Response to Second Consultation Paper on future arrangements for 1.9 - 2.2 GHz spectrum

Paul Reynolds
Hayden Green

April 2013

COMPETITION ECONOMISTS GROUP

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COMPETITION ECONOMISTS GROUP

1 Summary

1. CEG is a group of economic and financial experts with substantial experience in advising governments, regulators, industry bodies and operators on spectrum policy, spectrum auctions and telecommunications regulation. Drawing upon our international experience and taking into account the specific circumstances of the Hong Kong mobile market, we have identified a number of significant problems with the proposals set out in the Second Consultation Paper on arrangements for the frequency spectrum in the 1.9 – 2.2. GHz band upon expiry of the existing frequency assignments for 3G mobile services.

2. In 2012, we carried out a study for the GSMA on the international experience with mobile licensing. We identified that a presumption in favour of existing mobile spectrum holders having licences renewed represents international best practice. A presumption of renewal prevents investment being deterred, avoids service disruption and degradation and avoids additional costs such as in terms of customer migration. The limited conditions in which it may be appropriate to depart from that practice do not apply in the circumstances of the Hong Kong market.

3. In this paper, we have examined the likely outcomes of the proposals of the SCED and the CA.[1] Our analysis indicates that there is an overwhelming case against re-auctioning of any of the 3G spectrum in Hong Kong.

4. We find that Option 3 is more likely to harm competition than promote it, since:

    - As the CA has acknowledged, the market is already highly competitive;
    - There is no reason to expect that any new entry will be efficient or would deliver better consumer outcomes; and
    - Consolidation of spectrum by one or two operators would weaken the competitive constraint imposed by other operators and be likely to lead to higher prices than would have occurred had existing spectrum assignments been retained.

5. Significant service degradation will certainly occur as acknowledged by the CA (potentially taking service quality in high demand areas below tolerable levels for customers). There are also clear risks of deterring investment and/or causing inefficient investment.

6. Against these significant costs and risks, potential benefits from re-auctioning spectrum are speculative and, even were they to occur, they would be of much smaller magnitude than the costs. For example, although it is theoretically possible that re-

[1] For convenience, we refer collectively to the SCED and the CA as the CA in the rest of this report.

auctioning may result in increased spectral efficiency, this is unlikely in practice given that:

- More spectrum for one player means less for another; and
- International experience suggests that larger spectrum allocations do not outweigh the impact of a loss of competition in terms of consumer outcomes.

7. On the basis of our analysis, there is no reason to expect that the CA's proposed approach would give rise to benefits that would justify the serious costs and risks of partial re-auctioning of the spectrum.

8. The Second Consultation seems to rely on its proposals delivering benefits because they are 'market based'. There are few actual markets in which a critical input is forcibly removed from existing market players. Such extreme intervention is likely to only be justified in exceptional circumstances where there is a dominant player that has prevented the development of competition and where there exists no less disruptive alternative to achieve competition. The benefits of a market-based approach would actually be achieved by enabling spectrum trading.

9. There are several reasons as to why the proposed auction cannot be relied upon to achieve greater efficiency or competition.

   - One clear risk is that spectrum bidding and the auction outcomes are driven by an expected diminution of competition from spectrum consolidation. Such an outcome could result in less competition and higher prices to consumers.
   - The auction outcomes would also be distorted by the proposed link between the prices determined in the auction and the SUF for RFR spectrum.
   - All auctions carry the risk of flaws in the auction design and/or bidding behaviour which would give rise to inefficient outcomes.

10. We are also concerned that the proposals for setting SUF risk undermining the efficient utilisation of the spectrum. In particular, the CA states that it is seeking to capture the full market value while it is proposing to set SUF partly by reference to values (i.e. the full 850/900 MHz spectrum prices and the royalty payments) that are likely to significantly overstate the market value of the 3G spectrum. We recommend that SUF for retained spectrum is instead based on the information revealed in past auctions in Hong Kong and internationally as well as making adjustments for differences in the spectrum as well as different market circumstances.

11. The Hong Kong mobile market is currently working well with consumer outcomes amongst the best in the world. The CA's proposals offer little realistic prospect of benefits while they carry serious risks to investment, service quality and competition.

2 The international presumption of licence renewal

12. In 2012, CEG was asked by the global mobile industry association, the GSMA, to investigate the experience with mobile spectrum licensing around the world to identify how spectrum can best be made available to support the ongoing rapid growth in demand for mobile services.[2] We found that providing a presumption of licence renewal represents international best practice, i.e., operators should be allowed to renew their licences except under certain defined circumstances.[3]

13. A presumption of licence renewal creates significant consumer benefits including:

    - Providing operators with the certainty to continue investing to upgrade their networks and introducing new services, particularly given that mobile investments can have long payback times and hence require certainty of spectrum rights for years in advance for the investment to be justified.
    - By reducing business risk, enabling operators to raise capital at lower cost than otherwise and thereby enabling lower cost services.
    - Avoiding the service disruption and degradation that would be associated with operators with existing customer bases losing the spectrum required to meet customer demand.
    - Avoiding the costs of regulatory-induced customer migration (customer acquisition costs can often be as substantial as the ongoing network costs of service provision).

