

HKT's proposed acquisition of CSL

An economic analysis of competitive effects for the CA

Final report

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Head Office: 71-75 Shelton Street, Covent Garden, London, WC2H 9JQ, United Kingdom.

w: londoneconomics.co.uk e: info@londoneconomics.co.uk : [@LondonEconomics](https://twitter.com/LondonEconomics)

t: +44 (0)20 7866 8185 f: +44 (0)20 7866 8186

Authors

Paula Ramada, David Lewin, Sion Jones

(+44 (0) 20 7866 8185; info@londoneconomics.co.uk)



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Contents

Page

Executive summary	vii
1 Introduction	1
1.1 Methodology	1
1.2 Organisation of the document	2
1.3 Consultation responses	2
2 The markets affected by the proposed transaction	3
2.1 Introduction	3
2.2 2G versus 3G/4G	4
2.3 Substitution for mobile data services	4
2.4 Wholesale market for access to public mobile networks	5
2.5 Wholesale market for backhaul services	5
2.6 Wholesale market for inbound and outbound international roaming	5
2.7 Wholesale market for Interconnection	5
2.8 Conclusions on relevant markets	6
3 Assessment of competition in the retail mobile services market	7
3.1 Introduction	7
3.2 Market players	7
3.3 Market concentration	8
3.4 Market trends	11
3.5 Market outcomes to date	15
3.6 Market position of players in the retail mobile market competitors	15
3.7 Conclusions on pre-merger market overview	23
3.8 Market structure post-merger	24
3.9 Conclusions on the impact of the merger on market structure	28
4 The impact of the merger on the network capacity of the operators	30
4.1 Introduction	30
4.2 The effective spectrum holdings of each operator	31
4.3 Future changes to spectrum holdings	31
4.4 The number of BTS sites used by each operator	33
4.5 Public Wi-Fi access points	34
4.6 Demand for RAN capacity	34
4.7 The combined effect of site numbers and spectrum holdings on network capacity	35
4.8 Spectrum holdings and short-term capacity constraints on competition	39
4.9 Conclusions on network capacity for competitors	41
5 Quantification of the unilateral effects of the merger	42
5.1 Introduction	42
5.2 Framework of analysis	42
5.3 Diversion ratios based on porting data	42
5.4 Alternative estimates of closeness of competition between CSL and HKT	45
5.5 Upward Pricing Pressure indices	52
5.6 Reactions of competitors	59
5.7 Telstra and New World non-compete clause	59

Contents

Page

5.8	Conclusions from this chapter	60
6	Coordinated effects	61
6.1	Determinants of coordination	61
6.2	Coordinated effects in retail mobile markets	61
6.3	Competitive position of HKT, CSL and HTCL	62
6.4	Prospective competitive position of CMHK and SMT	64
6.5	Past instances of “coordination”	65
6.6	Family ties between HKT and HTCL	65
6.7	Coordinated effects in the other market affected by the proposed transaction	66
6.8	Conclusions	67
7	Assessment of countervailing effects	68
7.1	Entry prospects	68
7.2	Other forms of entry into the data segment	71
7.3	Conclusions on likely competitive constraints from entry	73
7.4	Competitive constraints from MVNOs	74
7.5	Consumer switching/churn and demand growth	74
7.6	The presence of a potential “maverick”	77
7.7	Efficiencies	78
7.8	Conclusions on countervailing forces	81
8	Vertical effects	83
8.1	Introduction	83
8.2	Will the merger affect the wholesale market for backhaul?	83
8.3	Will interconnect charges increase?	85
8.4	Will HKT use fixed-mobile bundling to leverage its strong position in the fixed sector?	86
8.5	Possible vertical effects through use of Wi-Fi	88
8.6	How will the merger impact the MVNO wholesale market for access?	90
8.7	The impact of the merger on the wholesale inbound roaming market	91
8.8	The impact of the merger on wholesale outbound roaming	92
8.9	Conclusions from this Chapter	93
9	Benefits to the public	94
9.1	The M&A guidelines in Hong Kong	94
9.2	HKT’s claim of public benefits	94
9.3	Assessment of HKT’s claim	96
9.4	Conclusions on benefits to the public	97
10	Competition effects of the merger and proposed remedies	98
10.1	Conclusions on the competitive effects of the proposed transaction	98
10.2	Examples from other jurisdictions	100
10.3	Proposed remedies	100
Annex 1	Spectrum supply for mobile services	106
Annex 2	Calculations and data for upward pricing pressure measures	110

Tables, Figures and Boxes

Page

Tables

Table 1:	The number of mobile subscriptions in Hong Kong at Q3 2013	9
Table 2:	Retail revenues in Hong Kong, 2012 (\$ '000)	10
Table 3:	Profitability in the Hong Kong mobile market in 2012 (excluding CMHK)	15
Table 4:	Characteristics of the main market players	17
Table 5:	Change in subscription numbers per operator, average net gains as a percentage of respective subscriber base	20
Table 6:	3G/4G absolute subscription gains versus overall gains	20
Table 7:	Parties' revenue market shares by revenue measures – 2012	25
Table 8:	Subscriber market shares	26
Table 9:	The impact of the merger on market	26
Table 10:	Effective spectrum holdings pre-merger	31
Table 11:	Spectrum holdings – retention scenario	32
Table 12:	Spectrum holdings – spectrum cap scenario	32
Table 13:	Spectrum holdings – voluntary undertaking scenario	33
Table 14:	Spectrum holdings – further divestment scenario	33
Table 15:	Number of BTS and operator sites by operator	33
Table 16:	Relative long term demand for RAN capacity	35
Table 17:	RAN capacity with utilisation of 80% by the merged entity	36
Table 18:	RAN capacity with utilisation of 100% by the merged entity	36
Table 19:	RAN capacity with utilisation of █████ by the merged entity	37
Table 20:	Market shares for the merged entity in the voice market	40
Table 21:	Churn and porting information	43
Table 22:	Allocation of subscriber gains in quarters for which HKT's market share decreases	45
Table 23:	Allocation of subscriber gains in quarters for which CSL's market share decreases	46
Table 24:	Illustrative estimates of cross-price elasticity	48
Table 25:	Correlations in changes of market shares 2008-2013	50
Table 26:	Correlations in changes of market shares last 8 quarters	50
Table 27:	Correlations in changes of market shares 2008-2013, 3G/4G	51
Table 28:	Correlations in changes of market shares last 8 quarters, 3G/4G	51
Table 29:	Variables and data required for pricing pressure indices	54
Table 30:	UPP assuming 10% efficiency credit	54
Table 31:	UPP assuming 5% efficiency credit	54
Table 32:	Minimum efficiency gain for non-positive UPP	54
Table 33:	Werden feedback UPP assuming 10% efficiency	55
Table 34:	Minimum efficiency gain for non-positive UPP – Werden feedback UPP	55
Table 35:	GUPPI	57
Table 36:	IPR with assumed linear demand	58
Table 37:	IPR for the case of symmetric firms	59
Table 38:	Diversion ratios predicted by market shares	63
Table 39:	Network sharing deals announced in Q1 2012	80

Tables, Figures and Boxes

Page

Table 40:	The main market players in the fixed broadband markets	83
Table 41:	Wholesale roaming revenues market shares in 2012	92
Table 42:	Retail roaming revenue market shares in 2012	92
Table 43:	Current spectrum holdings in Hong Kong	106
Table 44:	Effective current spectrum holdings	107
Table 45:	EBITDA	110
Table 46:	Revenues : retail ex handsets	110
Table 47:	Subscribers	110
Table 48:	EBITDA per average number of subscriptions over 4 quarters, 2012	110

Figures

Figure 1:	HHIs - Hong Kong vs other developed countries	10
Figure 2:	Changes in data and voice traffic in Hong Kong	12
Figure 3:	The growing revenues from mobile services in Hong Kong	12
Figure 4:	Penetration of smartphones in Hong Kong	13
Figure 5:	Transition from 2G to 4G services in the UK	14
Figure 6:	Position of the five MNOs within the retail market - 2012	16
Figure 7:	Growth of subscribers by MNO	18
Figure 8:	The changing shares of 3G/4G subscribers by operator	19
Figure 9:	Revenue structure in 2012	21
Figure 10:	Revenue trends for the five operators	22
Figure 11:	ARPU by operator over time	23
Figure 12:	Ownership before proposed merger	24
Figure 13:	Ownership after proposed merger	25
Figure 14:	HHIs – Hong Kong vs other developed countries	28
Figure 15:	Share of RAN capacity vs market share for the merged entity	38
Figure 16:	Diversion ratios from CSL to other MNOs, last 3 years	44
Figure 17:	Diversion ratios from HKT to other MNOs, last 3 years	44
Figure 18:	Changes in numbers of subscribers	49
Figure 19:	Changes in market shares	49
Figure 20:	Changes in numbers of subscribers, 3G/4G	50
Figure 21:	Changes in market shares, 3G/4G	51
Figure 22:	Evolution of CSL/HKT correlation in changes of market shares, 8-quarter moving averages	52
Figure 23:	Diversion ratios from HTCL to its competitors	62
Figure 24:	Diversion ratios from CSL to its competitors	63
Figure 25:	Diversion from HKT to its competitors	63
Figure 26:	Churn as a percentage of total subscriptions, per quarter, annualised	75
Figure 27:	Number of mobile services subscriptions (000)	76
Figure 28:	Growth rate of mobile services subscribers (change on 4 quarters prior)	76
Figure 29:	The role of Wi-Fi in Smartphone data traffic origination	89

Tables, Figures and Boxes

Page

Boxes

Box 1:	Characteristics of the Republic Wireless Wi-Fi service	71
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Executive summary

This final report considers the likely competition effects in Hong Kong telecommunications markets of the proposed acquisition of CSL New World Mobility Limited (CSLNWM) by HKT Limited. We assess whether there is likely to be a substantial lessening of competition (SLC) as a result of the merger; whether there are benefits to the public that are likely to outweigh any detriment arising from a substantial lessening of competition; and whether there are any remedies that could address any substantial lessening of competition.

Our assessment of the relevant product markets suggests that we focus our analysis on the retail market for mobile telecommunications services. Within this market we recognise the different characteristics of particular segments but we do not propose any further separation between voice and data, between business and private, or by technology. The relevant geographic market is Hong Kong.

There are other markets also affected by this merger and these are separately discussed. In particular the merger affects the market for wholesale access by mobile virtual network operators (MVNOs).

We make a qualitative assessment of competition in the market, the characteristics of the merging parties and the structural impacts of the merger. The merger reduces the number of mobile network operators (MNOs) from 5 to 4 and, as such, corresponds to a moderate increase in market concentration. The market also hosts MVNOs, but these represent a very small share of the number of subscribers and an even smaller share of revenues. There are indications that the Hong Kong mobile telecommunications market is competitive at present: it is less concentrated than markets elsewhere and both profits and prices appear low by comparison to levels observed in other developed countries.

The market can be sub-divided into a number of important segments and market shares of the merging companies can, accordingly, be measured in a number of different ways. Hong Kong Telecommunications Limited (HKT) and CSL Limited (CSL), the concerned MNOs in the proposed merger, together generate a small share of total revenues (especially when handset sales are included in the revenue measure) and a moderate share of the number of subscriptions. On the other hand, HKT and CSL serve more than 40% of both 3G/4G subscriptions and post-paid subscriptions and currently generate more than █████ of total data volumes. These are market segments of great importance in terms of future revenue growth and thus indicate a strong prospective market position for the merged entity.

Network capacity plays a very important role in determining the competitive position of MNOs. The merger results in a combined entity whose spectrum holdings are substantially larger than those of the other competitors. We consider the implications and the effects of alternative re-allocations of network capacity. We conclude that the combined effect of spectrum holdings and existing HKT and CSL base station sites gives the merged entity a significant advantage in the medium term beyond 2017, as the demands of data services on network capacity grow.

We next assess the likely magnitude of unilateral effects of the merger. Unilateral effects are a function of the closeness of the merging entities in terms of market-relevant characteristics. Based on a quantification of the upward pricing pressures created by the proposed transaction using a

number of different approaches, we observe that CSL provides a substantial competitive constraint on HKT but much less so for HKT on CSL.

We then consider the possible coordinated effects of the merger. By removing one competitor, mergers can have the effect of facilitating coordination among the remaining competitors. Successful coordination requires that competitors are able to devise and implement a coordinated outcome that is preferred to competition by all parties. It further requires that deviations from the agreement can be observed and 'punished' by competitors and that there are no destabilising forces such as a 'maverick' competitor or potential entry. The question is then whether the merger has an impact in terms of facilitating any of these coordination pre-requisites. The disappearance of CSL as an independent competitor is likely to have a positive effect on the remaining MNOs' ability to sustain coordinated outcomes. However, as long as there are adequate conditions to ensure that CMHK and SMT remain strong competitors and that the situation of MVNOs is not worsened compared to the no-merger counterfactual, the chapter concludes that the merger is unlikely to result in increasing the likelihood of the co-ordinated exercise of market power by the remaining competitors.

In the context of possible countervailing effects we consider market entry, developing data retail business models, consumer switching and efficiencies. There are high barriers to entry to becoming an effective competitor to the existing MNOs. In the medium term new business models may develop and better technologies be adopted, supporting novel forms of entry which may exert some competitive pressure on the merged entity, particularly in the data segment. Consumer switching and demand growth represent a large percentage of the subscription base in any given year and is thus likely to exert a significant competitive pressure on MNOs as long as remaining competitors have reasonably balanced levels of network capacity. On efficiencies the chapter concludes that there is insufficient evidence that there are merger-specific efficiencies that would counteract its potential for anti-competitive effects.

The proposed transaction is likely to negatively affect the bargaining position of MVNOs in the wholesale market for network access. MVNOs represent only a very small share of the market but they have a potential role in, for example, destabilising coordinated behaviour. We therefore suggest that preserving the competitive position of MVNOs would help maintain competition in the post-merger world.

A brief review of public benefits concludes that the benefits claim put forward by the notifying party provides insufficient evidence for it to be taken into account as a mitigating factor against possible negative effects of the merger on competition.

Finally, we conclude that the merger gives rise to a substantial lessening of competition in the retail market for mobile telecommunication services and wholesale market for network access for MVNOs. Remedies are proposed in order to address concerns of unilateral effects, to reduce excessive network capacity concentration, and to preserve network access conditions for MVNOs. The proposed remedies are necessary to eliminate or avoid the likely substantial lessening of competition effects identified in the two markets.

1 Introduction

We are delighted to submit to CA/OFCA this final report containing the economic analysis of the likely competition effects in the Hong Kong telecommunications market of the proposed acquisition of CSL by HKT.

1.1 Methodology

The methodology adopted for this analysis follows OFCA guidance and is in addition closely aligned to that which is applied by competition authorities elsewhere. The analysis is in three parts. First we assess whether the merger has or is likely to have the effect of substantially lessening competition (SLC); then we consider whether there are any benefits to the public that are likely to outweigh any detriment to the public from the SLC; and finally we proposed remedies in order to eliminate or avoid the effect of substantially lessening competition in the telecommunications markets as identified.

In order to assess the effects of the merger we start by defining all the markets that are affected by the merger. Relevant markets in this context are defined as the most narrowly defined markets that nonetheless include all products/services that are close substitutes to the focal good or service.

To study the impact of the merger on competition in each of the relevant affected markets we need to consider both unilateral and coordinated effects. Unilateral effects refer to the loss of the competitive constraints that each merging partner exerted on the other pre-merger.

Unilateral effects are assessed with reference to a number of factors, including:

- The market position of the merging firms and the market context of the merger
- Whether competitors have enough capacity to effectively compete with the merged firm
- Closeness of competition among the merging firms and in particular whether the merger eliminates an important competitive force

Coordinated effects refer to the possibility that the merger facilitates collusion in the market because there are fewer competitors and/or because the merger weakens other competitors or raises barriers to entry.

