Arrangements for the Frequency Spectrum in the 1.9 - 2.2 GHz Band upon Expiry of the Existing Frequency Assignments for 3G Mobile Services – Second Consultation Paper

Submission by CSL Limited to the Office of the Communications Authority

11 April 2013

Contents

1 Executive Summary

1.1 Option 1 best meets the CA's Policy Objectives

CSL strongly objects to the views and conclusions expressed by the CA in its Second Consultation Paper and in particular the CA's conclusion that Option 3 should be adopted for further consultation.

CSL remains unequivocal in its support for Option 1 and in its rejection of Option 3. We do not agree that Option 3 is, on any assessment, a reasonable means of reassigning the expiring 3G spectrum. Further, CSL strongly objects to statements made by the CA in its Second Consultation Paper to the effect that CSL either explicitly or implicitly expressed support for Option 3 in its submission to the CA's First Consultation Paper.

Most respondents to the First Consultation Paper endorsed Option 1 as the best basis on which to assign spectrum in the 1.9-2.2GHz (**2.1GHz**) band upon expiry of the existing spectrum assignment. As most respondents agreed, Option 1 is the only course of action that would meet all of the policy objectives in spectrum assignment as outlined in the First Consultation Paper. This view was also confirmed by the independent report prepared by Plum Consulting: *Spectrum reassignment in Hong Kong – the case of the 1.9-2.2GHz band* (10 April 2013) (the **Second Plum Report**).[1]

It is clear that Option 1 is the option that will best preserve customer service continuity and, with its associated regulatory certainty, best encourage continued efficient investment and innovation in the Hong Kong mobile market.

In the event that the incumbent 3G licensees are not granted a Right of First Refusal (**RFR**), they will likely be forced to engage in massive write-offs of the significant investment which has been sunk into their licences. This will also put future investment at risk in Hong Kong. Similarly, without the RFR and the associated regulatory certainty, service degradation, interruptions, confusion and general inconvenience to the public will result. These are unnecessary and undesirable outcomes and inconsistent with identified social and consumer welfare objectives and the prominent position of Hong Kong in global markets.

There is also strong international (and domestic) precedent for adopting a RFR. Indeed, most countries that have considered the renewal of GSM licences have opted for a presumption or high expectation of renewal in relation to expiring spectrum licences.

It is therefore inappropriate and unreasonable for the CA to pursue Option 3 and, in so doing, disregard both international best practice and the detailed reasons advanced by the majority of respondents to the First Consultation Paper – respondents which possess many years of experience in, and a great deal of knowledge of, the mobile market in Hong Kong.

[1] The Second Plum Report has been prepared by Plum Consulting for submission to the CA as part of the second consultation round. The First Plum Report, dated December 2012, was provided to the CA in December 2012.

1.2 Option 3 – adverse effects on consumers, investment, innovation and competition

The CA has mistakenly concluded that a 'compromise position' in Option 3, by virtue of its hybrid design, 'seems to mitigate to a substantial extent the public policy concerns identified under Option 2'.[2]

This is simply not the case. All of the problems inherent in Option 2 are also inherent in Option 3. As we will show, a compromise hybrid option will simply not work in Hong Kong.

Option 3 carries significant risks in relation to widespread customer service disruption, uncertainty, and the associated detrimental impact upon investment and innovation. The attempt to further a professed aim of introducing a new entrant would likely diminish, rather than enhance, competition. This is because competition in the already highly competitive Hong Kong mobile market is unlikely to be sustainably increased, as ongoing network investment will be constrained by costs of capital. New entry can be encouraged (without the risks inherent in auctions) via other means, such as allocation of new spectrum (including the digital dividend spectrum), acquisition or spectrum trading.

CSL reminds the CA of its statutory duty to form opinions and make decisions only on reasonable grounds and having regard to relevant considerations. Specifically, s.6A(3) of the *Telecommunications Ordinance* states:

> *(3) In exercising its powers under this Ordinance, the Authority when –*
>
> *(a) forming an opinion or making a determination, direction or decision under this Ordinance shall only do so on reasonable grounds and having regard to relevant considerations;... .*

As we will explain in this submission, we do not consider that there are reasonable grounds to advance Option 3. Accordingly, a decision to take Option 3 forward exposes the CA to the risk of adverse findings upon any judicial review in respect of its decision-making process.

1.3 Spectrum utilisation fee

CSL considers the proposed Spectrum Utilisation Fee (**SUF**) for the RFR spectrum to be extremely high when compared to relevant international benchmarks. CSL believes this is due to the flawed methods proposed by the SCED. Accordingly, CSL rejects the First and Second Method proposed by the SCED to calculate the SUF for the RFR Spectrum.

CSL vehemently opposes the proposed inclusion of the results from the 850/900MHz auction which occurred in March 2011. The CA's assessment that the 850/900MHz spectrum band is "*closely akin*" to the 1.9-2.2GHz band is incorrect.[3] The value of sub-1GHz spectrum is substantially higher than the 1.9-2.2GHz band because of the favourable propagation characteristics of sub-1 GHz spectrum, including in particular in-building reception which is ideally suited to the Hong Kong mobile market.

CSL also opposes the SCED tying the SUF of the RFR Spectrum to the unknown results of the proposed auction. This would be inequitable, and not transparent, and will also

---

[2] Secretary for Commerce and Economic Development (**SCED**) and the Communications Authority (**CA**), *Arrangements for the Frequency Spectrum in the 1.9 - 2.2 GHz Band Upon Expiry of the Existing Frequency Assignments for 3G Mobile Services* (28 December 2012), para 28 (**Second Consultation Paper**).

[3] Second Consultation Paper, para 43.

hinder network investment by creating uncertainty for incumbent operators as to future financial outlays. CSL instead proposes that market benchmarking alone be relied upon to calculate the RFR spectrum, as previous auctions account for the key drivers of spectrum value and are directly related to opportunity cost.

CSL supports a market benchmark approach which references the previous results in the 2.5/2.6GHz and 2.3GHz auctions which were conducted in 2009 and 2012 respectively. CSL's selection of these market benchmarks is based on careful consideration of the factors that influence spectrum value in Hong Kong.

CSL is prepared to take whatever legal action is necessary to protect its interests, and those of its customers, in the event the CA adopts Option 3 and its proposed SUF pricing methodologies.

CSL reserves all its rights in this regard.

1.4 Deficiencies in consultation process

CSL also holds serious concerns about the manner in which the CA has conducted this consultation thus far. The CA has not given due regard to the reasoned views expressed by respondents to the consultation. Instead, the CA has elected to pre-determine a sub-set of possible outcomes by imposing an arbitrary and unreasoned limitation upon the range of alternatives deemed by the CA as appropriate outcomes without proper engagement with submitters and consideration of other reasonably practicable alternatives and the detailed justifications provided by submitters for advocacy of these alternatives. It follows that the CA has not properly discharged its duty to consider reasonably practicable alternatives and to keep an open mind as to the issues until a proper cost and benefit assessment of each of these reasonably practicable alternatives has been undertaken. The Second Consultation Paper evidences the CA's arbitrary and unreasoned limitation upon the range of alternatives deemed by the CA as appropriate outcomes and is not framed to properly address policy and in accordance with requirements of procedural fairness.

CSL calls on the CA to ensure that the remainder of the consultation process is conducted fairly and that due regard is given to the majority view of stakeholders. Importantly, CSL requests that the CA maintains an open mind as to the merits of Option 1 and addresses anew the deficiencies inherent in Option 3 (as will be detailed in this submission).

CSL reserves all its rights in relation to the CA's conduct of the consultation process.

2 Introduction and overview

This submission responds to the second consultation paper jointly issued by the Secretary for Commerce and Economic Development (**SCED**) and the Communications Authority (**CA**) on 28 December 2012 entitled: *Arrangements for the Frequency Spectrum in the 1.9 – 2.2 GHz Band upon Expiry of the Existing Frequency Assignments for 3G Mobile Services* (**Second Consultation Paper**).

In its Second Consultation Paper, the CA proposes the adoption of:

(a) a hybrid option incorporating an administratively-assigned cum market-based approach in the 3G spectrum reassignments (**Option 3**); and

(b) two new methods for setting the SUF of the spectrum to be reassigned.

The CA's expressed rationale for selecting Option 3 is that offering incumbent operators the RFR for two-thirds of their 2.1GHz frequency holding will alleviate concerns about customer service continuity, while re-auctioning the remaining one-third of the spectrum will enhance spectrum efficiency, encouraging investment and the introduction of innovative services.[4]

CSL strongly objects to the arbitrary and unreasoned limitation that the CA seeks to impose upon the range of alternatives under consideration. The artificially restricted alternatives proposed in the Second Consultation Paper are sub-optimal and will not achieve the policy objectives set out in the First Consultation Paper, namely:

(a) ensuring customer service continuity;

(b) efficient spectrum utilisation;

(c) promotion of effective competition; and

(d) encouragement of investment and promotion of innovative service;

(collectively referred to as the **Policy Objectives**).

This submission will again state the case for the adoption of Option 1 (i.e. offering incumbent 3G operators the RFR in respect of their 3G spectrum). Assessed objectively, Option 1 is the only one of the three options proposed in the First Consultation Paper that will achieve all of the Policy Objectives listed above.

Prior to setting out in detail our reasons in support of Option 1, CSL first addresses the deficiencies in the CA's consultation process to date.

3 Flawed consultation process

3.1 The CA must maintain an open mind to all options

CSL holds serious concerns as to the manner in which the CA has conducted this consultation process. Specifically, CSL is concerned that the CA has failed to give due

[4] Second Consultation Paper, Annex 1, para 30.

regard to the reasonable views of respondents to this process and thereby has failed to conduct a fair and reasonable consultation.

The CA is subject to a statutory obligation to carry out a reasonable consultation process with the telecommunications industry.[5] According to well-established legal principles, a reasonable consultation requires that the conduct of the consultation is governed by the principles of procedural fairness.[6] The consultation must be a genuine stage in the CA's decision-making process and not merely a perfunctory ritual. In addition, the CA must keep an open mind on the subject under consultation and must not display bias.[7]

CSL holds serious concerns as to whether the CA has kept, and is keeping, an open mind as to the issues that are the subject of this consultation. The Second Consultation Paper, in particular, evinces a premature, arbitrary and unreasoned narrowing of reassignment and pricing options by the CA. It is reasonable to conclude that the CA has settled on sub-optimal options before the formal consultation process is completed and further submissions are considered.

Despite the CA's disclaimer in the Second Consultation Paper that no decision has yet been made as to the reassignment of the spectrum,[8] the CA's conduct indicates otherwise. By 'concluding' that Option 3 is to be adopted for further consultation,[9] the CA appears to have predetermined the outcome of the consultation process. This renders the process fundamentally unfair. Stakeholders have not been given a reasonable opportunity to make a meaningful contribution to the CA's review of the issues that are properly within the consultation.

3.2 Introduction of new pricing methodologies and benchmarks

CSL also notes that the pricing methodologies and benchmarks proposed in the Second Consultation Paper[10] have been introduced:

(a) without prior notice and consultation with stakeholders; and

(b) with a lack of transparency as to the methodologies, making it impossible to properly engage in discussion as to the operation of the methodology to yield calculations.

Given that the setting of the SUF is one of the key reasons for conducting this consultation process, the lack of discussion allowed by the CA around the espoused pricing methodologies is particularly inappropriate. The broader range of reasonably practicable pricing methodologies should have been introduced for consideration earlier in the consultation so as to enable a fairer process and an optimised outcome.