14. The World Bank has also noted that "*most legal and regulatory frameworks* [have] *adopted a regime based on the 'presumption of renewal' or 'renewal expectancy'*" and recommended:

> *"As much as possible, policy makers and regulators should strive to promote investors' confidence and give incentives for long-term investment. They can do this by favouring the principle of 'renewal expectancy', but also by promoting regulatory certainty and predictability through a fair, transparent and participatory renewal process."*[4]

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2 A copy of our report for the GSMA is available at http://www.gsma.com/publicpolicy/wp-content/uploads/2012/03/gsma_licensing_report.pdf

3 A presumption in favour of licence renewal is based on public interest considerations. It is not the same as the legal principle of legitimate expectations.

4 World Bank, *Mobile licence renewal: What are the issues? What is at stake?,* June 2005, p.1 and p.4.

15. Our report for the GSMA identified a limited number of circumstances under which the non-renewal of a spectrum licence may sometimes be justified. Two of these are not relevant to the current circumstances and have not been raised by the CA or any other party.[5]

16. The third potential justification for non-renewal – promoting competition – has been put forward by the CA. However, it needs to be recognised that even where there are expected to be benefits from greater competition, non-renewal creates clear costs in terms of deterring investment and disrupting service. Accordingly, it is important to assess the benefits and costs that are expected to arise in the specific market context so as to determine whether non-renewal would actually be justified. Our report for the GSMA found that before deciding not to renew a spectrum assignment for the purpose of promoting competition, a regulator should first:

    - Assess whether competition is already effective in the market (where competition is already strong, there will be no or very limited potential for any additional competitive benefit);
    - Identify whether competition can be promoted by other means such as the release of alternative spectrum; and
    - Assess whether the expected competition benefits will exceed the potential costs.

17. Put simply, the non-renewal of a mobile licence will only be justified in exceptional circumstances. These circumstances do not exist in Hong Kong, particularly given:

    - the intense competition that already exists in the market;
    - the importance of continuing access to spectrum in a market characterised by extremely high population density and high and rapidly growing demand for mobile services; and
    - Hong Kong's particular market conditions indicate that the cost of the proposed non-renewal of some spectrum will be high and far outweigh any benefits.

18. In the remaining sections of this report we explore these matters in more detail and comment on the likely effects of the CA's proposals in the Hong Kong market.

5 These are spectrum replanning for a new technological use (such as the re-allocation of spectrum from broadcasting following the introduction of digital broadcasting) and where there has been a serious breach of licence conditions (such as ongoing intolerable interference to users of neighbouring spectrum which cannot be rectified by less severe measures).

3 The potential outcomes from the proposed re-auctioning

19. In our assessment, the benefits that the CA has put forward do not reflect a realistic view of the current market dynamics. In addition, the CA has not had sufficient regard to the costs and risks that arise from its proposed approach. We believe that there is an overwhelming case against the CA's Options 2 and 3.

20. We note that the analysis in the Second Consultation has not sought to evaluate the likely specific outcomes of the proposals. For example, paragraph 34 of the Second Consultation refers to both enhanced spectral efficiency from incumbent operators acquiring more spectrum and innovative services of new entrants acquiring spectrum. It is unlikely that both of these outcomes would occur, and if they did occur they would imply some existing operators losing spectrum. In either case, there would be costs. In this section, we identify the range of costs and benefits that may result from the proposals and assess their likelihood and magnitude.

3.1 Effects on investment

21. The CA note (§35) that:

> *It is agreed that uncertainty in the few years towards the end of the existing term of 3G frequency assignments may affect the investment incentive of some of the incumbents. Nevertheless, the CA considers that Option 3 will be able to alleviate the concern about regulatory certainty, particularly if the incumbents are notified sufficiently in advance (at least three years in advance on a best endeavour basis arising from the Policy Framework) that they will have the opportunity to retain two-thirds of their original frequency holding.*

22. While the CA's recognition of the risks to investment is welcome, in practice its proposals will already be acting to deter 3G network investments. In particular, the proposals mean that no party can now be confident over what 3G spectrum they will have after October 2016 or what spectrum rival operators will have. This regulatory uncertainty will continue until the outcome of the auction is known, at least 18 months from now. This is at a time when rapidly growing demand can be expected to require significant new network investment as well as operators to continue to upgrade HSPA technology to achieve faster data rates.

23. The problems created by the proposals can be illustrated by considering investments in site locations. To cost effectively meet service quality requirements, operators must optimise 3G site locations so as to provide the competitive levels of indoor and outdoor coverage and sufficient radio resources to meet demand. Operators will

