized by the CEDB, the CA and all the stakeholders. Surging demand will be a particularly significant issue for Hong Kong which features a services based economy where its citizens are early adopters and heavy users of mobile services.

Spectrum deficit

9. At present, 552 MHz of spectrum has been assigned to operators for mobile services in Hong Kong⁴. The CA, in the latest Spectrum Release Plan for 2016-2018 issued on 24 March 2016, however, has indicated that there will be no further spectrum available for release. This is in spite of the fact that:

the 900 MHz and 1800 MHz being auctioned. See Plum’s paper on: *Valuing spectrum in Thailand: what can we learn?* (April 2016)

³ This refers to the 50 MHz of spectrum in the frequency range 890-915 MHz paired with 935-960 MHz and the 150 MHz in the frequency range 1710-1785 MHz paired with 1805-1880 MHz per the Consultation Paper.

⁴ See paragraph 5 of the Consultation Paper. The total of 552 MHz excludes 30 MHz assigned to 21 ViaNet Group Limited which is being used to provide a public internal fixed telecommunications service.

- The ITU estimates that a total of 1340-1960 MHz of spectrum will be needed by the mobile operators by 2020 to support all their services and meet consumer requirements.
- Several spectrum bands, amounting to a total of 741 MHz⁵, were identified for release to mobile operators by the World Radiocommunications Conference held in November 2015 (“**WRC-15**”).

10. Globally, governments are acting to make more spectrum available for mobile use in order to meet surging demand. Hong Kong is falling dangerously behind other countries in the amount of spectrum that is being made available for mobile services. No action has been taken in Hong Kong to make any of the spectrum identified by the WRC-15 available for mobile use. From the above it is clear that Hong Kong needs to essentially (i.e. at least) triple the amount of spectrum made available to users.

11. A spectrum release plan for the next three years which has identified zero new spectrum is a major red flag. To make matters worse, it is not simply a case of no fresh spectrum being available between now and 2018. In fact, no new spectrum has been assigned to the industry since 3 years ago (when the 2.5/2.6 GHz spectrum auction was held) and there seems no prospects of any spectrum being released even after 2018 and up until 2020 when the analogue switch off is meant to take place (though even this date is not certain at this point).

12. **Appendix B** contains, as an example, a table comparing the spectrum released in Hong Kong compared to that released in the UK. Per the table, Hong Kong is already lagging behind the UK by almost 80 MHz in terms of assigned spectrum. The gap will become even bigger since Ofcom in the UK is targeting for release at least 70 MHz of additional spectrum as a matter of priority, which is part of the UK Government’s overall target of releasing an additional 500 MHz of public sector spectrum below 5 GHz by 2020.⁶

⁵ See **Appendix A**.

⁶ See Ofcom paper on *Review of Public Sector Spectrum Release (PSSR)* issued on 2 March 2016, and *Enabling UK growth: Public Sector Spectrum Release Programme annual report* issued by UK Government Investments in April 2016.

13. This is a significant shortfall considering the growing demand for data services in Hong Kong and the shortage of spectrum needed to fulfill this demand. This shortfall will increase substantially over the next several years as the UK (and other administrations) takes real action to address the spectrum deficit.

14. The development of 4G/5G services in Hong Kong will fall behind other countries unless further spectrum resources are made available to the mobile operators. In fact, the development of 5G is already happening around the world in countries such as the USA, South Korea, Japan and Sweden. It would be unfortunate if Hong Kong were not able to be part of this drive towards 5G because of the shortage of spectrum.

15. On this basis, the Administration should critically examine the available spectrum resources in Hong Kong in the light of: (i) the ITU recommendations; (ii) decisions made at WRC-15; and (iii) the spectrum bands that have already been made available for mobile services in other countries, in order to release more spectrum prior to, or at the same time as, the forthcoming re-assignment of the 900/1800 MHz Band. There are currently two sources of new spectrum that may be made available for mobile usage. First there are the bands which are not in use, under-used or, although already allocated for other services, can be re-used at different locations or share-used by different services at the same location. Band 42 (3400-3600 MHz) is one obvious candidate. Second, there are the bands associated with the analogue switch off which is further discussed below.

Analogue switch off

16. An important part of the future spectrum landscape are those bands associated with the analogue switch off. The Administration has stated, in paragraph 5 of the Consultation Paper, that no new spectrum will be available for the provision of mobile services until after the switching off of the analogue terrestrial television services, which is expected to take place in 2020.⁷

⁷ It is important to note that the analogue switch off, i.e. the digital dividend, has already been delayed more than once and that Hong Kong now trails behind most major markets in re-farming this spectrum to the detriment of users.

17. This will likely be before the earliest date the first tranche of spectrum in the 900/1800 MHz Band is re-assigned (November 2020), which means that more spectrum could be supplied onto the market before or with the 900/1800 MHz Band. Conducting the re-assignment of the analogue spectrum before or at the same time as the 900/1800 MHz Band would lower regulatory risks, enhance service quality and benefit both users and the economy. It would also be fair to the mobile operators who are being asked to spend billions of dollars on spectrum renewals.

18. It is preferable that the analogue spectrum be released as early as possible since any delay will result in a loss in incremental GDP growth.⁸ Regardless of exactly when the digital dividend becomes available, the CA should immediately begin a consultation on the frequency bands involved and how much will be earmarked for mobile services. This will allow the mobile operators to take this into account when deciding how to approach any future allocation of the 900/1800 MHz Band, whether this be on an administrative or auction basis. This can be done now even if the exact date of availability in 2020 (or 2021) is not known. Anything less would be doing the industry, the economy and users a major disservice, and would be inconsistent with the CA's spectrum management duties under Section 32G of the Telecommunications Ordinance ("TO").

19. In summary, the growing demand for spectrum makes both the digital dividend and non-digital dividend re-assignments essential to ensuring sufficient spectrum is available, allowing the mobile operators to invest and innovate, supporting Hong Kong's economy, benefitting users, maintaining Hong Kong's role as a telecommunications hub, and enhancing both the Pearl River Delta and Belt/Road initiatives. The Administration should move forward on addressing the spectrum deficit now, before service quality and availability suffer.

⁸ See report published by The GSMA and The Boston Consulting Group in May 2012 entitled *The Economic Benefits of Early Harmonisation of the Digital Dividend Spectrum & the Cost of Fragmentation in Asia-Pacific*

Spectrum trading

20. The Administration long ago indicated its support for spectrum trading and introducing spectrum trading in Hong Kong. In the Radio Spectrum Policy Framework released by the CEDB in April 2007 (“SPF”), it stated, in paragraph 5.3:

The policy inclination is to introduce spectrum trading in Hong Kong in the long term, subject to a feasibility study and resolution of various implementation issues.

21. Further light was shed in April 2007 on the “feasibility study” and the “various implementation issues” which the Administration wanted to address before implementing spectrum trading:⁹

In the light of the support received in the submissions, we have indicated in the spectrum policy framework the policy inclination to introduce spectrum trading in Hong Kong in the long term (para. 5.3 of Annex A). We will proceed to undertake a feasibility study on the many implementation issues identified by the consultant, including the licensing arrangements, the question of financial gains from trading, and regulatory measures to prevent anti-competitive practices (e.g. hoarding of spectrum by operators with means).

22. Thereafter, the Administration engaged the services of an experienced consultancy group to review the feasibility of spectrum trading in Hong Kong.

23. In September 2009, OFCA organized a workshop to brief stakeholders on the findings of its consultant (Analysys Mason/DotEcon) who had been engaged to advise on the development of a spectrum trading regime in Hong Kong.

24. Subsequent to this workshop, stakeholders were asked to complete a questionnaire regarding their interest in spectrum trading to help the consultant firm up on its recommendations to OFCA to set up a spectrum trading regime in Hong Kong. These questionnaires were duly completed by each operator. There has been no indication that

⁹ Paragraph 24 of the Legislative Council Brief on *Proposed Spectrum Policy Framework – Outcome of Consultation* issued by the CEDB on 24 April 2007 (“**LegCo Brief**”).

spectrum trading has been opposed by any of the operators or other stakeholders. In fact, in the LegCo Brief, the CEDB recognized:¹⁰

There is general support for the introduction of spectrum trading [...]. Respondents consider this an important means to ensure the most efficient use of spectrum and further stimulate growth and innovation. Most mobile carriers would like this measure introduced as soon as practicable [...].

25. That was almost seven years ago. HKT is not aware what issues remain to be resolved. HKT's own research indicates there are no significant issues preventing the implementation of spectrum trading. Proposed trades are generally notified to the regulator and are implemented unless competition issues arise. A review of spectrum trading undertaken by UK law firm, Preiskel & Company (who specialize in telecommunications and spectrum issues) ("**Preiskel**"), is attached as **Appendix C** for the Administration's review and consideration.

26. Preiskel looks at the benefits of spectrum trading and associated implementation matters, and includes a table of major markets which now permit spectrum trading. Preiskel concludes, in its paper, by recommending the introduction of spectrum trading in Hong Kong on the basis of widespread global practices. This accords with trends elsewhere and opens the door to important consumer benefits arising from the way spectrum is handled. Preiskel does not consider implementation issues such as notification and a competition analysis as creating any significant hurdles.

27. It is also instructive to note that the GSMA recognizes the benefits of, and supports, spectrum trading¹¹:

Voluntary spectrum trading should be allowed so as to promote the efficient use of spectrum over time. By doing so, trading can support higher service volumes, lower cost and better quality services. Efficient trading should also be supported by a stable and predictable licensing and regulatory framework, long licence terms, licence renewal decisions being made well in advance and a notification process to maintain transparency over spectrum usage rights.

¹⁰ Paragraph 23 of the LegCo Brief.

¹¹ Recommendation 9 in Summary of GSMA's report on *Best Practice in Spectrum Licence Renewals – A Toolkit for Licensing Authorities* published in 2014 ("**GSMA Best Practice Report**").

Spectrum trades should also be subject to competition law and/or ex ante competitions assessments.

28. In essence, while spectrum trading does not increase the overall spectrum supply, it does provide mobile operators with the flexibility to acquire spectrum from other operators as and when they need it rather than having to wait for the next spectrum auction. This in turn allows spectrum to be used more efficiently and to increase competition, all to the benefit of customers. This is particularly important in view of the CA's statement in paragraph 21 of the Consultation Paper that:

[...] there will unlikely be any new spectrum available for release for the provision of public mobile telecommunications services before this re-assignment [...]

29. Ensuring that the total supply of spectrum in Hong Kong is being used most efficiently is the primary statutory directive given by the Legislative Council to the Administration in Section 32G of the TO.

30. Implementing spectrum trading in Hong Kong as early as possible is consistent with the CA's preference to let the market decide on the allocation of scarce economic resources and helps achieve the CA's objective of promoting the efficient allocation and use of spectrum. Spectrum trading is an efficient, flexible, real-time market based mechanism to place spectrum in the hands of those that need it and will use it to provide mobile services. Spectrum trading is no longer a new or novel concept; it has been implemented in most major markets without any difficulties and should be implemented in Hong Kong. It requires two steps: (i) a notification of an intended transfer; and (ii) a review of that transfer (primarily on competition grounds) by the CA. Spectrum trading should be introduced now.

31. In response to a recent inquiry by HKT, the CEDB by letter dated 27 April 2016 indicated that spectrum trading was again on its agenda, and that it would be asking a consultant to re-visit the issue. The consultancy study is planned to be completed in 2017. With respect, HKT's view is that the matter is well settled, not complex and can be implemented now. There is no need to 'kick this issue down the road' to the next administration. To do so only harms consumers, the economy and the industry.

Unlimited spectrum licence terms

32. Perpetual spectrum assignment periods provide certainty to, and hence encourage, network investment. This therefore avoids the problem experienced by operators towards the end of their spectrum assignment term, whereby they may be reluctant to undertake any major network investments in case they are not able to retain all of their current spectrum holdings after the assignment period has expired. Unlimited spectrum licence terms are especially required in the telecommunications industry where capital investment is significant and increasing, and requires years to recoup.

33. For the regulator, perpetual spectrum assignment periods reduce administrative burdens as there is no need to conduct consultations, hire consultants, hold spectrum auctions (other than for the initial assignment of spectrum) or litigate the outcomes. Notably, perpetual spectrum assignment periods or, at least, longer assignment periods (of 20 years, for instance) have already been implemented in many more developed regulatory regimes, including the UK. It is also useful to point out that the GSMA supports the adoption of longer/unlimited terms for spectrum assignments¹²:

Mobile licences should have a minimum 20 year term to provide sufficient certainty to support substantial new network investment. Predictability can be further enhanced by introducing indefinite licence terms which combine a minimum initial term with ongoing rights to continue to use the spectrum beyond the initial term unless the authority decides to revoke the rights after giving sufficient notice.

34. A review of spectrum licence terms adopted by several major regulatory regimes has been undertaken by Preiskel and is attached as **Appendix D** for the Administration's review and consideration. In its report, Preiskel concludes that unlimited spectrum licence terms, coupled with spectrum trading, encourages efficient spectrum use which, in turn, drives consumer benefits and decreases the burden on regulators and the industry. It should also be noted that unlimited licence terms should be revenue neutral. Longer terms should equate to higher original prices as the value is greater. While the utility of longer

¹² Recommendation 6 in Summary of the GSMA Best Practice Report.

licence terms is clearly enhanced with spectrum trading and a greater reliance on market based solutions, they can exist separately.

35. In conclusion, it is suggested that all the above issues be resolved prior to or in parallel with the assignment/re-assignment of the 900/1800 MHz Band in order to provide sufficient clarity to the future regulatory landscape. There is ample time to do so in view of the fact that the assignment period for the 900/1800 MHz Band does not expire until November 2020 (at the earliest), which is more than four years away. This is an essential step to enable operators in the industry to make proper commercial decisions as to the extent of their participation in the subject spectrum assignment/re-assignment exercise.

36. In particular the lack of new spectrum releases (and information about new spectrum releases) could be interpreted to reflect an intention by the Administration to extract monopoly rents from the operators by creating an artificial scarcity of spectrum. If a private entity with a monopoly attempted to withhold supply or extract monopoly rents, no doubt complaints would be filed under the Competition Ordinance. It is time for the Administration to re-visit its approach to spectrum management and move forward.

37. In the remainder of this submission, HKT provides its response to each of the individual questions raised in the Consultation Paper.

OPTIONS FOR SPECTRUM RE-ASSIGNMENT AND THEIR EVALUATION AGAINST THE IDENTIFIED MULTIPLE OBJECTIVES

38. The primary statutory direction relevant to spectrum is found in Section 32G of the TO where the CA is directed to:

[...] promote the efficient allocation and use of the radio spectrum as a public resource of Hong Kong.

39. From this statutory directive the Administration adopted the SPF, and from the SPF, the Administration decided to evaluate the renewal of the **3G Spectrum**¹³ in 2012 based on four criteria which it apparently is also employing for this present spectrum renewal exercise. These evaluation criteria are:

- ensuring customer service continuity;
- efficient spectrum utilisation;
- promotion of effective competition; and
- encouragement of investment and promotion of innovative services

40. Before HKT provides its assessment of each of the Administration's three proposed spectrum assignment approaches against the above criteria, it would like to comment more generally on each of the criteria.

Ensuring customer service continuity

41. In paragraphs 15-19 of the Consultation Paper, the Administration indicates that 552 MHz of spectrum has been assigned for the provision of public mobile services, that almost all of this spectrum (i.e. 493 MHz) is being used to provide 3G and 4G services, and that "only" 154.6 MHz of this 493 MHz of capacity (approximately 30%) now used for 3G and 4G services is due for re-assignment.

42. The Administration then concludes in paragraph 16 (after minimal analysis of outdoor and MTR coverage) that service continuity:

¹³ Spectrum in the 1.9-2.2 GHz band expiring in October 2016.

[...] is unlikely to be an area of concern when assessing the options for the Re-assignment of the 900/1800 Spectrum in 2020/21.

43. With respect, HKT finds the above conclusion to be inconsistent with the facts.

44. First, 154.6 MHz is not a small or inconsequential amount of spectrum. This is almost 30% of all relevant assigned spectrum.