CSL notes specifically that the Second Method for calculating the SUF is not properly explained by the CA in the Second Consultation Paper. The CA provides no reasons as to its formulation and there are insufficient criteria to explain how the CA has arrived at the benchmarks thus proposed. The only apparent benchmarking factor is the rate of the

[5] *Telecommunications Ordinance* (Hong Kong) cap 106, ss 32I(1) and 32G(2).

[6] *PCCW-HKT Telephone Ltd. v The Telecommunications Authority* [2007] HKCFI 129, para 44.

[7] Ibid.

[8] Second Consultation Paper, p 1. (Foreword).

[9] Ibid, para 39.

[10] Second Consultation Paper, para 55-60.

SUF.[11] However, CSL submits that the CA should have taken into account a broader, and more relevant, array of factors, particularly the propagation characteristics of the spectrum and the market context. Weightings of the benchmarks were also not specified, which means that stakeholders cannot calculate the prices under the proposed pricing methodology and are therefore restricted in forming informed views in response to the questions asked in the Second Consultation Paper.[12]

3.3 Conclusion: Flawed consultation process

For the reasons stated above, CSL's view is that the CA has not given due regard to the views of respondents to the consultation, and has not kept an open mind as to all relevant issues. Such conduct raises serious questions as to whether this consultation process has been conducted in accordance with the principles of procedural fairness.

CSL calls on the CA to ensure that the remainder of the consultation process is conducted fairly and that due regard is given to views commonly expressed by stakeholders. Specifically, CSL requests that the CA maintains an open mind as to the merits of Option 1, and considers anew the deficiencies inherent in Option 3 (as will be discussed in detail below).

CSL also wishes to make it clear that CSL is prepared to take whatever legal action is necessary to protect its interests, and those of its customers, in the event the CA persists in disregarding industry concerns as to Option 3 and the proposed SUF pricing methodologies.

CSL reserves all its rights in relation to the CA's conduct of this consultation process.

4 Option 1 – offering incumbent operators the RFR

4.1 Option 1 best meets the CA's policy objectives

CSL calls on the CA to adopt Option 1 as the process by which the expiring 3G spectrum will be reassigned.

Option 1, and the RFR (which is an integral part of Option 1), offers the most reliable method to meet the CA's Policy Objectives. The adoption of Option 1 avoids the dislocation of, and inconvenience to, large numbers of customers. Further, Option 1 provides licensees with the necessary certainty to continue to invest in existing and new networks. This in turn reinforces customer and investor confidence in Hong Kong's telecommunications market.

Given the high level of investment already made by the incumbent licensees over many years, it is likely that each incumbent will take up the RFR if offered. Not only then will Option 1 fulfil the Policy Objectives, it will also avoid the high costs, both in time and expense, of conducting an auction process for one-third of the 2.1GHz spectrum assignments.

[11] Ibid, para 43.

[12] See, for example, Second Consultation Paper, p 28, Question 2.

The Second Plum Report specifically examines Option 1 and details how it best meets the needs of the Hong Kong market with the least disruption to consumers.[13] Specifically, the Second Plum Report notes that Option 1:

- preserves customer service continuity with minimum risk; and
- is the option most likely to foster an environment where investment and innovation perform effectively.[14]

Further, the Second Plum Report finds that:

- the development of mobile services in Hong Kong, the intense competition and the growth of mobile data traffic all suggest that the usage of 3G spectrum in Hong Kong is efficient; and
- it is far from certain that further entry into the 2.1GHz band for provision of 3G services will create a positive economic benefit given the already intense competition between 3G operators.[15]

To reiterate some relevant points made in our first submission, the re-auction of 3G spectrum – whether in whole or in part – is essentially a 'greenfields' approach that, in present circumstances, would create a very high level of uncertainty in relation to spectrum usage in the lead up to the expiry of the current licence term. 'Greenfields' auctions are best suited to providing an initial economically efficient distribution of the spectrum resource, when the true value of the spectrum is not known. This is commonly the case when spectrum is first released to the market. However, 'greenfields' auctions are far less common because they are likely to be harmful in situations in which a market has reached maturity (as is the case with the Hong Kong market) and operators have demonstrated a pattern of significant investments and built up strong customer bases over several years. The resulting uncertainty needlessly jeopardises investment and innovation and causes serious disruption to customer service.

In addition, the risk at auction is that bidders with deep pockets will push the price of the spectrum to an artificially high amount. Not only is this a bad outcome for the bidders, customers will also be adversely affected by higher service charges. Relevantly, the Czech telecoms regulator, the CTU, recently suspended its auction for the 800MHz, 1800MHz and 2.6GHz bands because bids were escalating too far beyond the reserve price. The CTU suspended the auction on the basis that the high costs would detrimentally affect consumers, noting that the motivation for the auction was "never about profits for the state".[16] There is a clear risk that such a scenario may play out in Hong Kong if Option 3 were adopted and an auction held for one-third of the incumbents' spectrum assignments. This would be disastrous for both the industry and consumers.

In its mandate to 'facilitate the most economically and socially efficient use of spectrum with a view to attaining maximum benefit for the community',[17] the CA should avoid being distracted by extraneous considerations, such as increasing government revenue. Rather, the CA's focus should be on achieving the most economically and socially

[13] Second Plum Report, p 1.

[14] Ibid, pp 2-3.

[15] Ibid, p 3.

[16] K Wieland, *Czech regulator halts spectrum auction as bids too high*, (11 March 2013) Mobile World Live, <http://www.mobileworldlive.com/czech-regulator-halts-spectrum-auction-as-bids-too-high> at 14 March 2013.

[17] *Radio Spectrum Policy Framework*, (April 2007), clause 2.1(a).

efficient use of the 3G spectrum by taking into account dynamic considerations such as encouraging investment and risk-taking by network operators and application vendors.[18]

4.2 Option 1 is consistent with international best practice

Option 1 is also consistent with international best practice.

Policies facilitating the direct renewal of spectrum licences have been adopted by sophisticated regulators internationally, most notably by the UK regulator Ofcom and the Australian regulator, the Australian Communications and Media Authority (**ACMA**).

As noted in the CEG Report for the GSM Association (May 2012) (**CEG Report**), most countries that have already considered the renewal of GSM licences have established a presumption or high expectation of renewal in relation to spectrum licences.[19]

Similarly, the World Bank observed that most legal and regulatory frameworks adopted a regime based on the 'presumption of renewal' or 'renewal expectancy'.[20]

The CEG Report also notes that a presumption of renewal makes sense where the service, such as mobile communications, clearly represents the best use of a particular spectrum band and where the ongoing continuity of communications is important given the particular service's role as part of the economy's key infrastructure.[21]

CSL submits that the ongoing continuity of 3G services is clearly important to the people and economy of Hong Kong. Further, the incumbent operators' use of the 2.1GHz band has been highly efficient in facilitating the delivery of a range of innovative services to data-hungry customers. Consistent with international best practice, CSL calls on the CA to apply the presumption of renewal for the assignment of the 2.1GHz band.

4.3 Precedent for licence renewal in Hong Kong

There is also recent precedent for licence renewal in Hong Kong in utilised spectrum bands. The CA's then predecessor, the Telecommunications Authority (**TA**), offered incumbent operators a RFR for the renewal of the GSM and PCS licences in 2004. These bands included spectrum in the 800/900MHz band, which has now been, or will be, re-farmed for use in offering 3G mobile services.

For completeness, we also note that, as part of the same process, the TA decided not to renew the TDMA or CDMA licences due to a perceived inefficient use of spectrum by those networks.[22] The TA noted at the time that there was a sharp decline in the number of subscribers to the CDMA network (from 105,154 as at August 2002 to 25,687 as at July 2004), and that the number of subscribers to the TDMA network had remained at consistently low levels (at its peak, only 39,643 subscribers).[23] This situation, however, is in sharp contrast to the incumbent 3G networks, which as previously noted, serve

---

[18] Thomas W Hazlett and Roberto E Munoz, *What really matters in spectrum allocation design*, 9 April 2010, p 3.

[19] CEG, *Licensing to support the mobile broadband revolution: A report for the GSM Association*, May 2012, p 27 (**CEG Report**).

[20] World Bank, *Mobile licence renewal: What are the Issues? What is at Stake*, June 2005, pp 1-2; 5-6.

[21] CEG Report, p 30.

[22] OFTA, *Licensing of Mobile Services on Expiry of Existing Licences for Second Generation Mobile Service: Statement of the Telecommunications Authority*, (29 November 2004), pp 8-9: http://tel_archives.ofca.gov.hk/en/tas/mobile/ta20041129.pdf.

[23] Ibid, p 9.

approximately 9,390,465 subscribers (up from 7,416,909 in December 2011).[24] These figures clearly indicate that the incumbent operators are using their 3G spectrum efficiently. Accordingly, the TA's grounds for non-renewal of the CDMA and TDMA licences in 2004 have no relevance to the renewal of the 3G licences in 2013.

In relation to the GSM and PCS licences, the CA sought to distinguish its precedent of renewal on the basis that the Government had not yet developed its Spectrum Policy Framework, and that subsequently, both the Government and industry 'had come to the view that such an ad hoc approach was less than satisfactory'.[25] However, CSL maintains that the public policy considerations that were relevant at the time the decision was taken to offer incumbents operators the RFR, are equally relevant today - if not more so – notwithstanding the then absence of the Spectrum Policy Framework. The TA's decision to renew the licences was based on clear and reasonable public policy grounds that the spectrum had been efficiently used and that the licensees were providing satisfactory services to their customers, with continuous investment and improvements. The TA also highlighted the importance of a stable investment environment, the importance of mobile services to users, and the need to avoid service interruptions.

As noted above, these same considerations are just as significant in the current market environment in which there is explosive growth in mobile data usage, an increasing importance of mobile services to users, and a high level of competition between operators. This is why it is so critical to reject Option 3 as the basis to reassign the spectrum frequencies.

CSL regrets the suggestion that the TA's decision to renew the GSM and PCS licences in 2004 does not set an appropriate or reasonable precedent in respect of the renewal of the 3G spectrum licences. To counter any suggestion that the Government's past decisions regarding renewal give rise to a legitimate expectation on the part of incumbents as to further renewal, the CA is quick to refer to its statement in the Radio Spectrum Framework that "there is no legitimate expectation that there is any right of renewal or right of first refusal of any licence" on expiry.[26] However, statements to this effect are effectively immaterial in determining the existence of a legitimate expectation. What is material is that the CA, and its predecessors, has demonstrated a consistent practice in employing a RFR in similar circumstances in relation to the PMRS and PCS spectrum renewals. Such consistency in practice creates an expectation on the part of incumbent 3G operators that expiring 3G spectrum licence will be handled consistent with past practice.

Further, the incumbent 3G operators have invested billions of dollars in their networks and services based on their licence grants, which represents a substantial and reasonable reliance on the Government's past actions. If a RFR was denied to the incumbents, they would clearly suffer significant harm.

CSL strongly asserts that a decision that departs from past practice, and denies the incumbents a RFR, would not be consistent with the incumbents' legitimate expectation.

CSL reserves all its rights in relation to its legitimate expectation of licence renewal.

---

[24] OFCA, *Key Statistics for Telecommunications in Hong Kong: Wireless Services*, 7 March 2013 http://www.ofca.gov.hk/en/media_focus/data_statistics/index.html. Note that this figure represents both the number of 3G and 4G mobile customers in Hong Kong as at December 2012.

[25] Second Consultation Paper, para 16.

[26] Second Consultation Paper, para 20.