Our merger analysis also considers whether there are any countervailing effects. These include efficiencies that may arise as a result of the merger and their potential to exert a downward pressure on post-merger prices. These may, to some extent, mitigate the upward pricing pressure resulting from unilateral effects. However, efficiencies should only be counted against the anti-competitive effects of the merger if the merger is indeed indispensable for such efficiencies to be realised.

Once a view has been taken that the merger would have, or be likely to have, the effect of substantially lessening competition in a telecommunications market based on the above approach, an assessment is made of whether there are other benefits to the public from the merger and whether these are sufficient to outweigh any detriment to the public that would be, or would likely to be, constituted by any such effect.

Finally, merger analysis must reach a conclusion as to the conditions, if any, under which the merger should be allowed to proceed. This corresponds to careful consideration of the mechanisms through which anti-competitive effects may arise and the design of a package of remedies that addresses them.

1.2 Organisation of the document

Chapter 2 defines the relevant markets affected by the merger. While relatively broad markets are defined, there are important segments which are then considered individually throughout the report.

Chapter 3 analyses market structure and the impact of the merger on concentration.

Chapter 4 considers the impact of the merger on allocation of network capacity among the 4 remaining mobile network operators and contrasts this with what would be required to ensure that all operators can remain credible competitors.

Chapter 5 assesses closeness of competition and makes a quantified assessment of upward pricing pressures raised by the merger.

Chapter 6 discusses the likelihood of coordinated effects as a result of the merger, taking into account existing levels of competition among competitors, past instances of quasi coordination and the loss of one important competitor.

Chapter 7 reflects on the strength of countervailing forces such as the possibility of entry, efficiencies and constraining effects due to product or technical innovation

Chapter 8 considers the effect of the merger in other markets such as wholesale network access to MVNOS. In particular it assesses these effects given HKT's strong position as a fixed network operator in Hong Kong

Chapter 9 presents our view on claims regarding the public benefits of the merger

Finally Chapter 10 assesses the competition concerns identified, the likelihood that they constitute a substantial lessening of competition, and discusses potential remedies

1.3 Consultation responses

We have reviewed all of the consultation responses submitted before the consultation was closed and have taken them into account in reaching our conclusions.

2 The markets affected by the proposed transaction

2.1 Introduction

In this chapter we look at the definition of the relevant markets affected by the proposed transaction, following the approach outlined in Chapter 3 of the Guidelines on Mergers and Acquisitions in Hong Kong Telecommunications Markets (Merger Guidelines). We discuss product markets below and we take as relevant geographic markets the entire region of Hong Kong.

We start with the most important affected product market, the market for retail mobile telecommunications services.

There are important subdivisions within this market which can be clearly identified:

- Private and business;
- Prepaid and postpaid;
- 2G, 3G and 4G(LTE); and
- Voice and data.

We examine whether any of these sub-divisions should be considered as a separate market for the purpose of the analysis of the impact of the proposed transaction.

For the purpose of competition analysis, a relevant market corresponds to the most narrowly defined market in relation to which a hypothetical monopolist would be able to profitably raise prices above competitive levels. The forces that would otherwise prevent such monopolistic exploitation are demand-side substitution and supply-side substitution. A relevant product market is therefore the smallest set of products/services for which both demand side and supply side substitution are insufficient to defeat a small but significant and non-transitory increase in price (SSNIP).

In a number of jurisdictions, notably in Decisions by the European Commission, no further subdivision of the market, beyond the overall provision of mobile telecommunications services to end customers, has been considered as forming a relevant market.

On the demand side we can distinguish a number of separate segments: (i) business, (ii) post-paid voice and data (often with bundled handsets and with lock-in periods), (iii) pre-paid voice and, to some extent, data (possibly including certain no-frills post-paid plans as well), and (iv) data-only plans (that is to say, plans for use on devices which do not support voice services).

Such segments do not form separate relevant markets because of supply-side substitution. In other words, suppliers in any of these segments can also supply any of the other segments. However, the fact that the demand-side cannot generally substitute among these implies that it may therefore be important to examine the effect of the transaction not only on the market as a whole, but also on each segment separately. An effect on important segments within the relevant market can be, in the circumstances of this case, a substantial effect from a competition perspective.

2.2 2G versus 3G/4G

From a demand standpoint, and increasingly so, users of 3G or 4G services are unlikely to consider 2G services as adequate substitutes. As such, a small price increase in 3G/4G services would not make consumers switch to 2G services. In other words, 2G services do not exert a strong competitive constraint on suppliers of 3G/4G services.

From the supply-side perspective, substitution from 2G to 3G/4G services is not immediate and costless since supply of either may necessitate use of different spectrum bandwidths and will almost certainly have different technical requirements.

The European Commission has found in the past that the different technologies do not represent separate markets due to the fact that users are not particularly willing to pay a premium for the higher end technologies. However, 3G/4G technologies have developed and their market penetration has increased at the same time as costs per user and prices have come down. Demand has developed concomitantly and this is clearly the case in Hong Kong, where demand for data services has increased very rapidly.

As technology develops it may be increasingly unlikely that a supplier with only 2G capabilities, for example, would be able to effectively constrain 3G and LTE services suppliers. It is therefore important for our prospective analysis of the effects of the proposed transaction that we look, to the extent possible, at developments in the 3G/4G segment.

However, it is not practical at this stage to consider 3G/4G services as a separate product market which excludes 2G services. This is for 2 reasons: (i) most of the data that we will be able to use in the analysis of the merger will not distinguish between 2G on one hand and 3G/4G on the other and (ii) suppliers able to offer both 2G and 3G/4G services now constitute the bulk of supply in Hong Kong and all of them can very rapidly and at relatively low cost move their customers from 2G to 3G/4G plans.

2.3 Substitution for mobile data services

As data demand increases exponentially, the cost to MNOs in serving this demand is increasing. Data and voice have different spectrum needs so that the supply of data may become capacity constrained while the supply of voice does not.

A new form of quasi-mobile data service is emerging in the market as some suppliers combine fixed broadband with public Wi-Fi based data services, offering very extensive coverage by Wi-Fi hotspots in the relatively limited geography of Hong Kong. This poses the question of market separation between mobile voice and mobile data in new terms since these quasi-mobile data services are likely to exercise a competitive constraint on mobile data services but not on mobile voice.

As the depth and breadth of penetration of public Wi-Fi services grows, consumers' willingness to pay for data services from their mobile operators may decrease. On the other hand, given their very large capacity and low cost, Wi-Fi networks can be used by MNOs for data off-loading thus lowering data services costs for MNOs. As a result, owners of public Wi-Fi networks are likely to play an important role in data retail markets in the near future.

It is possible that the market share of data-only devices will increase in the future. For such devices, Wi-Fi and cellular data service are close substitutes. At the present stage, however, we have opted not to consider these types of data services as a market separate from retail mobile services more broadly. Our analysis nonetheless takes due account of the potential competitive constraints that Wi-Fi-based services may pose on the mobile services market going forward.

2.4 Wholesale market for access to public mobile networks

Wholesale network access is provided by MNOs to MVNOs. This includes the provision of a range of wholesale telecommunications services on a mobile telephone network for the purpose of providing retail mobile telecommunications services to end customers. These services include wholesale network access and international roaming, whether for voice, SMS or data services. The wholesale market for these services is therefore (i) on the supply-side, the MNOs who own mobile networks and (ii) on the demand-side, the MVNOs who seek access to MNO networks in order to provide their retail services.

2.5 Wholesale market for backhaul services

The connections from base stations to mobile switching centres are a series of transmission circuits commonly referred to “mobile backhaul”. In Hong Kong MNOs are not granted with the right to establish and maintain backhaul networks across public streets and unleased Government lands. Such right is restricted to licensees authorised to provide internal fixed services (“Internal FNOs”) making it essential for MNOs to acquire backhaul facilities from internal FNOs. Among the five existing MNOs, HKT is licensed to provide internal fixed service under a separate Licence held by PCCW-HKT and [REDACTED]

2.6 Wholesale market for inbound and outbound international roaming

International roaming is a service which allows mobile subscribers to use their mobile handsets and SIM cards to make and receive calls, to send and receive text messages and to use other data services when abroad. In order to be able to offer this service to their customers, mobile network operators conclude wholesale agreements with one another to provide access and capacity on mobile networks in the visited country.

In Hong Kong, demand for wholesale inbound international roaming services comes first from foreign mobile operators who wish to provide their own customers with mobile services outside the range of their own network and, indirectly, from foreign subscribers wishing to use their mobile telephones in HK. For outbound international roaming an MNO in Hong Kong needs to pay foreign operators to handle calls generated by its subscribers when they visit other countries.

2.7 Wholesale market for Interconnection

There is a wholesale interconnection market in which mobile operators negotiate with each other and with fixed network operators for the delivery and receipt of calls (and other person-to-person services). In Hong Kong, as in many other jurisdictions, there is an any-to-any obligation on licensed operators to ensure their customers can access any other customers of any other

networks. But there is not, as is the case in many other jurisdictions, any regulation on operators to determine the fees which they might charge other operators for origination or termination of calls. The interconnect market is distinct from other markets identified above and we consider the possible impact of the proposed merger on the interconnect market in Chapter 8 of our report. As part of this analysis we also consider the local access charge (LAC). This is a charge which local network operators – whether fixed or mobile – charge to external telecommunications service (ETS) providers for inbound and outbound international calls.

2.8 Conclusions on relevant markets

Given this analysis, our view on the relevant markets affected by the merger is the following:

- There is a single retail market of mobile telecommunications services to end users
- There is a wholesale market for access to public mobile networks.
- There is a wholesale market for fixed backhaul services
- There is a wholesale market for inbound and outbound international roaming.
- There is a wholesale interconnection market
- The geographical market for all the above product markets is Hong Kong

3 Assessment of competition in the retail mobile services market

3.1 Introduction

In this chapter we provide our analysis of the current state of competition in the retail mobile market in Hong Kong in terms of:

- The current market players
- Market concentration
- Market trends over the merger analysis period through to 2017
- Market outcomes to date
- The position of the market players within the retail market
- The market structure post-merger

3.2 Market players

Five mobile network operators compete in the retail mobile market of Hong Kong together with seven active MVNOs and a number of resellers¹. Genius Brand also offers 4G services on a wholesale only basis. In terms of their ownership, affiliations, and mobile services offered we can summarise the characteristics of the main players as follows.

- **SmarTone Mobile Communications Limited (SMT)** is wholly-owned by SmarTone Telecommunications Holdings Limited (SMTT) and SMTT is owned (66% interest) by Sun Hung Kai Properties Limited. Both SMTT and Sun Hung Kai Properties Limited are listed on the Hong Kong stock exchange (SEHK). SMT holds a Unified Carrier Licence (UCL) for the provision of mobile services. SmarTone Communications Limited (SMT Fixed), also wholly-owned by SMTT, is a fixed network operator (FNO) which uses wireless technology to provide fixed service in Hong Kong. SMT provides 2G, 3G and 4G services.
- **Hutchison Telecommunications Company Limited (HTCL)** is jointly owned by Hutchison Telecommunications Hong Kong Holdings Limited (HTHK) (76% interest) and NTT DOCOMO Inc. (24% interest). HTHK is a group member of Hutchison-Whampoa Limited, which in turn is 49.97% held by Cheung Kong Holdings Limited. All three holding companies are listed on the SEHK. HTCL holds a UCL for the provision of mobile services and provides 2G, 3G and 4G mobile services under its “3” brand name. HTCL also holds a 50% stake in Genius Brand (see below). As well as HTCL, HTHK owns 100% of Hutchison Global Communications Limited (HGC), which holds a UCL for fixed internal and external services and is a major player in the fixed market, providing a wide range of internal and external fixed services.
- **HKT** is wholly-owned by HKT Trust and HKT Limited (HKT Trust) listed on SEHK, which in turn is owned by PCCW Limited (PCCW) (63% interest), also listed on SEHK. HKT holds two carrier licences for the provision of mobile services. It also jointly and severally holds a UCL with PCCW-HKT Telephone Limited (The two companies are jointly referred to as “PCCW-HKT”).

¹ Which are closely tied to the MNOs and whose subscribers and revenues are included in the MNO statistics

PCCW-HKT is the incumbent FNO operating internal fixed services and is the sole universal service provider for the provision of “basic service” defined under the Telecommunications Ordinance (mainly public switched voice telephony and public payphone services). As an MNO, HKT provides 2G, 3G and 4G services. It has reported zero 2G customers [REDACTED]. As an FNO, PCCW-HKT provides a wide range of fixed services including telephony services, broadband Internet access services, leased line services, etc. By making use of its fixed networks, PCCW-HKT also bundles pay TV services with its broadband Internet access service to users.

- **CSL** is wholly owned by CSLNWM, which in turn is a joint venture established by Telstra Corporation Limited (76% interest), listed on the Australia Securities Exchange and New Zealand Exchange, and New World Development Company Limited (24% interest), listed on SEHK. CSL holds a UCL authorising it to provide mobile and fixed internal services. In the retail market, CSL is active in providing 2G, 3G and 4G mobile voice and data services under its two brand-names: 1010 and One2Free. Besides its own UCL, CSL jointly holds a 60% interest in New World Mobility Limited (NWM). Telecom Digital Mobile Limited, a non-affiliated MVNO holds the other 40%. NWM is an MVNO which is active in providing 2G and 3G services.
- **China Mobile Hong Kong Company Limited (CMHK)** is wholly-owned by China Mobile Limited, which is listed both on the SEHK and the New York Stock Exchange. China Mobile Limited is the biggest MNO in Mainland China. CMHK holds a UCL authorising it to provide mobile and internal fixed services in Hong Kong. CMHK is active in the Hong Kong mobile market providing mobile voice and data services. The company uses its own spectrum holding for the provision of mobile voice and mobile data services based on 2G/2.5G/4G technologies. In December 2011, CMHK started to provide 3G-based voice and data services by leasing network capacity from other MNOs. CMHK also entered into a network sharing agreement with HKT to enable it to share up to [REDACTED] of HKT’s 3G network capacity. This was effective from December 2012. It is now rolling out its own 4G network.
- **Genius Brand Limited (Genius Brand)** holds spectrum in the 2.5/2.6 GHz frequency band which may be used to provide 4G services. Genius Brand is a joint venture held on a 50/50 share basis by HKT and HTCL. It aims to operate a 4G network using its 2.5/2.6 GHz spectrum to support retail 4G services separately provided by HKT and HTCL under their respective brands.
- There are seven active **MVNOs** which use the radio access networks of the various mobile operators. [REDACTED]

3.3 Market concentration

The table below lists the number of subscribers and estimates subscriber market shares for September 2013 for each mobile operator and active MVNO³.

² This figure excludes 60% of the subscribers of NWM

³ Only MVNOs which have reported the number of subscribers of retail mobile services are included.

Table 1: The number of mobile subscriptions in Hong Kong at Q3 2013

MNOs	Subscribers (000)	Subscriber share	3G/4G subscribers (000)	3G/4G subscriber share	postpaid subscribers (000)	postpaid subscriber share
HTCL						
CSL ⁴						
SMT						
HKT						
CMHK						
HKT + CSL		36.7%		45.9%		39.5%
MVNOs ⁵						
China Motion ⁶						
China Unicom ⁷						
CITIC Telecom ⁸						
China-Hong Kong ⁹						
TII ¹⁰						
Truphone ¹¹						
NWM (40%)						
Total	17,001		11,412		7,834	

Source: OFCA

As measured by the Herfindahl–Hirschman Index (HHI), the concentration of market power in the retail market in Hong Kong is low for this sector by international standards. This is shown below. We are not aware of other countries, with the exception of India, which have a lower HHI for subscribers.

⁴ Unless otherwise specified, the number of subscribers of CSL in this report includes 60% of that from NWM, in which the former has a 60% interest in the latter.

⁵ Unless otherwise specified, the number of subscribers of MVNOs in total, or of NWM alone, includes only 40% of NWM, as the rest is assigned to CSL for the purpose of competition analysis.

⁶ China Motion Telecom (HK) Ltd.