45. Second, this is significantly more spectrum than that currently held by SmarTone Mobile Communications Limited ("**SmarTone**") which has 112.6 MHz, Hutchison Telephone Company Limited ("**Hutchison**") which has 129.4 MHz, and China Mobile Hong Kong Company Limited ("**China Mobile**") which has 116.0 MHz. Only HKT, after combining its own spectrum with that of CSL Limited in 2014, has more than 154.6 MHz of spectrum.¹⁴

46. Third, the subject matter spectrum is very important in terms of 3G and 4G services and handset compatibility. The spectrum is the core spectrum used by the operators and will remain such for years to come. This is not in the more problematic (but still important) above 3 GHz range spectrum.

47. Fourth, the exponential growth in demand is recognized by the Administration. It states at paragraph 24 of the Consultation Paper that the mobile market:

[...] has grown by leaps and bounds. According to statistics of the Office of the Communications Authority, there was a more than ten-fold increase in the volume of mobile data traffic between 2010 and 2015, with the monthly mobile data usage per customer rising from 296 MBytes at end 2010 to 1.4 GBytes in November 2015. This growth is expected to continue.[...]

48. HKT would also note that exponential growth rates are anticipated by analysts, industry players and the ITU.

49. When one considers the amount of spectrum at risk coupled with the exponential growth in demand, it is not correct to conclude that 3G and 4G service continuity is unlikely to be an area of concern when

¹⁴ See Table 1 on page 5 of the Consultation Paper showing the amount of spectrum held by each mobile operator.

assessing the options for the re-assignment of the 900/1800 MHz Band. Indeed, the Administration recognizes the scarcity/demand paradigm at paragraph 63 of the Consultation Paper when discussing the SPF:

[...] Furthermore, with the advent of future generation mobile services such as the Internet of Things and 5G mobile services, the increasing demand for mobile telecommunications services would likely drive up the demand for spectrum as well as its market value.

50. In fact, previously, in the 3G Spectrum renewal consultation, the Administration placed heavy emphasis on the continuity of 3G services after the spectrum has been re-assigned. In its statement concluding the 3G Spectrum renewal consultation, the Administration states:

From the perspective of simply maintaining service continuity, the CA accepts that Option 1, through a perpetuation of the existing 3G Spectrum assignments, has the advantage of maintaining more or less a seamless transition and hence service continuity.

51. HKT's conclusion is that service continuity is a very real issue and must be recognized as such. It cannot be simply dismissed as "unlikely to be an area of concern", although of course by doing so, the Administration can more easily pursue its apparent goal of a total or near total spectrum auction.¹⁵

52. It is this concern in regard to service continuity (and what that means in terms of service quality and meeting customer requirements and expectations) that prompts HKT to sincerely request that the Administration now move forward with the decision making process in regard to bringing more spectrum to the market. This includes spectrum which is not currently assigned and also spectrum associated with the analogue switch off (i.e. the digital dividend).¹⁶

¹⁵ It is obviously disturbing to find that there has been no real analysis conducted on any of the positions stated regarding service continuity. Yet the CA seems to have already taken a view on this very important issue. Indeed, HKT was under the impression that Plum was contracted to work primarily on this issue of service continuity.

¹⁶ As to the Administration's concerns regarding the service continuity of 2G services after 2020, HKT finds this somewhat confusing. Recalling the Administration's preference for a technology neutral approach and to allow market forces to dictate business decisions in competitive markets (in paragraph 19 of the Consultation

Efficient spectrum utilisation

53. HKT agrees with the analysis that, for historical reasons, the fragmented nature of the relevant spectrum should be addressed and fixed.

54. HKT also agrees that appropriate spectrum blocks should be created prior to re-assignment regardless of the re-assignment option selected. In this respect, HKT would suggest 2 x 5 MHz blocks in the 900 MHz band and 2 x 10 MHz blocks in the 1800 MHz band. However, this can all be done under any of the three possible scenarios (i.e. administrative assignment, auction or hybrid). Thus, efficient spectrum utilisation can, and should, be achieved and is not a differentiator among the scenarios.

55. In fact, the existing overall shortage of spectrum and the intense state of competition in the market will force the operators to use their frequency bands more efficiently. This is regardless of the manner under which the spectrum has been acquired, i.e. through full administrative assignment, full auction or a combination of both.

Promotion of effective competition

56. It is well recognized that the Hong Kong mobile market is one of the most intensely competitive markets in the world. Four mobile operators (and numerous MVNOs and resellers) already compete in a crowded market characterized by low retail prices and high penetration rates. Investment and innovation is more than satisfactory and there is no evidence that a market failure has occurred in the market. On this basis, the Administration should not feel obliged to adopt an auction approach to spectrum assignment simply because it considers it

Paper), it appears to be inconsistent for the Administration to suggest special treatment for 2G services, especially when 2020/21 is still four to five years away. Nevertheless, HKT understands the CA's concerns as to this user group and would undertake to meet their reasonable needs within a larger and flexible grant of spectrum under a Right-of-First-Refusal ("RFR") basis. The reference to inbound 2G customers is also noted, but the experience with CDMA 2000 roamers (which has experienced a substantial decline in traffic) should provide a warning that it can be unwise in the longer term to mandate the provision of a service using a specific technology.

necessary to facilitate the entry of new service providers into the market.

57. Should the Administration wish to encourage new entry, this would be better achieved: (a) in the short term, by implementing spectrum trading in Hong Kong so that new or existing operators can freely acquire spectrum (in any amount and at any time) in order to provide service, instead of having to wait for spectrum to become available at the next auction; and (b) in the medium term, by bringing more spectrum into the market.

58. As to making more spectrum available, this would be achieved as noted above by accelerating the release of both unassigned spectrum and spectrum associated with the analogue spectrum currently used for broadcasting. This would provide more opportunities for existing players and new entrants to acquire spectrum and provide more choice of mobile services, thereby providing a further stimulus to competition.

59. The Administration appears to have linked auctions with new entry. This may be true to the extent that, at least in theory, auctions allow new operators the opportunity to acquire spectrum. However, in Hong Kong, the market and local precedents are different. As to the market, as noted above, it is already hyper-competitive. A global comparison of retail prices, penetration rates, etc. proves this case.

60. As to local precedents, the example of 21 ViaNet Group Limited ("**21 ViaNet**"), which the Administration refers to in paragraph 21 of the Consultation Paper, cannot be seen as increasing the level of competition in the mobile market. 21 ViaNet appears to be relatively inactive and only provides fixed-wireless services. In fact, the case of 21 ViaNet clearly demonstrates that the Administration's policy of awarding spectrum via auction to allow new entry and stimulate competition in the market does not work.

61. 21 ViaNet entered the Hong Kong market in March 2012 after successfully bidding for, and being formally awarded, spectrum in the 2.3 GHz band auction. However, despite anticipation that the spectrum would be used to deploy state of the art mobile broadband technologies and provide much needed network capacity to maintain the growth of mobile data services, 21 ViaNet instead made use of the spectrum to

provide local fixed telecommunications services. This, obviously, did little if anything to stimulate competition in the mobile market.

62. Worse still, 21 ViaNet was not able to meet the standard network/service coverage requirements included in its licence and hence needed to obtain approval from the CA to amend/reduce its coverage obligations. 21 ViaNet, therefore, cannot be pointed to as an example of effective market entry (or efficient use of spectrum) and does not set a very good case for new entrants.

63. **Appendix E** describes in detail *The 21 ViaNet Disgrace* and how the Administration's policy has failed.

Encouragement of investment and promotion of innovative services

64. The Administration has suggested that investment and innovation can only be assured if the spectrum is auctioned such that operators, having paid the full market value for the frequency blocks, would be obliged to make further investments in order to put the spectrum to the best use so that they can justify the amounts they have paid for the spectrum.

65. HKT finds this argument both simplistic and unconvincing. What essentially drives investment and innovation is the state of competition in the marketplace. Regardless of how the spectrum has been acquired, whether through administrative assignment or via auction, operators in the market will be obliged to continuously invest and innovate in order to stay ahead of its competitors. Indeed, given the intensely competition state of competition in the Hong Kong market, there is no evidence to suggest that any of the four existing players have stopped investing or innovating, or that they do not invest or innovate if spectrum is assigned to them on an RFR (non-auctioned) basis.¹⁷

66. In fact, it may be true that spectrum auctions have a dampening effect on investment and innovation. If the prices paid for the spectrum in an auction are excessively high, this might leave fewer funds left over for capital investment. Charging a nominal price for the spectrum via an

¹⁷ Even if one were to accept the "high price" theory put forward by the Administration, high prices charged for administrative assignment of the spectrum would essentially achieve the same result.

administrative assignment process would, on the other hand, provide a stable investment environment for the existing operators and ensure that sufficient funds are available for further investment and innovation.

67. But even if the argument had some merit, which HKT does not accept, it must surely be linked to the high prices paid rather than to the means of extracting that high price. Thus, there would be no difference between a high auction price and a high RFR price, and the Administration has signaled its intention to do both in spite of the direct adverse impact that would have on consumers. Thus, even under the Administration's argument, no weight can be given to its conclusion that only auctions can spur investment and innovation (unless the RFR prices are substantially below the auction prices).

68. In the following section, HKT provides its comments on each of the three spectrum assignment options proposed in the Consultation Paper and responds to the specific questions raised under each option. HKT finds that only Option 1 best serves the public interest.

Option 1: Full-fledged administratively-assigned approach

69. Under this option, the incumbent spectrum holders will be offered an opportunity to re-acquire their current holdings on an RFR basis, subject to the payment of a Spectrum Utilisation Fee ("SUF") to be determined by the Secretary for Commerce and Economic Development ("SCED"). If any of the spectrum is not taken up then it will be put out to auction.¹⁸

Question 1: *Given the CA's views that there are likely to be competing demands for the 900/1800 MHz Spectrum, is there any overriding public policy reasons for the CA to consider not adopting a market-based approach pursuant to the Spectrum Policy Framework and to favour the full-fledged administratively-assigned approach (Option 1) for the Re-assignment of the 900/1800 MHz Spectrum?*

¹⁸ HKT would modify this option to the extent that the available spectrum in the 900/1800 MHz Band be firstly re-organized into 2 x 5 MHz or 2 x 10 MHz blocks, as appropriate, in order to remove the "fragments" which are inherent in the existing spectrum assignments.

Question 2: What are your views on whether the full-fledged administratively-assigned approach (Option 1) would achieve the four identified objectives in the Re-assignment of the 900/1800 MHz Spectrum?

70. There is little doubt that the mobile market is characterized by the tremendous growth in mobile data traffic in the past, which is expected to continue into the future. In paragraph 24 of the Consultation Paper, the CA describes the situation as one where:

[...] the mobile telecommunications market in Hong Kong has grown by leaps and bounds. According to statistics of the Office of the Communications Authority, there was a more than ten-fold increase in the volume of mobile data traffic between 2010 and 2015, with the monthly mobile data usage per customer rising from 296 MBytes at end 2010 to 1.4 GBytes in November 2015. This growth trend is expected to continue.

HKT agrees with this assessment of substantial and exponential growth and also noted the looming spectrum deficit.

71. Option 1 best achieves each of the four objectives identified in the Consultation Paper and satisfies the overriding public policy test to not adopt a market-based (e.g. auction) approach to re-assign the subject spectrum. This is described below.

Ensuring customer service continuity

72. It should be clear that service continuity will be 100% assured if the spectrum is wholly administratively re-assigned to the incumbent spectrum holders. This was true when the Administration was considering the assignment approach for the 3G Spectrum and is equally true here. A stable environment for investment and operations would also be ensured, both of which are important in a market with high data growth rates.

73. Given the large amount of spectrum involved in this exercise and the exponential increase in data traffic, ensuring customer service continuity is an extremely important consideration. Indeed, absent a significant proportion of spectrum being administratively assigned, there is a real risk (and real probability) of major service continuity issues. The looming spectrum deficit only heightens the importance of this factor. There are therefore compelling public policy reasons not to adopt a

market-based approach when re-assigning the 900/1800 MHz Band, and serious consideration of administratively assigning the spectrum back to the incumbent spectrum holders is warranted. A wholly administrative model is without doubt the best option of ensuring the highest level of service continuity.

74. HKT would note that even in the 3G Spectrum renewal consultation, which involved less spectrum and anticipated less demand growth, a substantial portion of the spectrum was assigned administratively in order to safeguard service continuity. The logic of the 3G Spectrum renewal decision was that 2/3 of the incumbent spectrum holders' spectrum was needed to be assigned administratively back to the operators in order to prevent service disruption. While the 3G example would suggest at least the same percentage of spectrum be re-assigned to the incumbent spectrum holders, the facts surrounding this larger spectrum amount and anticipated growth support a 100% administrative/RFR approach. In any event, as to this factor, administrative assignment has been found by the CA to be the best approach (in the 3G Spectrum renewal consultation) to ensure service continuity, and the facts here make this conclusion even more true for the 900/1800 MHz Band.

Efficient spectrum utilisation

75. In HKT's view, if the spectrum is administratively assigned back to the incumbent spectrum holders, the existing overall shortage of spectrum, coupled with the high level of competition in the mobile market, will ensure that the mobile operators use their limited stock of spectrum in the most efficient manner.

76. The Administration raises two concerns in regard to the efficient use of spectrum. First, that spectrum fragments should be eliminated going forward (HKT agrees) and, second, that only auctions (and the "market prices" they obtain) can create the incentives to use spectrum efficiently since maintaining the status quo would not provide the incumbent spectrum holders with any incentive to strive for higher spectral efficiency (HKT disagrees).

77. HKT does not see the first concern to be a significant differentiator in that the same solution can be applied to all three proposed options.

That is, any exercise to reorganize/consolidate the spectrum blocks within the 900/1800 MHz Band can still be conducted prior to administratively re-assigning the spectrum back to operators or auctioning the spectrum, so the CA will still be able to achieve its desired efficiencies.¹⁹

78. As to the second concern, the Administration has made it clear that its current thinking is that, in each option, high prices will be obtained. Under the Administration's analysis, these high prices will then ensure efficient use of the spectrum. In this regard, HKT sees no difference between high prices set by the Administration for spectrum assigned administratively and high prices which have been obtained via auction. Per the Administration's own analysis, both would promote efficient use of spectrum. On this basis, the CA's assumption that spectral efficiency cannot be achieved under administrative assignment is not correct.

79. High RFR prices and high auction prices would, under the Administration's approach, equally achieve spectrum efficiency. Thus, only if RFR prices were substantially below the auction prices would the Administration's approach be correct, i.e. that only auctions can ensure spectrum efficiency (assuming that the Administration's underlying premise is correct).

80. In sum, the goal of spectrum efficiency can be achieved under any option via the elimination of spectrum fragments and high spectrum prices (although HKT would suggest that high spectrum prices directly and adversely affect consumers). This factor is the same under all three options, and therefore is not a differentiator.

Promotion of effective competition

81. The Hong Kong mobile market has already proven to be intensely competitive. There is no evidence that this very high level of competition will not continue should the spectrum be administratively

¹⁹ HKT would like to take this opportunity, however, to urge OFCA to seriously consider simplifying the radio base station application process under Schedule 3 of the Unified Carrier Licences, particularly in view of the significant number of changes in the frequency band assignments that will result from this current spectrum re-assignment exercise.

re-assigned back to the incumbent spectrum holders. In fact, as the 2.3 GHz spectrum auction in 2012 has shown, allowing a new operator to obtain spectrum may have the opposite effect (i.e. less competition). As noted above, 21 ViaNet acquired spectrum via auction four years ago and does not compete in the mobile services market. More importantly, its spectrum is not being used to provide mobile services. At best, it appears that 21 ViaNet intends to offer limited fixed-wireless services, a different market altogether. New operators are not a pre-requisite for effective competition and indeed, new entry is not a likely outcome given Hong Kong's market size and already hyper-competitive state. In short, the market is, and will, remain highly competitive, and there is no evidence to support a view that an auction would somehow increase competition levels or consumer welfare in the mobile market. Hong Kong's experience to date (with 21 Vianet) is not supportive of the view that auctions equate to greater competition.

82. Finally, HKT would emphasize that spectrum trading and the release of new spectrum would be a more flexible, faster and efficient way to introduce new competition. A spectrum auction is not an essential or the only vehicle to achieve that end result. Effective competition can be achieved and/or maintained under any of the proposed options. This factor is not a differentiator among the three options.

Encouragement of investment and promotion of innovative services

83. Even if the spectrum is administratively re-assigned back to the incumbent spectrum holders, they will continue to invest and innovate because the existing state of competition already obliges them to do so. Investment, innovation and competition are recognized characteristics of the Hong Kong market. There is no evidence to suggest otherwise or to conclude that the incumbent spectrum holders are not investing or are not innovative. Indeed, high auction prices could have the opposite result by transferring funds to the Administration that would otherwise be invested to the benefit of users.