4.4 Conclusion: Offering incumbent operators the RFR

Both the Second Plum Report and a majority of respondents to the First Consultation Paper (including 100% of incumbent 3G operators) concluded that Option 3 would create uncertainty for mobile operators as to whether they will retain their existing spectrum assignments, or lose one-third of it at auction. Uncertainty inhibits innovation, investment and efficiency.[27] Uncertainty also has a dampening effect on competition.

CSL calls on the CA to reject Option 3, and adopt Option 1 for the sake of continuity, not disturbance, for both customers and incumbent operators.

5 Customer service continuity

5.1 Option 1 preserves customer service continuity

It is clear that Option 1 would best achieve the objective of preserving customer service continuity.

Under Option 1, there would be absolutely no disruption to customer services or customer contracts with incumbent operators. Following the renewal of their existing 2.1GHz spectrum assignments, incumbent operators would continue to provide innovative services to their customers.

The CA itself has stated:

> "*From the perspective of maintaining customer service continuity, Option 1 has the obvious advantage over the other two [options] in being able to maintain more or less seamless transition*."[28]

There is also clear international precedent for offering incumbent licensees a RFR on the basis of maintaining customer service continuity. Our survey of international approaches to spectrum reassignment demonstrates that renewal of spectrum licences is widely acknowledged as best practice.

For example, the UK regulator Ofcom decided in June 2011 to make 3G mobile licences perpetual such that the licences will continue in force unless or until revoked by Ofcom.

The Australian Government adopted a similar approach. In 2012, the Government decided to renew the 800MHz and 1800MHz spectrum licences of incumbent operators. Senator the Hon Stephen Conroy, Minister for Broadband, Communications and the Digital Economy, said at the time:

> "*Reissue of licences will provide certainty about the continuity and operation of mobile and wireless communication networks...This decision has involved a careful evaluation of how the public interest is served by allowing renewal of current licences*."[29]

[27] Second Plum Report, p 1.

[28] Second Consultation Paper, para 30.

[29] Media release of the Australian Government, *Renewal decision provides certainty for mobile consumers*, 10 February 2012 http://www.minister.dbcde.gov.au/media/media_releases/2012/015.

The CA's predecessor, the TA, also recognised the importance of ensuring continuity of customer service when it decided to renew the GSM and PCS licences in 2004. Indeed, "ensuring continuity of customer service" was a key consideration in the TA's decision to offer incumbents the RFR.[30]

At the time, the TA stated:

> *"The TA is aware of the consideration to provide a stable investment environment and to ensure continuity of services...[GSM and PCS licensees] have also been making efficient use of the scarce frequency spectrum assigned to them. If they were not allowed to continue offering their services to their customers, there would be severe service interruptions, causing confusion and inconvenience to the public. The social consequence would not be acceptable to society as a whole."*[31]

The same risks apply equally to non-renewal of the incumbent operators' existing 3G spectrum licences.

5.2 Option 3 will disrupt customer service continuity

(a) The CA acknowledges that Option 3 will adversely affect consumers

In contrast, Option 3's potential reduction in a licensee's spectrum assignment will directly cause significant consumer disruption. This fact is clearly acknowledged by the CA in its Second Consultation Paper.

The CA states in relation to scenarios which include the loss of part of an incumbent operator's spectrum:

> "*The Government is aware of the possible adverse impact that such full-fledged changes in frequency assignment could have on the quality and continuity of the service. This would adversely impact upon the millions of mobile service subscribers in Hong Kong*."[32]

CSL emphatically agrees with the CA on this point. The CA goes on to acknowledge that a loss of spectrum will result in degradation of customer service quality in terms of slower data download speed and more dropped calls, and also a weakening or complete loss of indoor mobile coverage for 3G services.[33]

The CA concludes:

> *"[I]t is certain that the decrease in network capacity of base stations due to spectrum loss will have [an] impact on the continuity of calls or data connections when mobile customers move from one location to another*."[34]

The CA's conclusions in this regard are consistent with those set out in the Second Plum Report. Plum Consulting found that a loss of 3G spectrum, and the resulting loss of

---

[30] OFTA, *Licensing of Mobile Services on Expiry of existing Licences for Second Generation Mobile Services – Analysis of Comments Received, Preliminary Conclusions and Further Consultation*, (19 March 2004)), p 5: http://www.info.gov.hk/archive/consult/2004/mobile.pdf.

[31] Ibid.

[32] Second Consultation Paper, para 23.

[33] Ibid.

[34] Ibid.

capacity, would create network congestion. In response to congestion, incumbent operators would be faced with adopting one or more of the following responses:

1 migration of some or all customers from 3G to other services/spectrum blocks;

2 significant network re-engineering to maintain quality of service where possible; and/or

3 a shift of resources to managing the challenges arising from the implementation of Option 3 that could be used to better serve customers in other ways.[35]

Regardless as to an incumbent operator's response, or combination of responses, to network congestion, it is clear that the outcome will result in disruption to customer services.

(b) Customer migration to other networks will be disruptive and expensive

In coming to its predetermination that disruption to customers will be less severe under Option 3, the CA apparently assumes that such losses in network capacity can be mitigated by the migration of customers, forced or otherwise, on to either an incumbent operator's 2G or 4G network. This assumption is erroneous. The CA does not take properly into account the fact that such migrations will be disruptive and expensive for operators and for mobile customers.

CSL notes in particular that migrating customers to the 2G network will result in an overall degraded data usage experience. The 2G data experience is no substitute for 3G data, even for low bandwidth users. Reduced 3G capacity will impact 3G roaming capability for both Hong Kong and international customers. Also, investments in 2G are decreasing as more efficient 3G and 4G technologies are available. Putting more load onto the 2G network will result in a degraded user experience for all 2G subscribers.

CSL also notes the CA's attempt in the Second Consultation Paper to distinguish the circumstances of the slow customer migration from 2G services to 3G services on the basis that customers might have been reluctant to take up 3G mobile data services because they were two distinct services.[36] The CA goes on to argue that, in contrast, customers will have a greater incentive to switch from 3G to 4G services because 4G services provide a "much enhanced user experience", and the price of the two services are "more or less the same".[37]

Contrary to the CA's views as to the incentives for customers to move from 3G to 4G, CSL considers that customers will have no choice but to migrate from the 3G to 4G network. Such forced migrations will impose an additional and onerous burden on customers, including (and especially) underprivileged families, as not all customers will be able to afford, or willing, to purchase a 4G capable handset, which is more expensive and incurs an additional and unnecessary cost to continue receiving a mobile service. This additional cost will act as a disincentive for many customers to migrate to the 4G network. Further, customers may discern no material difference in user experience in their most used Internet application/s, being browsing, checking email, and accessing Facebook accounts. If there is no discernible difference in user experience, then there is little incentive to upgrade to a more expensive handset and service plan.

[35] Second Plum Report, p 2.

[36] Second Consultation Paper, para 29.

[37] Ibid.

It is true that the 2G "voice" and 3G "data" services are two distinct services. However, the CA fails to recognise that there is segmentation in the data service market and not all customers need to, or want to, use 4G services. At the lower end of the data market, customers are offered many different "unlimited" 3G service plans with data speeds of up to 384kbps for about HK$70-$80 per month. In sharp contrast, at the higher end of the market, the existing 3G incumbents, and/or their MVNOs, offer 3G/4G unlimited service plans for several hundred dollars per month. These customers will be particularly reluctant to migrate to full speed 3G/4G services.

For the reasons stated above, it is too simplistic to assume generally that mobile data users will have incentives to switch from 3G to 4G services.

Further, the timing of release of the digital dividend spectrum is not sufficiently clear as to assume that this spectrum will be fully available and the network built utilising this spectrum available to assist in meeting major additional network traffic load in the timetable widely predicted for such increase in demand.

The CA also claims that spectrum in the 850/900MHz band would assist in maintaining customer service continuity in the provision of 3G services.[38] However, CSL has already re-farmed its existing 900MHz spectrum to 3G to cope with the ever increasing demand for 3G traffic. Contrary to the CA's assertion, at least as far as CSL is concerned, no further spectrum in the 850/900MHz band is available for further re-farming to 3G services.

(c) Implementing more base stations is not a viable solution

By removing one-third of 3G spectrum, the incumbent operators are left with only two options, or a combination thereof: either invest in more radio base stations, or degrade the overall quality of the service.

As CSL noted in its submission to the First Consultation Paper, implementing more radio base stations in Hong Kong is practically very challenging. The existing network, particularly in busy traffic areas, is currently very dense, and there are too few locations to accommodate the necessary additional stations.[39] And while CSL complies with the CA's requirements as to radio safety, CSL faces a continual stream of objections to the proposed installation of base stations in buildings from residents fearing radiation hazards. The barriers to installation of additional base stations are increasing and, as a result, the historical costs of in-fill and other establishment of base stations is not a reliable guide as to future costs.

Implementing more base stations is also very costly. Site rental costs in Hong Kong are very high. Further, any roll-out of additional base stations without additional customers will inordinately increase both CAPEX and OPEX costs of the incumbent operators, and this cost will be passed on to customers, (e.g. including by way of operators not being able to offer competitive subsidy plans to customers, and less choice for customers).

The practical difficulties in implementing more base stations, along with high ongoing costs, severely limits the additional roll out of base stations as a viable mitigation strategy.

(d) 3G spectrum must be retained to meet continuing demand for 3G services

[38] Second Consultation Paper, para 29.

[39] CSL Submission to First Consultation Paper, p 22.

It is also apparent from the Second Consultation Paper that the CA has failed to consider the requirement to serve the rapidly growing traffic needs of 3G users in the period between now and 2016. Strong demand for 3G services will continue to exist post 2016. According to the recently published GSMA report *The Mobile Economy 2013*, the global growth in 3G connections is set to increase from 1.7 billion connections in 2012 to 4.2 billion connections in 2017.[40] This indicates continual strong growth in 3G mobile data traffic over the next few years. The Second Plum Report similarly notes that there remains a significant requirement for capacity provided by 3G/HSPA technology between now and 2017. Add to that the necessity to retain 3G/HSPA data services for international roaming traffic.[41]

In contrast, 4G connections are projected to represent only 10% of global connections by 2017.[42] The CA cannot, therefore, assume that all 3G traffic will be migrated to 4G networks by 2016. This is evidenced by the slow phase out of 2G services, despite the long availability of 3G services.

Even if the incumbents migrate some 3G traffic to their 4G networks, strong demand will still exist for 3G data services up to and beyond October 2016. However, the incumbents will not be able to meet this demand with only two-thirds of their existing 3G spectrum assignments.

5.3 Thirty-three percent network capacity loss

Currently, each of the incumbent operators is using three carriers in their allocated 2 x 14.8MHz band. If the CA were to take 2 x 5MHz in the 2.1HGz band from each operator under Option 3, the resulting capacity loss would be 33% for each incumbent operator. Each operator would therefore need to squeeze its existing subscriber base into its remaining two carriers (assuming of course that an operator was unsuccessful at purchasing back its 2 x 5MHz at auction). This would lead to service congestion and degradation, resulting in the provision of inferior voice and data services to customers.

The CA estimates the degradation of customer service quality in terms of reduction in data download speed for each operator would be restricted to, at most, 18% on average during the transitional period.[43] However, the methodology (set out in Annex 2 to the Second Consultation Paper) by which the CA's assessment has been conducted, including its underlying assumptions, is significantly flawed. The CA's methodology is far too simplistic or optimistic a model to accurately reflect the real outcomes if Option 3 were to be adopted. Further, the CA's assumptions, as set out in Annex 2, are not supported by any robust or reliable research or analysis.