⁷ China Unicom (Hong Kong) Operations Limited

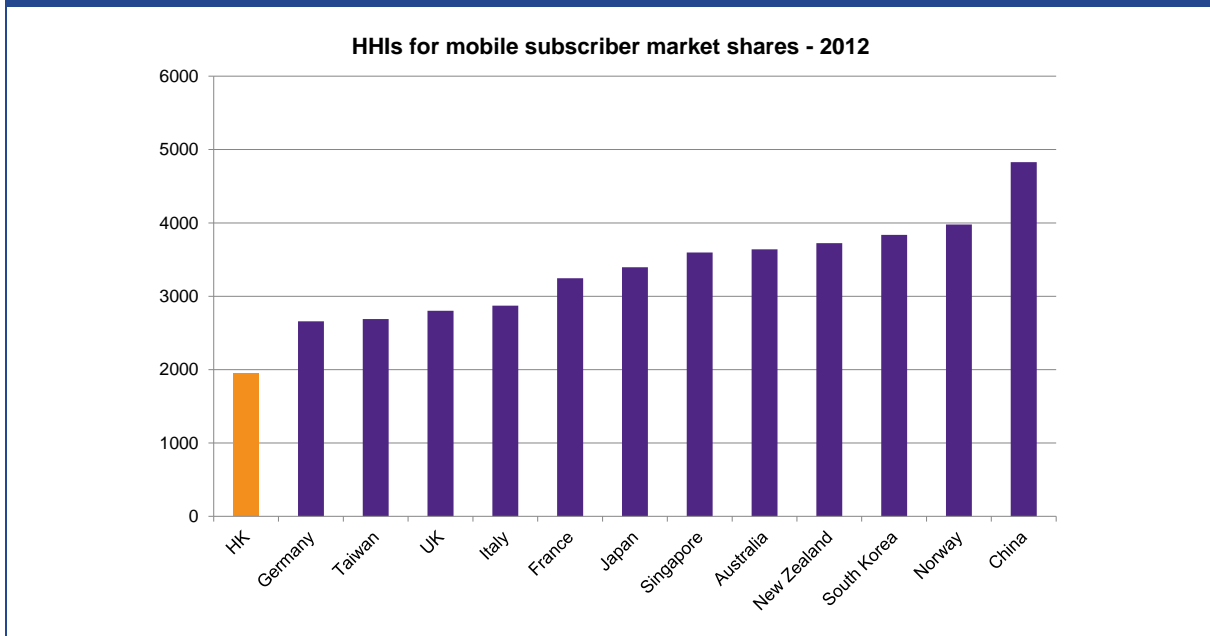
⁸ CITIC Telecom International Limited

⁹ China-Hong Kong Telecom Limited

¹⁰ Telekomunikasi Indonesia International (Hong Kong) Limited

¹¹ Truphone (Hong Kong) Limited

Figure 1: HHIs - Hong Kong vs other developed countries



Source: OFCA for Hong Kong and Merrill Lynch Mobile Matrix for other countries

It is also instructive to consider market shares in terms of revenue. There are alternative measures of revenue that could be used and in particular there are important differences between total retail revenues and retail revenues excluding handset sales.

Table 2: Retail revenues in Hong Kong, 2012 (\$ '000)

MNOs	Total retail	Retail ex handsets
CMHK	[REDACTED]	[REDACTED]
CSL ¹²		
HKT ¹³		
HTCL		
SMT		
Total		
HKT + CSL	26.1%	35.6%

Source: OFCA

This raises the question of which measure to use when assessing market developments and competitive positions. There are arguments for both.

On the one hand total retail revenues:

¹² According to OFCA, NWM’s retail revenue is not included in CSL’s revenue. The same applies to CSL’s revenue throughout this report.

¹³ According to OFCA, 2010 is the most recent audited figure for HKT’s total revenue with detailed breakdowns of its various components. Thus, the breakdown of HKT’s total revenue in 2011 and 2012 used in this report was calculated on the basis that the weighting of each of the constituent component of HKT’s total revenue is the same as that found in 2010. Total revenue figures for 2011 and 2012 are taken from HKT’s respective Annual Reports. .

- Measure the ability of the operators to capture customers with a high willingness to pay. It is reasonable to argue that those which are more successful at this have more market power than those which are not.
- Total retail revenue is a better defined measure than service revenues alone. The boundary between handset and service revenues reported to OFCA is difficult to define. Operators subsidise handsets through service contracts and the allocation of revenues between these two components is, to some extent, a matter of judgement.

On the other hand service revenues, which exclude handset revenues, measure the size of the operators' core business. Prepay customers and some (SIM only) contract customers purchase their mobile devices separately from their mobile service. This means that the mobile operators are constrained in the prices they charge for bundles of services and handsets by the prices charged by stand-alone suppliers of mobile handsets¹⁴. We believe that the trend towards unbundled pricing is likely to continue with the move towards more data-centric mobile services in which end users buy devices like tablets separately from mobile services.

Neither set of arguments is conclusive. So we consider both measures of mobile revenues in our analysis.

3.4 Market trends

3.4.1 The past four years

Over the past four years the structure of the Hong Kong market has remained stable. But we have seen two important market trends which we need to take into account in our merger analysis.

First we have seen a significant shift towards use of data services. This is driven by:

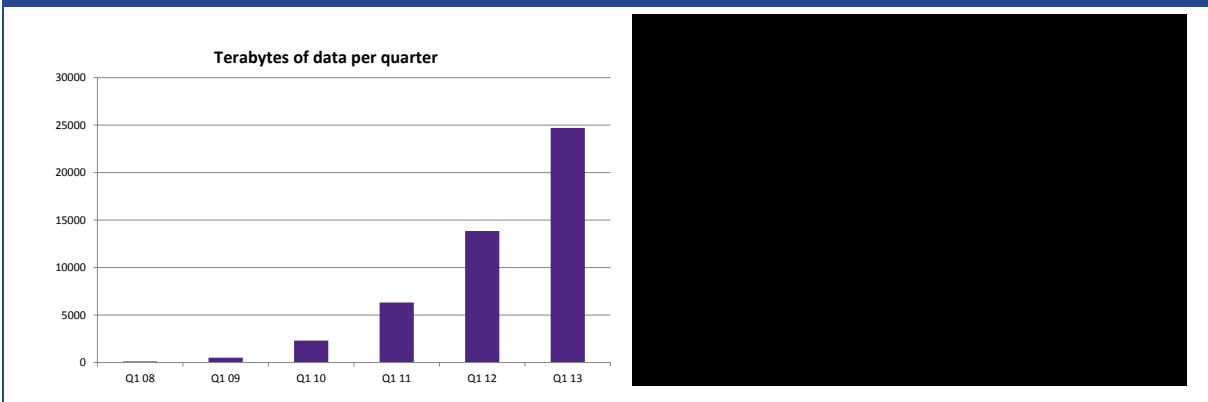
- The roll out of new radio access network technologies based on W-CDMA (3G) and OFDM (4G) which both increases mobile data speeds and lowers the unit cost of delivering a MB of data
- The rapid take-up of smart phones – notably the Apple iPhone and Android smartphones.

The figure below shows the growth in data volumes carried by the mobile networks in Hong Kong since 2008 alongside changes in voice minutes originating and terminating on the mobile networks in Hong Kong.¹⁵

¹⁴ Although we note that the strength of this constraint depends upon the prices charged by the mobile operators for SIM only packages

¹⁵ In Hong Kong, both inbound and outbound mobile calls count towards the call minutes entitlements of mobile service packages.

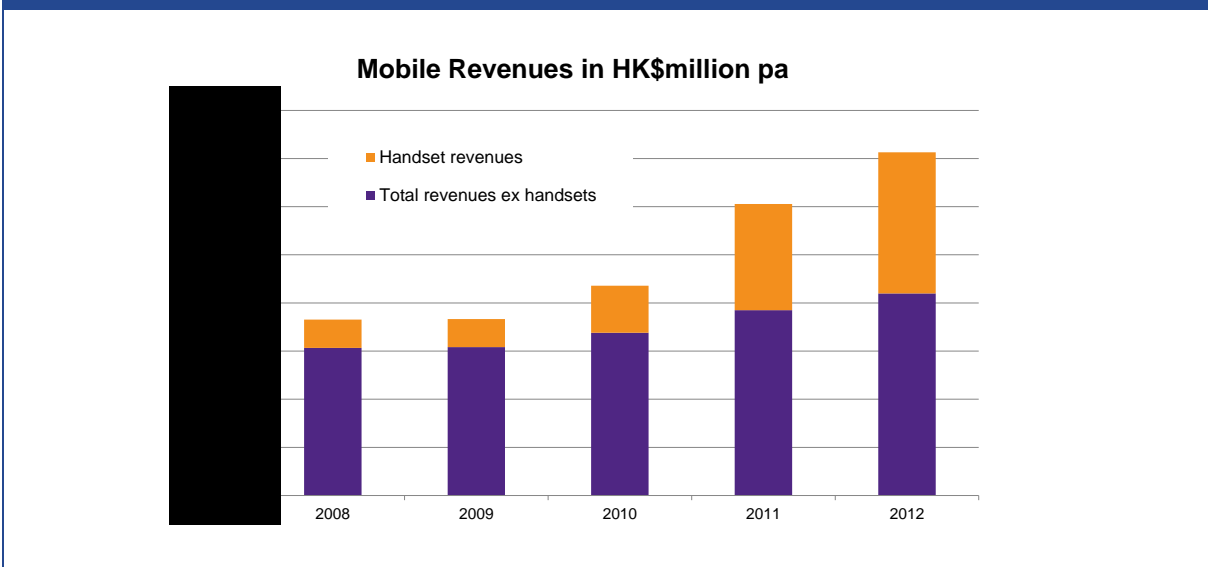
Figure 2: Changes in data and voice traffic in Hong Kong



Source: OFCA

Secondly we have seen a very substantial growth in the revenues for the bundle formed by mobile services plus handsets. Figure 3 shows the change in revenues between 2008 and 2012. We can see that total retail revenues doubled between 2008 and 2012 while mobile service revenues¹⁶ alone grew by 37%.

Figure 3: The growing revenues from mobile services in Hong Kong



Source: OFCA

It is likely that the revenue growth and the move to data services are related. As subscribers have moved to higher functionality smartphones, so their willingness to pay for mobile services has grown. There is an alternative explanation. The increase in revenues, which is significantly greater than the increase in subscribers, may reflect weakening price competition in Hong Kong. But this alternative explanation seems less likely given the continuing low levels of profitability in the Hong Kong mobile market (which are discussed in Section 3.5)

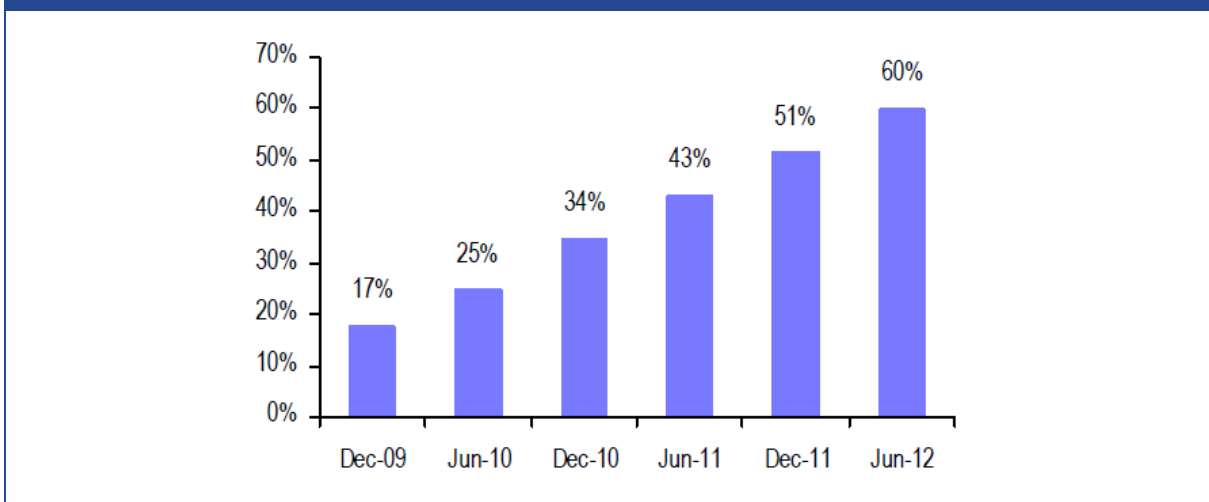
¹⁶ i.e. Total revenue excluding handsets

3.4.2 Future market trends

Over the period of the merger analysis to 2017, we can expect:

- A very substantial growth in mobile data traffic in Hong Kong¹⁷ - driven by the take-up of smartphones and tablets.
- A rapid move by Hong Kong's mobile operators from 2G and 3G technologies to 4G technologies¹⁸. We note that LTE offers much higher broadband speeds than 3G services at a substantial lower cost per Gbyte. We do not have Hong Kong specific forecasts of this effect. But the figure below shows forecasts for the UK. We see no reason why Hong Kong should differ significantly from the general trends shown in this figure
- A move from circuit switched to IP-based core networks with the introduction of voice-over-LTE at some point during the analysis period
- A growing reliance by mobile operators on offload capacity to Wi-Fi and picocells access points so as to manage the rapid growth in data traffic.

Figure 4: Penetration of smartphones in Hong Kong

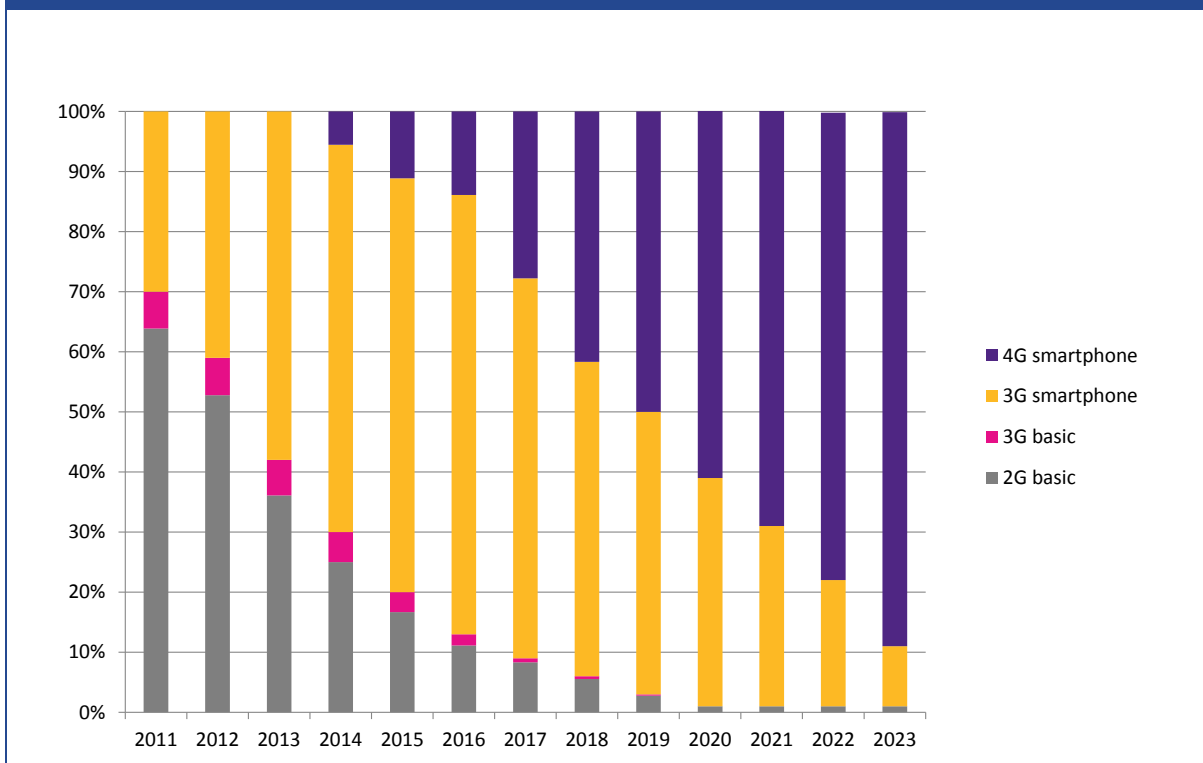


Source: UBS analyst's report

¹⁷ Cisco predicts a 13 fold increase in global mobile data traffic between 2012 and 2017

¹⁸ Based on TD-LTE at 2.3 Hz and on FD-LTE at 2.6 GHz

Figure 5: Transition from 2G to 4G services in the UK



Source: Plum for GSMA

These trends could have significant implications for the competitive positions of the main market players.