84. In summary, the full-fledged administratively-assigned approach under Option 1 is the best approach to ensure service continuity and in maintaining a predictable and stable investment environment. The other three factors are not differentiators due to high levels of

efficiency, competition, innovation and investment which will not change, and high spectrum efficiency which already exists. The Administration's intention to obtain high auction and RFR prices reinforces the high 'score' of the full-fledged administratively-assigned option.

Option 2: Full-fledged market-based approach

85. Under this option, all of the spectrum in the 900/1800 MHz Band will be re-assigned by auction prior to expiry of the existing assignments in 2020/21.

Question 3: *Do you have any concerns about the continuity of customer services, in particular as regards the provision of 2G voice services, to local users and inbound visitors if the full-fledged market-based approach (Option 2) were to be adopted for the Re-assignment of the 900/1800 MHz Spectrum?*

86. As made clear above, HKT is very concerned about customer service continuity in the event that all the spectrum is re-auctioned (i.e. Option 2). The importance of service continuity and the inability of an auction approach (i.e. Option 2) to meet that requirement were accepted by the Administration in the 3G renewal consultation. The facts are even clearer here in terms of spectrum capacity up for renewal, surging demand, needed investment, desired innovation and the need to provide users with high quality and diverse services.

87. In paragraph 35 of the Consultation Paper, the CA suggests that service continuity for 3G and 4G services should not be a concern in considering the re-assignment arrangements of the 900/1800 MHz Band. Its reasons are explained in paragraphs 15-16 where the CA assumes that there will be significant progress in the deployment of other spectrum bands for 4G services, i.e. 2.3 GHz and 2.5/2.6 GHz in the MTR during the coming five to six years leading up to the expiry of the assignment period for the 900/1800 MHz Band. The CA therefore focuses its attention on ensuring the continuity of 2G mobile voice services, for which it states, in paragraph 36, that only a small amount of spectrum will be needed.

88. The CA's analysis, with respect, misses the point. As noted above the amount of spectrum involved in this exercise is substantial and the most ever re-assigned in one go. Option 2 creates substantial risks as to service continuity and these risks cannot and should not be minimized. Per Table 2 in the Consultation Paper, a total of 136 MHz of spectrum out of the 900/1800 MHz Band is currently being used by mobile operators to provide 4G services, including within the MTR. This is a substantial amount of spectrum and represents a significant proportion of the total amount of spectrum (40%) which is being used to provide 4G services today. Indeed, this is more 4G spectrum than the combined 2.3/2.5/2.6 GHz spectrum used today by China Mobile, SmarTone and Hutchison for 4G services. This, coupled with the expected exponential growth in 4G traffic, cannot support a conclusion that a full auction approach does not raise any risks as to service continuity. In reality, the opposite is very much the case. The issue of service continuity is linked to more than the MTR and 2G. It very much affects all users of 2G, 3G, 4G and 5G services.

89. The CA's assumption that, going forward, there will be very little reliance on the 900/1800 MHz Band for 4G services is wrong. Progress to deploy the 2.3 GHz and 2.5/2.6 GHz bands in the MTR has been traditionally slow. It is expected that the 1800 MHz frequency band will still be needed to support 4G services well beyond 2020/21. In fact, it is possible that this spectrum will remain a major source of 4G capacity going forward regardless of the MTR situation, so it would be wrong to suggest that 40% of the spectrum now deployed by the mobile operators can somehow be discounted or ignored.

90. Accordingly, if the incumbent spectrum holders are unable to secure sufficient spectrum through auction to support their 3G/4G/5G services (including exponential demand growth), service continuity will without a doubt be a major problem. Since part of the spectrum which the operators originally earmarked for 2G services would need to be used for 3G/4G, at the end of the day, 2G service quality will also suffer.

91. HKT notes the Administration's concerns regarding 2G services and customers, both in terms of local users and inbound roamers. In paragraph 17 of the Consultation Paper, it is stated:

[...] the CA cannot preclude the possibility that come 2020/21, when the 900/1800 MHz Spectrum is due for re-assignment, there would remain a portion of mobile subscribers who would prefer to access mobile voice services with 2G handsets, and therefore, their likely service needs may have to be considered by CA when assessing the options for the Re-assignment of the 900/1800 MHz Spectrum.

92. The Annex to the Consultation Paper shows that the large majority of visitors to Hong Kong come from Mainland China (77.3%). Given that the two mobile operators in China who are presently providing 2G services (based on the GSM standard) have so far not yet announced any plans to switch off their 2G networks, the mobile operators here will still need to provide 2G services to these customers when they come to Hong Kong. This is particularly important in order to fulfill one of the aims of the Spectrum Policy Framework 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 [...]

93. Implementing Option 2 will very likely have a serious impact on customer service continuity for all services across the board; 2G, 3G and 4G, and in the future 5G.

Question 4: What are your views on the full-fledged market-based approach (Option 2) in achieving the four identified objectives in the Re-assignment of the 900/1800 MHz Spectrum?

94. HKT's views on whether Option 2 achieves each of the four objectives identified in the Consultation Paper are as follows:

Ensuring customer service continuity

95. As previously explained, if all of the 900/1800 MHz Band is auctioned, there is a real possibility of service disruption to existing 2G voice services, 3G, 4G and most likely future 5G services which are making use of the 900/1800 MHz Band. The impact on mobile services across the board could therefore be fairly extensive. It should be quite clear, and consistent with the analysis of the 3G renewals, that the customer service continuity criterion is not well served by Option 2 in

the event that an operator is unable to re-acquire its current spectrum holding at auction. Indeed, as recognized in the 3G consultation, Option 2 has substantial shortfalls (i.e. is the weakest option) in regard to ensuring service continuity.

Efficient spectrum utilisation

96. In paragraph 43 of the Consultation Paper, the CA states that the fragmented nature of the 900/1800 MHz Band has resulted in more spectrum than necessary being used to provide 2G services and that auctioning the spectrum will provide the CA with a chance to redesign the band plans into paired 5 MHz or 10 MHz blocks such that operators may use the spectrum more efficiently.

97. HKT agrees that eliminating spectrum fragments and re-organizing the bands into blocks of 2 x 5 MHz or 2 x 10 MHz would result in more efficient use of the frequency bands. However, the band plan can be re-organized by the CA under any of the three spectrum assignment methods put forward in the Consultation Paper, not just under the full-fledged market-based approach. All of the options put forward in the Consultation Paper are equally able to address this concern.

98. Further, in paragraph 44 of the Consultation Paper, it is suggested that:

[...] Auction is the best mechanism to ensure that the scarce spectrum resource will be assigned to the parties who value it the most and who will most likely put it to the most efficient use.

99. HKT disagrees with this statement.

100. First, as an example, clearly this has not happened in the case of 21 ViaNet who acquired spectrum via auction in 2012 and has not yet offered any mobile services.

101. Second, per the Administration's analysis, it is not the acquisition of spectrum via auction that promotes high efficient use. If the economic theory put forward by the Administration is at all correct, it is the high prices paid for the spectrum (not the spectrum assignment method) that forces operators to use the spectrum more efficiency and, based on past experience and the SUF pricing discussion in the Consultation Paper, it is clear that any approach to be adopted by the

Administration (whether it be administrative assignment or auction) will be accompanied by high prices. Whether the Administration chooses to auction the spectrum or not, therefore, is irrelevant to the achievement of this objective.

102. All three options can equally address both the issue of fragmentation and efficiency. However, in our view, the linkage between auctions and efficiency appears to be quite simplistic and unsupported by any real analysis or evidence.

Promotion of effective competition

103. In paragraph 21 of the Consultation Paper, the CA suggests that auctioning spectrum provides opportunities for stimulation of competition in the market, and cites the 2.3 GHz band spectrum auction in 2012 as a successful example of a new operator joining the Hong Kong telecommunications market. This appears to refer to 21 ViaNet. HKT does not consider this to be a successful case. As far as HKT is aware, today, i.e. some four years later, 21 ViaNet is still struggling to put together a solid business using the 30 MHz of spectrum it acquired at the auction, and has made little if any impact on the market. Indeed, HKT's understanding is that this spectrum is either idle or being used sparingly for fixed-wireless (not mobile) services. Experience in Hong Kong has therefore shown that spectrum auctions decrease competition.

104. What is clear, however, is that the mobile market in Hong Kong is currently very competitive. Four mobile operators compete vigorously. Prices are close to cost, service quality is good and high levels of customer service are the norm. Consumer benefits are by any comparison high. This will not change irrespective of the spectrum re-assignment method adopted. In fact, under an auction approach, it is quite possible that a financially weak mobile operator could become spectrum constrained, or another "21 ViaNet" could acquire but not use the spectrum for mobile services, both adversely affecting competition in the mobile market in the post 2020/2021 term.

105. New entry (i.e. a fifth mobile operator) in a small, saturated and competitive market does not appear to be likely. However, the best way to encourage new entry and competition would be to introduce more spectrum into the market and to implement spectrum trading. In HKT's

view, Option 2 would not promote effective competition as the market is already hyper-competitive. On the contrary, it could have an opposite effect by leaving an operator spectrum or financially constrained, or by introducing an ineffective new entrant (e.g. 21 ViaNet). HKT would suggest that the linkage between auctions and more competition may be relevant in markets with limited competition, but this certainly does not apply to Hong Kong.

Encouragement of investment and promotion of innovative services

106. Administratively re-assigning the spectrum back to the incumbent spectrum holders rather than auctioning the spectrum provides operators with a stable and predictable environment for investment and hence facilitates the launch of innovative services.

107. The CA's argument, in paragraph 46 of the Consultation Paper, suggesting that only if spectrum is acquired via auction will the mobile operators be incentivized to make further investments (in order to put the spectrum to its best use) is not accompanied by any analysis or evidence. To the extent that it attempts to present economic theory, the same result could flow from high prices being charged for the spectrum which is being offered to the incumbent spectrum holders on an RFR basis, which the Administration appears to be prepared to do. In reality, however, HKT would suggest that low spectrum prices would allow the mobile operators to use their limited resources to invest and innovate (rather than charging a high price for the spectrum and handing a massive cheque for the proceeds back to the Treasury).

108. Operators will strive to invest, innovate and gain the affection of consumers regardless of whether they acquired the spectrum through auction or administrative assignment. Investment and innovation is driven by competition and not the manner in which the spectrum is acquired. Indeed, as stated above, high prices fetched in open spectrum auctions may well leave operators with little funds left over to make further network investments. HKT therefore does not see how Option 2 would encourage investment or promote innovative services.

Option 3: Hybrid administratively-assigned cum market-based approach

109. Under this option, an RFR will be offered to each incumbent spectrum holder for a part of their existing spectrum holding for the continued provision of 2G services beyond 2020/21 (“**RFR Spectrum**”), while the remaining spectrum will be re-assigned via auction (“**Auctioned Spectrum**”). If any of the incumbents decide not to take up their RFR rights then that spectrum will also form part of the pool of spectrum to be auctioned.

Question 5: What are your views on the hybrid approach (Option 3) in achieving the four identified objectives in the Re-assignment of the 900/1800 MHz Spectrum?

110. HKT’s views on whether Option 3 achieves each of the four objectives identified in the Consultation Paper are outlined below. HKT incorporates by reference its comments on (i.e. criticisms of) Option 2 as well as it comments on (i.e. support of) Option 1 herein.

Ensuring customer service continuity

111. As noted above and accepted by the Administration in the 3G Spectrum renewal consultation, the best way of ensuring there is service continuity is to administratively re-assign all of the frequency bands back to the incumbent spectrum holders. Even a partial re-assignment of the spectrum carries risks of service discontinuity, but this is still better than fully auctioning the spectrum. Of course, this risk is even more real than in the 3G Spectrum renewal exercise as demand is growing exponentially and more spectrum is involved in this case.

112. Paragraphs 47 and 48 in the Consultation Paper make the assumption that spectrum needs to be offered to the incumbent spectrum holders on an RFR basis in order to guarantee the service continuity of 2G services. This may be true but misses the larger need to meet the service continuity requirement for 3G and 4G services (and in the mid-term, future 5G services) since the 900/1800 MHz Band is today also being used to support 3G and 4G services. The CA therefore needs to consider the impact on 2G, 3G, 4G and 5G services when deciding on the assignment approach. Accordingly, it is incorrect for the CA to assume in paragraph 49 that 2G is the only service that is affected and

hence only a minimum amount of spectrum in the 900/1800 MHz Band (i.e. 2 x 5 MHz) need be re-assigned to the operators on an RFR basis.

113. Based on the approach previously adopted for the 3G Spectrum re-assignment exercise, HKT would suggest it more appropriate to use the 2/3 approach there as the starting point under Option 3. Of course, this percentage would then need to be adjusted upwards in order to take into account the exponential demand growth and the much larger amount of spectrum now at risk.

Efficient spectrum utilisation

114. Auctioning the spectrum, even if it is only part of the 900/1800 MHz Band under Option 3, does not guarantee that the spectrum will be used most efficiently. What drives efficient use is the overall shortage of spectrum and the state of competition in the market. Administratively assigning all of the spectrum would not result in any less efficient use of the spectrum compared to full auction of the frequency bands or this hybrid option.

115. The problem regarding the fragmented state of the current spectrum assignments within the 900/1800 MHz Band and the re-organization of the frequency bands into blocks of 2 x 5 MHz or 2 x 10 MHz for improved spectral efficiency can be dealt with regardless of whether the CA decides to proceed with full administrative assignment, full auction or a hybrid of both approaches. It is not correct to assume or suggest that the spectrum blocks can only be reorganized prior to re-assignment if Option 2 or Option 3 were adopted. In HKT's view, the spectrum fragments should be eliminated as a matter of good spectrum management under all three options, and hence this is not a differentiating factor.

Promotion of effective competition

116. It is already well established that competition in the Hong Kong mobile market is fierce. Regardless of the manner in which the 900/1800 MHz Band is assigned, this state of affairs will undoubtedly continue.

117. In fact, auctioning the spectrum, even if it is only part of the 900/1800 MHz Band under Option 3, does not always promote effective competition.

118. First, with four mobile operators, multiple MVNOs and resellers already in place, the mobile market is highly competitive. New entry in a small and highly competitive market is therefore unlikely even if the spectrum were to be auctioned.

119. Second, HKT would again draw the CA's attention to the case of 21 ViaNet who acquired spectrum via auction previously, but has yet to make any inroads into the Hong Kong market and is not providing mobile services. The linkage between auctions and effective new entry (and spectrum usage efficiency) is therefore not evident in Hong Kong. Indeed, the precedent suggests the opposite conclusion.

120. Third, there is no evidence that high auction prices will attract new entry.

121. The availability of spectrum trading as a tool to enable operators to readily acquire spectrum, and the release of new spectrum for mobile services are much important and conducive to new entry.

Encouragement of investment and promotion of innovative services

122. Auctioning the spectrum, even if it is only part of the 900/1800 MHz Band under Option 3, will still create an uncertain environment for the incumbent spectrum holders and thus may discourage investment and innovation.

123. More importantly, it is the existing competitive state of the mobile market that encourages mobile operators to invest and innovate regardless of the spectrum assignment approach adopted.

124. Of course, low prices charged for the spectrum would also leave the operators with more funds to invest in their network and roll out more innovative services.

Question 6: *Would you consider the proposed arrangement to set aside 2 x 5 MHz of the 900/1800 MHz Spectrum as the RFR Spectrum for each of the four MNOs to ensure continuous provision of 2G services during the first*

three years of the new spectrum assignment term too much, too little or about right? Is there any arrangement other than the provision of RFR Spectrum to each of the four MNOs would also ensure the continuity of 2G services for a reasonable period of time in the new 15-year spectrum assignment term?

125. First, 2 x 5 MHz of RFR Spectrum per mobile operator disregards the market situation and is irrational. This is only 1/5 of the total amount of spectrum being re-assigned yet the 3G precedent, the amount of spectrum at risk, anticipated growth levels and a looming spectrum deficit all cry out for a much larger RFR (even if such is not 100%).

126. Second, the RFR Spectrum is not just needed to continue the provision of 2G services but also (and frankly more importantly) to support the provision of 3G, 4G services and 5G services in the future. Indeed, today, the 1800 MHz band is mostly used by operators to provide 4G services and the 900 MHz band to provide 3G/4G services, not 2G services.