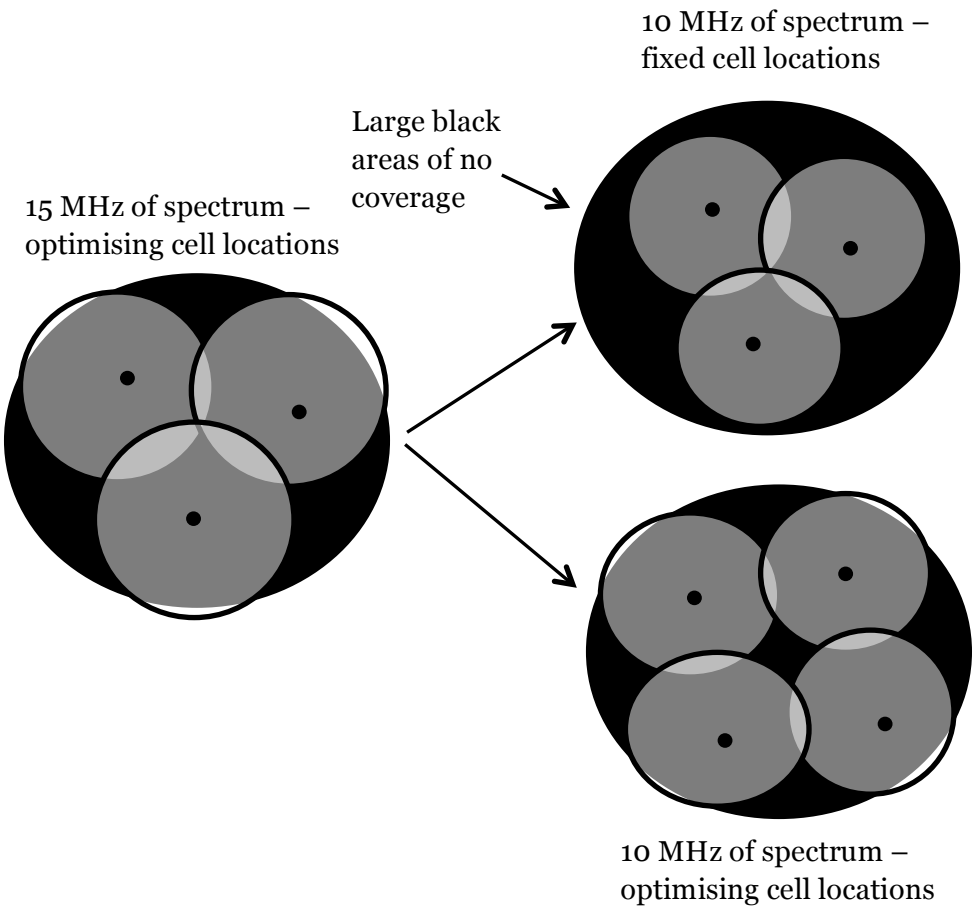
optimally locate base stations and configure antennae on the basis of their specific spectrum assignments. Operators aim to provide required capacity and coverage (with minimal coverage gaps) at lowest cost. This is particularly complex in relation to 3G because of:

- cell breathing in which the effective coverage of a cell decreases the greater the traffic load carried by that cell; and
- rapidly growing demand, which is also uneven across the network as new services increase demand for capacity amongst particular customer segments and at particular times.

24. In this context, uncertainty over whether an operator will lose one third of its 3G spectrum does not simply impact on investments in marginal capacity expansions but also on fundamental network planning. In Figure 1, we illustrate the nature of the problem that would arise were an operator to invest on the expectation of retaining its 2 x 15MHz of spectrum, only to subsequently fail to do so. In this scenario the operator would be forced to decide whether to:

    a. incur large coverage gaps (as shown in the top right diagram) or excessive site numbers compared with the optimal site location for that spectrum assignment (shown in the bottom right of the diagram); or
    b. to incur the cost of decommission its existing sites, negotiating new site rental agreements and physically re-locating its sites.

Figure 1 – the risk of sub-optimal site locations



25. Faced with these risks, operators are likely to:

    - hold back on new network investments for as long as possible (with attendant adverse consequences in terms of reduced service quality) and avoid reducing prices so as not to stimulate additional demand; and
    - limit its capital expenditure to critically needed investments, which may turn out to be sub-optimal once final spectrum assignments are known with the consequence of higher ongoing costs of service provision.

26. The Second Consultation reveals little indication that the CA fully appreciates these significant negative effects. Rather, the Second Consultation (§36) takes the view that:

> *Even if some incumbents turn out to be unable to acquire any 1.9 – 2.2 GHz spectrum in the auction, they are expected to have an even greater incentive and in fact great commercial need to invest in the network in*

> *order to compensate for the loss of spectrum capacity, so long if they want to maintain the quality of services and remain competitive in the market.*[6]

27. This perspective is difficult to understand. Investment involves incurring costs. Imposing additional costs on the market is not desirable in and of itself. It will only be worthwhile if those costs are outweighed by an even greater quantum of benefits. In section 3.5, we explain why that condition does not apply in the circumstances of the Hong Kong market. Rather, re-auctioning risks leading to a re-assignment of spectrum in a way that carries greater costs to society than benefits.

3.2 Degradation of service quality

28. The CA notes (§31) that:

> *Specifically, under Option 3, at worst, each incumbent 3G operator may lose one-third of the spectrum in the 1.9 – 2.2 GHz band in the auction. In this case, OFCA estimates the degradation of customer service quality in terms of reduction in data download speed would be restricted to at most 18% on average during the transitional period.*

29. The CA seems not to recognise the severity of the problems that its proposals would exacerbate. The CA forecasts (Annex 2) that there will be a six-fold increase in total mobile data traffic from 2012 to 2016. However, this is effectively an *average* growth rate across the market. In particular areas, such as where it is conducive to watch videos while travelling on the MTR, the growth rate will be *higher*. Accordingly, service degradation is likely to be most severe in areas where the demand for mobile data services is greatest. The CA proposals would therefore serve to exacerbate the level of service degradation, which is already likely to be severe in particular areas.