Specifically, CSL identifies the following flaws in the CA's methodology and underlying assumptions:

- The CA's calculations are all based on averages across the total available spectrum to arrive at an 'average carrier' view. The averaging of this data is too simplistic and masks the realities of the consequences of Option 3 for each individual carrier. The CA's assessment almost certainly understates the potential degradation for the most efficient carriers. In addition, the analysis assumes the status quo in terms of the number of operators when it introduces spectrum in

[40] GSMA and A.T. Kearney, *The Mobile Economy 2013*, 2013, p 13.

[41] Second Plum Report, p 7.

[42] GSMA and A.T. Kearney, *The Mobile Economy 2013*, 2013, p 13.

[43] Second Consultation Paper, para 31.

bands other than 2.1GHz into its analysis. This is clearly not a realistic basis on which to perform the assessment, as new entry has occurred with previous releases of spectrum.[44]

- The broad assumption in paragraph 8 of Annex 2 about doubling network capacity via new mobile technology and expanding cell sites is fraught with uncertainty and severe cost implications. Having regard to the 3GPP standard, we do not see any practical breakthroughs that will have the effect of doubling spectral efficiency for 3G carriers. New technology is taken up only over time and only as attractive devices become available. Adding more sites in a dense market like Hong Kong will be problematic in many areas and without additional spectrum many such areas will become black spots.

- As noted in the Second Plum Report, the CA makes the mistake in Annex 2 of focussing on download speed. The key factor, however, for meeting demand is the capacity or data throughput of the network. It is the combination of the amount of spectrum available and the reuse of that spectrum (determined by network layout) that produces a high capacity network. Consideration of download speed alone is simply not sufficient.[45]

- Similarly, the extrapolation from the 2012 traffic is said to come from 'a statistical model' and again there is the likelihood of significant error in practice, with potential major customer impact. The CA estimates that there will be a 6-fold increase in the total mobile data traffic from 2012-2016. This is too conservative an estimate and is not consistent with recent predictions of growth. According to Cisco, global mobile data traffic is expected to grow to 11.2 Exabyte's per month by 2017, which is a ***13-fold increase*** over 2012. Mobile data traffic will grow at a compound annual growth rate (**CAGR**) of 66% from 2012 to 2017, with the Asia Pacific and North American regions accounting for almost two-thirds of global traffic by 2017. Importantly, the Asia Pacific region will have the 2nd highest CAGR of 76%, ***increasing 16.9 fold*** over the forecast period. [46] We expect Hong Kong to be at the forefront of this growth. These figures suggest that the CA has significantly underestimated the growth in mobile data traffic over the next few years, and therefore, the estimated degradation rate.

- The CA's assumption as to mobile data growth is also based on a blending of 3G and 4G traffic growth, without any consideration of the respective growth rate for each network. As noted above, the global growth in 3G connections is set to rise through to 2017,[47] indicating continual strong growth in 3G mobile data traffic over the next few years. 4G connections, however, are projected to represent only 10% of global connections by 2017.[48] CSL contends that it is far too simplistic for the CA to combine 3G and 4G traffic for the purpose of calculating data traffic demand. It is disappointing that the CA has failed to conduct any analysis on the respective growth of 3G and 4G traffic.

- The CA's methodology is also based on the erroneous assumption that existing 3G customers will be willing to upgrade their devices to 4G-compatible devices, and that this will contribute to a doubling in network capacity. This is, again, too simplistic an assumption. As previously noted, the need to upgrade to a costly 4G-

[44] Second Plum Report, p 10.

[45] Ibid, p 9.

[46] CISCO, *Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2012-2017*, 2013, p 5.

[47] The Mobile Economy 2013, p 13.

[48] Ibid.

compatible device will be a disincentive for many customers satisfied with their current 3G service and device.

- The CA has been proven wrong in its assumption that all five blocks of 2 x 5MHz spectrum available in the 2.5/2.6GHz band auction (conducted in March 2013) would be acquired by the incumbent 3G operators. In fact, the operators acquired only four out of the five blocks, with the remaining spectrum block acquired by China Mobile. This outcome casts further doubt over the CA's estimation of the incumbent 3G operator's spectral capacity for mobile data services.

- In the CA's methodology, there is no discussion of, or allowance for, bandwidth/spectrum headroom requirements which could be proportionately higher in 2016 than in 2012. This is a significant oversight, as headroom capacity is a fundamental part of mobile network planning and design.[49]

- The assumption of a straight line relationship between network capacity shortage and download speed degradation is problematic. Data speed degradation will most noticeably occur wherever there is short term lack of radio access network capacity, which will occur more frequently in the new capacity-constrained environment. This will be more likely in fluctuating busy area locations (for example, around transport nodes, entertainment zones, shopping precincts, etc.). Networks must be designed to adequately handle peak traffic loads area by area, hour by hour. With less spectrum capacity, such areas will be more heavily impacted than would be expected in a macro straight line basis unless substantial and very costly base stations are added (if possible). Congestion is clearly a non-linear function of spectrum bandwidth availability for both voice and data. In the voice context, the number of simultaneous calls able to be handled will reduce in line with the usual erlang traffic non-linear 'trunking' relationship to the fewer radio channels available. In the data context, the reduction in throughput, and hence average speed, is not erlang based but instead is dictated by packet queuing theory and non-linear increased delays as packet buffers fill and refill or overflow beyond the short term data link transfer capacity. To assume, therefore, a linear relationship between average data download speed and network capacity shortage is not correct.

- The issues caused by less spectrum than required by reasonable network design not only include data download speed but upload speeds and call dropouts. Dropouts are particularly annoying for customers.

Given the deficiencies identified above, CSL contends that the CA's assessment that the loss of one-third of an incumbent operator's 2.1GHz spectrum would not result in a 'mere' 18% reduction in data download speed. In any event, and although we do not agree with this figure, it is difficult to envisage why a telecommunications regulator would accept degradation of service quality to consumers by 18% post October 2016. Further, the assessment is too simplistic: it does not accurately reflect the adverse impacts Option 3 will have on each of the incumbent operator's network. The CA's assessment almost certainly understates the potential degradation of customer service quality in terms of the reduction in data download speed for each operator. In reality, the consequences of adopting Option 3 will be far more catastrophic, both for incumbent operators and consumers in Hong Kong.

[49] Headroom capacity represents the capacity over and above the amount required to provide for the forecast busy period traffic levels for the current planning period to allow for (i) some margin if higher than forecast traffic growth occurs; and (ii) traffic levels above average traffic peaks that will occur for many reasons, such as unforseen events (e.g. disasters, transport delays, network equipment failures etc).

In particular, the removal of one-third of an incumbent's 3G spectrum assignment will severely increase the number of dropped calls and result in poor access to Internet services. During busy periods in the Mass Transit Railway (**MTR**), for example, 3G customers will find it extremely difficult to make phone calls and to access the Internet. These problems will not be isolated to the MTR; the entire network will suffer from congestion. By way of a useful analogy, cutting one-third of an incumbent's spectrum capacity is akin to blocking one lane in the three-lane Western Harbour Tunnel during peak traffic periods. The result is significant congestion and disruption to consumers.

Network operators are already re-investing heavily in their networks in order to address the fast rising consumer demand for wireless broadband services, which requires both re-scaling of networks and re-shaping of coverage to address the different patterns of usage of Internet services to the patterns of usage of voice services. The allocation of investment is critical to ensuring service quality is maintained and, wherever possible, enhanced while servicing additional loads on networks. The increasing pace of change in usage of networks, and the correspondent need for each existing network operator to re-invest in its network to service such changes, creates financial stresses on each incumbent operator. The financial stress will be further exacerbated if operators are also required to service additional network loadings and changed usage patterns with less network capacity.

With the predicted growth in mobile data traffic, incumbent operators need more spectrum, not less, to maintain and improve their high-quality services. By removing one-third of an incumbent operator's spectrum assignment, the CA penalises the incumbents and significantly diminishes the quality of service provided to 3G customers. Regulators worldwide are releasing, or plan to release, more spectrum, particularly the digital dividend spectrum, to meet the ever increasing demand for data traffic. They are not, as the CA proposes to do, taking back spectrum from incumbent operators. The CA's proposal is clearly at odds with international best practice.

Removal of spectrum will fundamentally change how networks will need to be architected and result in much investment becoming redundant – this investment is 'locked into' existing transmission sites and transmission capacity, which cannot be relocated without incurring substantial new costs. These new costs are 'dead weight' costs imposed upon incumbent operators, with no attendant consumer benefit and with consumer detriment through diverted expenditure away from improving existing service coverage and quality. The only consumer benefit alleged by the CA is if a new entrant can enter and achieve viable scale. However, this is most unlikely to be achieved and is, accordingly, an illusory benefit for the reasons discussed below at paragraph 8.2.

CSL also notes that that if a new entrant wins the re-auctioned spectrum, it will take a quite a few years to build the same capacity that is presently available. Not only then will the customers of the incumbent operators suffer as a result of reduced capacity in the incumbents' networks, but customers of the new operator will also suffer as capacity is slowly built. Meanwhile, much of the new operator's spectrum will be under-utilised during this period.

5.4 Conclusion: Customer service continuity

CSL agrees with the CA's assessment that Option 1 will best preserve customer service continuity. Option 3, on the other hand, will not alleviate any of the problems the CA identified in Option 2. Just like Option 2, Option 3 will require incumbent operators to make significant adjustments to their networks and services to respond to the consequences associated with a substantial loss of network capacity. These adjustments will be highly disruptive to the continuity of customer services.

Not only will 3G customers suffer the consequences of disruption to their services, but Hong Kong itself risks losing its reputation as a hub to some of the fastest broadband services in the world. Rather than reducing the incumbent operator's spectrum assignments, the CA should instead focus on releasing more spectrum to mobile operators by, for example, accelerating the release of digital dividend spectrum, and implementing a regulatory regime for spectrum trading (which has disappointingly been delayed by the Government for many years).

So as not to inflict severe disruption on the consumers of Hong Kong, CSL calls on the CA to adopt Option 1 to reassign the expiring 3G spectrum licences, not Option 3.

CSL understands that OFCA will soon engage a consultant to study the impact on customer under different scenarios, for example, if Option 3 were to be adopted. CSL requests that the incumbent 3G operators should participate in the consultant selection and consultancy process, and in particular, an agreed methodology as to how to assess the impact on customer. Without the participation of the incumbent 3G operators on these important processes, it will be impossible to provide a true and an accurate assessment and a real outcome. The incumbent 3G operators should also be fully consulted prior to concluding the findings of the consultancy study.

6 Efficient spectrum utilisation

6.1 Incumbent operators have used 2.1GHz spectrum efficiently

Since the initial assignment of 3G spectrum, the incumbent operators' use of this spectrum has been fully efficient.

That this is the case is apparent from the following indices:

- According to the CA's own statistics, the mobile penetration rate in Hong Kong reached 228.6% as at December 2012 (up from 216% as at April 2012), one of the highest rates in the world.[50]
- As at December 2012, there were 16,403,076 mobile subscribers, 9,390,465 of which were 3G/4G subscribers (this is up from 7,416,909 in December 2011).[51]
- Total mobile data usage for December 2012 was 7,674,492,895 megabytes.[52] Relevantly, Cisco indicates, in its visual networking index, that mobile data traffic will continue to grow strongly at a CAGR of 78% globally up to 2016.[53]
- According to data published by the International Telecommunications Union (**ITU**),[54] Hong Kong had 74.5 active mobile broadband subscriptions per 100 inhabitants, the sixth highest in the world.

[50] See OFCA website, *Key Communications Statistics*, 1412 March 2013 http://www.ofca.gov.hk/en/media_focus/data_statistics/key_stat/index.html.

[51] Ibid.