First the very substantial growth in demand for mobile data means that the future power of mobile operators in the market will depend on their ability to handle high volumes of data traffic. This will in turn depend on the size of their effective spectrum holdings, the number of base station sites in operation and the number of public Wi-Fi access points available to them. Mobile operators will be able to expand capacity by building new base station sites. But this is significantly more expensive¹⁹ than upgrading existing base station sites for LTE. We consider the effects of network capacity constraints later in Chapter 4.

Secondly it is possible that the market power of MVNOs may weaken over the period of the merger analysis. Mobile operators will need to maximise network capacity to deal with rapidly growing volumes of data traffic. This may have implications for the relationship between MVNOs and their hosts. See Section 7.4 and 8.6 for further analysis.

We also note that MVNOs are used primarily to address the voice-centric segments of the market and that the number of subscribers of independent MVNOs has remained static over the past 15 months whilst the number of subscribers to the retail arm of mobile operators has grown by 8%.

¹⁹ Five times more expensive according to recent Plum studies for Qualcomm.

3.5 Market outcomes to date

We have identified two outcomes from the functioning of the retail mobile market in Hong Kong which give an indication of the level of competition:

- On the supply side the level of profitability of the competing mobile operators in Hong Kong is well below that observed in other developed countries. The average EBITDA²⁰ margin in Hong Kong (excluding CMHK) is [20 - 30%]. In contrast the corresponding margin in developed countries as a whole was 40% at the end of 2011 according to the Merrill Lynch Mobile Matrix. This suggests that mobile operators in Hong Kong may have competed away their profits to a significantly greater extent than mobile operators elsewhere
- On the demand side overall prices are low by international standards. For example the ITU compares 160 countries in terms of the cost of a basket of mobile services as a proportion of gross national income per capita. Hong Kong ranks 11th cheapest on this measure²¹. It is likely that these low prices reflect strong competition. But it is also possible that they reflect the low cost of providing mobile services in a country with the demographics of Hong Kong

Table 3: Profitability in the Hong Kong mobile market in 2012 (excluding CMHK)²²

Operator	EBITDA (HK \$m)	Revenues (HK \$m)	EBITDA margin
HKT			
HTCL			
SMT			
CSL			
Total			

Source: OFCA and annual reports of respective parent companies of the operators

3.6 Market position of players in the retail mobile market competitors

In this section we look at the market position of the merging firms relative to each other and to the other market players. In particular we assess the extent to which there are significant market segments on which the two merging firms are close competitors.

3.6.1 Characteristics of the mobile operators

Below we plot the position of the five mobile operators in terms of ARPU²³ in 2012²⁴, the size of subscriber base in 2013, and the extent to which each operator carries data traffic in mid-2013. The basis for this last measure is the extent to which the ratio of data to voice traffic deviates from the average for each operator. We can see that HKT and CSL are close competitors when judged

²⁰ EBITDA means earning before interest, taxes, depreciation and amortization.

²¹ *Measuring the Information Society*, ITU, 2012

²² There is no information for CMHK.

²³ In this chapter we use ARPU based on total revenues because this captures wholesale MVNO revenues as well as retail revenues. In later chapters e.g. on unilateral effects our preference is to use the ARPU for voice and non-voice revenues only since this is likely to reflect the prices that are most visible to customers when considering whether or not to switch supplier

²⁴ The latest date for which data was available at the time of our analysis

on this plot. It is important to note that we expect the relative position of the operators on this diagram to change over time. In particular the data centric index for the five operators is changing – especially for CMHK as [REDACTED]

[REDACTED]²⁵.

Figure 6: Position of the five MNOs within the retail market - 2012



Source: OFCA

The table below provides a summary of the assessed market characteristics of the main players.

²⁵ Based on analysis in other jurisdictions we expect that ARPUs will be more stable over time. As such we expect that changes in the position of the MNOs on the X-axis of the diagram will be less substantial

Table 4: Characteristics of the main market players

Operator	HTCL	CSL	SMT	HKT	CMHK	MVNOs	CSL + HKT	total or ave
Total subscribers (000) 9/13						1,224		17,001
% pre-paid								54%
% 3G/4G								67%
Market shares								
all subscribers						7%	37%	
3G/4G subscribers							46%	
postpaid subscribers								
share of mobile data market								
total revs (with handsets)								
retail revs (ex handsets)							36%	
spectrum holdings	24%	25%	19%	14%	18%	na	39%	
ARPU per month (HK\$) ²⁶ (total with handsets)								
ARPU per month (HK\$) (total ex handsets)								
EBITDA as % of revenues								
Data in GB per sub per month ²⁷								
Voice minutes per sub per month (in and out)								
Significant overseas mobile activity	Yes	Yes	No	No	Yes	na		
Affiliation to major fixed operator	Yes	No	No	Yes	No	na		

Source: OFCA and LE research

Based on this analysis we observe that:

- SMT operates at the top end of the market. [REDACTED]
- CMHK currently operates mainly in the mass-market segment to attract voice centric customers. [REDACTED] It now has more spectrum than any other operator to offer 4G services and is rapidly converting them to 3G/4G services. [REDACTED], CMHK could be a disruptive competitor over the next four years

²⁶ ARPU here is defined as total revenue in 2012 divided by total subscribers in Q2 of 2012 with MVNO subscribers allocated to each mobile operator pro rata to its retail subscriber numbers

²⁷ [REDACTED]. This is reflected in this measure - which indicates the extent to which the subscriber base as a whole is data centric.

- HTCL, HKT and CSL appear to compete for roughly the same set of customers in that [REDACTED]
[REDACTED]
- MVNOs operate at the bottom end of the market, serving voice centric prepaid customers. We do not have information about ARPUs, but we would expect them to be low compared with the mobile operators.
- The size of the merged entity in terms of market shares is greatly dependent on the measure chosen. In terms of overall revenue (including handset sales) the parties' post-merger share is [REDACTED]. If we consider their joint share of ex-handset retail revenues this becomes 36%. In terms of overall subscribers they have 37% and in the segment of 3G/4G subscribers they have a very strong 46% share.

3.6.2 Subscription trends

The figure below shows how the number of subscribers for each mobile operator has grown between 2008 and 2013. We can see that:

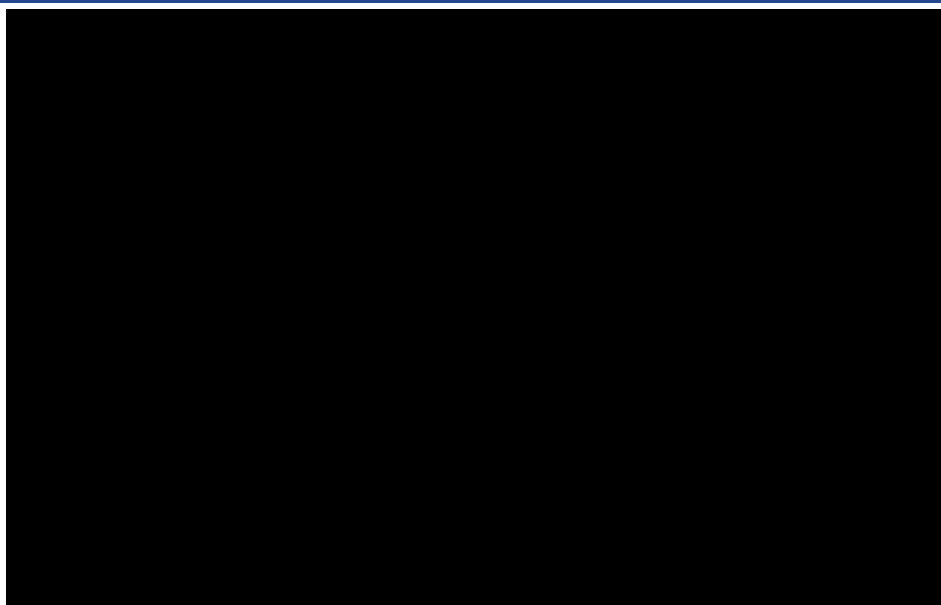
- In absolute terms subscriber growth is strongest for [REDACTED]
- Subscriber growth is weakest for [REDACTED], especially over the last 15 months.

Figure 7: Growth of subscribers by MNO



Source: OFCA

Figure 8: The changing shares of 3G/4G subscribers by operator



Source: OFCA

In the 3G/4G segment [REDACTED] that it has switched all of its customers to next generation service plans by [REDACTED]. We note however that:

- The allocation of subscribers between segments is open to judgement. According to OFCA,²⁸ a subscriber classified as a 3G subscriber may also use 2G services while a subscriber classified as a 4G subscriber may also use 3G and 2G services. For example HKT reported that 100% of its subscribers are in the 3G/4G category while [REDACTED]

- [REDACTED]

3.6.3 Subscription gain/loss per operator

It is also of interest to assess whether there are significant differences in subscription loss/gain across operators. Operators with lower switching numbers and operators gaining a larger share of new subscriptions would generally be considered to be in a stronger market position.

The table below provides an idea of operator-level trends in absolute value changes to subscriber base. As we mentioned this data is mostly attributable to overall increases in subscriber numbers

²⁸ According to OFCA, 4G customers refer to customers (1) who are registered as 4G customers or purchase pre-paid SIM cards for 4G services; or (2) who have used 4G frequencies to receive the public mobile services; 3G subscribers refer to customers (1) who are registered as 3G customers or purchase prepaid SIM cards for 3G services; or (2) who are not registered as 3G customers or purchase prepaid SIM cards for 3G services but have used 3G frequencies to receive the services.

but this is less so in the last few quarters where switching numbers seem to have increased relative to new subscriber numbers.

Table 5: Change in subscription numbers per operator, average net gains as a percentage of respective subscriber base

	Jun2008 to Sep2013 net gain, overall subscriptions	Sep2011 to Sep2013 net gain, overall subscriptions	Sep2011 to Sep2013 net gain, 3G/4G subscriptions
HTCL			
CSL			
SMT			
HKT			
CMHK			
MVNOs			
Average for all suppliers			

Source: OFCA, LE/Plum analysis

[Redacted text block]

[Redacted text block]

Table 6: 3G/4G absolute subscription gains versus overall gains

Operator	net 3G/4G subscription gains, Sep2011 to Sep2013, yearly average (000s)	net overall subscription gains, Sep2011 to Sep2013, yearly average (000s)
HTCL		
CSL		
SMT		
HKT		
CMHK		
MVNOs		
average total per year		

Source: OFCA, LE/Plum analysis

[Redacted text block] Section 3.6.2 provides more details.

[Redacted text block]

In terms of overall subscription numbers, [REDACTED]

[REDACTED]

[REDACTED]

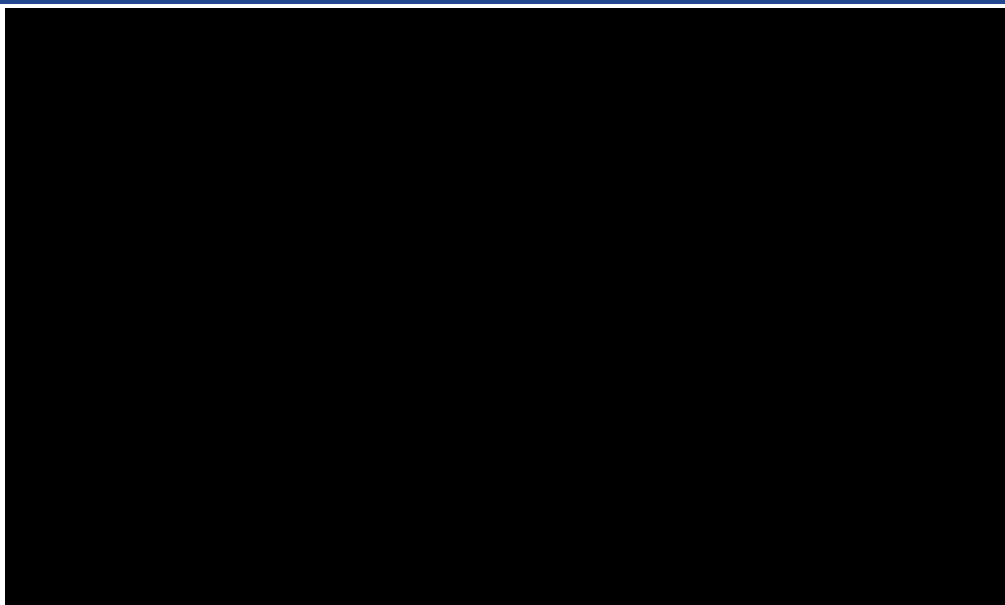
In combination these facts may raise concerns for the proposed transaction. If our interpretation is correct, HKT is acquiring a firm which has been in the recent period a very successful competitor. CSL's success may be attributable to a combination of aggressive pricing, quality of service and product innovation. An acquisition in such cases may lead to the removal from the market of a strong competitive force that may have been particularly successful in head-to-head competition against the acquirer. In such cases, the merger may remove an important competitive constraint on the acquirer.

3.6.4 Revenues and revenue trends

In this sub-section we report our findings in relation to revenue structure and ARPUs with a particular focus on how the merging parties compare.

As Figure 9 shows, the merging parties have quite different revenue structures.

Figure 9: Revenue structure in 2012



Source: OFCA data, LE/Plum analysis

[REDACTED] However we give this finding little weight in our analysis given that:

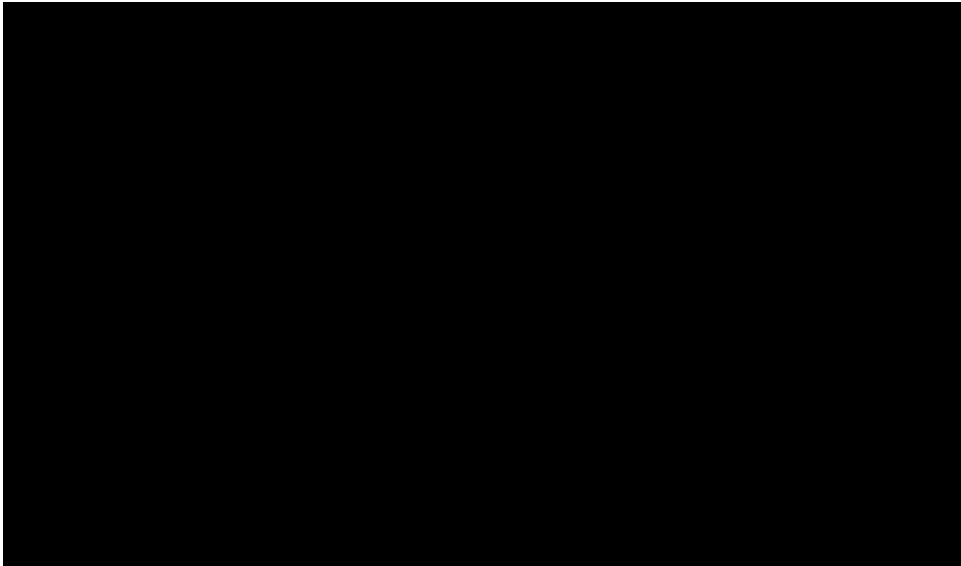
- The division of retail revenues by an operator between voice and non-voice services has a large subjective element, given that many subscribers pay for a bundle of the two services

- As Table 4 shows the data volumes for HKT subscribers are [REDACTED]
- The figures of HKT for 2012 are based on OFCA projections of total revenue from 2012 in which the weighting of each revenue component remains the same as that found in 2010. Please refer to Footnote 23 for details.