127. In this regard, HKT would note that in the 3G Spectrum re-assignment exercise, 2/3 of each incumbent spectrum holder's spectrum was offered as RFR. The same proportion (%) should be applied to this current exercise as the starting point of the analysis in order to safeguard the continuity of existing 2G, 3G and 4G services.²⁰ Indeed, the relevant factors (e.g. exponential demand growth, the significant amount of spectrum involved, the importance of service continuity, the need for a stable investment/innovation environment) all point to the need to adopt a much higher percentage in the present case if Option 3 were to be implemented.

128. Third, it is unfair to offer the same amount of spectrum as an RFR to each operator given that some operators have a larger number of customers (both retail and wholesale) to support. Ensuring customer service continuity logically requires an amount of RFR spectrum to be offered to each incumbent spectrum holder which is commensurate

²⁰ For this purpose, RFR Spectrum should be offered to the incumbent spectrum holders in both the 900 MHz band and 1800 MHz band.

with the number of customers served by that operator and that operator's current spectrum holdings. This must be done on a percentage basis not on a MHz basis. It makes no sense to offer the same amount of spectrum on an RFR basis to an operator with a large customer base (and large spectrum requirements) and an operator with a small customer base (and small spectrum requirements). There is also no basis to penalize an operator that has invested, innovated and successfully competed with the same spectrum amount as an operator that has invested less, innovated less or not competed successfully. The RFR approach should to the maximum extent possible be based on a percentage approach in regard to the existing holdings in the relevant bands and not a flat amount.

129. Fourth, HKT notes the CA's proposal, in paragraph 51 of the Consultation Paper, to impose a requirement on the mobile operators who have taken up their rights under the RFR to use the spectrum to continue providing 2G services for a 3 year period after commencement of the new term of assignment. While this is contrary to the technology neutral approach, and a bad precedent to set (and hence should be avoided wherever possible), HKT understands the CA's concerns as to these users.

130. HKT would suggest that all the concerns noted above can be met within a larger and more flexible RFR approach within the licence period.²¹

²¹ If the CA were still minded to impose this requirement then the RFR price for this piece of spectrum should be discounted in order to reflect the commitment taken on by the holders of the spectrum. In any case, HKT also notes that the proposed requirement to provide 2G services appears to contradict a statement the CA made earlier in paragraph 19 of the Consultation Paper (emphasis added):

"The CA will continue to adopt its technology-neutral approach when considering the views of the industry on the technology to be adopted in the provision of public mobile telecommunications services, as well as the types of mobile services to be provided using the radio spectrum which may be assigned to the MNOs. Accordingly, the CA considers that the decision on whether, and if so when, the 2G networks will be switched off in Hong Kong should be determined by the MNOs based on their assessment of the demand for 2G services [...]"

Variants of Option 3

131. The following variants of Option 3 have been proposed in the Consultation Paper:

- **Option 3A** - All four slots of 2 x 5 MHz of RFR spectrum to be in the 1800 MHz Band
- **Option 3B** - Three slots of 2 x 5 MHz of RFR spectrum to be in the 900 MHz band and the remaining slot to be in the 1800 MHz band
- **Option 3C** - All four slots of 2 x 5 MHz of RFR spectrum to be in the 900 MHz band
- **Option 3D** - Individual MNOs can choose the frequency band of their RFR spectrum

Question 7: *Among the four hybrid sub-options, what is your preference and why? Do you have any other variants to the hybrid option you would like to suggest, and if so, what are the details and the justifications?*

132. At the outset, all four hybrid sub-options assume that only 2 x 5 MHz is offered to each incumbent spectrum holder on an RFR basis. This represents a mere 20% of the operators' existing assignments and will do almost nothing to ensure service continuity. However, given that both the 900 MHz band and the 1800 MHz band are needed to preserve service continuity for 2G, 3G and 4G services (and future 5G services), HKT would strongly suggest that, in the event of the Administration proceeding with Option 3, the incumbent spectrum holders should, as the starting point of any RFR and service continuity analysis, be permitted to retain more than 2/3 (67%) of the spectrum they currently hold in both the 900 MHz band and the 1800 MHz band.

133. Indeed, the 2 x 5 MHz approach seems to be based on very little analysis as to future demand, spectrum usage, service continuity, investment, innovation and competition. Such a proposal is inconsistent with past practice, global best practices, the opinions expressed by the Administration's consultants and would surely be a disaster for consumers. To be clear, HKT supports none of the four hybrid options.

134. Accordingly, taking into account the existing amount of spectrum held by each operator in the 900 MHz band and 1800 MHz band, and the



number of customers served by each operator, HKT would suggest that if the Administration was minded to adopt Option 3 that RFR Spectrum be offered to each incumbent spectrum holder as shown in the table below. This approach takes into account the need to create larger spectrum blocks, eliminate spectrum fragments and, at the same time, allows for some spectrum to be auctioned.

900 MHz band

Operator	Amount of RFR Spectrum	Total RFR Spectrum	Existing Spectrum	RFR %
HKT	1 block of (2 x 5) MHz	10 MHz	16.6 MHz	60%
SmarTone	1 block of (2 x 5) MHz	10 MHz	16.6 MHz	60%
Hutchison	1 block of (2 x 5) MHz	10 MHz	16.6 MHz	60%
Total RFR Spectrum		30 MHz	49.8 MHz	60%
Auctioned Spectrum	2 blocks of (2 x 5) MHz	20 MHz		
Total Available Spectrum		50 MHz		

135. In the above proposal for the 900 MHz band, HKT, SmarTone and Hutchison would be offered an equal amount of RFR Spectrum. No RFR Spectrum would be offered to China Mobile as it currently does not hold any spectrum in the 900 MHz band and hence there are no concerns regarding service continuity for that operator in this spectrum block. While this allocation is not consistent with a percentage approach reflecting market shares and usage, and HKT would suffer more than the other two 900 MHz spectrum holders, it may be seen as part of a realistic and fair ‘package’.

1800 MHz band

Operator	Amount of RFR Spectrum	Total Spectrum	Existing Spectrum	RFR %
HKT	3 blocks of (2 x 10) MHz	60 MHz	72.8 MHz	82%
SmarTone	1 block of (2 x 10) MHz	20 MHz	26.4 MHz	76%
Hutchison	1 block of (2 x 10) MHz	20 MHz	23.2 MHz	86%
China Mobile	1 block of (2 x 10) MHz	20 MHz	26.4 MHz	76%
Total RFR Spectrum		120 MHz	148.8 MHz	81%
Auctioned Spectrum	1 blocks of (2 x 10) MHz	20 MHz		
	1 block of (2 x 5) MHz	10 MHz		
Total Available Spectrum		150 MHz		



136. In the above proposal for the 1800 MHz band, SmarTone, Hutchison and China Mobile would each be offered 20 MHz of RFR Spectrum whereas HKT would be offered more (60 MHz), commensurate with their respective customer bases (both retail and MVNO/reseller), in order to ensure service continuity. In total, the amount of RFR Spectrum offered would be around 81% of the currently assigned spectrum in the 1800 MHz band.

137. While HKT very much believes that the full-fledged administratively-assigned approach best meets the requirements of consumers, it presents the above in order to contribute to the debate and to suggest an alternative hybrid approach that protects consumers.

SPECTRUM UTILISATION FEE

138. In accordance with the SPF, SUF will be payable for all non-government use of spectrum. In the Consultation Paper, the SCED puts forward various ways of setting the SUF depending on which spectrum assignment approach is adopted.

Option 1

139. Under Option 1, all of the spectrum will be re-assigned to the incumbent spectrum assignees if they exercise their right of first refusal. The SCED proposes to set two SUFs for the RFR spectrum; one for the 900 MHz band and one for the 1800 MHz band. The SUFs will be set with reference to the levels of SUF of spectrum in the frequency bands with similar propagation characteristics as determined by auctions conducted in recent years.

140. For the 900 MHz band, the SCED suggests that the level of SUF paid for the 850/900 MHz band as determined by the auction conducted in March 2011 be used as reference in determining the SUF for the 900 MHz band. The average price fetched for this one single spectrum auction was \$97.6m per MHz.

141. For the 1800 MHz band, the SCED suggests that the level of SUF paid for the 2.5/2.6 GHz band and 1.9-2.2 GHz band as determined by the auctions conducted in March 2013 and December 2014 respectively be used as reference in determining the SUF for the 1800 MHz band. The average price fetched for the spectrum in the March 2013 auction was \$30.8m per MHz and that for the December 2014 auction was \$49.21m per MHz. Taken together, this would produce an average price of \$39.9m per MHz.

Option 2

142. Under Option 2, all of the spectrum will be assigned via auction. While the SUF payable for the spectrum will be determined via the auction process, the SCED proposes to set the auction reserve prices based on the levels of SUF paid for spectrum in the frequency bands with similar propagation characteristics as determined by auctions conducted in recent years. This means the same auction prices referred

to above will be used as the basis for setting the reserve prices for the 900 MHz band and 1800 MHz band auctions.

Option 3

143. Under Option 3, an SUF will need to be set for the RFR Spectrum as well as the Auctioned Spectrum. For the Auctioned Spectrum, the SUF will be determined via the auction process and the reserve price will be set by the SCED on the same basis as that described under Option 2 above. For the RFR Spectrum, the SCED considers that the outcome of the auction for the Auctioned Spectrum should give the best indicator of the market value of the RFR Spectrum. Accordingly, the SCED proposes that the SUF of the RFR Spectrum in respect of the 900 MHz band and the 1800 MHz band should be set at the average SUF determined by the auction of the 900 MHz band auction and the 1800 MHz band auction respectively.

SUF cap in respect of RFR Spectrum

144. In order to address concerns regarding uncertainty over the SUF payable for the RFR Spectrum as a result of it being linked to the outcome of a future auction at the time the RFR rights are to be exercised, the SCED proposes adopting the same approach as that used for the 3G Spectrum whereby a cap would be placed on the SUF payable for the RFR Spectrum.

Minimum SUF in respect of RFR Spectrum

145. By the same token, and as adopted in the 3G Spectrum re-assignment exercise, the SCED wishes to set a minimum price payable for the RFR Spectrum. It is indicated that this is to prevent the incumbent spectrum holders from manipulating their bids in the spectrum auction to produce a low SUF for their RFR Spectrum while at the same time enjoying a guaranteed right to the RFR Spectrum.

146. The SCED also considers that the minimum SUF for the RFR Spectrum should be set higher than the reserve price for the Auctioned Spectrum so that the incumbent spectrum holders will be required to decide on whether to secure their holding of spectrum by taking up their RFR rights (but potentially pay more) or give up their rights and take their chances in the spectrum auction (but potentially pay less).

Question 8: What are your views and comments on the principles and methods of setting the SUF as proposed in paragraphs 64 to 75 above?

147. At the outset, OFCA appears to suggest that it is duty bound to set the SUF (whether it be for the RFR Spectrum or the Auctioned Spectrum) at a high level in order to ensure that the spectrum will be used efficiently:

Given that frequency spectrum is a scarce public resource, it is incumbent upon the Government to ensure that the SUF of spectrum is set to reflect as close as possible its full market value so that spectrum assignees, which run their commercial operations in a fully liberalised market, would put the spectrum so acquired to its most efficient use.²²

148. HKT disagrees with this approach. The statutory requirement is to ensure the efficient use of spectrum. The public policy requirement is to ensure that consumer welfare is maximized. The statute says nothing about minimizing the amount of spectrum to be introduced into the market and then, as the sole provider of spectrum, extracting huge monopoly rents for the use of that spectrum by the operators. Such an approach will only result in the SUFs being excessive and necessarily passed onto users as a regressive tax.

149. Indeed, this has already been seen in 2014/15 whereby, after so many years of keeping the administration fee charged to customers at \$12 per month, the fee increased to \$18 in order to help recoup the high levels SUF that had been paid to the Government in order to acquire spectrum at the previous auctions.²³ Should the 900/1800 MHz Band go through an auction process and the Administration continues to extract such monopoly rents from the participating operators, then the operators will have no choice but to again pass these SUF payments onto consumers via further price increases. HKT estimates that monthly charges could increase by about \$36 per household (or \$12 per subscription).

²² Paragraph 62 of the Consultation Paper.

²³ For instance: (i) \$2,421.2 million was collectively paid for 49.2 MHz of spectrum in the 1.9-2.2 GHz band in December 2014; (ii) \$1,540 million was collectively paid for 50 MHz of spectrum in the 2.5/2.6 GHz band in March 2013; (iii) \$1,952 million was collectively paid for 20 MHz of spectrum in the 850/900 MHz band.

150. High spectrum prices do not necessarily result in spectrum efficiency. It is the overall shortage of spectrum and the intense competition in the mobile telecommunications market which drives operators to use their acquired spectrum more effectively. In fact, Plum (whom OFCA has engaged on this spectrum re-assignment exercise) recognizes that there is little relationship between high SUFs and spectrum efficiency. In a paper published by Plum in April 2016 regarding: *Reserve prices in spectrum auctions: why size matters* (“**Plum Report on Reserve Prices**”), Plum states:

By virtue of spectrum scarcity and the mobile data growth phenomenon, mobile operators face sufficient incentives to utilise spectrum efficiently. They face a constant trade-off between efficient use of spectrum, capital expenditure and acquisition of new spectrum, arguably irrespective of the price they pay for the spectrum.

151. In any case, OFCA should not make reference to only one spectrum auction to set the SUF for the 900 MHz band or only two auctions to set the SUF for the 1800 MHz band (either in respect of the RFR or reserve price for spectrum to be auctioned). In particular, the 850/900 MHz spectrum auction conducted in March 2011 was but a one-off auction which, based on global comparisons, produced exceptionally high prices.

152. To be fair, OFCA should benchmark more broadly by looking at overseas spectrum auctions and the prices obtained for similar frequency bands (around the time the spectrum auction is to be held in Hong Kong) in order to set the level of the SUF for both bands. **Appendix F** shows the results of the research carried out by HKT on spectrum auctions conducted around the world over the past few years for frequency bands which are in the same range or are close to the 900/1800 MHz Band. Based on these benchmark auction prices, HKT has calculated an average set of prices. The SCED should use these average prices as reference SUF prices for Option 1²⁴:

- The SUF per MHz for the 900 MHz band should be around \$29m per MHz.

²⁴ For simplicity, these prices are based on a simple average of the prices fetched in the spectrum auctions surveyed.

- The SUF per MHz for the 1800 MHz band should be around \$23m per MHz.

153. Another relevant benchmark that should be referenced is the annual SUF amounts which the mobile operators are currently paying in respect of the 900/1800 MHz Band. At present, the incumbent spectrum holders pay an annual SUF amounting to \$1,450 per KHz, which translates to \$1,450,000 per MHz per annum, or around \$22m per MHz for a 15 year spectrum assignment period. There is no reason why the mobile operators should be asked to pay more than they do at the moment. If the SUF is to be increased significantly beyond the current levels then the onus should be on the Administration to justify charging more and making consumers pay more for their mobile bills, given that the costs would inevitably need to be passed onto users (as has happened before). Certainly, the current SUF level could be used as the auction reserve price.

154. The use of a single reference point (or only two reference points) to benchmark spectrum prices appears to be a way simply to create very high SUFs, and hence should not be adopted. Indeed, HKT would caution against setting such high SUFs as this will have an adverse effect on consumer prices as the costs will inevitably need to be passed onto the customer.

155. In the event that Option 2 is adopted, then the above benchmark SUFs can be used as the starting point to set the auction reserve price, subject to a reasonable discount being applied in order to allow for competitive bidding. Reserve prices are set to enable a full and robust auction. Reserve prices should not be the SCED's guess as to the market value. That will be determined by the market (i.e. in the auction). The SCED should not try to replace or out-guess the market.

156. With regards to the setting of auction reserve prices, it is interesting to note that in the Plum Report on Reserve Prices, Plum states:

[...] high reserve prices are potentially problematic for several reasons. If set above opportunity cost, they could price out potential market entrants, distort the price discovery mechanism of an auction, and increase the likelihood of unsold spectrum and thus inefficient outcomes.



In seeking to extract receipts from potential buyers of spectrum through reserve prices, governments inadvertently increase the risks of incurring social costs and creating inefficiencies in post-auction output markets. Such unintended consequences could include delays to network rollout, poorer coverage and service quality, higher prices and negative impacts on investment and innovation.