[52] OFCA, *Key Statistics for Telecommunications in Hong Kong: Wireless Services*, 7 March 2013 http://www.ofca.gov.hk/en/media_focus/data_statistics/index.html.

[53] Second Plum Report, p 8.

[54] ITU, *ICT Facts and Figures – 2011*, 25 October 2011 http://www.itu.int/ITU-D/ict/facts/2011/material/ICTFactsFigures2011.pdf.

The strong growth of 3G customers, mobile broadband subscriptions and mobile data usage clearly demonstrates that incumbent operators have invested heavily in their 3G networks and have made efficient use of their 3G spectrum assignments.

A highly competitive environment also drives efficiency in the use of spectrum. Indeed, as the CA itself commented in the First Consultation Paper:

> "*In a keenly competitive market for mobile services, it is incumbent upon MNOs to utilise their spectrum efficiently in order to stay competitive and maximise their return on investment*."[55]

The Second Plum Report also relevantly notes:

> *"The development of mobile services in Hong Kong, the intense competition and the growth in mobile data traffic all suggest that the usage of 3G spectrum in Hong Kong is efficient*."[56]

There is no basis, whatsoever, to suggest that the incumbent operators have not made efficient use of their assigned 3G spectrum. Similarly, the CA's conclusion in the Second Consultation Paper that further efficiency *may* be achieved is nothing more than mere speculation unsupported by the facts.[57] Such hypothesising cannot, and does not, form the basis of a reasonable ground on which to make decisions and form opinions as to the efficiency of 3G spectrum usage by the incumbent operators in Hong Kong.

CSL notes with disappointment that, to its knowledge, the CA has failed or refused to undertake any detailed assessment as to whether the incumbent operators have used their existing 3G spectrum assignments efficiently. Consequently, any conclusions drawn by the CA as to issues of efficient spectrum use in the absence of such an assessment hold little weight.

6.2 Option 3 adversely affects spectrum efficiency

It is difficult to see how efficiency in the 2.1GHz band could be improved by diluting the spectrum holdings of the incumbents and/or enabling new entry without releasing any additional 2.1GHz spectrum. Technical efficiency is best promoted through analysis of changes in network utilisation over time and adapting networks to address developing new patterns of demand. This requires sufficient stability in available spectrum to identify where and how such changes in demand patterns are occurring and the optimal way of reusing available spectrum to address these changes in demand. Spectrum efficiency is more likely to be enhanced through the stability of existing allocations than through creating scarcity through forced re-allocation of spectrum. Put simply, fragmenting existing 3G spectrum bands or forcing operators to accommodate existing customers on reduced spectrum bands under Option 3 will adversely affect spectrum efficiency.

The CA has concluded that Option 3 will contribute to enhancing the efficiency in spectrum utilisation because re-auctioning one-third of the available spectrum will give

---

[55] First Consultation Paper, para 18.

[55] Secretary for Commerce and Economic Development and the Office for the Telecommunications Authority, *Arrangements for the Frequency Spectrum in the 1.9 2.2 GHz Band Upon Expiry of the Existing Frequency Assignments for 3G Mobile Services* (30 March 2012), para 18 (**First Consultation Paper**).

[56] Second Plum Report, p 12.

[57] Second Consultation Paper, para 33.

incumbent operators and interested parties alike the opportunity to acquire a contiguous band of 2 x 20MHz of spectrum in the 2.1GHz band.

However, the CA fails to acknowledge and appreciate the significant uncertainty incumbent operators will face in terms of whether they will be able to obtain, at auction, a contiguous 2 x 20MHz assignment in the 2.1GHz band. Potential bidders have the financial capacity to buy up the entire available spectrum, leaving incumbent operators with only two-thirds of their original assignment and therefore only two-thirds of their current network capacity. Such an outcome would certainly detract from spectrum efficiency rather than enhance it as spectrum becomes fragmented.

It must also be emphasised that no new 3G spectrum will become available in the course of this reassignment process. Even if it were possible for an incumbent to successfully acquire a contiguous 2 x 20MHz assignment, such an acquisition would come entirely at the expense of other incumbents, who would fail to retain one-third of their existing spectrum assignment, thereby reducing significantly their capacity to use their remaining spectrum efficiently.

In its Second Consultation Paper, the CA argues that spectrum efficiency can be enhanced by allowing the incumbents to build up contiguous spectrum in excess of their existing assignments – that is, 2 x 20MHz of spectrum in the 2.1GHz band.[58] However, the CA fails to appreciate that the spectrum efficiency of incumbent operators who fail to obtain a contiguous assignment of 2 x 20MHz will significantly diminish. From a holistic perspective, we fail to see, and the CA fails to explain, how spectrum efficiency on the whole will be enhanced as a result of this highly disruptive approach.

CSL acknowledges that spectrum auctions can provide a fast and effective means of assigning new, previously unreleased, spectrum to operators The primary objective of auctions should be efficiency – that is, putting spectrum in the hands of those best able to use it, not raising revenue. However, in the absence of any credible evidence that the 3G spectrum is being inefficiently utilised by incumbents, the CA should be wary of using auctions to disrupt a market that is already working highly effectively. The CA's primary consideration in an efficient market scenario should be to first do no harm.[59]

6.3 Conclusion: Efficient spectrum utilisation

For the reasons set out above, the grant of an RFR to existing licensees would provide the most reliable pathway by which Hong Kong's strong record of efficient use of spectrum could continue. By contrast, Option 3 would involve the fragmentation of spectrum and the accommodation of customers on reduced spectrum bands. Contrary to the CA's assertion that Option 3 best facilitates spectrum efficiency, such an outcome will significantly impact on an incumbent operator's ability to use its spectrum assignment efficiently.

[58] Ibid, para 34.

[59] Peter Cramton, Evan Kwerel, Gregory Rosston and Andrzej Skrzypacz, *Using Spectrum Auctions to Enhance Competition in Wireless Services*, (2011) 54 Journal of Law and Economics 187.

7 Encouragement of investment and promotion of innovative services

7.1 Option 1 provides investors with certainty

Option 1 is best suited to meeting the policy objectives of encouraging investment in the 3G mobile market, and promoting the development and delivery of innovative services. By contrast, the uncertainty inherent in Option 3 reduces the incentive to invest in networks and innovative services.

Put simply, the RFR under Option 1 provides incumbent operators, investors and customers with confidence and certainty as to the continued provision of 3G services. Confidence and certainty are two key factors for fostering an environment where investment and innovation perform effectively for the benefit of customers.

The greater certainty that Option 1 provides will allow operators to focus on forward looking investment strategies, not on whether they will retain their assigned spectrum, and if not, how they will continue to meet Hong Kong's ever increasing appetite for data with less network capacity.

Option 1 will also allow operators to invest in network development and the deployment of new and innovative services, knowing that there is little risk of losing their investment. This certainty is absolutely critical for investments in mobile networks, which typically have a long payback period.[60]

The World Bank has noted the importance, generally, of licence renewal for investment:

> "*Providing details for licence renewal or reissue is an important guarantee for regulatory certainty, which is a prerequisite for attracting potential investors entering the market of developing and emerging economies*."[61]

7.2 Option 3 provides no certainty for investors

In contrast, the lack of certainty inherent in Option 3 will clearly and significantly reduce the incentive for licensees to continue to maintain and invest further in their networks. The risk of losing one-third of its spectrum will prompt an incumbent operator to rethink its technology, product and services roadmap, with similar implications for its investment plans and the development of innovative services.

If the CA were not to offer incumbent operators a RFR in respect of their entire 3G mobile spectrum, this would likely lead to substantial write-offs of the significant investment that has been made and would place future investment in the Hong Kong mobile market at risk.

The CA admits that uncertainty in the few years towards the end of the existing term of 3G frequency assignments may affect the investment incentives of some of the incumbents.[62] However, the CA contends that the adoption of Option 3 will be able to alleviate concerns about regulatory certainty, particularly if the incumbents are notified

[60] CEG Report, p 27.

[61] World Bank, *Mobile licence renewal: What are the Issues? What is at Stake?*, June 2005, pp 1-2; 5-6.

[62] Second Consultation Paper, para 35.

sufficiently in advance (i.e. at least three years in advance) that they will have the opportunity to retain two-thirds of their original frequency holding.

CSL rejects this assertion. Investment uncertainty will not abate under Option 3 merely because the incumbents know that they will have the "opportunity" (as the CA generously puts it) to retain two-thirds of their existing spectrum assignment. Rather, uncertainty will persist right up until the spectrum auction in (we assume) late 2014 as incumbents face the uncertainty over their ability to successfully re-acquire their full spectrum assignment, and the cost of doing so. Uncertainty is also likely to persist post-auction as those incumbents who were not successful in re-acquiring all their existing spectrum assignments face the significant challenge of meeting increasing customer demand, and providing a high level of quality service, with substantially reduced spectrum capacity.

Such uncertainty is simply not conducive to continued investment and innovation in the Hong Kong mobile sector.

The CA should also be cautious in assuming that new entry will lead to the development of a greater range of innovative and advanced 3G services. Further entry in an already overcrowded market can have significant consequences for consumers because they are denied the benefits of investments in new and innovative 3G services.

In intensely competitive markets, like the Hong Kong market, operators may allow prices to drop in the short term below their long-run incremental costs.[63] However, this is not sustainable in the long term because overly-low prices do not provide operators with an adequate return on their investments. And inadequate returns make it uneconomic to invest in services and new network capacity for additional data traffic.

This is a clear risk to both operators and consumers in the Hong Kong market, given its relatively small scale and lack of concentration. Any further entry will only exacerbate the problem through further market fragmentation, increased costs, and a reduction in incentives for infrastructure investment. Not only would this scenario threaten the incumbent operators' financial viability, but consumers would also face higher prices and miss out on the benefits of investment in new and innovative services resulting in a poorer user experience.

There is also no reason to conjecture that a new entrant will provide equivalent or superior service quality or coverage to that supplied by the incumbent operators. The incumbent operators have not 'stood still' and cannot stand still if they are to retain the loyalty of existing customers and attract new users. The rate of innovation in service provision, and in improvements to mobile networks in Hong Kong, is world leading. A new entrant will not stimulate more innovation or improvements in coverage or quality of existing networks, but rather will hamper continuing investment and innovation by existing mobile operators.

7.3 Conclusion: Encouragement of investment and promotion of innovative services

As we have previously submitted, CSL has invested hundreds of millions of dollars into its network to enhance coverage, capacity, capability and speed. All along, we have provided high quality innovative services that improve the lives and well-being of customers in Hong Kong.

[63] Goldman Sachs, *Wireless: United States* (23 January 2003), p 1.

CSL's prior track record as a leading mobile operator in Hong Kong with its continued investment and innovation (along with the other existing 3G operators) is continuing and should give the CA full confidence that Option 1 would promote an environment conducive to future investment and innovation by CSL and other incumbents. It is clear that Option 3 would only serve to damage investment and innovation, thereby adversely affecting millions of 3G customers.

8 Promotion of effective competition

8.1 Option 1 provides regulatory and investment certainty

In its Second Consultation Paper, the CA prematurely dismisses Option 1 on the basis that it would provide "only the status quo position" in respect of the level and intensity of competition in the Hong Kong mobile market.[64] However, the status quo position so readily dismissed by the CA represents world class competition. The OECD pointed out as early as 2001 that "infrastructure competition continues to deliver leading performance in Hong Kong".[65] The same assessment continues to apply today.

A RFR under Option 1 promotes effective competition by giving regulatory and investment certainty to incumbent operators. This creates the incentive for incumbents to further invest and innovate in their networks and services. Such an outcome allows licensees to better compete by distinguishing their services from those of their competitors.