Figure 10 below shows how market shares by total revenue have changed over the last four years.

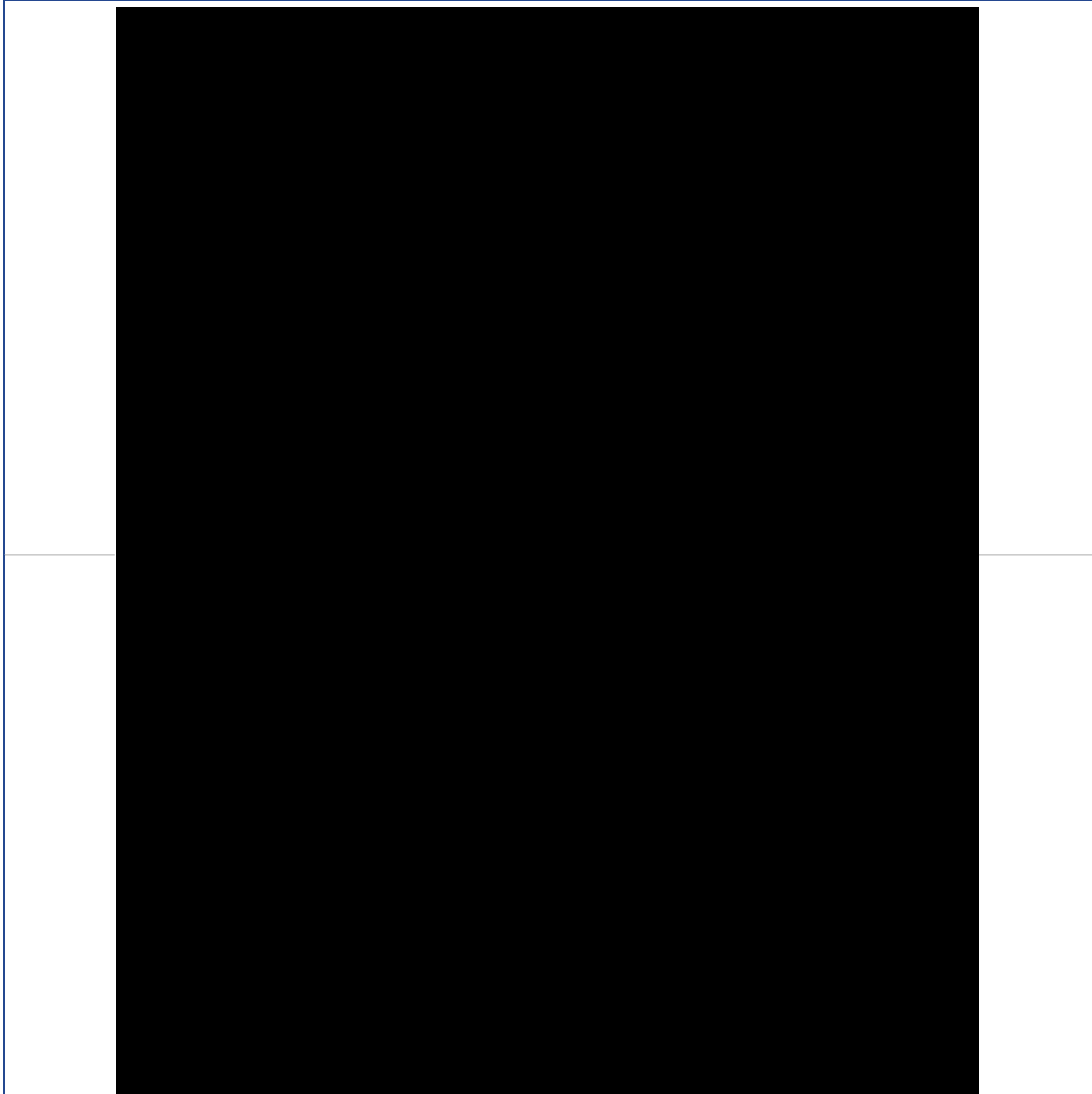
[REDACTED]

Figure 10: Revenue trends for the five operators



Source: OFCA

The next figure compares evolution of ARPUs per month under two different revenue measures – ARPU when using total revenues and ARPU when using total revenues less handset revenues.

Figure 11: ARPU by operator over time

Source: OFCA data and LE/Plum analysis

We can see that:

- [REDACTED]
- [REDACTED]
- The ARPUs of [REDACTED], are significantly different. There is however a slight convergence of ARPUs over the five-year period.

3.7 Conclusions on pre-merger market overview

Much of the evidence summarised above points to the conclusion that the retail mobile market in Hong Kong is very competitive. In particular we note that:

- There are five players – more than in most other countries – and market concentration, as measured by HHI, is one of the lowest in this sector in the world
- CMHK is potentially a maverick operator in the Hong Kong market now that it has 3G and 4G network capability
- Retail prices, end user switching costs and the profitability of the Hong Kong operators are low by international standards.

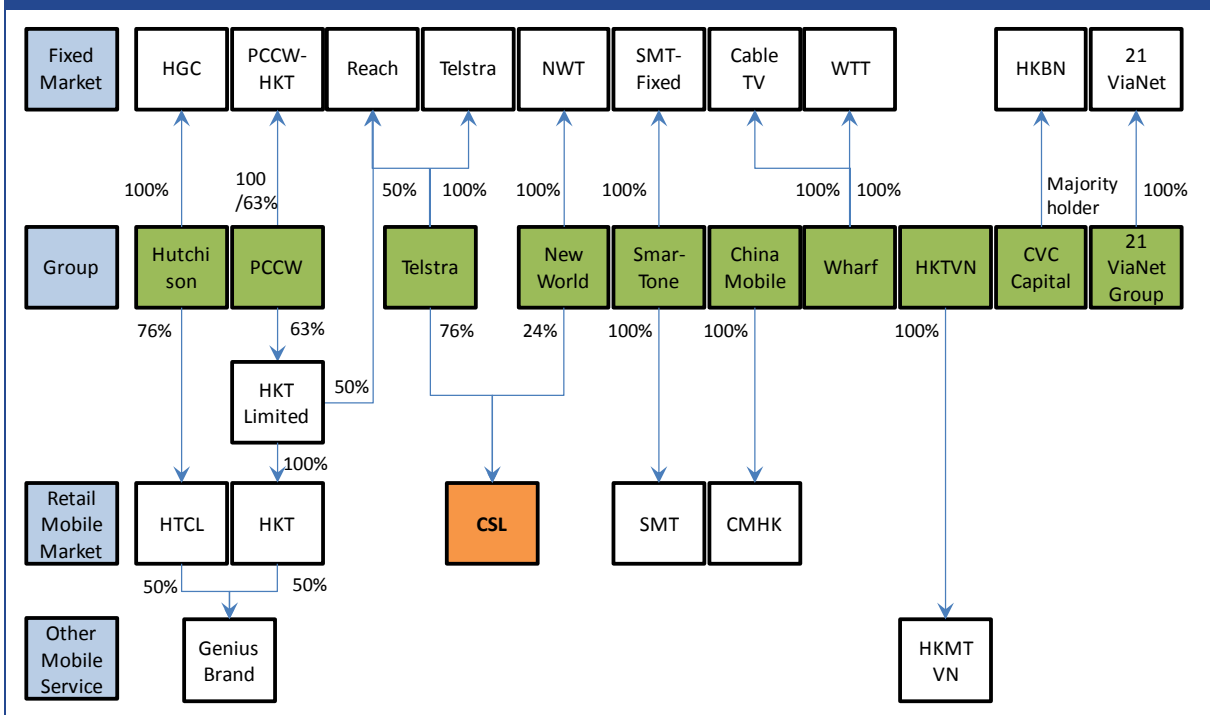
We note, however, that this, in itself, does not provide clear guidance as to the potential effects of the merger. The test of whether the merger should be allowed rests on assessing the likelihood that the merger results in a substantial lessening of competition (SLC). This may take place even if post-merger Hong Kong is still relatively competitive when compared to other markets. In particular, an SLC is likely to occur if the merging parties are close competitors. We assess this effect in the next chapter.

3.8 Market structure post-merger

This section looks at market structure post-merger and considers what impact the merger would have on various measures of market concentration.

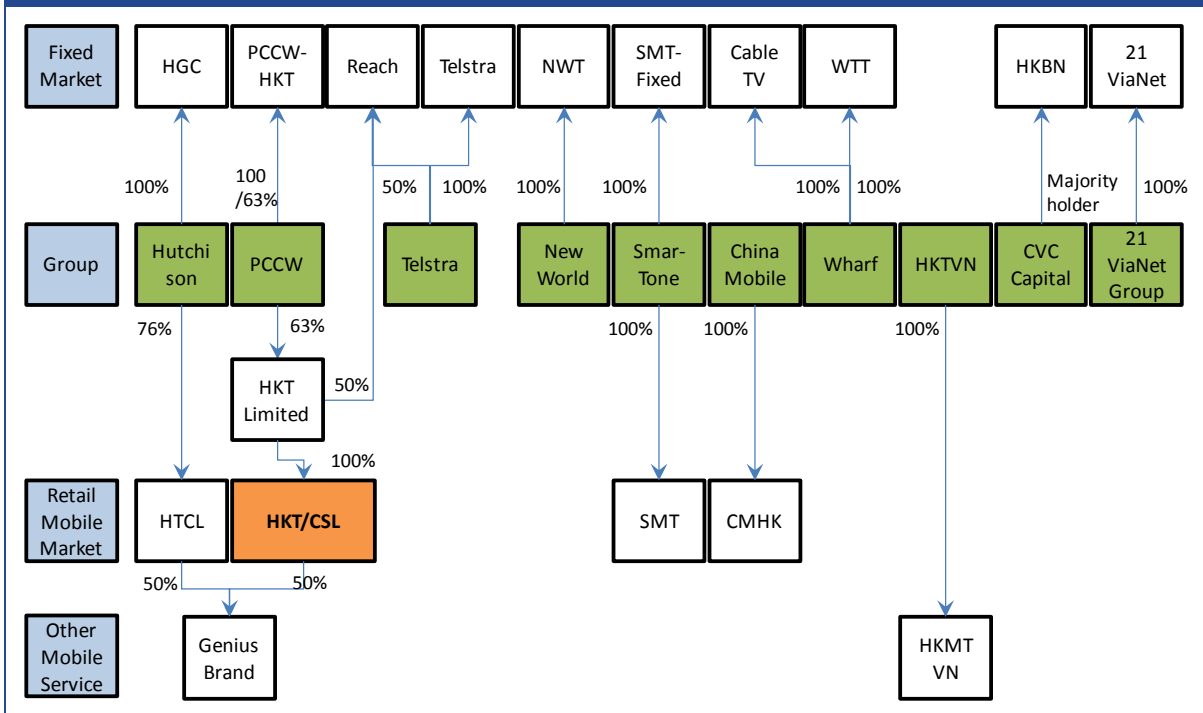
The impact of the merger on ownership is summarised below.

Figure 12: Ownership before proposed merger



Source: OFCA

Figure 13: Ownership after proposed merger



Source: OFCA

3.8.1 Market shares

Table 7 shows various measures of revenue market share for the five operators and indicates the trend in the total revenue market share since 2008.

Table 7: Parties' revenue market shares by revenue measures – 2012

Operator	Voice revenues	Non-voice revenues	Total retail revenue minus handsets	Total retail revenues	Trend in total revenues since 2008 ²⁹
CMHK					
CSL					
HKT ³⁰					
HTCL					
SMT					
CSL+HKT	33.2%	28.1%	35.6%	26.1%	

Source: OFCA data, LE/Plum analysis

We can see that:

²⁹ The increase or decline in total revenue per operator relative to the industry average

³⁰ According to OFCA, 2010 is the most recent audited figure for HKT's total revenue with detailed breakdowns of its various components. Thus, the breakdown of HKT's total revenue in 2011 and 2012 used in this report was calculated on the basis that the weighting of each of the constituent component of HKT's total revenue is the same as that found in 2010. Total revenue figures for 2011 and 2012 are taken from HKT's respective Annual Reports.

- The revenue market share for the merged entity is between 26% and 36%, depending on the revenue measure used
- It is highest when we look at retail revenues excluding handset sales
- It is smallest when we look at total retail revenues. Note that, on this measure, [REDACTED]
- The combined revenue share of the two merging parties has [REDACTED]. See also Section 3.6.4.

Table 8 then shows a similar table for market share by subscriber numbers. Here we can see the market shares for the merged entity is 37% for all subscribers or 46% for 3G/4G subscribers. Note however our reservations about using 3G/4G subscriber numbers as discussed in Section 3.6.2.

Operator	% of all subscribers	% of 3G/4G subscribers
CMHK	[REDACTED]	[REDACTED]
CSL	[REDACTED]	[REDACTED]
HKT	[REDACTED]	[REDACTED]
HTCL	[REDACTED]	[REDACTED]
SMT	[REDACTED]	[REDACTED]
MVNOs	[REDACTED]	[REDACTED]
Total	100%	100%
CSL + HKT	36.8%	45.9%

Source: OFCA data, LE/Plum analysis

3.8.2 The impact of the merger on HHI

The figure below shows the impact of the merger on HHIs using various measures of market share for 2013 (subscribers and spectrum) or for 2012 (revenue measures).

Measure of market shares	HHI pre-merger	HHI post-merger	Increase in HHI
All subscribers (9/13)	1,924	2,537	612
3G/4G subscribers only (9/13)	2,143	3,168	1,025
Total revenues (2012)	2,548	2,829	280
Retail Revenues - ex handsets (2012)	2,227	2,786	559
Spectrum holdings (9/13)	2,082	2,782	700

Source: LE/Plum analysis of OFCA data

We have checked that the proposed transaction is not covered by the safe harbour provisions in the Merger Guidelines. In paragraphs 2.7 to 2.12 the guidelines indicate that an in-depth analysis would be unlikely to be pursued if either one of two safe harbour tests is met.

The first test provides that an in-depth analysis would be unlikely to be pursued if:

- a) the combined market share of the four largest firms (CR4) is less than 75% and the merged entity has a market share of less than 40%; or
- b) where CR4 is more than 75% and the merged entity has a market share of less than 15%.

As can be seen from Table 7 and Table 8, CR4 in this case is greater than 75% and the proposed merged entity has a market share of significantly greater than 15% and so the proposed transaction does not fall within the scope of the first safe harbour test.

The second test provides that an in-depth analysis would be unlikely to be pursued if:

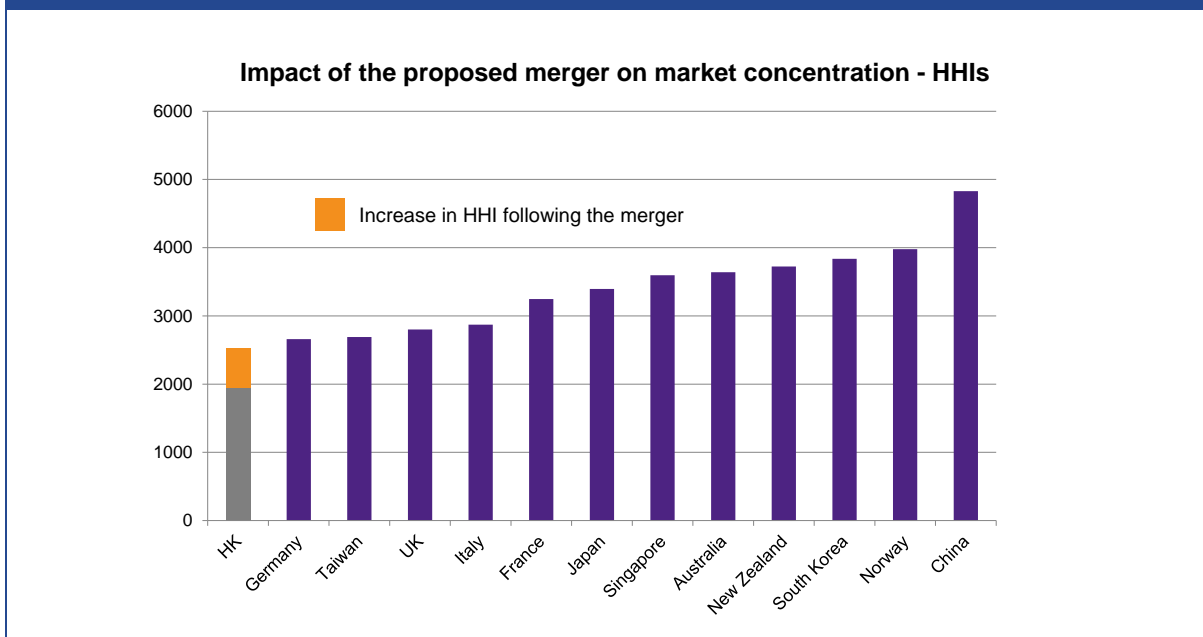
- a) Post-merger HHI is no greater than 1,000
- b) Post-merger HHI is between 1,000 and 1,800 but the merger results in an increase of HHI of less than 100 points
- c) Post-merger HHI is greater than 1,800 but the merger results in an increase of HHI no greater than 50 points.