30. High levels of dropped calls and a substantial reduction in data speeds substantially reduce the value of mobile services to consumers and businesses. It can also lead to long-lasting harm to an operator's reputation and prompt demands for compensation from customers.

31. It should be noted that the greater the expected shortfall in capacity relative to demand, the more costly the problems for both operators and customers. For example, to try to provide additional capacity in high demand areas, operators will be forced to site base stations in costlier and less attractive (i.e. more sub-optimal) locations. Customers may be prepared to tolerate some diminution of speed or an occasional dropped call. However, if the service is excessively slow or the same call is dropped repeatedly, then customers may cease using the service (even where the communication is important). This is highly detrimental to overall welfare.

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[6] An implication of this statement is that if an operator is unable to invest to compensate for the loss of spectrum capacity in a cost effective way then it will not maintain service quality nor remain competitive.

3.3 Impact on spectral efficiency

32. The CA notes (§34) that:

> *an incumbent 3G operator will have the chance to acquire adjacent spectrum slots through the auction to attain a contiguous band of 2 x 20 MHz spectrum. This will allow the full potential of the LTE-Advanced technology to be realised, enhance spectral efficiency, and foster the development of innovative and higher speed mobile services.*

33. The more bandwidth an operator has the greater the potential for that operator to offer higher data rates. It will also need fewer cell sites to achieve a particular level of coverage.

34. However, the Second Consultation notes that Option 3 will provide the opportunity for new entry. If a new entrant obtains some new spectrum from existing 3G operators the 3G spectrum could end up significantly more fragmented than currently, with one or more operators having less than 2 x 15 MHz of the spectrum. For example, suppose that at the auction:

    - a new entrant acquired 2 x 10 MHz of the spectrum from the incumbents; then,
    - rather than the current situation of 4 operators with 2 x 15 MHz, there would be:
        - 2 operators left with 2 x 15 MHz; and
        - 3 operators with 2 x 10 MHz each.

35. If the CA believes that there is a genuine chance of new entry then it should factor in a significant risk of more fragmented spectrum and, potentially, worse spectral efficiency. The costs associated with that reduced efficiency of spectrum usage appears not to have been properly accounted for by the CA. Those costs would include reduced average data rates in the market and increases in the overall cost of service provision.

36. For those reasons, a full impact assessment of the CA proposals should take into account:

    - The likelihood of either spectrum ending up more consolidated or more fragmented; and
    - The expected impact of each outcome and noting that there may be greater impacts the further away a spectrum assignment is from the optimal allocation (i.e. while there may be relatively little upside gain were an operator to acquire 2 x 20 MHz compared with 2 x 15 MHz, the downside risk of operators ending up

with only 2 x 10 MHz could represent a significant loss in spectrum efficiency compared with the current assignments).[7]

3.4 Effects on competition and innovation

37. The CA states (§37):

> *The respondents pointed out that the market for mobile services in Hong Kong is already one of the most competitive in the world, with five MNOs serving a population of over seven million. The CA agrees with that but reasonably believes that Option 3 will equally (if not more likely) bring about innovative services and new business paradigms, leading to an even more competitive market with wider product choices for consumers.*

38. There are a number of problems with the analysis of competition in the Second Consultation. First, it is not necessarily the case that encouraging more and more competitors to enter a market will deliver greater consumer benefits. If it were, then governments would never allow companies to merge. Even countries with long-established merger regulation allow the vast majority of mergers to proceed because those transactions are not expected to reduce the effectiveness of competition. Put simply, more competitors do not always equal more competition.

39. The overall effect on consumer benefits from competition depends upon:

- Whether there is sufficient rivalry between operators to maintain prices at levels that cover firms' costs, including a reasonable, risk-adjusted return on capital (but without any "supernormal rents"); and
- Critically, the cost of supplying services which will be reduced significantly if operators are able to reach efficient scale (in this regard, a market with many small competitors may result in higher cost service, on average).

40. There is a sizeable body of market evidence that indicates that consumer benefits can be maximised with a modest number of operators. For example, the UK Competition Commission concluded that a mobile network operator would need to capture 20%-25% of the market volume to substantially realise the potential scale economies.[8] A

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7 The potential for asymmetric impacts from changes to bandwidth is illustrated in Figure 5.2 (p.62) of the Realwireless Report for Ofcom, *4G capacity gains*, 27 January 2011 (albeit that the specific example shown is for LTE technology). The report is available at http://stakeholders.ofcom.org.uk/binaries/research/technology-research/2011/4g/4GCapacityGainsFinalReport.pdf