The adoption of Option 1 will also facilitate the future development of a secondary spectrum market (and therefore more competition) by removing regulatory uncertainty around licence continuation, which is one of the greatest barriers to trading licences. The Second Plum Report notes that spectrum trading provides a mechanism for improving efficient use of spectrum, encouraging innovation, and enables investors to make more informed decisions.[66] CSL therefore requests the CA to fully implement a spectrum trading scheme in Hong Kong so as to further promote competition in the mobile market. There is no justifiable reason as to why the CA continues to withhold the introduction of a regulatory regime for spectrum trading.

8.2 An increase in competitors will not necessarily promote more effective competition

In its Second Consultation Paper, the CA expresses a "reasonable belief" that Option 3 will generate even greater competition in the Hong Kong mobile market.[67] Tellingly, however, the CA provides no grounds to support this belief, other than an assumption that a new entrant will enhance competition. However, the assumption that "more competitors equals more competition" in the context of the Hong Kong mobile market is flawed.

The CEG Report notes that it is likely to be efficient for there to be only a relatively small number of operators in markets such as the mobile industry where there are significant

[64] Second Consultation Paper, para 37.

[65] OECD, *Communications Outlook 2001*, p 41.

[66] Second Plum Report, p 14.

[67] Second Consultation Paper, para 37.

economies of scale. In particular, market volumes may only enable a few operators to reach the minimum efficient scale.[68]

International consensus is that effective competition in most mobile markets can be achieved with around three to four national operators.[69] Accordingly, while having many competitors may give the appearance of greater competition compared with a market with fewer operators, in terms of what should ultimately matter - outcomes for customers – a market with fewer but more efficient operators is clearly better.[70]

Effective competition in mobile markets requires only a few, large competitors. This is readily apparent in Europe, North America, Australia, and indeed, around the world. In a number of jurisdictions, competition authorities have permitted mergers for the consolidation of mobile markets to 3 to 4 major operators. CEG has pointed out that European market reviews have found markets with at least 3 mobile operators to be generally effectively competitive.[71]

In addition, Bank of America Merrill Lynch data shows that across developed markets the average number of mobile operators is 3.5. Internationally, only three markets have more than 5 significant operators: Bangladesh, India and Nigeria.[72]

CSL reminds the CA that Hong Kong has a population of only 7.1 million but accommodates five mobile network operators, which service more than 15 million customer accounts. Add to that an unprecedented 13 mobile MVNOs providing services to 1,334,583 customers.[73] The Hong Kong mobile market has reached saturation point with an extremely high penetration rate of 228.6% as at December 2012.[74] There is stiff competition amongst incumbent 3G operators, all of which are fully-fledged players with several years of experience in the market.

The Second Plum Report notes that the mobile market in Hong Kong exhibits healthy competition with all five players having a market share above 10% and the lowest concentration index (Hirschman Herfindall index) among all major economies.[75]

There is clearly no problem with the level of competition in the Hong Kong mobile market by any assessment. Intense competition in the market has delivered low mobile service charges for consumers. However, any Government intervention to 'enhance competition' in the sector is likely to backfire disastrously for consumers.

CEG relevantly notes:

> *"If a regulator were to try to achieve a greater number of operators, customers could be made worse off because those operators would need to set higher prices to recover their higher unit cost levels. Customers could also be harmed if a*

[68] CEG Report, p 51.

[69] Ibid, p 52.

[70] Ibid, p 51.

[71] Ibid.

[72] Ibid, pp 51-52.

[73] OFCA, *Key Statistics for Telecommunications in Hong Kong: Wireless Services*, 7 March 2013 http://www.ofca.gov.uk/en/media_focus/data_statistics/index.html.

[74] See OFCA website, *Key Communications Statistics*, 12 March 2013 http://www.ofca.gov.hk/en/media_focus/data_statistics/key_stat/index.html.

[75] Second Plum Report, p 15.

regulator prevented an operator that was better at delivering services from being able to expand to meet customer demand."[76]

In Hong Kong's intensely competitive market, a new entrant might only be viable if it drives one of the incumbent operators out of the market. If this occurred, consumers would be left with the same number of operators but would bear the huge costs of market rationalisation, namely the stranded investment in the network of the departing operator and the customer confusion which results from operator failure.

As the Second Plum Report notes, even if new entry to the market were viable and could stimulate further competition in a hyper-competitive environment such as Hong Kong, it is difficult to see where the new benefits would come from. Any gain beyond existing competitive conditions would be marginal – rather than creating new benefits for consumers, there would simply be a flow of benefits between operators.[77] Even in the event that further competition generates a marginal benefit, it is likely to be outweighed by the disruption costs arising from an incumbent operator's partial loss of 2.1GHz spectrum.

8.3 New entrants may acquire spectrum outside 2.1GHz band

In support of Option 3, the CA states that MVNOs should not be deprived of the opportunity to acquire spectrum themselves if they hold a carrier a licence. However, MVNOs have ample opportunities to acquire their own spectrum.

As we have noted previously, neither existing nor anticipated future market conditions would exclude a new entrant from acquiring spectrum, as the following points demonstrate:

- A new entrant successfully bid for a bandwidth of 30MHz of spectrum in the 2.3GHz band auction conducted in February 2012.
- The CA released five blocks of 5MHz paired spectrum in the 2.5GHz/2.6GHz band for auction in March 2013 and a potential new player, China Unicom, participated in the auction.
- Digital dividend spectrum (assumedly available by the end of 2015 subject to frequency coordination with mainland China) will become available for use for mobile services. New entrants will have at least an equal opportunity to acquire that valuable spectrum.

Accordingly, there is no need to fragment the existing 2.1GHz band so as to facilitate new entry. This can be facilitated outside the 3G band, and importantly, without disturbing customer service continuity and adversely affecting competition.

We also note that the MVNO licensing regime is an effective regulatory tool for allowing service providers who do not have spectrum rights to offer mobile services at the retail level. While Hong Kong has four 3G MNOs, the fifth MNO, in the capacity of a MVNO, has launched 3G mobile broadband services to compete with the existing 3G MNOs. This is in addition to the 13 MVNOs currently operating in the Hong Kong mobile market.

[76] CEG Report, p 51.

[77] Second Plum Report, p 15.

8.4 Conclusion: Promotion of effective competition

As we have observed previously, the Hong Kong mobile market exerts tremendous pressure on the existing players to make efficient use of spectrum and provide better and more innovative services to consumers. The possibility of potential new players being at the forefront of service innovation and performing equal to, or better than, incumbents is nothing more than baseless speculation. Indeed, market failure of such late entrants is a real possibility. Also, there is no evidence to suggest that the incumbent 3G operators will perform any worse than a hypothetical new entrant. On the contrary, the costs of the disruptive impact of re-auction of one-third of the incumbent operators' 2.1 GHz spectrum holding on operators and customers are entirely certain and detrimental, and completely outweigh the benefit, if any, arising from a hypothetical new entrant.

Rather than adopting Option 3 on the basis of a flawed assumption that new entrants create further competition, a better and more sensible course of action to promote effective competition in the Hong Kong mobile market (if that is possible) is to:

- firstly, accelerate the process for the release and auction of the digital dividend auction; and

- secondly, finalise and implement a regulatory regime that facilitates spectrum trading in Hong Kong, which has been unreasonably delayed by the CA for many years.

These two measures, coupled with merger or acquisition, will more effectively promote competition by enabling potential new entrants to access spectrum and participate in the Hong Kong mobile market, without the need to fragment existing assignments in the 2.1GHz band, which would cause significant disturbances to competition and customer service continuity.

9 Spectrum Utilisation Fee

9.1 Introduction

In the second consultation, the SCED has proposed two additional methods for calculating the SUF for RFR Spectrum. The additional methods are to be calculated as follows:

- **First Method**: the incumbents will be required to pay a minimum HK$77 million / MHz over the 15 year licence period which is derived from the annual SUF in 2015/2016 or the SUF of the re-auctioned spectrum (whichever is higher); or

- **Second Method**: the incumbents will be required to pay the average of HK$80 million / MHz (the weighted average of the relevant past market benchmarks) and the SUF of the re-auctioned spectrum.

The SCED provided these estimates as a lump sum, which cannot be disaggregated and compared to past international auctions using the internationally recognized benchmark of 'value/MHz/population'. CSL was therefore forced to convert the lump sums provided by the SCED. CSL calculated the proposed value of the 2.1GHz band under both the additional methods as approximately HK$10.85 – 11.27 / MHz / population.

CSL submits the absurdly high prices proposed reflect the SCED's flawed methodologies. The SCED used inappropriate past Hong Kong benchmarks for both of its additional methods which seek to maximize revenue as opposed to using 'like for like' comparators.

The proposed value is extremely high compared to recent international auction results for the 2.1GHz band. The Second Plum Report confirms the average value obtained in recent 2.1GHz auctions in high income countries is as low as HK$2.10 / MHz / population. This is one-fifth of the SCED's proposed price. The recent UK 4G auction for paired 2.6GHz spectrum achieved a price of approximately HK$1.01 / MHz / population. This is one-tenth of the SCED's proposed price.

CSL notes the SCED has not considered the negative effects of excessive auction prices which have been evident in overseas markets and include: delays in network roll-out, increased consumer fees and excessive debt for mobile telephone operators.[78] To cite but one example, excessive spectrum prices in the European auction process in 2000 caused a telecommunications bubble which damaged the European mobile industry.[79]

9.2 The Market Benchmarking approaches in the Second Consultation Paper

CSL agrees with the SCED that, if applied appropriately, the market benchmark approach would best reflect the spectrum's market value and be an equitable solution for the incumbent spectrum holders.[80] However, CSL rejects the two additional methods proposed by the SCED and proposes an alternative approach which applies appropriate past market benchmarks based on objective criteria.

CSL rejects the First Method for two primary reasons:

- unfairly tying the SUF of the RFR Spectrum to the outcome of the re-auctioned spectrum which will distort the auction design and process; and
- the incorrect selection of the annual royalty payment in 2015/2016 as a past market benchmark inflates the SUF.

CSL rejects the Second Method for three primary reasons:

- unfairly tying the SUF of the RFR Spectrum to the outcome of the re-auctioned spectrum which will distort the auction design and process;
- the incorrect selection of the 850/900MHz auction of March 2011 as a past market benchmark significantly inflates the SUF; and
- a lack of transparency in how the SCED calculated the weighted average of the relevant past market benchmarks which has not allowed submitters to properly engage in discussion as to the operation of the methodology to yield calculations.

CSL instead recommends that the SUF for the RFR Spectrum be determinedon the basis of past Hong Kong market benchmarks which have been assessed using objective criteria which allows similarities to be drawn.

(a) Tying the SUF for the RFR Spectrum to re-auction prices in the First and Second Methods

The Second Consultation paper notes that it is the duty of the Government to ensure the SUF of the RFR spectrum and the re-auctioned spectrum "*will as far as possible reflect*

[78] For example, Alfredo Del Monte, *European UMTS Licence Allocation: Why Economic theory has not worked,* p 3 available at www.economiaindustriale.unina.it/papers/UMTS.pdf.

[79] Ibid.

[80] Second Consultation Paper, para 56.

the full market value of the spectrum."[81] The two additional methods proposed by the SCED both tie the SUF of the RFR Spectrum to the re-auction spectrum which gives rise to two potential problems in achieving full market value:

- incumbents will be uncertain as to the level of SUF they will be required to pay for RFR spectrum prior to bidding on the re-auction spectrum; and

- incumbents' bids may be distorted as there will exist an incentive to adjust the bids to obtain a lower SUF for RFR spectrum or, alternatively, new entrants bids may be distorted as there would be an incentive to increase the value of the SUF for RFR Spectrum to unsustainable levels.