As Table 9 clearly indicates, the proposed transaction does not fall within the second safe harbour provision in any of the alternative ways in which HHI might be calculated.

Further analysis of Table 9 indicates that:

- The merger increases the HHI of market concentration using total subscribers significantly – from 1,924 to 2,537. But this is still low compared with market concentrations in other developed countries in this sector - as shown in the next figure
- When measured in terms of revenues (with or without net handset revenues) or in terms of spectrum holdings the post-merger HHI is around 2,800 – about 10% above the post-merger subscriber HHI
- Using 3G/4G subscriber market shares, the post-merger HHI shows a very substantial increase in market concentration. But it is important to take account of the fact that [REDACTED] [REDACTED] [REDACTED]. If we assume, as seems reasonable on the basis of current trends, that [REDACTED] [REDACTED] by 2016, then the post-merger HHI falls from 3,168 to around 2,600.
- Across the various alternative HHI measures, the increase in HHI brought about by the merger ranges between 200 and 1000. This is well above the 50 points increase limit of the second safe harbour, which is applicable if the post-merger HHI exceeds 1,800.
- It is therefore concluded that the proposed merger does not fall under any of the “safe-harbour” conditions set out in the Guidelines.

Figure 14: HHIs – Hong Kong vs other developed countries



Source: Merrill Lynch Mobile Matrix plus OFCA

Based on the subscriber HHI measure, it appears that the merger would not lead to levels of market concentration that are high by international standards in this sector, though the post-merger market would be described as highly concentrated by the Hong Kong merger guidelines since the HHI is greater than 1800. This is important to bear in mind although, clearly, the test of whether the merger should be allowed rests on assessing the likelihood that the merger results in a substantial lessening of competition. This may take place even if post-merger Hong Kong is still relatively competitive when compared to other markets in the same sector.

3.9 Conclusions on the impact of the merger on market structure

The merger would have a significant impact on the structure of the market. We estimate that:

- The merged entity would hold a 37% share of the market by subscribers, making it [redacted] post-merger
- The merged entity would start from a strong position in several important market segments: it holds 46% of 3G/4G subscriptions, [redacted] of post pay subscriptions, [redacted] of mobile data traffic, and significant positions in terms of spectrum and network capacity which are discussed in detail in a separate chapter.
- However, the merged entity would hold only a [redacted] share of the market by total revenues, making it [redacted] of the four operators in Hong Kong post-merger
- Market concentration as measured by HHIs would increase from 1924 to 2537 if measured by subscribers or from 2548 to 2829 if measured in terms of total revenues. Thus the post-merger HHI by subscribers remains lower than virtually any other developed country.

It therefore cannot be ruled out that the merger gives a very strong market position to HKT/CSL in some important market segments. In order to assess this potential effect we need to consider the possibility that other competitors in the market will be able to exert a strong competitive constraint on the merged entity. An important requirement for that to be possible is that

competitors have adequate network capacity in both the near term and the medium term. This is the focus of our analysis in the next Chapter.

Chapter 5 then considers in detail the extent to which HKT and CSL are close competitors and, in particular, the strength of the competitive constraints that either one exerts on the other. We then consider the potential strength of other countervailing forces in Chapter 7.

4 The impact of the merger on the network capacity of the operators

4.1 Introduction

In this chapter we consider the effect of the merger on each mobile operator's network capacity and the extent to which changes in capacity created by the merger may be expected to impact on competition within the market.

For each MNO, network capacity is a (roughly multiplicative) function of the amount and type of spectrum held and of the number of its transmission sites. As such, the merger, through the combination of two MNO networks, would increase substantially the total radio access network (RAN) capacity available to the merged HKT/CSL - considerably more than the simple sum of the network capacities of the two firms operating separately. HKT/CSL could, for example, upgrade the majority of the operator sites which it inherits on merger to use all of its combined spectrum holdings at relatively low cost. As a result the merged entity might hold a very substantial share of overall radio access network capacity in Hong Kong for a modest investment. Given that we expect to see strong demand for mobile data services over the next few years, this increase in RAN capacity could give the merged entity a significant competitive advantage over its rivals and would reinforce any substantial lessening of competition effect identified in any telecommunications market.

In assessing the network capacity effects of the merger we need to consider both long-term and short-term issues. In the **long term** we can focus on demand for data and assume that the bulk of each operator's spectrum is reformed for 4G services. In these circumstances we need to consider:

- The effective spectrum holdings of each operator – both now and in 2016 after the reassignment of the 2.1 GHz spectrum and the merger
- The number of base stations sites owned or leased by each operator
- The access of each mobile operator to public Wi-Fi services which enable Wi-Fi offload of mobile data traffic.
- The extent to which each operator's share of the mobile data market might change over the next few years.

We consider each of these factors separately below and then consider their combined impact on the balance between RAN capacity and demand following the merger.

In the **short term** we need to look at any shortfall in RAN capacity which might create competitive problems immediately following the merger. This analysis is set out in Section 4.8. In conducting this analysis we do not, as some respondents to the consultation on proposed merger have suggested, look at the balance of spectrum holdings in each frequency band. Already different operators have reformed their existing spectrum at different frequencies in different ways from 2G to 3G and 4G technologies. Instead we look at whether there are short-term network capacity problems in terms of competitiveness in the provision of voice services, launching 4G services, and providing good in-building coverage.

4.2 The effective spectrum holdings of each operator

Based on the analysis set out in Annex 1, we estimate that the effective pre-merger spectrum holdings of the five operators are as set out below.

Table 10: Effective spectrum holdings pre-merger								
Operator/B and	MHz of effective spectrum						% holding	
	900 MHz	1800 MHz	2.1 GHz	2.3 GHz	2.6 GHz	Total	all spectrum	< 1GHz
CMHK	0.0	26.4	0.0	30.0	40.0	96.4	18%	0%
CSL	16.6	46.4	29.6	0.0	40.0	132.6	25%	24%
HKT ³²	0.0	26.4	29.6	0.0	20.0	76.0	14%	0%
HTCL	26.6	23.2	29.6	30.0	20.0	129.4	24%	38%
SMT	26.6	26.4	29.6	0.0	20.0	102.6	19%	38%
No use for mobile			30.0			30.0		
Total	69.8	148.8	148.4	60.0	140.0	567.0		
Total useful	69.8	148.8	118.4	60.0	140.0	537.0	100%	100%

Source: OFCA

The 30 MHz of 2.1 GHz spectrum which is described as of *no use for mobile services* consists of:

- Four lots of 5 MHz of unpaired spectrum currently held by the four 3G operators³³
- 10 MHz of unpaired spectrum (at 2010 to 2020 MHz) which is currently not assigned to any mobile operator.

4.3 Future changes to spectrum holdings

These spectrum holdings will change following the merger and the auction to reassign 2.1 GHz spectrum, the rules for which were recently announced by the CA. There is some uncertainty as to what these spectrum holdings will be in that:

- The auction rules were set in the pre-merger market situation of five existing independent mobile network operators
- There is uncertainty as to how strongly the different operators will bid for the reassigned 2.1 GHz spectrum. For example it is possible that, by 2016, CMHK may decide that its 4G spectrum, along with its 3G capacity sharing agreement with HKT is sufficient to meet its requirements for data services.

To take account of these uncertainties we assess spectrum holdings (and resulting RAN capacity) under four scenarios:

³² We assume that the 40MHz spectrum in 2.5/2.6GHz held by Genius Brand is split 50:50 between HKT and HTCL

³³ SMT, CSL, HKT and HTCL

- The **retention** scenario of Table 11 in which the merged entity retains the existing 2.1 GHz spectrum of HKT and CSL. This is the baseline scenario from which to assess the impact of the other three scenarios
- The **spectrum cap** scenario of Table 12 in which we assume that the rules of the reassignment auction restrict the merged entity to 2x20 MHz of 2.1 GHz spectrum without the need for any merger remedies. The reassigned spectrum is then divided roughly equally among the three remaining players³⁴
- The **voluntary undertaking** scenario of Table 13 in which in which the merged entity is held to its proposed voluntary undertaking on 2.1 GHz spectrum and the auctioned 2.1 GHz spectrum is assigned roughly equally to the three other operators
- The **further divestment** scenario of Table 14, in which the merged entity gives up both 2.1 GHz spectrum, as defined in the voluntary undertaking scenario, and 2x10 MHz of 1800 MHz spectrum - where the merged entity holds the bulk of its spectrum. Again the reassigned spectrum is split roughly equally between the other three operators. This scenario is designed to explore the impact of some of the remedies suggested by respondents to the consultation on the proposed merger.

In all four scenarios we assume that the 30 MHz of unassigned spectrum which is of “no use” remains unused.

Table 11: Spectrum holdings – retention scenario

Operator/B and	MHz of effective spectrum						% holding	
	900 MHz	1800 MHz	2.1 GHz	2.3 GHz	2.6 GHz	Total	all spectrum	< 1GHz
CMHK	0	26.4	0	30	40	96.4	18%	0%
HKT/CSL	16.6	72.8	59.2	0	60	208.6	39%	24%
HTCL	26.6	23.2	29.6	30	20	129.4	24%	38%
SMT	26.6	26.4	29.6	0	20	102.6	19%	38%
Total useful	69.8	148.8	118.4	60	140	537	100%	100%
HKT/CSL %	24%	49%	50%	0%	43%			

Source: OFCA and LE/Plum analysis

Table 12: Spectrum holdings – spectrum cap scenario

Operator/B and	MHz of effective spectrum						% holding	
	900 MHz	1800 MHz	2.1 GHz	2.3 GHz	2.6 GHz	total	all spectrum	< 1GHz
CMHK	0	26.4	13	30	40	109.4	20%	0%
HKT/CSL	16.6	72.8	40	0	60	189.4	35%	24%
HTCL	26.6	23.2	32.7	30	20	132.5	25%	38%
SMT	26.6	26.4	32.7	0	20	105.7	20%	38%
Total useful	69.8	148.8	118.4	60	140	537	100%	100%
HKT/CSL %	24%	49%	34%	0%	43%			

Source: OFCA and LE/Plum analysis

³⁴ This is clearly simplifying assumption. In practice the spectrum would, almost certainly, be reassigned in 2x5 MHz lots and some bidding operators might gain a greater share than assumed here. But our calculations suggest that a reassignment which attempts to take account of these factors makes no material difference to our analysis

Table 13: Spectrum holdings – voluntary undertaking scenario

Operator/B and	MHz of effective spectrum						% holding	
	900 MHz	1800 MHz	2.1 GHz	2.3 GHz	2.6 GHz	total	all spectrum	< 1GHz
CMHK	0.0	26.4	17.0	30.0	40.0	113.4	21%	0%
HKT/CSL	16.6	72.8	29.6	0.0	60.0	179.0	33%	24%
HTCL	26.6	23.2	35.9	30.0	20.0	135.7	25%	38%
SMT	26.6	26.4	35.9	0.0	20.0	108.9	20%	38%
Total useful	69.8	148.8	118.4	60.0	140.0	537.0	100%	100%
HKT/CSL %	24%	49%	25%	0%	43%			

Source: OFCA and LE/Plum analysis

Table 14: Spectrum holdings – further divestment scenario

Operator/B and	MHz of effective spectrum						% holding	
	900 MHz	1800 MHz	2.1 GHz	2.3 GHz	2.6 GHz	total	all spectrum	< 1GHz
CMHK	0.0	32.4	17.0	30.0	40.0	119.4	22%	0%
HKT/CSL	16.6	52.8	29.6	0.0	60.0	159.0	30%	24%
HTCL	26.6	31.2	35.9	30.0	20.0	143.7	27%	38%
SMT	26.6	32.4	35.9	0.0	20.0	114.9	21%	38%
Total useful	69.8	148.8	118.4	60.0	140.0	537.0	100%	100%
HKT/CSL %	24%	35%	25%	0%	43%			

Source: OFCA and LE/Plum analysis

4.4 The number of BTS sites used by each operator

We have analysed the database supplied by OFCA on the location, operator, technology and power of all base stations operating at 1 Watt³⁵ or more in Hong Kong. Based on this analysis we estimate that the number of base stations and base station sites as shown in Table 15.

Table 15: Number of BTS and operator sites by operator

MNO	2G base stations	3G base stations	4G base stations	Number of BTS	Number of base station sites	Base stations per operator site
CMHK						
CSL						
HKT						
HTCL						
SMT						
Total/average						

Source: OFCA database and LE/Plum analysis

³⁵ A base station is usually classified as a macro-cell if its power exceeds 200 mWatt

The number of base station sites is estimated by counting the number of separate physical locations at which each mobile operator uses one or more BTS. We use street addresses rather than the coordinates in the database to determine where BTSs are located separately. This approach gives us estimates which are broadly consistent with those provided by the mobile network operators.³⁶ Using this method, we estimate that there are [REDACTED] base station sites set up by HKT and CSL that are in sufficiently close proximity that we can treat them as if they are collocated. Please note that:

- The sites used for mobile TV and CDMA 2000 services are excluded from our analysis
- In compiling this table we have assumed that the Genius Brand [REDACTED]

The figure shows that on average each base station site is used by [REDACTED] base stations. This reflects the fact that operators can use a site more efficiently by placing more than one base station there. This lowers the incremental cost per base station

4.5 Public Wi-Fi access points

In our analysis of potential entry in Chapter 7 we conclude that all of the rivals to the merged entity will have access to roughly the same number of public Wi-Fi access points as the merged entity. Given this conclusion we do not consider this aspect of network capacity further.

4.6 Demand for RAN capacity

Long-term demand for RAN capacity by each operator is unlikely to reflect existing demand patterns given:

- The move to data centric services. This suggests that we should compare long-term RAN capacity with data market shares rather than with voice or subscriber market shares for each operator
- The rapidly changing position of [REDACTED]
- “Regression to the norm” effects in which current differences between operators in the amount of data generated per subscriber reduce over time. [REDACTED]
[REDACTED] It is likely that these differences will shrink as smart phones become the norm and other operators reduce the early lead in data services [REDACTED].

Table 16 presents three measures of long-run relative demand for RAN capacity. The first two simply measure current market shares by subscriber³⁷ and data volumes. The third takes account of the effects listed above to estimate relative long-term demand for RAN capacity on the assumptions that:

³⁶ CMHK, CSL, HKT and HTCL had provided OFCA with the number of their respective base station sites.

³⁷ Assuming that MVNO subscribers are distributed among mobile operators in proportion to their own subscriber base

- The subscriber market shares of each operator remain unchanged
- The amount of data generated by the average subscriber of each operator converges until it is equal with one exception
- The average [REDACTED] generates [REDACTED] traffic than subscribers to other operators.