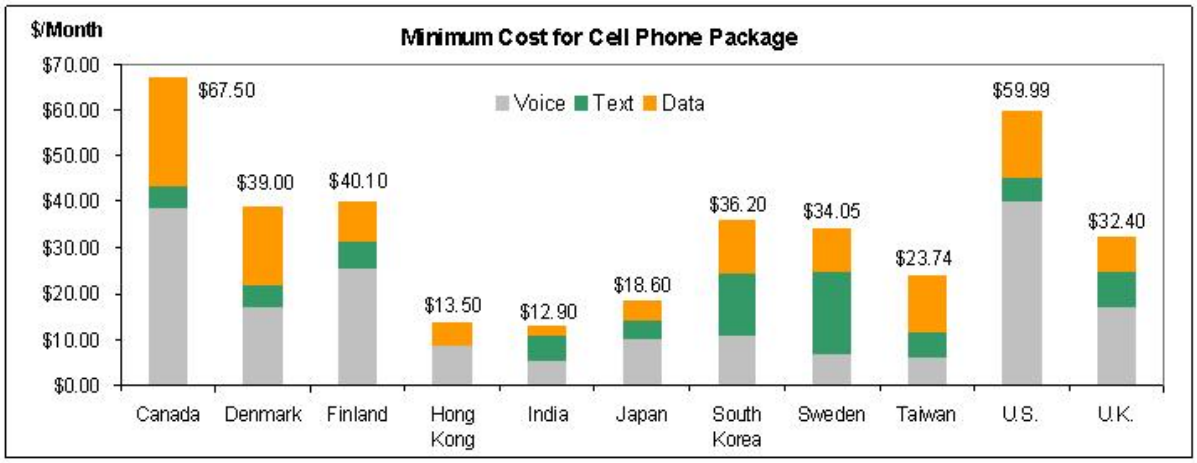
8 The UKCC's finding is noted in the European Commission's Staff Working Paper accompanying the Commission Recommendation on the Regulatory Treatment of Fixed and Mobile Termination Rates in the EU, p.26 (available at http://ec.europa.eu/governance/impact/ia_carried_out/docs/ia_2009/sec_2009_0600_en.pdf).

handful of operators is also sufficient to achieve strong competition because mobile markets display high levels of customer switching, rapid technological and commercial developments (making coordination difficult) and generally low barriers to expansion.

41. These factors mean that competition can be effective with only a small number of operators with significant scale, say four. They also mean that there is little prospect of better consumer outcomes arising from new entry in the Hong Kong market. In particular, if some incumbent operators were to lose some of their spectrum, the scale of their operations would be reduced, with adverse effects on their costs and competitive impact.

42. There is also no evidence to suggest that a new entrant would be able to deliver superior outcomes to the current operators. The prices for mobile services in Hong Kong already are amongst the lowest in the world and significantly lower than other high income countries. Further, Hong Kong has achieved lower prices than other countries where operators have acquired large 3G spectrum assignments,[9] suggesting that any benefit from a larger 3G spectrum allocation is less important in delivering low prices than maintaining the Hong Kong market's current competitive dynamics.

Figure 2 – International comparison of mobile service prices



Source: New America Foundation, An international comparison of cell phone plans and prices, October 2010 (available at http://newamerica.net/publications/policy/an_international_comparison_of_cell_phone_plans_and_prices).

43. Furthermore, while the Second Consultation refers to new entrants bringing greater innovation, again there is no evidence that the Hong Kong market is deficient in this

9 For example, Bell Canada has 2 x 20 MHz of 1900 MHz spectrum and 2 x 10 MHz of 2 GHz. and DNA and Sonera in Finland have 2 x 19.8 MHz of 2 GHz spectrum. Telenor, Hi3G and SULAB have 2x20MHz of spectrum in the 1.9-2.1 GHz band (along with 5 MHz of unpaired spectrum).

respect or that new entry would usher in improvements in this respect. Moreover, it should be recognised that technological innovation in mobile services is driven predominantly by international equipment suppliers rather than individual operators, i.e., it typically originates from "further up" the supply chain.

44. In these circumstances, efficient new entry seems highly unlikely. The incumbent players with their existing (sunk) networks are likely to value spectrum more highly than any potential new entrant. Entry carries the costs of the need to roll-out a 3G network and supply a customer base with 3G-compatable devices, and appears to offer little opportunity for additional competitive benefits. If entry were to occur, concerns would inevitably arise about the long-term viability of the new firm. The 3G auctions in Europe led to a number of bidders acquiring licences, who were subsequently unable to develop a viable business case and exited the market. The cost of such failed entry in terms of the under-utilisation of spectrum until it is re-assigned would be greater in the current Hong Kong given the pressing need for spectrum to meet soaring demand.

45. In other words, the potential competitive gains from the CA's proposals are speculative at best and even if they would occur would likely be small. However, there is the clear potential for the approach to reduce competition and give rise to significantly worse outcomes for consumers. For example, suppose that an operator (including a current non-3G operator) outbid all other operators and ended up with double (or more) the 3G spectrum of any of their rivals – a quite conceivable outcome of the proposed process. This would:

    - increase the cost of service provision for those rival operators; and
    - by further limiting their capacity at a time of already constrained capacity, reduce the incentive they have to price aggressively so as to grow demand for their services.