(i) Failure to provide certainty on the SUF for RFR Spectrum

The SCED recognises the incumbents' concerns about the risk of committing to an unknown level of SUF by tying the SUF of the RFR Spectrum to the outcome of the re-auction but fails to provide such certainty.[82] This approach is patently unfair. The incumbent 3G operators would be required to decide whether to exercise its RFR without knowing its potential expenditure. The SCED's additional methods are inconsistent with principles of openness and transparency that should be adhered to in price determination.

CSL further notes that being unable to account for its maximum expenditure is completely unsatisfactory in a regulated market. The *Telecommunications Regulation Handbook* produced by the World Bank in conjunction with the ITU notes that regulators provide details of what charges will be levied to "*promote greater transparency and certainty"*.[83] The effect of this uncertainty is incumbent 3G operators are likely to be reluctant to invest heavily in capital works which may hinder mobile network development.

(ii) Bid shading by the incumbent 3G operators and bid gaming by potential new entrants to the 3G market

CSL notes the SCED has also recognised the second potential problem of bid shading behaviour by the incumbents if the value of the SUF of the RFR spectrum is tied to the outcome of the re-auctioned spectrum.[84] In order to forestall this type of behaviour by the incumbents, the SCED proposes to set the auction reserve price at a "*true minimum value of the Re-auctioned spectrum"* which means the reserve price will be "*significantly higher*" than previous auctions.[85] CSL submits the SCED's proposal to set a higher reserve will potentially inflate the re-auction spectrum prices and RFR Spectrum SUF which is inconsistent with a market-based approach. The SCED is proposing to solve one potential market distortion (i.e. incumbents bid shading) with another potential market distortion (i.e. inflated reserve price).

CSL submits the reserve prices should be set conservatively and not as a pre-estimate of an expected market price.[86] This is particularly true in the highly competitive Hong Kong mobile market, where competitive bidders will ensure the SUF reflects true market

[81] Ibid.

[82] Ibid.

[83] World Bank et al, *Telecommunications Regulation Handbook* (Tenth ed.) 2011, p 76.

[84] Second Consultation Paper, para 63.

[85] Ibid.

[86] CEG Report, p 50.

value.[87] By artificially inflating the reserve price, the SCED is potentially distorting the market price. Alternatively, tying the SUF of the RFR Spectrum to the re-auction spectrum lends itself to gaming by the participants in the auction process. Participants would be aware that the incumbents would be required to pay the highest bid under the First Method or an average of its bids under the Second Method. This would artificially inflate the prices paid for the available spectrum and, consequently, the SUF for the RFR spectrum would fail to reflect true market value.

CSL submits tying the RFR Spectrum SUF to the re-auction spectrum is a flawed approach to achieving full market value and unfair to incumbent 3G operators. The potential for market distortion is unnecessary as there are viable alternatives which reflect the full market value of the spectrum without the potential for distortion. Such alternatives include using past Hong Kong benchmarks to determine the SUF for the RFR Spectrum.

9.3 Deficiencies in the First Method

CSL understands that under the First Method, the SUF to be paid by the incumbent will be the higher of the following two amounts:

- HK$77 million per MHz covering the entire 15 year licence period; or
- the level of SUF as determined by auction for the re-auctioned spectrum.

The Second Consultation Paper notes that under this Method "*the incumbents cannot be certain about the amount of SUF they have to pay eventually for the RFR Spectrum*" but goes on to claim "*they would have a **general idea** of the minimum, or as the case may be, the maximum amount of SUF payable*" [emphasis added].[88]

CSL submits this is a misleading statement predicated on unknown assumptions by the SCED about the potential bidding process for the re-auctioned spectrum.

In order to arrive at a minimum of HK$77 million / MHz, the SCED has conducted the following calculation:

151 million ÷ 29.6 (paired 2.1GHz band spectrum) = HK$5.1 million/ MHz × 15 (being the duration of the licence period) = HK$77 million/ MHz

CSL rejects this figure and considers it far too high. CSL submits the SCED has used a flawed approach in calculating the minimum SUF under the First Method for the following reasons:

(a) Failure to account for unpaired spectrum

The SCED in calculating the value of the frequency spectrum has only taken into account the paired spectrum for which the incumbents will pay a royalty of HK$151 million in 2015/16. This is incorrect and misleading. The incumbents pay the royalty payment for 2 x 14.8MHz paired spectrum *and* 5MHz of unpaired spectrum within the 2.1GHz band. The fact that the unpaired spectrum remains idle is immaterial.[89] No party during the 2001 auction could have reasonably foreseen that the unpaired spectrum would remain

[87] Ibid.

[88] Second Consultation Paper, para 57.

[89] First Consultation Paper, pp 3 and 22.

unused. It is unreasonable for the Government to now calculate the SUF/MHz with hindsight.

(b) The Annual Royalty payment in 2015/2016 does not reflect market value of the 2.1GHz band spectrum

Firstly, the annual royalty payment for the 3G spectrum in 2015/16 overstates the market value. The SUF currently paid by the incumbents was based on a hybrid-progressive model designed in 2001. At that time, the Government's overarching policy objective was to minimise the initial financial burden on licensees due to an adverse market environment.[90] The Government set a rising fee schedule which overstates the value of the spectrum in its final year to compensate for the earlier years.

Secondly, in Option 3, one-third of CSL's spectrum holdings will be reallocated which will impact on the value of the remaining two-thirds of its 3G spectrum holdings. For example, on the revenue side, CSL's existing customers will have reduced service quality which could affect customer retention. Further, on the costs side, CSL will be forced to increase its infrastructure in order to meet existing data demands. Accordingly, CSL submits that the use of the 2015/2016 royalty payment to benchmark the SUF of the RFR Spectrum is completely inappropriate and does not reflect commercial reality.

Thirdly, CSL submits the selection of the annual 2015/16 royalty payment was unreasonable in light of the SCED not accounting for the net present value (**NPV**) of the spectrum over the past 14 years. The NPV is an opportunity cost approach to calculating the SUF which allows an assessment of whether the positive outputs (e.g. CSL's revenues) have over the past 14 years exceeded its input cost to demonstrate whether the SUF paid reflects the true market value of the spectrum.[91] The Second Plum Report identifies this approach would have reduced the annual SUF value significantly. CSL considers the selection of the 2015/16 royalty payment as a benchmark, as opposed to engaging in an opportunity cost analysis, reflects the Government's revenue raising strategy.

The First Method therefore provides an overly high minimum value of HK$77 million which does not reflect market value and is based on a flawed calculation.

9.4 Deficiencies in the Second Method

CSL understands that under the Second Method, the SUF would be set at the average of the weighted average of the relevant past market benchmarks and the SUF of the re-auctioned spectrum as determined by auction.

The SCED has chosen the following benchmarks:

- a SUF calculated on the basis of the annual royalty payment for the 3G spectrum in 2015/2016;[92]
- the SUF of the 2.5/2.6 GHz band for the provision of broadband wireless access spectrum (January 2009);[93] and
- the SUF of the 850/900MHz band auction (March 2011).[94]

[90] Hong Kong Government slide pack available at http://tel_archives.ofca.gov.hk/en/speech-presentation/dg20010213.pdf.
[91] ITU Report, p 7.
[92] Second Consultation Paper, para 59.
[93] Ibid.

In the Second Consultation Paper, the SCED states "*the weighted average of the past market benchmarks would amount to **around** HK$80 million per MHz."* CSL remains uncertain, and the SCED has failed to explain, how this estimated value was derived from the benchmarks listed above.

(a) Lack of transparency in calculation under the Second Method

CSL submits that the SCED has withheld or failed to provide critical information and reasoning on how it arrived at this estimated value, which would allow the incumbents to properly assess the veracity of the estimate.[95]

For example, the SCED has failed to provide the following information:

- the relevant weightings used for each past benchmark, aside from noting that "*greater weight attached to the SUF of the 850/900 MHz spectrum*";[96]
- supporting evidence for the statement that the value of the spectrum will increase over time. In particular, the SCED does not provide any information on the past auctions which demonstrated this upward trend;[97] and
- objective criteria/logical reasoning for opting for the 850/900MHz spectrum in March 2011 (the SCED provides superficial reasoning based on the services provided and levels of technological support).[98]

CSL submits that withholding this critical information has meant that submitters, including CSL, have not been able to undertake a thorough analysis of the Second Method.

The Second Method also requires the SUF of the re-auctioned spectrum to be an input into the averaging calculation. However, this is an unknown variable. CSL reiterates that requiring the incumbents to decide whether to exercise the right of first refusal while the SUF remains unknown is patently unfair and commercially unrealistic.

A major benefit of market benchmarking is its "*simplicity, objectivity and transparency*."[99] This is a well recognised benefit. A report produced by Plum Consulting for the OFTA noted that the use of spectrum market transactions is the simplest, and most objective and transparent, principle as it does not "*require potentially uncertain values of non-spectrum inputs/assets to be deducted from the revealed market price"*.[100] Transparency is particularly indispensable during a reassignment process. Lack of transparency will create commercial uncertainties for bidders. Therefore, it is highly unacceptable that the transparency surrounding potential expenditure is lost in the Second Method.

(b) 850/900MHz band (March 2011) does not reflect market value of the 2.1GHz band spectrum

---

[94] Ibid.

[95] Ibid.

[96] Ibid.

[97] Ibid.

[98] Ibid.

[99] First Consultation Paper, p 11.

[100] Plum Consulting, *Study on Radio Spectrum Pricing System: Final Report (a report for OFTA)*, December 2009, 32: see also Australian Communications and Media Authority, *Opportunity Cost pricing of Spectrum: Public Consultation on Administrative Pricing for Spectrum Based on Opportunity Cost* (April 2009), pp 10-11.

CSL submits the 850/950MHz spectrum auction in March 2011 is not an appropriate benchmark as it is not a 'like for like' comparator with the proposed auction for 2.1GHz spectrum band.

The characteristics of sub-1GHz spectrum are far superior in propagation to the 2.1GHz band which makes it far more valuable to mobile network operators in Hong Kong.

Firstly, the sub-1GHz spectrum significantly enables coverage inside buildings and across larger geographic areas and provides higher network efficiency than spectrum above 2GHz. Being able to provide superior coverage inside buildings is of considerable value in Hong Kong with its high density urban population.[101] The 2.1GHz band does not offer equivalent coverage.

Secondly, the sub-1GHz spectrum signal transmission is superior in coverage to signal transmission in the 2.1GHz spectrum. This means an operator requires less base stations to cover an equivalent amount of the population which, despite Hong Kong's relative size, significantly reduces capital expenditure on infrastructure.[102] Recent international multi-band auctions also demonstrate the different values operators place on sub-1GHz spectrum compared to 2.1GHz spectrum. In the 2010 German multi-band auction, the prices paid by operators for the 800MHz spectrum were nearly 7 times higher than those obtained for 2.1GHz.[103] In February 2013, results from an auction in the United Kingdom showed that mobile operators place significantly more value on the 800MHz band than the 2.6GHz band.[104]

Further, the Commerce and Economic Development Bureau (**CEDB**) also acknowledges the intrinsic value of sub-1 GHz spectrum which is reflected in its licence fee structure. The fees for the management of radio frequency, which is governed by the Cap 106V, assigned to mobile operators is higher for frequency assigned sub-1GHz than for frequency above 1GHz.[105]

It is clear to CSL that a major contributing factor to the overly high SUF input of HK$80 million / MHz under the Second Method is the inappropriate selection of the 850/900MHz band as a past benchmark.