157. If the approach under Option 3 is taken, then an SUF will need to be set for the RFR Spectrum and a separate reserve price established for the Auctioned Spectrum. In order to ensure that the SUF of the RFR Spectrum is closely aligned with the SUF obtained for the Auctioned Spectrum, HKT agrees that it is appropriate for the SUF of the RFR Spectrum to be calculated as the average of the SUF for the Auctioned Spectrum. Accordingly, the reserve price for the Auctioned Spectrum should be set as previously suggested, i.e. at a discount to the benchmark SUF to allow the market to determine the SUF as noted by Plum.

158. HKT also considers it appropriate for an SUF cap to be applied for the RFR Spectrum in order to minimize concerns over the amount of SUF payable for the spectrum, given that it will be linked to the prices fetched in a future spectrum auction whose outcome will not yet be known at the time the incumbent spectrum holder is required to commit to taking up its RFR rights.

159. On the other hand, HKT does not consider it necessary to set a minimum price for the RFR Spectrum. The SUF payable for the RFR Spectrum could simply be the same as the average price²⁵ fetched for the Auctioned Spectrum, subject to the SUF cap for the RFR Spectrum (which is still needed to alleviate concerns arising from not knowing what the maximum amount of SUF is payable for the RFR Spectrum). This would ensure that the market value of the RFR Spectrum and the Auctioned Spectrum are aligned as closely as possible and avoids the need to “guess” a minimum price for the RFR Spectrum which could be far removed from its actual market value as determined under auction.

160. While a reserve/minimum bid price is required for any Auctioned Spectrum, HKT does not see the need for a minimum price to be set for

²⁵ In calculating the average price, the highest and lowest auction prices could be excluded.

the RFR Spectrum and rejects the SCED's attempts to justify setting such a price on the grounds of potential manipulation by bidders during the spectrum auction. No analysis or evidence has been provided to support this assertion, and such manipulation is likely to be unlawful.

Payment method of SUF

161. HKT finds it interesting that the Consultation Paper does not ask for views on the payment method and simply states that an upfront lump sum SUF payment will be made for use of the spectrum. The Administration appears to assume that all concerned parties find this payment method acceptable. HKT disagrees and would suggest that this issue needs to be more fully ventilated.

162. Payment of the SUF by annual installment would enable the spectrum assignees to better manage their capital expenditure and operating expenses, and permit all mobile operators, including any new entrants (whom the Administration indicates it wishes to facilitate), a better chance to participate more fully in any spectrum auction. Splitting up the payment of the SUF over the assignment period of the spectrum also more closely reflects how the spectrum asset will be used, i.e. as an input to the day-to-day operations of the mobile operator to enable it to provide services and hence generate income.

163. It may also result in higher final auction prices as the spectrum will become more "affordable" if payment of the SUF is spread out over a number of years. This issue has been raised before by the industry, and should have the support of the SCED and the CA. Accordingly, HKT considers it appropriate for the SUF to be paid on an annual basis over the term of the spectrum assignment to reflect the fact that the expenditure is revenue (rather than capital) in nature.

164. While annual SUF payments were adopted when the 3G Spectrum was first assigned to the mobile operators in 2001, since then, SUF payments resulting from the award of spectrum via an auction or RFR basis have largely required spectrum assignees to settle the SUF upfront in one lump sum payment. On this basis, if the Administration is not prepared to revert back to annual payments for the SUF, the Administration should at least discuss with, and seek agreement from, the Inland Revenue Department that the upfront lump sum SUF



payments are revenue in nature and hence can be treated as tax deductible by the spectrum assignees.

PROPOSED ARRANGEMENTS FOR SPECTRUM RE-ASSIGNMENT

165. In this section of the Consultation Paper, the Administration puts forward various proposals regarding the size of the frequency blocks for the 900/1800 MHz Band, the parties who are eligible to participate in any spectrum auction, and whether a limit on the amount of spectrum that can be acquired by each operator needs to be imposed.

Band plans

166. The CA proposes to re-organize the fragmented frequency blocks currently found in the existing spectrum assignments in the 900/1800 MHz Band prior to re-assignment of the spectrum.

167. In view of the rising demand for high speed mobile broadband services, the CA considers it appropriate to create as many frequency blocks of 2 x 10 MHz as possible in the 1800 MHz band. This would allow operators the opportunity to build frequency blocks of 2 x 20 MHz, which is the maximum carrier bandwidth supported by 4G technology. As a total of 150 MHz is to be re-assigned in this band, this also will necessitate the creation of some 2 x 5 MHz blocks.

168. For the 900 MHz band, given that only 50 MHz of spectrum will be available for re-assignment, the CA proposes to create frequency blocks of 2 x 5 MHz.

Question 9: *Do you agree that in devising the band plan, priority should be given to frequency slots of 2 x 10 MHz each for spectrum in the 1800 MHz band? Do you agree that the band plan in the 900 MHz band should be restructured into frequency slots of 2 x 5 MHz each?*

169. HKT considers it sensible to re-organize the 1800 MHz band into 2 x 10 MHz blocks in order to facilitate deployment of the spectrum for 4G services. Accordingly, this would, by necessity, result in the creation of one 2 x 5 MHz block in addition to the seven blocks of 2 x 10 MHz.

170. For the 900 MHz band, given the limited amount of spectrum available for assignment, HKT supports the creation of five 2 x 5 MHz blocks.

171. Importantly, regardless of which spectrum assignment option is adopted by the Administration, HKT agrees that it is essential to re-organize the existing frequency blocks which have been assigned to the operators in the 900/1800 MHz Band so that they are in paired blocks of 2 x 5 MHz or 2 x 10 MHz. This is to ensure more efficient use of the spectrum.

Eligible bidders

172. Should an auction be held to determine the assignment of spectrum, the Administration proposes that all interested parties will be allowed to take part. This includes both the incumbent operators and any new entrants.

Question 10: Do you agree that the Auctioned Spectrum should be open for bidding by all interested parties, including the incumbent spectrum assignees and new entrants?

173. HKT sees no reason to bar anyone from participating in the auction.

Spectrum cap

174. The CA suggests that it is necessary to impose a spectrum cap to limit the total amount of spectrum that may be acquired by each individual bidder under this spectrum assignment exercise. Accordingly, the CA proposes to impose a spectrum cap of 90 MHz for the total amount of spectrum in the 900/1800 MHz Band that may be acquired by an operator, either via RFR or via auction.

175. In addition, the CA considers it appropriate to limit the amount of spectrum that may be acquired by an operator in the 900 MHz band, either via RFR or auction, to 20 MHz. This 20 MHz sub-cap, however, excludes the spectrum in the 800 MHz and 850/900 MHz bands currently held by some of the mobile operators but which is not part of this consultation.

Question 11: What are your views on the proposal to impose a spectrum cap and the proposed cap level of 90 MHz?

176. As a matter of principle, HKT sees no reason to impose any spectrum cap unless the CA can point to a substantial competition

concern. Otherwise, as the CA has stated in the Consultation Paper, the market should be allowed to decide how the spectrum is to be re-assigned.

177. Interestingly, any spectrum cap proposal would be inconsistent with the stated view that the relevant spectrum is less than one-third of the total spectrum which is currently being deployed for mobile broadband services (paragraph 15 of the Consultation Paper), and that there are no service continuity issues other than for the provision of mobile voice services to customers using 2G handsets (paragraphs 16 and 17 of the Consultation Paper).

178. One question that does arise, however, and which is not addressed in the Consultation Paper, is what spectrum cap would apply to joint ventures between mobile operators? Logically, any cap would be flexible enough to accommodate such bidding. If a 90 MHz cap existed for one operator, then a two-operator joint venture would be allowed to acquire 180 MHz of capacity.

179. Of course, this is likely to be much less of an issue under Option 1 and, to a certain extent, Option 3 since under these two options all of the spectrum or at least part of the spectrum is assigned to the operators on an RFR basis. But even so, the Administration should address this issue as well as the issue of connected parties.

Question 12: Do you consider it necessary to introduce a sub-cap for the 900 MHz spectrum within the overall spectrum cap of 90 MHz? If the answer is yes, is the proposed sub-cap at 20 MHz suitable?

180. Per the above, HKT does not consider it necessary to impose any sub-cap for the 900 MHz band. The market should be allowed to decide how much spectrum is assigned to each operator. If an operator considers it worthwhile to acquire more than 20 MHz of spectrum in the 900 MHz band then it should be permitted to do so absent clear competition concerns (which are most doubtful).

181. Further, this issue would not arise if Option 1 or Option 3 were to be adopted since, under these two options, spectrum is either wholly or partly re-assigned to the operators on an RFR basis. With the introduction of new spectrum and spectrum trading, all of these



concerns are addressed, and the new Competition Ordinance provides sufficient powers to oversee the market.

LICENSING ARRANGEMENTS

182. As per past spectrum auctions, successful bidders will be granted a new unified carrier licence under which the spectrum will be assigned for a period of 15 years, coinciding with the term of the licence.

183. Should the successful bidder be an existing licensee, the licensee may request that its existing licence be merged with the new licence. The newly merged licence will therefore contain the spectrum assignments for the licensee's existing and newly acquired spectrum and run for a period of 15 years from the new licence date.

Spectrum assignment periods

184. Spectrum in the 900 MHz band currently expires on dates ranging from 19 November 2020 to 11 January 2021. All spectrum in the 1800 MHz band expires on the same day, 29 September 2021.

185. The CA proposes to align the new spectrum assignment period (15 years) for the 900 MHz band so that they commence on 12 January 2021 to simplify future administrative and licensing arrangements and facilitate the smooth handover of any spectrum in the 900 MHz band from one operator to another.

186. The CA sees no need to align the new assignment period for the 1800 MHz band with the 900 MHz band, so the new assignment period (15 years) for the 1800 MHz band will commence from 30 September 2021.

187. The SUF for the extended period of assignments for the 900 MHz band shall be equal to the royalty payments for the year just before the expiry of the existing assignments proportionate to the number of days of the extended period. This affects Hutchison and SmarTone only.

Question 13: *What are your views on the proposed arrangements to align the 15-year term of the new assignments for the spectrum in the 900 MHz band to commence on 12 January 2021, and to have the new 15-year assignment term for the spectrum in the 1800 MHz band to commence on 30 September 2021?*

188. HKT considers it practical to align the new assignment periods for the 900 MHz band for ease of administration and thus does not object to the Administration's proposal.

189. HKT would suggest, however, that the licence term for both the 900 MHz band and 1800 MHz band be extended. There is now a growing trend to grant licences with no expiration dates, allowing operators to invest with certainty, which enhances competition and consumer benefits. This has occurred in the UK and is very much worth implementing here. The approach would be revenue neutral, as higher value spectrum would receive a higher price.

Question 14: Do you agree that the SUF for the extended period of assignments shall be determined in accordance with the method as set out in paragraph 88 above?

190. While HKT recognizes the simplicity associated with the Administration's proposal as to how the SUF is set for the extended period of assignments, one question that does arise is whether the SUF payable for the extended period fairly reflects the market value for the relevant spectrum during that time. On this basis, HKT would like to reserve its position on this specific issue until the next round of consultation when it is expected that the level of SUF for the various pieces of spectrum will be debated more thoroughly.

Network and service rollout obligations & performance bond for rollout obligations

191. In paragraph 91, the CA proposes more stringent than usual network and service rollout requirements for the 900/1800 MHz Band due to the:

[...] extensive coverage of existing mobile networks using the 900/1800 MHz Spectrum and the superb radio propagation of spectrum in the 900 MHz and 1800 MHz bands which facilitates the provision of broad geographical coverage in an economic way.

192. Accordingly, the CA suggests that spectrum assignees provide a minimum coverage of:

- 90% of the population of Hong Kong in the case of mobile services, or

- 200 commercial and/or residential buildings and to establish and maintain a minimum of 50 hubs in the case of fixed services

within five years from the date of the spectrum re-assignment.

193. However, if the incumbent spectrum holders can provide their coverage figures demonstrating that they have already met these requirements using the spectrum bands concerned, then the rollout requirements will only apply to those operators (new or existing) who have acquired new spectrum they were not previously holding.

194. In addition, for those operators to which rollout obligations apply, a performance bond will be required to be lodged by the operator as a guarantee of its compliance with the network and service rollout obligations, the amount of which is to be determined by the CA later when the RFR spectrum is offered or in the Information Memorandum pertaining to the spectrum auction.

Question 15: What are your views on the network and service rollout obligations and performance bond requirement proposed to be imposed on the assignees of the 900/1800 MHz Spectrum in their provision of public mobile telecommunications services under the new term of frequency assignments?

195. In principle, HKT sees no reason to object to the Administration's proposal. However, if an operator is re-assigned or essentially acquires the same frequency bands that it is currently holding then HKT would suggest that, in such circumstances, it is not necessary for the operator to provide its coverage figures demonstrating that it has already met the coverage requirements.

196. The market will drive both the required mobile service coverage and number of hubs for fixed services. There is no real need to expend OFCA or operator resources on this, except perhaps in the case of new entrants, but even here, other options such as spectrum trading provide a market-based solution and an alternative to more regulation.

PROPOSAL FOR THE RE-ASSIGNMENT OF SOME OF THE 900/1800 MHZ SPECTRUM FOR COVERAGE IN COUNTRY PARKS AND REMOTE AREAS

197. The CA proposes to administratively re-assign the spectrum currently being used by the mobile operators in the designated areas²⁶ for another 15 years until 29 September 2036, i.e. the same as the new term of assignment for the spectrum in the spectrum in the 1800 MHz band, and to continue to charge no SUF for the use of the spectrum.

Question 16: *What are your views on the proposal in paragraph 95 concerning the re-assignment of spectrum for the provision of mobile coverage in the country parks and remote areas?*

198. HKT sees no reason why the current arrangements regarding the assignment of spectrum for use in the designated areas should not continue. The spectrum is being used by the mobile operators to provide coverage for emergency situations and hence should continue to be exempt from payment of SUF.

²⁶ These refer to country parks and certain remote areas as specified in gazette notice G.N. 2068 of 2009.



Appendix A

ITU WRC-15 – New Frequency Bands for 4G

Frequency bands	Amount of Spectrum	Remarks
470 – 698MHz (600 MHz)	TBC	➤ In parts, in some countries in Americas, and in APAC
694 – 790MHz (700 MHz)	60 MHz	➤ Global band, now also in EMEA
1427 – 1518MHz (L-Band)	91 MHz	➤ Global band, including all Region 3 countries (China as well) ➤ WRC-15 has tasked the ITU Radiocommunication Sector to continue the studies on frequency sharing between mobile services and other relevant services. The decision would be effective on 1 January 2017
3300 – 3400MHz	100 MHz	➤ Global band, in many countries, not in Europe / North America
3400 – 3600MHz (Band 42)	200 MHz	➤ Global band, already allocated in Europe, identified most countries in Region 3 including China since WRC-12 for IMT
3600 – 3700MHz (Band 43)	100 MHz	➤ Global band, in many countries, not in Africa / some in APAC
4800 – 4990MHz	190 MHz	➤ Some countries in APAC, and one in Americas
Total	741 MHz	



Appendix B

Comparison of Spectrum available in Hong Kong v. UK

Frequency (MHz)	Band No.	OFCA (HK) MHz	OFCOM (UK) MHz	
			Current	Future Release (by 2020)
300				380-385/390-395 MHz (Up to 10 MHz)
800	20		2 x 30	
850	5	2 x 12.5		
900	8	2 x 29.9	2 x 34.8	
1400				1427-1452 MHz (Up to 20 MHz)
1500	32		1 x 40	
1800	3	2 x 74.4	2 x 71.6	
2100	1	2 x 59.2	2 x 59.4	
2300	40	1 x 90		Lower 2.3 GHz (Up to 40 MHz)
2600	7	2 x 70	2 x 70	
2600	41	Government	1 x 50	
3500	42		1 x 40	
Total		582 MHz	661.6 MHz	Up to an additional 500 MHz (including the high priority 70 MHz identified above)
Difference		79.6		Plus up to 500 MHz

Notes:

1. Future Release refers to an additional 500 MHz of public sector spectrum below 5 GHz which the UK Government targets to release by 2020. The high priority bands are as marked within this column. See Ofcom paper on *Review of Public Sector Spectrum Release (PSSR)* (March 2016) and report on *Enabling UK growth: PSSR Programme annual report* issued by UK Government Investments (April 2016).
2. The total amount of assigned spectrum shown in the table for Hong Kong (582 MHz) includes the 30 MHz of spectrum in the 2300 MHz band assigned to 21 ViaNet Group Limited. This spectrum has been excluded from the total figure of 552 MHz quoted by the CA.