46. It should also be recognised that although the operator that acquires the additional spectrum would see its costs go down, it would not necessarily pass-through those reductions in its prices. Rather, it could simply marginally undercut the prices of its rivals. Because the rivals' prices would now be *higher* (to cover their increased costs), the operator might therefore be in a position to expand its market share while increasing its prices. Differences in service quality would also act to tip the market in favour of the operator with the larger bandwidth.

47. Clearly, this would not be a desirable outcome for consumers relative to the status quo, yet it is quite plausible. In short, the CA's proposals could over time act to replace the current intensely competitive market with a market dominated by one player and with higher prices than would have been achieved by simply retaining the current spectrum assignments. The substantial costs associated with such developments are not properly considered in the Second Consultation, but they should rightly have a substantial bearing on the final decision.

3.5 Overall assessment of the likely costs and benefits of Option 3

48. The following table summarises the likely costs and benefits of Option 3 and our expectation as to their magnitude.

Table 1 – Expected costs and benefits of Option 3

Costs	Benefits
• **High likelihood of deterring investment** • **Risk of inefficient investment** • **Acknowledged serious service degradation** • **Significant risk of weakened competition** • **Risk of a loss in spectral efficiency (both overall and for some operators)**	• **Possibility of some gain in spectral efficiency for some operators** • **Very small prospect of modest competitive gains**

49. The potential benefits from re-auctioning spectrum are speculative and will be modest at best and these must be weighed against the substantial and far more certain costs. For example, the CA acknowledges that serious service degradation will occur. This by itself should most likely eliminate Option 3 and favour the adoption of Option 1. Further, although it is theoretically possible that re-auctioning may result in increased spectral efficiency, this is unlikely in practice given that:

    - more spectrum for one player means less for another; and
    - international experience suggests that larger spectrum allocations do not necessarily lead to reduced prices.

50. Any gain in spectral efficiency is limited to an operator's increase in its spectrum assignment from its current assignment. On the other hand, the competitive impact will be magnified because the difference between spectrum assignments will reflect both the gain to one operator and the loss in spectrum by the other operator(s). For example, if one operator were to acquire 2 x 5 MHz from another this 2 x 5 MHz provides the basis for the gain in spectral efficiency. However, the difference in spectrum assignments between the operators (which risks undermining competition)

would be 2 x 10 MHz, i.e. twice as much as the increase in the acquiring operator's spectrum assignment.

51. It is also highly unlikely that the preferred option will promote competition, since:

    - as the CA has acknowledged, the market is already highly competitive and it is very difficult to see how new entry could increase the vigour of existing rivalry.
    - it is not even clear what the long-term prospects of a new entrant might be, given past experience in Europe, i.e., new entrants exiting; and
    - any consolidation of spectrum by a single operator risks leading to higher prices and reduced efficiency.

52. Finally, Option 3 would reduce operators' incentives to invest efficiently and will cause disruptions for consumers as the CA acknowledges – the costs of which can be avoided by adopting the standard international practice of renewing the spectrum licences. For these reasons, we believe that there is an overwhelming case against re-auctioning of any of the 3G spectrum.

4 Why re-auctioning cannot be relied upon to deliver benefits

53. The CA seems to believe that its proposal will be beneficial because they are 'market based'.

54. The efficiency of market based transactions is based on the fact that parties will only engage in a voluntary exchange where they expect to receive benefits that outweigh their costs. However, there are few markets in which a critical input in the production process (in this case, spectrum) is forcibly removed from existing market players in the manner proposed by the CA.

55. In this section, we examine whether the proposed auction can be expected to lead to greater efficiency and consumer benefits. In particular, we investigate whether the auction can be expected to lead to the spectrum being assigned to the operators that can deliver the greatest consumer benefits from the use of the spectrum.

4.1 Bidding distortions arising from competitive impacts

56. One clear risk is that spectrum bidding (and the resulting auction outcome) is driven by an expected diminution of competition from spectrum consolidation. In particular, where the assignment process for a critical input can be used to weaken competitors and reduce overall competitive pressure then the auction price and outcome can be determined by those operators that stand to gain the most from reducing competition.

57. In the extreme situation in which all mobile spectrum was to be re-assigned with no constraints on how much can be acquired by any individual operator, then one might expect the auction to be won by a single operator. The winning bid would be likely to reflect the profit it would expect to earn from monopolising the market. This is because the spectrum will be more valuable to a monopolist than to a group of operators that compete against each other.

58. Although the extreme scenario described above does not reflect the CA's proposal, the basic point remains. Namely, the prospect of reducing competition 'post-auction' can still act to distort operators' bids, even when only part of the mobile spectrum is being auctioned. In particular:

    - if an operator or some operators perceive that there is a material prospect of gaining enough additional spectrum at the expense of rivals to achieve a material difference in quality or cost of service; then
    - they may bid for that spectrum taking into account the gains in market share they expect to achieve at the expense of their rivals over the longer-term by

acquiring that additional spectrum, and the reduced ability of those rivals to constrain them.

59. Such an outcome would result in less competition and higher prices to consumers. Although the Government would capture some of the higher consumer prices in the licence fees, this would represent a highly inefficient form of revenue collection, because of the efficiency or dead weight loss created by the higher prices. There are far less distortionary ways of raising revenue (including through general taxation) and any additional revenue licence fees would be more than outweighed by the loss in consumer surplus from higher prices particularly as a result of the reduced demand for mobile services.