9.5 CSL's past market benchmark analysis

The Second Consultation Paper proposes to use a series of past market benchmarks to determine the spectrum value. As noted above, CSL supports this approach to the extent that it reflects commercial thinking (e.g. expectations about future uses of the spectrum, changes in allocations) which a government cannot account for in administratively determined spectrum prices.[106] However, this support is premised on the correct selection of past market benchmarks.

CSL recognises market benchmarking is not straightforward. The problem of making 'like for like' comparisons between frequency bands, market conditions, points in time and

[101] Graham Friend, *Hong Kong 850 MHz spectrum auction prices reflect the advantages of in-building coverage of low frequency spectrum*, 23 March 2011 available at http://coleago.wordpress.com/2011/03/23/hong-kong-850mhz-spectrum-auction-prices-reflect-the-advantages-of-in-building-coverage-of-low-frequency-spectrum/.

[102] Qualcomm, *Harmonization of the Digital Dividend,* May 2011.

[103] Peter Cramton, *Declaration on behalf of T-Mobile USA on FCC spectrum screen*, p 4.

[104] Ofcom announces winners of the 4G mobile auction, dated 20 February 2013 available at http://media.ofcom.org.uk/2013/02/20/ofcom-announces-winners-of-the-4g-mobile-auction.

[105] Telecommunications (Carrier Licences) Regulation Cap 106V, Schedule 3, section 5.

[106] Plum Consulting, *Study on Radio Spectrum Pricing System: Final Report (a report for OFTA)* , December 2009, p 32.

jurisdictional differences are well known.[107] The ITU recently released a report into the valuation of spectrum titled *Exploring the value and economic valuation of spectrum* (**ITU Report**) which in regard to benchmarking, stated "*one must be careful, however, in drawing universal conclusions, through benchmarking, about a process (valuation) that…varies so widely over time, geography and type of service.*"[108]

CSL considers the SCED has not taken the level of care required and provides inadequate reasoning for the selection of past benchmarks.

CSL submits in order to ensure the best 'like for like' auction benchmarking, each auction must be compared against objective criteria to demonstrate similarities and differences. To this end, the ITU Report's intrinsic and extrinsic factors provide a useful guide:

Intrinsic factors	Extrinsic Factors
• propagation characteristics • technologies and services that can use the band	• physical characteristics of the market • socio-economic and political characteristics • policy and regulatory governance of the market.[109]

*Based on *Exploring the Value and Economic Valuation of Spectrum,* ITU, April 2012

The intrinsic and extrinsic factors listed above are not an exhaustive list of factors but are described in the ITU report as *"factors that cannot be ignored*".[110]

As outline above, CSL submits that to increase the likely accuracy that the reference points are a 'like for like' comparison, the intrinsic and extrinsic criteria should be considered:

Auction	Intrinsic Factors	Extrinsic Factors
1.9/2.2GHz (Option 3 proposed by the Government)	**Propagation characteristics**: • mid length cell radius; • satisfactory building penetration; **Technologies and services that can use the band:** • Re-assigned for the provision of 3G services	**Physical characteristics of the market:** • Hong Kong is a series of small land-mass islands; • topography is dominated by Victoria Peak on Hong Kong Island; • Third highest population density in the world with heavily built up urban areas; **Economic factors:**

[107] Ibid.

[108] John Alden , ITU, *Exploring the value and economic valuation of spectrum*, Regulatory & Market Environment, April 2012, p 7.

[109] Plum Consulting, *Methodologies for Valuing Spectrum: Review of the Experts' Report,* 1 March 2011, 6; John Alden, ITU, *Exploring the Value and Economic Valuation of Spectrum*, April 2012, 7; see also Scott Wallsten, *Is there really a Spectrum Crisis? Quantifying the Factors Affecting Spectrum License Value*, January 23 2013, p 3.

[110] John Alden, ITU, *Exploring the value and economic valuation of spectrum*, Regulatory & Market Environment, April 2012, p 8.

		• Increasing demand for BWA technologies from customers; • Hong Kong GDP per capital 10th in the world;[111] **Policy and Regulation** is currently unknown.
2.5/2.6GHz auction (January 2009)	**Propagation characteristics:** • mid length cell radius; • satisfactory building penetration; **Technologies and services that can use the band:** • Assigned for provision of BWA (Broadband Wireless Access) services. • BWA is radio access technology that can support a variety of wide area high-speed wireless data services e.g. wireless access to mobile user devices for voice, video, Internet access and other applications.	**Physical characteristics of Hong Kong** as above **Economic factors:** • Global Financial Crisis intensified and Hong Kong in recession **Policy and Regulation:** • Technology neutral - not subject to any particular standards or technologies for BWA development as far as it conforms to widely recognized international standard; • Where scope of the service authorised includes a mobile service: an area where at least 50% of the population of Hong Kong live from time to time within 5 years; • Auction design: Simultaneous Multiple Round Ascending (**SMRA**) format.
850/900MHz band (March 2011)	**Propagation characteristics:** • longer cell radius; • superior building penetration; **Technologies and services that can use the band:** • Assigned for the provision of public mobile telecommunications services in Hong Kong (expanding network capacity to further develop the mobile industry) • Can support both the CDMA2000 family and the	**Physical characteristics of Hong Kong** as above **Economic context:** • Mobile users capable of accessing mobile data services increased 100% from December 2007 to July 2010. **Policy and Regulation:** • Technology neutral - not subject to use of any particular technical standards for provision of public mobile telecommunications services provided that the technical standards that they

[111] Central Intelligence Agency, *The World Factbook*, 2012 accessed at https://www.cia.gov/library/publications/the-world-factbook/rankorder/2004rank.html.

	WCDMA family of technologies WCDMA (Wideband CDMA): can support higher data rates than first-generation CDMA	adopt conform to widely recognised international standards; • Min. network and service coverage for 50% of Hong Kong population for each of the Frequency Bands within five years; and • Auction design: SMRA format
2.3GHz band (February 2012)	**Propagation characteristics:** • mid length cell radius; • satisfactory building penetration; **Technologies and services that can use the band:** • Assigned for the provision of BWA Services	**Physical characteristics of Hong Kong** as above **Economic context:** • Rapid development of BWA technologies using the 2.3GHz band over the last two years; • Increasing growth in mobile data usage in 3G (1.6 times growth over 2010/2011) **Policy and Regulation:** • Technology neutral - not subject to use of any particular technical standards for provision of public mobile telecommunications services provided that the technical standards that they adopt conform to widely recognised international standards; • Where scope of the service authorised includes a mobile service: an area where at least 50% of the population of Hong Kong live from time to time within 5 years • Auction design: SMRA format

9.6 CSL's proposed past market benchmarks

(a) 2.5/2.6GHz auction (January 2009)

CSL supports the SCED's proposal to use the previous result in the 2.5/2.6GHz auction conducted in January 2009. CSL agrees with the SCED statement that the spectrum has

been "*deployed for the provision of data services with mature technology support*."[112] However, analysing the 2.5/2.6GHz auction in more depth using objective intrinsic and extrinsic factors, the reasons for using the auction as a past market benchmark become even more apparent. An integral factor – the propagation characteristics of the 2.5/2.6GHz and 1.9/2.2GHz bands – is so similar on a technical level that this would have no distinguishing impact on the value of the spectrum. The provision of BWA services which includes wireless access to mobile user devices for voice, video and Internet access, is nearly identical to the 3G services to be offered.

In regard to extrinsic factors, the 2.5/2.6GHz auction provided the spectrum on a technology-neutral basis. Regarding market context, the 2009 Global Financial Crisis (**GFC**) had intensified with Hong Kong suffering an economic slowdown. Hong Kong's economic growth remains below pre-2009 levels.

(b) 2.3GHz auction (February 2012)

CSL submits that the most recent 2.3GHz auction in early 2012 is the best 'like for like' comparator and, therefore, the SCED should use this auction as a past market benchmark in calculating the SUF for the RFR Spectrum. Moreover, CSL finds it incongruous that the 2.3GHz auction (February 2012) which is from a broad regulatory perspective extremely similar to the 2.5/2.6GHz auction (January 2009) was not included as a past market benchmark. CSL considers that this demonstrates the flawed approach of the SCED in selecting the past market benchmarks.

The propagation characteristics of the 2.3GHz and 1.9/2.2GHz bands are almost identical with similar range of coverage and building penetration qualities that this would have no distinguishing impact on the value of the spectrum. As above, the provision of BWA is identical to 3G services.

In regard to extrinsic factors, the 2.5/2.6GHz auction was conducted on a technology-neutral basis. The market conditions are almost identical with rapid growth in mobile data usage.

9.7 International Benchmarks

CSL submits that the proposed SUF "ball park" figures of HK$77 million and HK$80 million in the First and Second Method respectively are far too high compared to international benchmarks. As noted earlier, CSL calculates the proposed SUF equates to approximately HK$10.85 – 11.27 / MHz / population (using spot exchange rates).

CSL notes that auction spectrum prices set in other countries can provide useful benchmarks for arriving at an SUF, though such comparisons need to allow for differences between countries as well as the previously identified intrinsic and extrinsic factors.[113]

The Second Plum Report provides a comparison between the SCED's proposed values of $77million / MHz and $80 million / MHz and recent international auction results for 2.1GHz band in high income countries like Hong Kong. Plum shows that the average price for the international benchmarks was $2.10 / MHz / population using purchasing

[112] Second Consultation Paper, para 59.

[113] Plum Consulting, *Study on Radio Spectrum Pricing System: Final Report (a report for OFTA)*, December 2009, p 33.

price parity exchange rates and normalised to a 15 year licence. The average value from these auctions equals HK$17m / MHz in 2016 prices.[114]

Ofcom recently released the results of its 4G auction, which included the 2.6GHz band. This band has similar propagation characteristics to the 2.1GHz band and the prices obtained in the auction should be considered by the SCED. The average price for the 2.6GHz spectrum was approximately HK$1.01 / MHz / population, or one-tenth of the price proposed by the SCED.[115]

The international benchmarks demonstrate the approximate value of HK$10.85 – 11.27 / MHz / population is far too high.

9.8 Conclusion: Spectrum utilisation fee

CSL rejects the First and Second Method currently proposed by the SCED.

However, CSL does support a market benchmark approach which references the previous results in the 2.5/2.6GHz and 2.3GHz auctions which were conducted in 2009 and February 2012 respectively. CSL selected these market benchmarks as they reflect the best 'like for like' comparators when analysed on factors that affect the spectrum's value. CSL vehemently opposes the inclusion of the results from the 850/900MHz auction which occurred in March 2011. CSL's primary reason is that the value of spectrum sub-1 GHz is considerably higher than the 2.1GHz band because of its propagation characteristics, including its in-building reception, which is ideally suited to the Hong Kong mobile market.

CSL also opposes the SCED tying the SUF of the RFR Spectrum to the unknown results of the proposed auction. This would be inequitable and non-transparent. CSL instead proposes that market benchmarking alone be relied upon to calculate the RFR spectrum as the previous auctions account for the key drivers of spectrum value and are directly related to opportunity cost.

Accordingly, CSL recommends the SCED should take the average of the results of the following past benchmarks (with inflation adjusted) to calculate the SUF for the RFR Spectrum:

- the 2.5/2.6GHz auction conducted in January 2009; and
- the 2.3GHz spectrum in February 2012.

[114] Assuming a population of 7m, PPP exchange rates and inflation of 3.5% p.a. from 2012 to 2016.

[115] Ofcom announces winners of the 4G mobile auction available at http://consumers.ofcom.org.uk/2013/02/ofcom-announces-winners-of-the-4g-mobile-auction/