Appendix C

Paper by Preiskel & Company

Secondary Spectrum Markets Regulation – A Multi-Jurisdictional Analysis



Appendix D

Paper by Preiskel & Company

Spectrum Licence Terms – A Multi-Jurisdictional Analysis

Appendix E

The 21 ViaNet Disgrace

In the Consultation Paper, the Administration makes a big deal about spectrum auctions (such as the one being contemplated for the 900/1800 MHz Band) providing an opportunity for competition to be stimulated via new entrants into the Hong Kong market:²⁷

The mobile telecommunications market in Hong Kong had operated with four or more MNOs for decades, with competition contributing to low service charges, high service quality, and a full range of choices for service users. Spectrum assignment exercises provide opportunities for further stimulation of competition in the market. The auction of the 90 MHz of frequency spectrum in the 2.3 GHz band in 2012, for instance, led to an additional operator joining the Hong Kong telecommunications market. Bearing in mind that the Re-assignment of the 900/1800 MHz Spectrum involves a sizable 200 MHz of spectrum, and that there will unlikely be any new spectrum available for release for the provision of public mobile telecommunications services before this re-assignment, the current exercise provides a good opportunity to attract new entrants and investments in the Hong Kong telecommunications market [...]. [Emphasis added]

The “additional operator” mentioned above refers to 21 ViaNet. 21 ViaNet was supposed to be the new entrant that would provide “further stimulation of competition in the market”.

How wrong has this turned out to be?

Let us look at the details of the 2.3 GHz band auction in 2012, and what has happened to 21 ViaNet since it won spectrum at this auction:

Date	Event
Nov-11	<ul style="list-style-type: none"> Information Memorandum published by OFTA inviting applications to bid for spectrum in the 2.3 GHz band for the provision of broadband wireless access services. The successful bidders are required to provide mobile services coverage to a minimum of 50% of the Hong Kong population, or fixed services coverage to at least 200 commercial and/or residential buildings within five years from the licence grant.
Jan-12	<ul style="list-style-type: none"> 21 ViaNet’s application to participate in the spectrum auction is

²⁷ See paragraph 21 of the Consultation Paper.

Date	Event
	<p>accepted and is announced by the Telecommunications Authority (“TA”) as one of Qualified Bidders.</p>
Feb-12	<ul style="list-style-type: none"> • 21 ViaNet bids in the spectrum auction and OFTA announces that it has become one of the provisional successful bidders for 30 MHz of spectrum at a price of \$150 million. • In OFTA’s press release, it welcomes this fresh assignment of spectrum to the existing and new operators to enable the provision of more mobile data capacity: <p><i>“Over the past two years, mobile data service has continued to grow at a spectacular rate. As a result, the industry finds it necessary to continually provide for additional network capacities in order to meet the market demand. With the assignment of the radio spectrum through the spectrum auction today, the successful bidders will be able to deploy state of the art mobile broadband technologies and provide the necessary network capacities to maintain the momentum of growth of the booming service.”</i></p> • Press release issued by 21 ViaNet expressing its intention to deploy its newly acquired spectrum to provide mobile data services: <p><i>“We are focused on capturing the best market opportunities and are pleased to win the Hong Kong spectrum auction with the minimum required bid. We believe that this opportunity is a cost-effective means of opening up more growth opportunities for 21 ViaNet. We are seeing an accelerating business trend towards accessing data through the mobile Internet. By extending our Internet infrastructure services into the wireless Internet, we aim to further embed 21Vianet into the core Internet infrastructure in Greater China.”</i></p>
Mar-12	<ul style="list-style-type: none"> • 21 ViaNet is formally announced by the TA as one of the successful bidders in the 2.3 GHz band auction and is assigned the spectrum. • A Unified Carrier Licence (“UCL”) is issued to 21 ViaNet on 30 March 2012 containing the assigned spectrum. Despite its earlier press release, 21 ViaNet elects to make use of the spectrum to provide local fixed telecommunications services <u>not</u> mobile data services. On this basis, per its licence requirements, 21 ViaNet’s network/service needs to cover 200 commercial and/or residential buildings in Hong Kong within 5 years.
Jul-15	<ul style="list-style-type: none"> • More than 3 years after successfully bidding, 21 ViaNet is unable to meet its network/service coverage requirements and hence makes an application to the CA to amend its coverage obligations to focus on village houses in rural and remote areas.

Date	Event
Aug-15	<ul style="list-style-type: none"> • 21 ViaNet’s application is approved by the CA, and 21 ViaNet’s network/service coverage obligations are amended such that it is now only required to provide coverage to 3,000 village houses by 29 March 2017 and 4,000 village houses by 29 March 2018.
Today	<ul style="list-style-type: none"> • While the other successful bidders are making use of their assigned spectrum, we still await launch of any service by 21 ViaNet.

As can be seen from the foregoing, 21 ViaNet has proven that the Administration’s policy of using spectrum auctions to allow new entry and stimulate competition in the Hong Kong mobile market has failed.

First, despite the Administration’s intentions, 21 ViaNet did not make use of the spectrum to provide mobile data services. It therefore does not, today, compete in the mobile data services market which is experiencing high growth and requires much needed network capacity. In fact, 21 ViaNet is barely competing in the local fixed telecommunications services market.

Second, even in its elected (fixed telecommunications) services market, 21 ViaNet has not been able to meet the standard network/service coverage requirements which are normally associated with UCLs, and has had to seek approval from the CA to amend/reduce its coverage obligations. Clearly, this does not bode well for new operators wishing to enter the mobile market, so why should the Administration go out of its way to deliberately assist them?

The truth is, with 4 mobile network operators and numerous MVNOs/resellers, the Hong Kong mobile telecommunications market is already saturated. Competition is highly intensive. Retail prices are low. There is therefore little margin left to sustain new entrants. Any plans for new entrants to break into the Hong Kong market will in all likelihood be thwarted. The story of 21 ViaNet so far is a clear testament to this fact: Spectrum auctions do not provide any further stimulus to competition in an already highly competitive market in Hong Kong. On the contrary, the evidence indicates that spectrum auctions place spectrum in the hands of those who cannot compete.

Appendix F

Survey of Spectrum Auction Prices around the World

900 MHz Band

Country	Date	HKD per MHz per Population	HKD per MHz (if applied to Hong Kong Population)
Thailand ¹	Dec-15	12.24	89,889,276
Ghana ²	Dec-15	0.93	6,865,954
Serbia ²	Nov-15	1.75	12,832,487
Moldova ³	Nov-15	0.86	6,308,867
Average			28,974,146

¹ One of the successful bidders subsequently forfeited on payment and hence was required to give up the spectrum

² This was in the 800 MHz frequency range

³ Combined 800/900 MHz frequency bands

1800 MHz Band

Country	Date	HKD per MHz per Population	HKD per MHz (if applied to Hong Kong Population)
South Korea ⁴	May-16	2.94	21,604,780
Australia	Feb-16	0.09	663,549
Norway	Nov-15	5.28	38,820,741
Thailand	Nov-15	4.34	31,857,673
Average			23,236,685

⁴ The 1800 MHz band was auctioned alongside 700/2100/2600 MHz

Sources:

- (i) Auction prices per news items on:
www.telegeography.com/products/commsupdate/
- (ii) Exchange rates as at 16 May 2016 per:
www.x-rates.com
- (iii) Population figures per:
www.worldometers.info/world-population/population-by-country/

SECONDARY SPECTRUM MARKETS REGULATION

A MULTI-JURISDICTIONAL ANALYSIS

PREISKEL & CO

18 MARCH 2016

Executive Summary

- There is widespread practice across most major jurisdictions to allow spectrum trading
- Spectrum trading has a central role to play in ensuring that spectrum is used efficiently
- The more efficient use of spectrum by existing market players or by new entrants directly delivers important benefits to consumers including new services, enhanced service quality and lower prices
- Spectrum trading is consistent with a market based approach, including the auctioning of spectrum
- Spectrum trading is not difficult to implement or manage

Introduction

This report surveys spectrum trading across several jurisdictions in Asia, the EU and North America. Across and within these groupings, regulators have increasingly sought to foster spectrum trading in order to more efficiently manage spectrum, recognizing that market forces can act much faster than regulators who may hold spectrum auctions on a quite infrequent basis. Although creating a 'secondary market' in spectrum is not quite universal, it is increasingly common to be able to trade (ie, sell) spectrum rights in the secondary market.

The emergence of spectrum trading brings important benefits to consumers in terms of services available, service quality, price and/or competition. Three important implications are: (i) spectrum is more likely to be acquired by those who place the highest value on it; (ii) spectrum will be used to provide the scope and quality of services that consumers demand; and (iii) lower barriers to entry result which promotes competition and ensures the continuation of the virtuous circle. All these results are beneficial to users as spectrum trading allows companies with lower transaction costs to acquire and use spectrum. It is also the case that secondary trading appears to have increased the original auction prices, because allowing greater specialisation (ie, increasing the potential demand) allows greater value to be derived from the spectrum. For instance, the USA is a prominent example of a thriving secondary market, and very high auction prices are seen alongside secondary trading.¹

Secondary markets improve even on a hypothetical perfect auction

Secondary markets can improve even on a hypothetical perfect auction. This follows from the fact that spectrum trading can occur anytime whereas auctions are quite infrequent. Further, a more specialised market can emerge in which parties (ie, new entrants and niche players) other than vertically integrated operators purchase and use spectrum where it is more efficient for them to do so.

¹ In August 2015, Verizon and T-Mobile agreed to \$173 million spectrum swap in the secondary market (See "Verizon, T-Mobile strike \$173M deal to swap AWS, PCS spectrum in dozens of markets", Fierce Wireless, 3 August 2015 (<http://www.fiercewireless.com/story/verizon-t-mobile-strike-173m-deal-swap-aws-pcs-spectrum-dozens-markets/2015-08-03>)). This secondary trading occurred alongside very high predicted auction prices of more than \$100 million in FCC re-farming of terrestrial TV spectrum: "FCC Auction Promises Bonanza for Small TV Broadcasters" *Wall Street Journal*, 5 January 2016 (<http://www.wsj.com/articles/fcc-auction-promises-bonanza-for-small-tv-broadcasters-1452046575>).

Lowering transaction costs allows spectrum to flow to more valuable blocks

The emergence of spectrum trading is likely to lower transaction costs and free up valuable spectrum. This is likely to allow scarce and already allocated spectrum to flow to the most valuable use. Importantly, this will allow the emergence of blocks of spectrum in cases where there are gains from scale, as with 4G mobile spectrum used for data. This is a similar efficiency gain to that seen with Multi-Operator Core Networks; the intermediary enables optimal spectrum use by providing a platform to existing operators.

Lower barriers to entry result

An important practical consideration is that spectrum trading is likely to lower entry barriers by making spectrum blocks more readily available. For example, a new carrier would possibly be more likely to gain access to spectrum via a competitive market involving spectrum trading from either a competitor or an entity that may be looking to maximise revenues in the short term (or otherwise reposition itself in the market) than having to wait years for the next auction.

Secondary markets do not impose excessive regulatory burdens

There are several examples of well-functioning secondary markets in spectrum trading, which do not seem to impose excessive regulatory burdens. Notification systems can be easily created. Any prior approval requirements are generally limited to a competition assessment (or spectrum caps). Fees that are imposed appear to be minimal.

Regulators typically implement spectrum trading through a straightforward, four-step procedure:

1. The current licence holder notifies the regulator of the intention to trade;
2. The regulator publishes the notified information;
3. If required,² the regulator reviews the transaction;
4. Details of the final transaction are published.

The notification process typically includes:

- Details of the licence (or spectrum rights) to be traded;
- The planned date of transfer;
- Affirmation of the consent to the transfer, e.g. provision of the contract of transfer;
- Background information on the buyer and seller to allow for a competition review;
- In some cases, details of the price and other terms of transfer are included.

Following notification, the regulator typically publishes a short notice with details of the proposed transfer, containing general information on the parties to the transaction and the technical details of the licence (geography, frequency, etc.). The notice tends to be short to avoid any issues with sharing business sensitive information.

The other major step for the regulator is to review the transaction. This is rarely a substantial issue, and in the survey we encountered no denial of a transfer for cause. The points regulators typically check are:

² Some jurisdictions allow some trading to take place subject only to notification, in which case review is not required. This appears to mirror the Hong Kong's approach to telecommunications mergers.

- Meeting licence conditions: the regulator checks (i) that the current licence holder currently complies with the licence, and (ii) that the new licence holder is in a suitable position to meet the licence conditions (e.g. financial soundness);
- Ensuring no interference issues arise and that the transfer does not pose issues with the efficient use of spectrum;
- Checking that the transfer complies with any relevant international obligations;
- Checking for competition law issues. This assessment is often referred to competition authorities by the telecoms regulator.

If this review is favourable, regulators will often publish details of the final transaction, including relevant details such as the identity of the trading parties, details of the licence traded, and the date of transfer.

Although there are variations, most jurisdictions follow the above framework to a considerable extent. Some jurisdictions provide detailed guidance on the procedure involved, and the UK provides particularly clear guidance.

Implementation of trading in the UK

The UK has passed secondary legislation detailing the trading procedures to be used for spectrum trading.³ Spectrum trading was first allowed in 2004, and has since grown in scope to include almost all relevant spectrum, notably including mobile spectrum following 2011 reforms.⁴

The relevant regulations for mobile trading are the Wireless Telegraphy (Mobile Spectrum Trading) Regulations 2011, which provide for total and partial transfers of licences respectively under Regulations 4 and 5.

Regulation 7(1) sets out the information to be provided by the notifying parties under transfer procedure:

- Details of the licence to be transferred;
- Details of the transferor and transferee;
- The nature of the transfer (partial or total);
- Signed confirmation of the parties' consent to the transfer;
- Accompanying information necessary for OFCOM's review of the proposed transfer (e.g. information relevant to the competition law assessment).

Regulation 7(2) sets out the contents of the notice published by OFCOM, which states:

- The parties to the transaction;
- The date OFCOM accepted the notification;

³ The Wireless Telegraphy (Mobile Spectrum Trading) Regulations 2011 ("Mobile Spectrum Trading Regulations") and the Wireless Telegraphy (Spectrum Trading) Regulations 2012 set out the procedures for trading in mobile and other spectrum bands. The 2011 Regulations contain the most relevant details on mobile spectrum trading implementation and can be accessed at: <http://www.legislation.gov.uk/ukxi/2011/1507/made/data.pdf>

⁴ In the case of mobile, the list of tradable bands was updated by the Wireless Telegraphy (Mobile Spectrum Trading) (Amendment) Regulations 2015, which added the frequency bands 1452-1492 MHz, 2350-2390 MHz, and 3410-3600 MHz to the Schedule of tradable bands.

- Details of the proposed licence transfer.

Regulation 8 details the matters OFCOM must take into account in deciding whether to approve the transfer. The relevant considerations are:

- Current compliance with the licence terms by the transferor;
- The ability of the transferee to meet the licence conditions after transfer, and also the ability of the transferor to do so in cases where the transferor has continuing rights and obligations;
- Whether the transferee meets the relevant suitability criteria for the licence;
- Competition law assessment;
- Compliance with international obligations and national security interests.

Regulation 9 provides a power to direct that a transfer only take place subject to conditions designed to meet any concerns arising under the list of relevant matters in Regulation 8. This provides OFCOM with the flexibility to allow the transfer to proceed, subject to conditions if concerns arise.

In most cases, OFCOM conducts a relatively light touch review, except for cases raising significant competition law issues.⁵ If OFCOM wishes to approve the transaction, the parties surrender the existing licence to OFCOM, which then issues new licences reflecting the trade.⁶ OFCOM then publishes a notice containing details of the transfer, which is recorded in OFCOM's Spectrum Information System.⁷

Further guidance and worked examples are contained in OFCOM's *Trading Guidance Notes*.⁸ A new version of these *Notes* is expected next month, according to recent discussions with the regulator.

Summary of patterns from the country by country results

The major markets that Hong Kong often uses as a policy reference all allow spectrum trading. This includes the UK, the USA, Canada, Singapore, Taiwan and Australia (as well as most EU countries). In fact, although they implemented trading in different ways and with different scopes, across the entire survey no country operates a blanket ban on spectrum trading.