4.2 Linking the SUF with the auction outcomes

60. The auction also risks being distorted by the proposed links between the prices determined in the auction and the SUF for RFR spectrum. Even if an incumbent operator can make the same or better use of the spectrum than a new entrant, it could end up bidding less than the entrant because the price the incumbent pays for the auctioned spectrum also raises the price it will have to pay for its *retained* spectrum. It is also conceivable that an entrant may enter bids that are simply designed to raise its rivals' costs – particularly if it believes that the incumbents will regard maintaining their 2 x 15 MHz of spectrum as critical to their businesses.

4.3 Other potential distortions to auction outcomes

61. A third factor that could give rise to inefficient outcomes is flaws in the auction design and/or the behaviour of particular bidders. While licensing authorities and bidders are likely to go into an auction expecting that they have done everything they need to do to best serve their interests, there is a substantial body of academic literature describing auctions that have ended poorly, including:

    - where less competition has been achieved than should have been possible; or
    - where licences have been won by bidders who clearly could not make the best use of the spectrum.[10]

62. Re-auctioning could also attract speculative bidders who have no real intention of using the spectrum, but intend to profit by re-selling the spectrum back to an existing operator at a later date (or to sell the company holding the assignment to that operator).

63. The efficiency of auctions also relies on bidders valuing the spectrum (and framing their bids) on the basis of the benefits that they can deliver to their customers, as

[10] For example, see P. Klemperer, "Collusion and predation in auction markets", February 2001.

reflected in their expected revenues. It is not clear that the state-owned China Mobile will bid on this basis or whether other factors may influence its bid, such as obtaining greater scale. Indeed, there are a number of studies that have found that state-owned companies use capital less efficiently than their private-sector counterparts.[11]

4.4 Alternatives are likely to carry greater benefits than costs

64. Sound policy development should be based on not only an assessment of a specific proposal, but also the costs and benefits of any alternative measures that might reasonably be deployed to achieve the same objectives. In this instance, there are at least two options which the CA has not considered that might improve the use of spectrum, and avoid many of the problems associated with Option 3.

65. First, if there were currently spectrum that was idle or under-utilised, this could be allocated to help meeting the growing demand for mobile services. The CA has recently completed the assignment of 2.5/2.6 GHz spectrum and we understand that the 'digital dividend' spectrum may be assigned in the future. There is also the unpaired spectrum in the 1.9 – 2.2 GHz band available for allocation. In our opinion, if there is spare spectrum, it is far better to allocate that capacity than to risk the distortions described above by re-auctioning spectrum that is critical to the supply of existing services.

66. Second, the CA should prioritise the introduction of spectrum trading. This would help ensure that if one operator can make better use of the spectrum than another then they will have the incentive and ability to enter into a mutually beneficial trade. In particular, a trade will take place where the acquiring operator is willing to pay a price for the spectrum that exceeds the value of that spectrum to the existing licensee. In doing so, spectrum trading takes advantage of the fact that the decisions as to how spectrum is re-allocated are made by the parties who have the best information, i.e. the individual users of the spectrum. Spectrum trading also reduces risks to operators as they will have the option to sell their spectrum rights if their need for spectrum turns out to be less than expected. Spectrum trading has been successfully introduced in Australia, Canada, Guatemala, New Zealand, Norway, the USA and the UK and on a more limited basis in Austria, France, Germany, the Netherlands and Sweden. Although there are a number of implementation issues that need to be addressed, the practical experience internationally demonstrates that these can be resolved.

67. The CA notes that spectrum trading will be considered as a separate exercise. However, given the serious risks that would be created by the CA re-auctioning

[11] A summary of empirical studies is set out in World Bank Policy Research Working Paper, Public versus Private Ownership – the current state of the debate, 2000 (Section 6).

proposals, in finalising its current process it should consider whether these risks can be avoided by the earlier introduction of trading.

5 The setting of SUF

68. In this final section, we make a number of general comments on the CA's proposed approach to setting SUF.

69. First, it should be noted that the need to set spectrum usage fees only arises because of the absence of spectrum trading. As we explained above, the ability to trade spectrum would give an operator that was making relatively poor use of its current spectrum efficient incentives to sell some (or all) of its rights to an operator that could make better use of the spectrum.

70. Second, it seems unlikely to us that 3G spectrum in Hong Kong is currently sub-optimally assigned to any significant degree. Hong Kong has amongst the lowest prices and highest penetration in the world, with widespread access to fast and high quality mobile services. This does not suggest that there are any material inefficiencies associated with the current assignments.

71. Third, there is a risk that administratively-set prices will be too high. This might mean that:

    - valuable spectrum is left idle until prices are reduced; and/or
    - the high prices effectively force a reduction in competition so that the high SUFs are able to be recovered through higher end-prices for mobile services.[12]

72. A regulator faces a very difficult task estimating the market price for spectrum with any accuracy, since it depends on the valuation and information of diverse market participants. This is the basic reason why effective competition is more efficient than central planning at revealing efficient prices. Exacerbating the administrative challenge is the fact that, the more that the regulator tries to capture the full market price of the spectrum (i.e. by allowing little margin for error), the greater will be the risk of prices being set too high, with the risk of the distortions described above.