Table 16: Relative long term demand for RAN capacity

MNO	% share of demand		
	2013 subscribers	2013 data traffic	Long term data traffic
CMHK	[REDACTED]	[REDACTED]	[REDACTED]
HKT/CSL	[REDACTED]	[REDACTED]	[REDACTED]
HTCL	[REDACTED]	[REDACTED]	[REDACTED]
SMT	[REDACTED]	[REDACTED]	[REDACTED]
	100%	100%	100%

Source: OFCA and LE/Plum analysis

We can see that the expected demand for RAN capacity varies considerably depending on which measure we choose. In assessing MNO spectrum requirements, so as to match demand to capacity, we believe that the 2013 data traffic is an unsatisfactory measure of long-term demand for RAN capacity but that the other two measures are both relevant. We think it is appropriate to give the long-term data shares considerable weight.

4.7 The combined effect of site numbers and spectrum holdings on network capacity

We can estimate the long-term radio access network (RAN) capacity of each operator - on the assumption that all spectrum can eventually be re-farmed for 4G services - by the expression:

$$\text{Long-term RAN capacity} = \text{spectrum holding} \times \text{number of operator sites} \times \text{utilisation factor}$$

where the utilisation factor is:

- Equal to 1 for the rivals of the merged entity (and for CSL and HKT pre-merger)
- Less than 1 for the merged entity. The utilisation factor would be 1 if the sites of HKT and CSL were located in perfectly complementary places so as to provide optimal radio access network planning for the merged entity in the situation in which the merged entity wanted to maximise the RAN capacity from all its sites. Such a value is highly unlikely.
- Greater than [REDACTED]³⁸. The utilisation factor would equal [REDACTED] if the existing locations of CSL and HKT sites were almost identical and, as a result, [REDACTED] sites were redundant and did nothing to increase the RAN capacity of the merged entity. Such a value might also reflect the situation in which HKT decided to decommission [REDACTED] sites following the merger.

³⁸ The number of sites operated by HKT divided by the number of sites operated by CSL and HKT less any overlap

Table 17 through Table 19 show the long-term share of RAN capacity for the four spectrum scenarios under three assumptions:

- That the merged entity is able to make an 80% utilisation of the operator sites it inherits on merger. This is a reasonably likely outcome
- That the merged entity is able to make 100% utilisation of the operator sites it inherits on merger. This is the best possible case for the merged entity and is unlikely
- That the merged entity is able to make a [REDACTED] utilisation of the operator sites it inherits on merger. This is the minimum utilisation for the merged entity. It also represents a situation in which the merged entity decommissions all [REDACTED].

The three tables each compare long-term share of RAN capacity with the market share estimates of Section 4.6 above.

Table 17: RAN capacity with utilisation of 80% by the merged entity

MNO	Share of total RAN cap for scenario				Market share measure		
	Retention	Spectrum cap	Voluntary undertaking	Further divestment	2013 subs %	2013 data %	Long term data?
CMHK	[REDACTED]						
HKT/CSL	[REDACTED]						
HTCL	[REDACTED]						
SMT	[REDACTED]						
	100%	100%	100%	100%	100%	100%	100%

Source: LE/Plum analysis

Table 18: RAN capacity with utilisation of 100% by the merged entity

MNO	Share of total RAN cap for scenario				Market share measure		
	Retention	Spectrum cap	Voluntary undertaking	Further divestment	2013 subs %	2013 data %	Long term data?
CMHK	[REDACTED]						
HKT/CSL	[REDACTED]						
HTCL	[REDACTED]						
SMT	[REDACTED]						
	100%	100%	100%	100%	100%	100%	100%

Source: LE/Plum analysis

Table 19: RAN capacity with utilisation of [REDACTED] by the merged entity

MNO	Share of total RAN cap for scenario				Market share measure		
	Retention	Spectrum cap	Voluntary undertaking	Further divestment	2013 subs %	2013 data %	Long term data?
CMHK	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
HKT/CSL	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
HTCL	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
SMT	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
	100%	100%	100%	100%	100%	100%	100%

Source: LE/Plum analysis

The three tables each compare long-term share of RAN capacity with the current (2013) market shares by subscribers and data traffic and with likely data traffic shares in the long-term³⁹. If we focus on Table 17, the most likely outcome, and compare RAN capacity shares with current market shares and long-term data traffic shares we find that:

- CMHK [REDACTED]
- HTCL has a [REDACTED]
- [REDACTED] SMT is [REDACTED] is likely to have a surplus of RAN capacity in the long-term.
- The merged entity has excess long-term data capacity under the spectrum retention scenario. This could give it a significant competitive advantage over rivals and lead to a weakening of competition. In a market where demand for data is rising rapidly, excess capacity will enable the merged entity to offer a superior quality of service to that of its rivals. A rival could match the quality of service by building more base station sites. But this would then raise its cost base. Another implication is that, with excess capacity in the hands of the merged entity, rivals of the merged entity may be unable to react to any price increase attempt on the part of the merged entity through increase in output because of the capacity constraint.
- Under the spectrum cap, voluntary undertaking, and further divestment scenarios the spectrum held by the merged entity is reduced and the share of RAN capacity of the merged entity also shrinks.

We cannot be sure, without doing very detailed radio network planning, what utilisation of the CSL and HKT operator sites will be possible for the merged entity. So Figure 15 compares the share of RAN capacity and likely demand for RAN capacity for the merged entity using values of the utilisation factor which span the range of possibilities. To indicate the importance we place on long-term data share, we have marked the *2013 subscriber share* as a dotted line.

³⁹ [REDACTED]

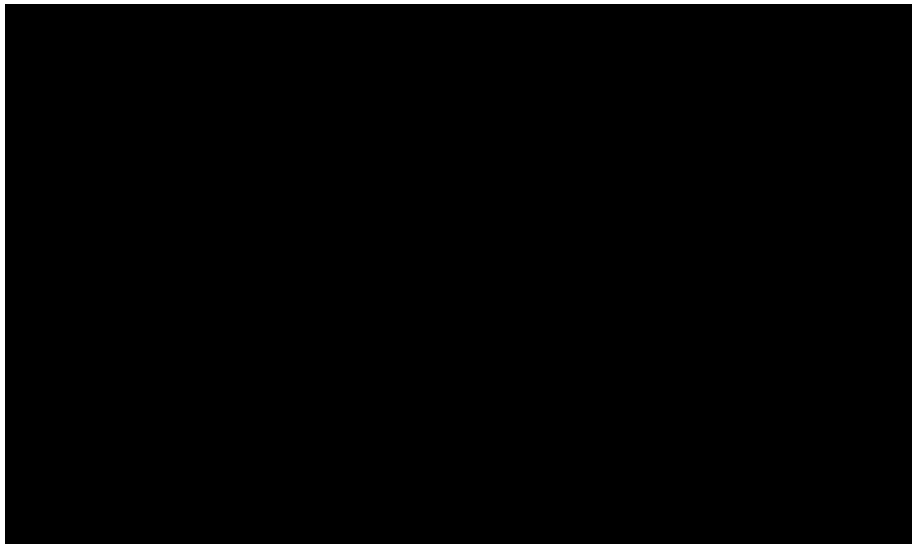
We can see that:

- The retention scenario leads to the merged entity gaining a significant excess share of RAN capacity relative to the likely demand by subscribers
- The further divestment scenario leads to a likely shortfall in shares of RAN capacity for the merged entity. Implementing this scenario runs the risk of leaving the merged entity with too little spectrum to compete effectively in the market
- The spectrum cap scenario leaves the merged entity with an excess of long-term data capacity
- The voluntary undertaking scenario may also lead to a small excess of long-term data capacity. But, at the same time, it comes close to matching the merged entities share of RAN capacity to the 2013 subscribers share.

Based on this analysis we conclude that:

- The retention scenario leaves the merged entity with too much spectrum for effective competition and should be avoided
- The further divestment scenario runs the risk of leaving the merged entity with too little spectrum to compete effectively
- Of the two remaining scenarios, the voluntary undertaking offers the best balance between future shares of RAN capacity and likely future demand

Figure 15: Share of RAN capacity vs market share for the merged entity



Source: LE/Plum analysis

In addition we note that:

- The long-term capacity effects analysed above consider only the RAN capacity of the mobile networks. In practice we also need to consider by the growing ability of subscribers to offload data traffic to the public Wi-Fi services operated by fixed network operators and other independent Wi-Fi service providers. Growing use of Wi-Fi offload offers another way of

dealing with data traffic, and allows operators with a shortage of RAN capacity to minimise quality of service differences between its own data services and those of rivals with greater RAN capacity by bundling their mobile services with public Wi-Fi services

- The merged entities rivals could, if they wished, share operator sites to increase their RAN capacity for a relatively modest investment.

These additional points reinforce our finding that the voluntary undertaking offered by HKT looks like a sensible way to ensure that the merged entity has sufficient network capacity in the long-term without giving it a substantial competitive advantage over its rivals.

One of the respondents to the consultation on the proposed merger has suggested that, as a pre-condition for the merger, HKT should be required to return 2x5 MHz of the 2x7.5 MHz of 800 MHz spectrum it currently uses to provide CDMA services in Hong Kong. It argues that this spectrum is lightly used, that demand is declining, and that it could be better used by one of HKT's rivals to provide (say) 4G services. There may be public interest arguments for reaching such an outcome. But the scope of our merger analysis is to determine whether this proposal would help to deal with a substantial lessening of competition. Our assessment is that:

- The voluntary undertaking scenario on its own is sufficient to balance network capacity so as to enable effective competition following the merger;
- Adding a requirement for HKT to return 2x5 MHz of CDMA spectrum goes beyond what is required to deal with the imbalances in network capacity created by the merger;
- We therefore do not consider this possibility further.

4.8 Spectrum holdings and short-term capacity constraints on competition

How would changes in spectrum holdings created by the merger impact on competition in the voice and data sub-markets in the short term, e.g. prior to the 2.1 GHz reassignment auction? There are four issues to consider here.

First does the merger give the merged entity any short-term advantage in its ability to rollout 4G data services - which offer higher bandwidth at lower unit costs than 3G services? In our view it does not. All of the rivals to the merged entity have substantial spectrum at 2.3 and 2.6 GHz with which to launch 4G services. For example the merged entity would have a 30% share of 4G spectrum at 2.3 and 2.6 GHz combined – well below either [REDACTED] or [REDACTED]. So the main issue here is the impact of the merger on long-term data capacity. This is analysed in the previous section.

Secondly does the merger give the merged entity an increase in spectrum holdings which would give it a significant competitive advantage over its rivals in the voice sub-market? In the long-term mobile networks will carry voice as simply another data application which generates modest data volumes and the impact of the merger on long-term data capacity is dealt with in the previous section. So this is a short term issue. Undoubtedly the merger substantially increases the supply

of spectrum which the merged entity can use for voice services⁴⁰ in the short term, as Table 20 illustrates.

Table 20: Market shares for the merged entity in the voice market

Measure of voice market share	% for merged entity
Subscribers	[REDACTED]
Voice minutes April 2013	[REDACTED]
Spectrum at 850 and 1800 MHz	41%

Source: OFCA, LE/Plum analysis

We can see that:

- The increase in voice spectrum is matched by an increase in the number of subscribers using the spectrum
- The new voice spectrum market share following the merger is [REDACTED] the merged entities market share by voice minutes. However demand for voice services is falling at [REDACTED] per annum.

So it seems unlikely that the additional capacity created by the merger would lead to any competitive advantage for the merged entity.

Thirdly does the merged entity’s share of the 2.1 GHz spectrum (used for 3G services) in the period between the merger and the reassignment auction give it such an advantage in terms of 3G network capacity as to raise serious concerns?

Following the merger, and prior to reassignment of the 2.1 GHz spectrum, the merged entity will hold 50% of the 2.1 GHz spectrum. In considering whether this holding is of serious concern we need to consider three factors:

- We can expect the mobile sector in Hong Kong to invest in 4G rather than 3G capacity from now on, given that 4G offers higher broadband speeds at lower unit costs. The merged entity's rivals have adequate assignment of spectrum here
- HKT has entered into an agreement to share its 3G capacity with CMHK. We do not know the maximum percentage of this capacity which is available to CMHK (because we do not know the 3G capacity of HKT's network). [REDACTED]
- The period between completion of the merger and the spectrum reassignment is relatively short – around two years.

Given this analysis we conclude that delaying the transfer of 2x15 MHz of 2.1 GHz spectrum from the merged entity until the reassignment auction would not raise serious concerns.

⁴⁰ Counting spectrum held at 850 and 1800 MHz as voice spectrum in the short term

⁴¹ Assuming that MVNO subscribers are distributed among mobile operators in proportion to their own subscriber base

Finally does the merger give the merged entity any short-term advantage in its ability to offer good in-building coverage through use of sub-1 GHz spectrum? Again we do not see any competition issues arising here. The merger does not lead to an excessive share of sub-1 GHz spectrum going to the merged entity. Indeed the reverse is true. The merged entity would hold 24% of sub-1 GHz spectrum compared with 38% for HTCL and SMT. We note CMHK's weakness here in that it holds no sub-1 GHz spectrum at all. But this is a pre-existing situation, rather than one created by the merger.

4.9 Conclusions on network capacity for competitors

The merger causes no major concerns in the short term about the ability of rivals to compete with the merged entity in terms of voice service capacity or ability to launch 4G services. This conclusion holds so long as HKT's network capacity sharing agreement with CMHK and the merged entity's network access agreement with MVNOs continue to be in force post-merger and prior to the 3G spectrum assignment in 2016.

There are however concerns that the long-term data capacity of the merged entity would be high enough to give it a significant competitive advantage over its rivals – especially given that demand for data services is growing rapidly. The extent to which long-term data capacity causes concerns depends upon the extent to which the spectrum holdings of the merged entity are restricted. Based on our analysis we conclude that:

- Both the **retention** and the **further divestment** scenarios are likely, for different reasons, to reduce competition and should be avoided
- Of the two remaining scenarios, the **voluntary undertaking** offers the best balance between future RAN capacity and likely future demand

However in judging what, if any, spectrum measures should be applied before approving the merger, we also need to consider:

- The effect of the merger on the likelihood of unilateral and coordination effects following the merger. This is the subject of Chapters 5 and 6
- The countervailing competitive constraints which the merged entity would face. This is the subject of Chapter 7.

Having analysed these effects we then develop proposals for spectrum remedies in the final chapter.

5 Quantification of the unilateral effects of the merger

5.1 Introduction

In this chapter we consider the unilateral effects of the merger on competition. We assess:

- The closeness of competition between CSL and HKT – we look at estimates of cross price elasticity, correlation in market share movements and diversion ratios
- The extent to which the elimination of this competition, following the merger, would lead to upward pricing pressure

5.2 Framework of analysis

If a merger is to create significant unilateral effects then the products offered by the merging parties must be viewed as close substitutes to each other by a significant group of customers. It is not however necessary for this group to constitute a majority of the total customers in the relevant market for the effect of the merger to be substantial.

This section considers a wide range of elements that may assist in determining whether the two merging parties are close competitors to such an extent as to raise concerns about unilateral effects translating into significant upward price incentives.

Diversion ratios are an important element to be considered in this respect. Diversion ratios measure customer gains by competitors as a percentage of customer losses suffered by a given company. We would say that B is a close competitor to company A if the diversion ratio from A to B is high.

This chapter considers alternative approaches in which closeness of competition could be quantified: cross price elasticity, correlation of market share changes, and estimates of diversion ratios. The latter are then used to estimate upward pricing pressure indices.

5.3 Diversion ratios based on porting data

The closer substitutes the products of two merging firms are, the greater is the post-merger incentive to raise price, other things equal. In equilibrium, a firm's profit-maximizing price is set at the level where any additional profits gained from a higher price for customers who remain with the firm are just equal to the profits foregone on lost customers. After the merger, the firm captures lost profits from the fraction of its lost customers who switch to the now-acquired competitor. This fraction is called the diversion ratio and determines the incentive to increase prices post-merger. A higher diversion ratio between the merging parties implies greater profit recapture, and thus greater incentive to raise price.