It is important to note that the survey does not provide a detailed analysis on the exact scope of spectrum trading, as the details can vary, but instead aims to provide some information on whether and how spectrum trading takes place. In some cases, important historical factors such as existing licence conditions or other requirements may create certain limits but these cases are the exception to the rule. Often, it is necessary to seek approval of a trade, which can only be denied on certain specified conditions (e.g. competition law assessment).

These important caveats notwithstanding, it is fair to say that most advanced and competitive markets have actively sought to encourage secondary spectrum trading in recent years.

⁵ Discussions with the regulator suggested that most spectrum bands would not merit a very detailed review, although trades in some scarce spectrum bands would be likely to trigger a detailed competition law review.

⁶ Regulation 7(5) of the 2011 Mobile Spectrum Trading Regulations

⁷ Regulation 7(6) of the 2011 Mobile Spectrum Trading Regulations

⁸ OFCOM *Trading Guidance Notes* OfW513 (December 2011), available at <http://stakeholders.ofcom.org.uk/binaries/spectrum/spectrum-policy-area/spectrum-trading/tradingguide.pdf>.

Conclusions and recommendations

On the basis of widespread global practices, we would recommend extending the scope for reallocation of spectrum to include secondary trading in spectrum in Hong Kong. This accords with trends elsewhere and opens the door to important consumer benefits from liberalisation of spectrum handling. Based on the experiences of many markets, it is now clear that implementation issues such as notification and competition analysis do not create any significant hurdles.

COUNTRIES SURVEYED

A. NORTH AMERICA

1. Canada
2. USA

B. EU

1. Austria
2. Denmark
3. Finland
4. France
5. Germany
6. Ireland
7. Italy
8. Spain
9. Switzerland
10. UK

C. AUSTRALIA

D. ASIA

1. India
2. Malaysia
3. Singapore
4. Taiwan

A. NORTH AMERICA

A. 1 CANADA

Is spectrum trading allowed?	Yes
Is regulatory notification required?	Yes
Is regulatory approval required? If so, is a competition assessment involved?	Yes. Competition assessment applies.
Is there a register of transactions?	Yes
Which authority manages spectrum trading?	Industry Canada
Sources of published information	www.ic.gc.ca/eic/site/smt-gst.nsf/eng/home
Are any fees due for spectrum transfers?	No additional fees are mentioned, although guidance documents preserve scope to impose one
Other points of note	

A. 2 USA

Is spectrum trading allowed?	Yes
Is regulatory notification required?	Yes
Is regulatory approval required? If so, is a competition assessment involved?	Approval is needed for most transactions, but short leases need only be notified. Competition law assessment takes place.
Is there a register of transactions?	Yes
Which authority manages spectrum trading?	The Federal Communications Commission
Sources of published information	www.fcc.gov ; the FCC Orders enabling trading and providing detailed reasons for doing so are available in the Federal Register
Are any fees due for spectrum transfers?	A \$395 filing fee applies
Other points of note	The FCC has enabled extensive trading and commentators report a stable and successful trading regime.

B. EUROPE

In EU member states, the Telecoms Framework Directive requires Member States to allow spectrum trading for certain defined bands.⁹ The Directive is implemented by Member States through their domestic law, but requires at least a baseline level of trading to be permitted.

B. 1 AUSTRIA

Is spectrum trading allowed?	Yes
Is regulatory notification required?	Yes
Is regulatory approval required? If so, is a competition assessment involved?	Yes and yes
Is there a register of transactions?	Yes
Which authority manages spectrum trading?	The Telecommunications Office, which acts under the Infrastructure Ministry
Sources of published information	https://www.rtr.at/en/m/Frequenzen
Are any fees due for spectrum transfers?	No additional fee is mentioned
Other points of note	

B. 2 DENMARK

Is spectrum trading allowed?	Yes
Is regulatory notification required?	Yes ¹⁰
Is regulatory approval required? If so, is a competition assessment involved?	Approval is not always mandatory. ¹¹
Is there a register of transactions?	Yes
Which authority manages spectrum trading?	The Danish Business Authority
Sources of published information	Danishbusinessauthority.dk ; www.ens.dk/en/
Are any fees due for spectrum transfers?	No additional fees are mentioned
Other points of note	Denmark was an early adopter of spectrum trading, and trading is reporting to be extensive

B. 3 FINLAND

Is spectrum trading allowed?	Yes
Is regulatory notification required?	Yes
Is regulatory approval required? If so, is a competition assessment involved?	Yes, with competition law assessment.
Is there a register of transactions?	Yes
Which authority manages spectrum trading?	The Finnish Communications Regulatory Authority (FICORA)

⁹ Article 9b of Directive 2002/21/EC of the European Parliament and of the Council of 7 March 2002 on a common regulatory framework for electronic communications networks and services (Framework Directive) as amended by Directive 2009/140/EC and Regulation 544/2009

¹⁰ Some sub-licensing arrangements do not need to be notified

¹¹ Immediate notification is required, but in some cases approval is not needed

Sources of published information	www.viestintavirasto.fi/en/spectrum/spectrumplanning.html
Are any fees due for spectrum transfers?	No additional fees are mentioned
Other points of note	

B. 4 FRANCE

Is spectrum trading allowed?	Yes
Is regulatory notification required?	Yes
Is regulatory approval required? If so, is a competition assessment involved?	Yes and yes ¹²
Is there a register of transactions?	Yes
Which authority manages spectrum trading?	The Autorite de Regulation des Communications Electroniques et des Postes (ARCEP)
Sources of published information	www.arcep.fr
Are any fees due for spectrum transfers?	No additional fees are mentioned.
Other points of note	

B. 5 GERMANY

Is spectrum trading allowed?	Yes
Is regulatory notification required?	Yes
Is regulatory approval required? If so, is a competition assessment involved?	Yes and yes
Is there a register of transactions?	Yes
Which authority manages spectrum trading?	The Federal Network Agency (BNetzA)
Sources of published information	www.bundesnetzagentur.de
Are any fees due for spectrum transfers?	No additional fees are mentioned.
Other points of note	A programme is in place to make spectrum trading more flexible.

B. 6 IRELAND

Is spectrum trading allowed?	Yes
Is regulatory notification required?	Yes
Is regulatory approval required? If so, is a competition assessment involved?	Yes and yes
Is there a register of transactions?	Yes
Which authority manages spectrum trading?	The Commission for Communications Regulation (ComReg)
Sources of published information	www.comreg.ie/radio_spectrum/spectrum_management.540.html

¹² In some spectrum bands, France does not require approval.

Are any fees due for spectrum transfers?	A EUR 5,000 fee applies to transfers
Other points of note	ComReg will review extending trading to include leasing

B. 7 ITALY

Is spectrum trading allowed?	Yes ¹³
Is regulatory notification required?	Yes
Is regulatory approval required? If so, is a competition assessment involved?	Yes, and yes ¹⁴
Is there a register of transactions?	Yes
Which authority manages spectrum trading?	The Autorita per le Garanzie nelle Comunicazioni (AGCOM) and the Ministry of Economic Development
Sources of published information	www.agcom.it
Are any fees due for spectrum transfers?	No special fee is mentioned
Other points of note	

B. 8 SPAIN

Is spectrum trading allowed?	Yes
Is regulatory notification required?	Yes
Is regulatory approval required? If so, is a competition assessment involved?	Yes and yes. Simplified rules apply to assignments of six months or less.
Is there a register of transactions?	Yes
Which authority manages spectrum trading?	The Secretariat of State for Telecommunications and the Information Society (SETSI)
Sources of published information	http://www.minetur.gob.es/telecomunicaciones/
Are any fees due for spectrum transfers?	No special fee is mentioned
Other points of note	The transfer system was instituted to reallocate spare capacity from the analogue TV switch off

B. 9 SWITZERLAND

Is spectrum trading allowed?	Yes
Is regulatory notification required?	Yes
Is regulatory approval required? If so, is a competition assessment involved?	Yes and yes.
Is there a register of transactions?	

¹³ Italy limits certain transfers to being between operators of the same technology.

¹⁴ Trading in scarce spectrum requires competition approval.

Which authority manages spectrum trading?	The Federal Communications Commission (FCC), which can delegate to the Federal Office of Communications (OFCOM).
Sources of published information	www.bakom.admin.ch
Are any fees due for spectrum transfers?	No special fee is mentioned
Other points of note	Switzerland adopted spectrum trading relatively early, in 1998, and commentators report a steady, low and manageable volume of transactions.

B. 10 UNITED KINGDOM

Is spectrum trading allowed?	Yes ¹⁵
Is regulatory notification required?	Yes
Is regulatory approval required? If so, is a competition assessment involved?	Yes and yes, although some leases do not require approval.
Is there a register of transactions?	Yes
Which authority manages spectrum trading?	The Office of Communications, OFCOM
Sources of published information	www.ofcom.gov.uk ; spectruminfo.ofcom.gov.uk
Are any fees due for spectrum transfers?	No special fee is mentioned
Other points of note	<p>Trading was liberalised in 2011, to include some mobile spectrum in response to the T-Mobile / Orange transaction creating Everything Everywhere.</p> <p>Note that licenses must be returned to OFCOM for transfer, and that certain licence terms forbid secondary trading absent handing the licence back to OFCOM. OFCOM thereafter modifies the licences and returns them to the operator.</p> <p>There are some limited but significant examples of spectrum trading, e.g. Qualcomm Spectrum's sale of spectrum to Vodafone in 2015.</p>

¹⁵ Spectrum leasing is also permitted for some spectrum.

C. AUSTRALIA

Is spectrum trading allowed?	Yes
Is regulatory notification required?	Yes
Is regulatory approval required? If so, is a competition assessment involved?	Yes and yes
Is there a register of transactions?	Yes
Which authority manages spectrum trading?	The Australian Communications and Media Authority (ACMA)
Sources of published information	http://www.acma.gov.au/Industry/Spectrum/Radiocomms-licensing/Spectrum-licences/spectrum_21
Are any fees due for spectrum transfers?	
Other points of note	Australia provides detailed guidance on the scope of trading, e.g. regulation of minimum contiguous bandwidths.

D. ASIA**D. 1 INDIA**

Is spectrum trading allowed?	Yes ¹⁶
Is regulatory notification required?	Yes
Is regulatory approval required? If so, is a competition assessment involved?	Yes and yes, but regulator can only deny on specific conditions.
Is there a register of transactions?	Yes
Which authority manages spectrum trading?	The Wireless Planning and Coordination Wing (WPC) of the Department of Telecommunications. The Telecoms Regulator of India also has relevant competences
Sources of published information	www.wpc.dot.gov.in
Are any fees due for spectrum transfers?	Yes
Other points of note	The spectrum cap may be relaxed in the future.

D. 2 MALAYSIA

Is spectrum trading allowed?	Yes
Is regulatory notification required?	Yes ¹⁷
Is regulatory approval required? If so, is a competition assessment involved?	Yes and yes
Is there a register of transactions?	Yes
Which authority manages spectrum trading?	The Malaysian Communications and Multimedia Commission
Sources of published information	http://www.skmm.gov.my/Spectrum/Assignment-of-Spectrum.aspx
Are any fees due for spectrum transfers?	
Other points of note	

D. 3 SINGAPORE

Is spectrum trading allowed?	Yes
Is regulatory notification required?	Yes
Is regulatory approval required? If so, is a competition assessment involved?	Yes and yes
Is there a register of transactions?	Yes
Which authority manages spectrum trading?	The Infocomm Development Authority (IDA)
Sources of published information	www.ida.gov.sg
Are any fees due for spectrum transfers?	
Other points of note	

¹⁶ Trading has been liberalized, but is subject to conditions designed to protect initial auctions and to prevent windfall gains.

¹⁷ There is limited practice to date, but the power to review assignments for competition law issues appears to be preserved.

D. 4 TAIWAN

Is spectrum trading allowed?	Yes ¹⁸
Is regulatory notification required?	Yes
Is regulatory approval required? If so, is a competition assessment involved?	Yes and yes ¹⁹
Is there a register of transactions?	Yes
Which authority manages spectrum trading?	The Office of Post and Telecommunications under the Ministry of Transportation and Communications (MOTC) governs spectrum allocation. The National Communications Commission (NCC) handles spectrum management, frequency assignment, and radio interference.
Sources of published information	www.ncc.gov.tw ; www.motc.gov.tw
Are any fees due for spectrum transfers?	
Other points of note	There is reported to be relatively little trading

¹⁸ Transfers are allowed for certain new licences

¹⁹ Taiwan operates thresholds based on spectrum concentration

SPECTRUM LICENCE TERMS

A MULTI-JURISDICTIONAL ANALYSIS

PREISKEL & CO

25 APRIL 2016

Executive Summary

- Recent years have seen widespread liberalisation of spectrum licences, to encourage efficient spectrum use.
- Longer licence terms have often accompanied these changes, with many countries adopting very long spectrum terms, or even abolishing them entirely.
- With longer licences, periodic licence fees have become increasingly important, and have sometimes replaced the fee from an initial auction.
- With this new focus on longer licences and periodic fees, the primary means for spectrum reallocation is likely to be in a regulated secondary market rather than initial auctions.
- An unlimited licence term with a strong secondary market encourages efficient spectrum use, driving consumer benefits while also decreasing burdens on regulators and industry.

Introduction

This report considers spectrum licence terms across several jurisdictions. It shows a trend to lengthen and remove limits on the duration of spectrum licences across several jurisdictions. It can be read alongside our earlier report of 19 March 2016, which surveyed global best practices in spectrum trading in secondary markets. The earlier report found a widespread pattern allowing spectrum trading across several advanced economies, and considered the means by which jurisdictions implement trading.

Alongside emergent secondary trading, and related to it, many licence terms have become longer and have in some cases been removed: an unlimited, tradable licence replaces periodic auctions. The result is that secondary trading, rather than the initial auction, has come to be the primary means by which spectrum licensing occurs in some jurisdictions. Even where unlimited terms are not seen, there is a strong trend towards longer terms to support investment, especially towards the end of the licence term when investment might otherwise be discouraged by uncertainty.

For example, in Australia the term applied is the maximum allowed under primary legislation, and even this is under active review and may be replaced with an unlimited term. In all cases, terms have either increased (e.g. Australia, Canada), have been associated with a strong presumption of renewal at the end of the licence terms (USA), or had their term limit removed and an unlimited term applied instead (UK).

The trend reflects an increased reliance on secondary trading, and so this report considers developments in licence terms alongside the trading regime in place. After assessing (i) the emergence of longer and unlimited licence terms and (ii) benefits these terms can bring, it goes on to consider (iii) how regulators have ensured that public interest concerns, such as the maintenance of competition and efficient spectrum blocks, are addressed in those cases where spectrum changes hands more in the secondary market than in initial auctions.

The report draws on experience in Australia, Canada, Ireland, the United Kingdom, and the United States; this sample reflects these jurisdictions' relatively developed experience of licence term changes and secondary trading, and the detailed relevant guidance and commentary they provide.

The emergence of longer spectrum licence terms

In recent years, a number of regulators around the world have adopted increasingly long spectrum licence terms. The move to a longer or unlimited term potentially allows more certainty in the marketplace, leading to greater investment, while also driving more secondary trading. This frees up relatively scarce spectrum and drives consumer benefits as a result.

In some cases, regulators have applied terms as long as is possible to award under the governing guidance or legislation. For example, in Australia the maximum spectrum licence term allowed is fifteen years. The regulator not only applied this maximum term in recent licences, but has considered the possible need to increase the length of the licence, as detailed in the country-specific table below.

Even in those cases where terms are still limited, legislation or guidance often contains language conferring an expectation of renewal to the existing holder absent special circumstances, as detailed in the country-specific tables below. This reflects reasonable expectations surrounding the large investment involved in creating a network to use the spectrum licence.

In short, very long and unlimited licence terms have emerged in response to the increasingly large investments involved in operating networks under spectrum licences. This has a number of important positive implications, and raises a few regulatory questions, considered next.

Benefits from longer licence terms

Longer licence terms can bring substantial benefits, especially in the context of increasingly large investments required for next generation networks and a potential shortage of spectrum requiring the most efficient possible spectrum utilisation through a secondary auction. These benefits include:

- Increased certainty encouraging more investment in networks;
- In the case of an unlimited licence, the avoidance of uncertain incentives towards the end of the licence term, which may discourage investment because the investment would be a “hostage” to the licence renewal;
- A decreased regulatory burden because there is no need to hold spectrum auctions, after the initial allocation occurs; trading instead occurs in the secondary market;
- Longer term licences can encourage secondary trading, because the remaining licence term is more valuable; this can encourage efficient partitioning and subdivision of licences, lowering barriers to entry for smaller players and encouraging specialised uses such as spectrum exchanges, which may be more difficult or even impossible to accomplish under initial licence grants.
- If the longer term encourages specialised use through more trading, the value of the licence may increase, potentially driving up the value of the licence to the market.