73. Fourth, as noted in the previous section, linking the SUF to the price in the forthcoming auction creates a risk that bids – and, worse, the auction outcome – will be distorted and that spectrum will be assigned sub-optimally.

74. Given that the CA proposes to determine prices for the spectrum that will be retained, we recommend that the prices be determined taking into account available information relevant to the efficient price of spectrum and then to conservatively set the price so as to ensure that it is not set too high.

[12] We note that there are not the same costs from setting prices too low as, in that case, the spectrum will still be used to provide the services

75. Taking into account the CA's concerns with the LCA method, we believe that the best available information relevant to the efficient price of the spectrum are the outcomes of past auctions in Hong Kong and internationally, calibrated to take into account relevant differences in the spectrum being assigned and the market circumstances. We do not believe the annual royalty payment should be included in the "benchmark set". The rate was determined by regulatory fiat and the payment effectively operates as a tax. There is therefore no reason to think that it reflects the current value of the spectrum or an efficient price.

76. The CA proposes to take into account the prices achieved at the auctions for the 850/900 MHz spectrum "*given that this is the most recently established SUF for a frequency band and the fact that it is closely akin to the spectrum under concern*". While we consider that the 850/900 MHz auction outcome does have some information value, it needs to be recognised that this spectrum has vastly superior propagation characteristics than 1.9 – 2.1 GHz spectrum.

77. For example, based on an analysis of prices achieved in international auctions, Ofcom decided that 800MHz spectrum in the UK should be valued (for the purpose of setting reserve prices) at 3 times the level of prices for 1800 MHz spectrum, which in turn should be 5 times the level of prices for 2.6 GHz spectrum.[13] Ofcom noted that the higher prices of sub-1 GHz spectrum reflects the better indoor coverage achieved, the fewer cells/lower costs required for a particular level of coverage and the faster speed to achieve coverage because fewer sites are needed. Accordingly, Ofcom's analysis suggests that the 1.9 – 2.1 GHz spectrum will be a small fraction of the value of the 850/900 MHz spectrum. In short, to use the 850/900 MHz results would distort the price setting exercise.

78. The CA also proposes not to have regard to the prices achieved in the 2.5/2.6 GHz band "*to prevent any strategic bidding behaviour from distorting the outcome of the 2013 auction*". This type of distortion is the same type of concern that we identified in the previous section as giving rise to a risk that a new entrant may outbid a more efficient incumbent operator. However, in the case of the 2.5/2.6 GHz auction, the auction has now been completed and hence this concern is no longer relevant. Nor is there any significant risk of creating credibility problems in the future because spectrum auctions are held so rarely that it would be highly unlikely for another auction to be held in the middle of a consultation process to administratively set the price of similar spectrum.

79. The 2.5/2.6 GHz auction, in fact, represents the most recent established SUF in Hong Kong for a frequency band which is much closer in terms of propagation characteristics to the 1.9 – 2.1 GHz band than the 850/900 MHz spectrum.

[13] Ofcom, *Assessment of future mobile competition and award of 800 MHz and 2.6 GHz*, 2012, Table 8.4.

80. For these reasons, as we indicated above, we believe that the best approach is for SUF to be set on the basis of past auction outcomes both in Hong Kong and internationally. These outcomes should be selected on the basis of comparability and calibrated to account for any relevant differences. In addition to the type of spectrum, comparability should also be assessed taking into account relevant demand and cost factors including demographic differences, GDP per capita, licence duration, licence conditions and the availability of other spectrum. Econometric analysis could be carried out to determine the appropriate adjustments.

6 About CEG Asia Pacific

81. CEG is a leading provider of economic consulting services with particular expertise in regulatory, competition and spectrum issues affecting the electronic communications industry. CEG economists have advised governments, regulators, operators and industry associations across the world on issues affecting the communications industry. CEG is listed in Global Competition Review's Top 20 Economics Consultancies in the world.

82. Examples of the projects on which CEG economists have advised include:

- Advice on market and regulatory reviews including in relation to the assessment of competition in mobile markets, MVNO access, national roaming and network sharing. CEG also undertook an econometric study for Ofcom examining the price and demand effects of different interconnection charging models.

- Advice to bidders in spectrum auctions in a number of countries in Europe and Africa. Professor Maarten Janssen, an academic associate of CEG, is a leading expert in auction design and was engaged by the Dutch Parliament to lead a group of experts in evaluating the Dutch 3G auction. CEG has also advised on a range of other spectrum management issues including spectrum refarming proposals and the setting of spectrum charges.

- Preparation of a number of key studies for the GSMA on regulatory and policy issues including *Licensing to support the mobile broadband revolution*, IP interconnection, a regulatory reform roadmap for Bangladesh, the European Commission's regulation of roaming and termination, liberalisation of international gateway access, mobile content and mobile embedded devices.

- Development of and assessment of bottom-up and top-down cost models and cost benchmarking of mobile and fixed networks in Africa, Australasia and Europe.

- Advice to the Italian regulator, AGCOM, on its margin squeeze guidelines as well as advising operators on merger approvals and on a number of competition law cases.