These benefits are considered in further detail below with reference to the specific example of the detailed review that preceded the conferral of an unlimited licence term in the UK. They have been identified in official documents and industry association reports around the world, such as the current Australian *Consultation on trading and third party authorisations* referred to in the country-specific table below, and the GSMA’s *Best practices in spectrum licence renewals*.

Reflecting these benefits, the GSMA recommends the adoption of an unlimited term:

“Mobile licences should have a minimum 20 year term to provide sufficient certainty to support substantial new network investment. Predictability can be further enhanced by introducing indefinite licence terms which combine a minimum initial term with ongoing rights to continue to use the spectrum beyond the initial term unless the authority decides to revoke the rights after giving sufficient notice.”¹

As detailed in the country tables below, a trend towards longer licences is visible around the world, to support investment in new networks.

Accounting for public interest concerns in a less regulated spectrum market

Regulators would want to confirm that public interest objectives are still achieved under a regime of longer licence terms and greater reliance on secondary trading. Important objectives include ensuring competition between licence holders and preventing non-interference. These objectives can still be achieved in an appropriately designed secondary market, and do not turn on whether licences are allocated via initial auction or via secondary trading. This means that the benefits of secondary trading under a longer licence term can still be seen, without undermining these important objectives.

One recurrent issue regulators seek to address is the potential for spectrum to be “warehoused”, i.e. the licence is held but the spectrum is not used. It should be noted that this problem can also occur under a system of limited terms and recurrent auctions. As mentioned in our previous report, one of the most potent ways to decrease this warehousing issue is to encourage secondary trading, which is likely to encourage underused existing licences onto the market: The ability of secondary trading to address this possible issue with warehousing does not turn on the length of the traded licence term.

With the move to a longer term with reliance on secondary trading, competition law review is likely to become more important, to prevent market structures in which incentives do not encourage trading. As with other markets, although unlikely, there may be situations in which companies do not face incentives to trade. Nonetheless, a careful competition law review will be important to ensure that incentives to compete are retained. This review works well in many other markets and should ensure that a competitive market structure is retained despite the move to allocation in a secondary market rather than through auctions.

To implement longer terms while ensuring that public interest objectives are still achieved, regulators have taken a number of steps to accommodate the shift to increased reliance on secondary trading:

- Requiring notification of transfers, and reviewing the transaction for competition law issues upon receipt of the notification.
- An annual licence fee is often applied instead of, or in addition to, fees set at auctions; the fee is calculated to take account of public interest considerations in licence pricing.²
- Retaining a power to revoke the licence in exceptional circumstances.³

¹ GSMA *Best practices in spectrum licence renewals*, recommendation 6.

² Optimal pricing of spectrum licences share some characteristics of other resource licences, such as oil, for which the regulator may seek to maximize the value of the asset over its lifetime, e.g. over the life of the spectrum licence. One implication of this can be that a short term competitive price may not fully capture the benefits of the resource; the annual fee can be set to take account of this pricing issue.

The annual licence fee tends to be set with reference to the opportunity cost of the spectrum. For example, OFCOM's Strategic Review of Spectrum Pricing concluded that the most appropriate approach to licence fees after the expiry of the initial term is to set an Annual Incentive Pricing ("AIP") fee for the spectrum, reflecting an estimate of its opportunity cost.⁴ This creates an incentive to use the spectrum licence, to avoid losing the opportunity cost created by the licence fee.

Taking these steps can ensure good secondary market performance and efficient use of spectrum under a lengthy or even unlimited term, and tend to be implemented through secondary legislation, or guidance from the regulator.⁵ They protect against reasonable concerns, and these ultimately do not turn on the licence term and can arise in a term-limited or term-unlimited market.

In short, concerns about market performance do not turn on whether an unlimited licence is obtained on a secondary market, rather than being purchased at an initial auction, and suitable regulatory oversight is needed either way.

Implementation of unlimited terms to facilitate trading

In the UK, an example of the shift to an unlimited licence term can be seen in the 2014 decision to grant an unlimited-term licence to UK Broadband.⁶ This followed an extensive consultation. In deciding to grant the extension, OFCOM emphasised the following points:

- Risks from the uncertainty surrounding auctions had the potential to discourage investment in networks. One of the most serious risks identified was that under spectrum auctions the new entrant might need to change equipment or delay rollout until all licences are obtained at auction, whereas the new entrant might face far less uncertainty in obtaining the correct blocks of spectrum in a secondary market, significantly increasing rollout speed;⁷
- Credible investment plans suggested that the unlimited licence term would encourage sustainable and increased investment;⁸
- As the unlimited term seemed likely to encourage entry, increased competition was likely to result, both in terms of the potentially lower price offered for the new product and also the knock-on effect of increased price and quality competition from other operators;⁹
- Potential benefits in reaching new or under-served customers and in innovation.¹⁰

³ For example, OFCOM retains a residual power to review licence grants under certain circumstances under licence terms and also, in exceptional cases, under the primary legislation itself (see Schedule 1 to the Wireless Telegraphy Act 2006). In the USA, it is common to condition the licence, and the renewal expectation associated with it under the relevant secondary legislation, on meeting a coverage requirement requiring build out.

⁴ OFCOM's Strategic Review of Spectrum Pricing consultation concluded with a Statement accessible at: <http://stakeholders.ofcom.org.uk/consultations/srsp/statement>

⁵ Please see entries in tables below to secondary legislation and guidance under which terms are set and trading occurs.

⁶ OFCOM, Statement on the Variation of UK Broadband's 3.4 GHz Licence, Statement of 9 October 2014 ("OFCOM variation statement"), available at: <http://stakeholders.ofcom.org.uk/consultations/uk-broadband-licence/>

⁷ OFCOM variation statement, para 6.11.

⁸ OFCOM variation statement, para 6.6.

⁹ OFCOM variation statement, para 8.1.

¹⁰ OFCOM variation statement, sections 9 and 10.

A particularly important part of the Statement concerns the efficient use of spectrum. One classic justification for spectrum regulation under auctions is to preserve efficient spectrum blocks, perhaps in light of the emergence of new technologies, because transaction costs can impede the emergence of the most efficient blocks. The Statement identifies benefits from longer-term spectrum synchronisation, allowing benefits such as the reduction of guard bands between neighbouring spectrum allocations.¹¹

OFCOM's approach to this concern was to consider the risk posed that the most efficient spectrum blocks might not emerge, but to discount this for the likelihood that trading would encourage the most efficient use,¹² and also, importantly, to consider that UK Broadband was offering an immediate and concrete plan for investment.¹³ This meant that the assessment was between an immediate and likely consumer benefit, and a more speculative possibility that inefficient spectrum blocks might potentially emerge in the future.

OFCOM found that the balance seemed strongly in favour of granting the licence extension, to encourage investment.¹⁴ An unlimited licence term was therefore granted. In line with OFCOM policy on spectrum fees, an annual fee will be applied from the expiry of the initial term in July 2018.¹⁵

The regulator will want to balance these considerations in deciding whether to grant an unlimited term, and the costs and benefits of term extension may depend on the existing allocation, and the scope to see consumer benefits in the short to medium term. However, where longer terms encourage the transfer of licences to new entrants, with the potential emergence of more efficient spectrum blocks, it seems very likely that the immediate consumer benefits from the will outweigh the limited risk of inefficient spectrum blocks emerging. In any event, normal safeguards on secondary trading and powers to address emergent issues could be used to deal with a problem, if one were to emerge, rather than foregoing the efficiency gains from the deepening of a secondary market using longer terms.

Conclusions and recommendations

Longer licence terms have been seen in several jurisdictions, including the abolition of licence terms in the case of the UK. As the term increases, the secondary market becomes increasingly important. Longer terms thus represent a shift in emphasis away from the initial grant of spectrum licences to a more flexible framework, in which market forces allow dynamic spectrum use, while oversight is maintained to ensure sound and efficient market functioning. This encourages new services to be offered, delivering consumer benefits by reducing uncertainty caused by the term limits set by auctions.

¹¹ OFCOM variation statement, para 11.3.

¹² OFCOM variation statement, para 12.7

¹³ OFCOM variation statement, para 14.6.

¹⁴ OFCOM variation statement, paras 14.13-14.

¹⁵ OFCOM variation statement, para 15.9.

COUNTRIES SURVEYED

A. NORTH AMERICA

1. Canada
2. USA

B. EU

1. Ireland
2. UK

C. AUSTRALIA

A. NORTH AMERICA

1. Canada

Are unlimited term licences issued?	No, but terms have become significantly longer in recent years.
What is a typical licence term in recent mobile spectrum licences?	20 years
Has the licence term changed or been reviewed?	Recent consultations have supported a move to longer licence terms expressly to encourage longer-term investment in networks: See e.g. Revised Framework for Spectrum Auctions in Canada, (March 2011) (expressly finding greater incentives to invest under longer licence terms), available at: http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf01626.html .
How are spectrum licence fees determined?	An annual licence fee is payable, determined under Gazette Notice No. DGRB-005-03, available at http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf08105.html
Is spectrum trading allowed?	Yes
How is trading implemented?	Guidance from Industry Canada provides for trading, as do licence terms
Is there guidance or secondary legislation on trading?	The position on trading is set out in ministry guidance, which exercises powers created by primary legislation
Are there terms on trading in the licences?	The licence refers to terms in appendices published during the renewal process, such as the K3 appendix accessible at http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf11004.html
Relevant links	The <i>Licensing Procedure</i> guidance can be found at https://www.ic.gc.ca/eic/site/smt-gst.nsf/vwapj/cpc-2-1-23-i4-2015-eng.pdf/\$FILE/cpc-2-1-23-i4-2015-eng.pdf
Other points of note	Industry Canada, the relevant government body, can set a variety of licence terms but has favoured longer terms in recent years. The appendix terms applied to the licences refer to an expectation that the current licensee can expect renewal “unless a breach of licence condition has occurred, a fundamental reallocation of spectrum to a new service is required, or an overriding policy need arises.” K3 Appendix, 1.

2. USA

Are unlimited term licences issued?	No, but there is a very strong expectation of the renewal of an existing licence term.
What is a typical licence term in recent mobile spectrum licences?	10 years for most wireless licences
Has the licence term changed or been reviewed?	Most licence terms have been very steady, and are set out in Chapter 47 of the Code of Federal Regulations (see e.g. 47 CFR §24.15 and 47 CFR §27.13(a)). For some specialised examples, such as the refarming of TV spectrum and novel licensing arrangements, different terms have been considered.
How are spectrum licence fees determined?	Fees are determined by auction.
Is spectrum trading allowed?	Yes.
How is trading implemented?	FCC Orders, such as the Secondary Market Order, set out the approach to secondary trading.
Is there guidance or secondary legislation on trading?	Trading takes place under the procedure outlined in the FCC Orders.
Are there terms on trading in the licences?	The licence refers to the primary legislation and relevant provisions in the Code of Federal Regulations.
Relevant links	The relevant sections of the CFR can be accessed at www.ecfr.gov
Other points of note	<p>The relatively inflexible approach to terms may reflect the relatively large number of licences divided by geography, compared with some other jurisdictions.</p> <p>The ten year term may be associated with “build out” licence conditions requiring construction as a condition of licence holding. Other markets deal with this issue in other ways, and may not need a defined term on this basis.</p> <p>There is a “significant expectancy of renewal” associated with the ten year term where the current holder can demonstrate “substantial service” under the current licence. In practice, this means that re-licensing to the same party is highly likely where build out requirements have been met: See e.g. 47 CFR §24.16.</p>

B. EU

1. Ireland

Are unlimited term licences issued?	No, but very long terms have been seen in recent licences.
What is a typical licence term in recent mobile spectrum licences?	Recent terms have been as much as 27 years (e.g. Vodafone's licence from 2013 to 2030).
Has the licence term changed or been reviewed?	Very long licence terms have been seen in recent auctions.
How are spectrum licence fees determined?	Prices are set by auction, with initial and annual fees.
Is spectrum trading allowed?	Yes.
How is trading implemented?	Trading is subject to review by ComReg, to check for potential issues posed by trades.
Is there guidance or secondary legislation on trading?	Yes: Detailed rules on trading are contained in the Wireless Telegraphy (Liberalised Use Licence and Preparatory Licences in the 800 MHz, 900 MHz and 1800 MHz band) Regulations, 2012 (S.I. No. 251 of 2012). The relevant regulator, ComReg, publishes a detailed Framework for spectrum transfers setting out detailed policies and procedures on secondary trading.
Are there terms on trading in the licences?	The licence refers to the 2012 secondary legislation, which sets out a detailed framework for secondary trading.
Relevant links	Vodafone's licence is representative, and is available at: http://www.comreg.ie/_fileupload/MLU1007.pdf
Other points of note	

2. UK

Are unlimited term licences issued?	Yes.
What is a typical licence term in recent mobile spectrum licences?	Before licence terms became unlimited, a 20 year term was normal. OFCOM retains a power to revoke licences for spectrum management reasons.
Has the licence term changed or been reviewed?	Yes. Several licences have been transformed to indefinite terms, including some existing licences. Detailed reviews have taken place, concluding that a carefully designed indefinite licence is the optimal approach.
How are spectrum licence fees determined?	Spectrum fees are determined through consultation designed to estimate the opportunity cost of the spectrum licence under OFCOM's Strategic Review of Spectrum Pricing.
Is spectrum trading allowed?	Yes.
How is trading implemented?	Trading occurs subject to OFCOM notification and approval, retaining oversight over the market.
Is there guidance or secondary legislation on trading?	The Wireless Telegraphy (Mobile Spectrum Trading) Regulations 2011 set out the procedure for spectrum trading. Terms in the licence reflect this legislation and require the transfer to occur through notification to and approval by OFCOM.
Are there terms on trading in the licences?	Yes: a licence term requires transfers to happen through the framework established by the secondary legislation, which involves requesting re-assignment by OFCOM once the transfer is agreed.
Relevant links	BT's mobile spectrum licence is a representative example of an unlimited term licence: http://licensing.ofcom.org.uk/binaries/spectrum/mobile-wireless-broadband/cellular/licences/SA_2.6_LICENCE_BT_0948779_22-04-13.pdf
Other points of note	With the passage of time, issues have emerged as licence holders come towards the end of licence terms and appear to be discouraged from investment. To deal with this issue, OFCOM has taken to granting unlimited terms subject to review and oversight powers, addressing this issue with lumpy investment.

C. AUSTRALIA

Are unlimited term licences issued?	No, but current proposals would lengthen the term and an outstanding consultation reports notes advantages of and requests comment on unlimited terms.
What is a typical licence term in recent mobile spectrum licences?	The maximum possible term of fifteen years has been applied.
Has the licence term changed or been reviewed?	Yes: the term increased from ten to fifteen years in the late 1990s. There are current proposals to increase this to twenty years under the Radiocommunications Bill 2016.
How are spectrum licence fees determined?	Licences are auctioned.
Is spectrum trading allowed?	Yes.
How is trading implemented?	Trading is allowed subject to notification and approval by the ACMA.
Is there guidance or secondary legislation on trading?	The trading rules are set out in the Radiocommunications (Trading Rules for Spectrum Licences) Determination 2012 and
Are there terms on trading in the licences?	Yes, the licence sets out the trading procedure and refers to the relevant secondary legislation.
Relevant links	Further details of current proposals to increase the licence term to twenty years can be found in the Radiocommunications Bill 2016 Consultation Paper, available at: https://www.communications.gov.au/file/15631/download?token=0L4TaEso
Other points of note	On 18 April 2016, the ACMA released a consultation paper requesting comment on the possibility of applying an unlimited licence term. Drawing on earlier proposals made as early as 2002, section 4.2, entitled Uncertainty Regarding Tenure, raises significant concerns about diminished investment incentives and impediments to secondary trading towards the end of licence terms. See: Spectrum Trading: Consultation on trading and third party authorisations of spectrum and apparatus licences, pp. 22-3, available at: http://www.acma.gov.au/webwr/_assets/main/lib310771/spectrum_trading.doc