One way of estimating diversion ratios that is quite unique to telecom markets is to use porting data. Porting data exist because of regulations on number portability introduced with the intention to facilitate customer switching and enhance competition in telecom markets. Porting data provides information about all MNO subscribers whose switching involves porting of their mobile number.

In particular, for our purposes, we ideally require information on how customers that ported their numbers away from one MNO were distributed among the other MNOs. The percentage of porting switchers that port into a particular competitor is thus, in principle, a very good predictor of the respective diversion ratio.

We note, however, that only a fraction of lost subscriptions move their numbers with them to the new provider. This percentage is [REDACTED] for both CSL and HKT [REDACTED] [REDACTED]⁴².

Table 21: Churn⁴³ and porting information

		2011	2012	2013 ⁴⁴
CSL	churn % of subscribers	[REDACTED]	[REDACTED]	[REDACTED]
	port-out % of churn	[REDACTED]	[REDACTED]	[REDACTED]
HKT	churn % of subscribers	[REDACTED]	[REDACTED]	[REDACTED]
	port-out % of churn	[REDACTED]	[REDACTED]	[REDACTED]
HTCL	churn % of subscribers	[REDACTED]	[REDACTED]	[REDACTED]
	port-out % of churn	[REDACTED]	[REDACTED]	[REDACTED]

Source: CSL, HKT and HTCL data, LE/Plum analysis

Our use of porting statistics to estimate diversion ratios is therefore reliant on the assumption that subscribers that move away from either CSL or HKT and do not port their numbers make similar choices, in terms of their new MNOs, as those who do port their numbers.⁴⁵

To confirm the robustness of our diversion ratio estimates we provide, later in this chapter, alternative approaches to estimating proximity of competition between the HKT and CSL. We find across these approaches substantial support to the conclusions from the analysis based on porting data. We note also that porting statistics are widely used for this purpose by competition authorities internationally.⁴⁶

With this in mind, we proceed with our estimation of diversion ratios based on porting statistics.

⁴² SMT and CMHK have also provided certain information but not comparable since it was based on post-paid customers only.

⁴³ Churn is defined here as the number of lost subscriptions over a certain period of time.

⁴⁴ CSL and HKT data up to Nov 2013; churn values for 2013 were multiplied by 12/11 to approximate a full year

⁴⁵ This may not necessarily be the case. For example, subscribers who do not port their numbers are more likely to be pre-paid. And pre-paid customers may make substantially different choices for alternative MNOs than post-paid customers.

⁴⁶ Examples include US FCC (2012) T-Mobile and MetroPCS, WT Docket No. 12-301; New Zealand Commerce Commission (2012), Determination on Vodafone New Zealand Limited and TelstraClear Limited [2012] NZCC 33, EC Decision M.6497 HUTCHISON 3G AUSTRIA / ORANGE AUSTRIA ; EC Decision M.5650 T-MOBILE / ORANG.

Figure 16: Diversion ratios from CSL to other MNOs, last 3 years

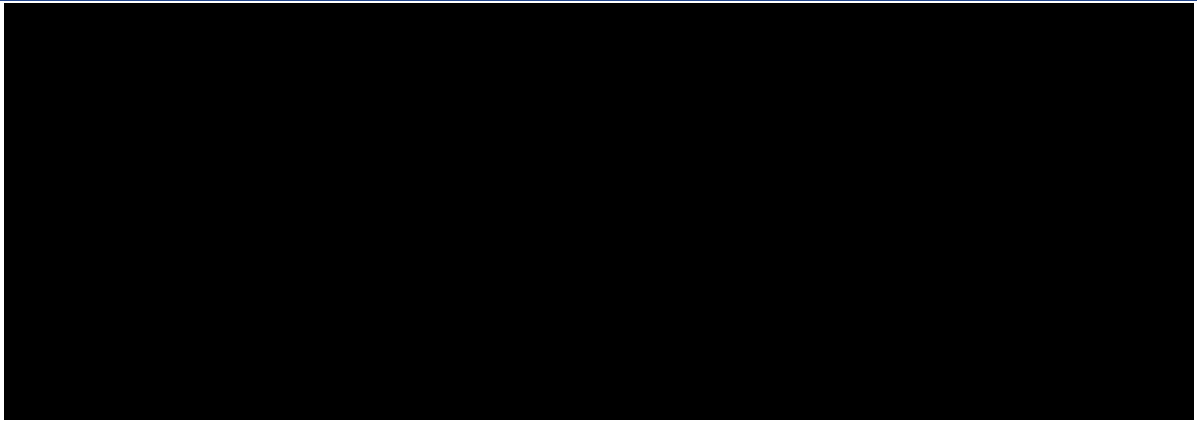


Source: OFCA data, LE/Plum analysis

It is interesting to note that HKT is not a particularly favoured destination MNO for subscriptions that port out from CSL. [REDACTED]. If we compute the average diversion ratio from CSL to HKT over the last two years we obtain [15 - 25%]. In terms of trends, it may be worth noting that HKT is a slightly closer competitor to CSL in the last two years than in the period before. [REDACTED]

In contrast, the figure below shows that CSL is the most often chosen alternative MNO for subscriptions leaving HKT. If we compute the average diversion ratio from HKT to CSL over the last two years we obtain [35 – 45%]

Figure 17: Diversion ratios from HKT to other MNOs, last 3 years



Source: OFCA data, LE/Plum analysis

In terms of trends, we note that diversion from HKT to CSL has slightly decreased over the last year from a [REDACTED]. There is [REDACTED]

5.4.2 Cross price elasticity

Estimates of cross price elasticity are yet another method to approximate diversion ratios. There is a theoretical relationship between cross price elasticity and diversion ratio, given by:⁴⁸

$$\text{diversion of sales from firm 1 to firm 2} = D_{12} = \frac{\Delta Q_2}{\Delta Q_1} = \frac{\varepsilon_{21} Q_2}{-\varepsilon_1 Q_1}$$

This formula implies (if we take HKT's own price elasticity [REDACTED]⁴⁹ and given that HKT's market share is [REDACTED] of CSL's, that for a diversion ratio of [REDACTED] the cross price elasticity from HKT prices to CSL quantities should be [REDACTED].

We do not have all the required data to calculate cross price elasticity. We would need price changes and quantity changes between CSL and HKT. We have neither. To proxy price changes we have used changes in ARPUs. It is therefore likely that the results are sensitive to the measure of ARPU used.

If we use changes in subscriber numbers over time we have a problem in that, mostly, subscriber numbers increased year on year for all competitors. There are also trends in ARPUs over the period that may affect these calculations. For example, [REDACTED].

However, this may not be a result of changes in prices but rather of changes in customer mix. [REDACTED]. This is an important drawback to the use of ARPUs as a proxy for prices.

With these shortcomings in mind, we describe below how we attempted to circumvent them and our initial estimates for "cross-price elasticities".

A cross-price elasticity gives us the percentage change in sales for company A when the price charged by company B increases by a certain percentage. As such, a positive cross-price elasticity implies that the products of the two firms are viewed by their customers as substitutes.

In the Hong Kong telecom market, as indeed is the case elsewhere, there has been extremely rapid growth in subscriptions and, to some extent, in average spend per customer. In other words, for most company pairs, from year to year we observe that subscriber numbers of one increase even as the average spend at the other increases. This implies that the raw data of ARPUs and subscribers will tend to give an impression of positive cross price elasticities that may well be misleading.

In order to "clean" the data from these trends, we use instead, in each year and for each company, the ARPU of a particular company like HKT or CSL relative to average market ARPU. And, instead of number of subscribers, we use a company's market share. So the transformed cross price elasticity that we estimate is the following:

⁴⁸ Jerry Hausman, Serge Moresi and Mark Rainey, (2010) "Unilateral Effects of Mergers with General Linear Demand", Economic Letters

⁴⁹ [REDACTED].

$$\frac{\% \text{ change in market share of company A from } t \text{ to } t + 1}{\% \text{ change in ARPU relative to average ARPU of company B from } t \text{ to } t + 1}$$

We have yearly data for all of these variables for each of the MNOs. The cross price elasticity above will not be constant from year to year so we have to look at how it behaves throughout the period for which we have data (2008 to 2012) but with a bigger emphasis on latter years.

As we have noted above, there are different ARPUs that could be used. Our preference here is to use the ARPU for voice and non-voice revenues only since this is likely to reflect the prices that are most directly under the control of MNOs and also most visible to customers when considering whether or not to switch supplier. This is what we have denoted elsewhere as ARPU1.

Table 24: Illustrative estimates of cross-price elasticity				
elasticity	2009	2010	2011	2012
Q(CSL),P(HKT)				
Q(HKT),P(CSL)				

Source: OFCA data, LE/Plum analysis

In relation to the first measure of revenue per customer, if we were to consider the value in 2011 as an outlier (see footnote on Table 24), then we would estimate that the cross price elasticity from HKT prices to CSL sales is [REDACTED]. So if HKT were to increase its prices [REDACTED] CSL’s market share would increase [REDACTED].

In relation to cross price elasticity in the other direction, i.e. from CSL prices to HKT quantities, we see a clearly decreasing trend which confirms some of the results we have reported elsewhere.

Conclusions from this sub-section

We find some indication of cross price effects from HKT price to CSL quantity. If HKT increases prices it loses customers to CSL. We find evidence of very small effects in the reverse direction, i.e. when CSL increases prices it does not lose that many customers to HKT. So this aspect of our analysis would indicate that CSL exerts some competitive constraint on HKT, but not the converse.

In terms of order of magnitude, we had argued above that our estimated diversion ratios would imply a cross-price elasticity from HKT prices to CSL [REDACTED], and that value is consistent with the direct estimate of cross price elasticity from HKT prices to CSL at a value of [REDACTED] reported in Table 24 above.

As we have noted, ARPUs and changes in market shares are imperfect proxies and the implications for actual cross price elasticities have to be taken with caution. The reason why this analysis is of value is because it adds one more independent piece of evidence supporting the overall picture of closeness of competition that we are putting together.

50 [REDACTED]

5.4.3 Correlation of changes in number of subscribers and in market shares

An additional indication of closeness of competition is the pair-wise correlation in changes of subscriber numbers or market shares. If two companies are close competitors to each other we may expect that they gain and lose customers from each other. As a result the correlation between the time series of changes in subscriber numbers would be negative. In order to investigate this we looked at the correlation in quarterly data for subscriber numbers, changes in subscriber numbers, market shares and changes in market shares.

We note that the correlation of subscriber numbers over time is not a good measure of what we are investigating because of the fact that subscriber numbers have increased overall for all companies and this causes the correlations of interest to be positive. It is therefore important to control for market size effects. This can easily be done by looking at market shares instead of number of subscribers. In order to abstract from possible trends in market shares we create time series of changes in market shares and investigate the correlation between these.

In addition, we do the above for both the market overall and for the 3G/4G segment.

Figure 18: Changes in numbers of subscribers



Source: OFCA data, LE/Plum analysis

Figure 19: Changes in market shares



Source: OFCA data, LE/Plum analysis

The graphs above and the table below show a very significant negative correlation in subscriber gain/loss and market share gain/loss between CSL and HKT. [REDACTED]

Table 25: Correlations in changes of market shares 2008-2013

	HTCL	CSL	SMT	HKT	CMHK	MVNOs
HTCL	[REDACTED]					
CSL	[REDACTED]					
SMT	[REDACTED]					
HKT	[REDACTED]					
CMHK	[REDACTED]					
MVNOs	[REDACTED]					

Source: OFCA data, LE/Plum analysis

These effects remain, albeit slightly less strong, when only the last eight quarters of the data are considered, as shown in the table below.

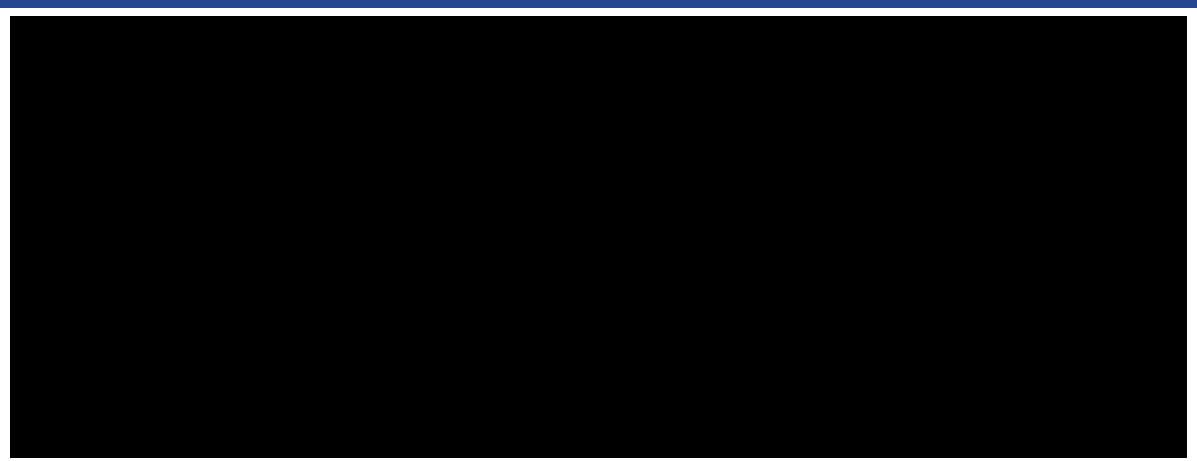
Table 26: Correlations in changes of market shares last 8 quarters

	HTCL	CSL	SMT	HKT	CMHK	MVNOs
HTCL	[REDACTED]					
CSL	[REDACTED]					
SMT	[REDACTED]					
HKT	[REDACTED]					
CMHK	[REDACTED]					
MVNOs	[REDACTED]					

Source: OFCA data, LE/Plum analysis

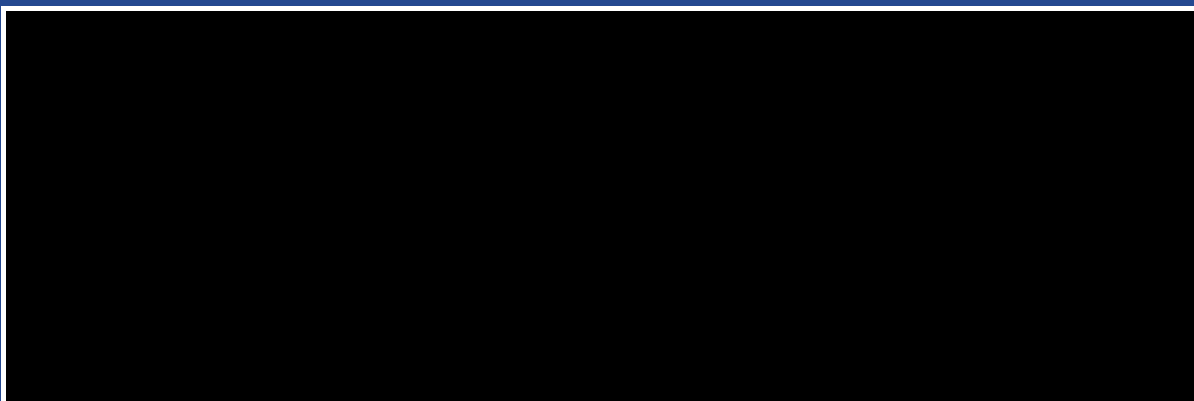
In a similar analysis we look at the sub-set of 3G/4G subscribers only. The result of negative correlation between HKT and CSL remains clearly present.

Figure 20: Changes in numbers of subscribers, 3G/4G



Source: OFCA data, LE/Plum analysis

Figure 21: Changes in market shares, 3G/4G



Source: OFCA data, LE/Plum analysis

Table 27: Correlations in changes of market shares 2008-2013, 3G/4G

	CMHK	CSL	HKT	HTCL	SMT	MVNOs
CMHK						
CSL						
HKT						
HTCL						
SMT						
MVNOs						

Source: OFCA data, LE/Plum analysis

Table 28: Correlations in changes of market shares last 8 quarters, 3G/4G

	CMHK	CSL	HKT	HTCL	SMT	MVNOs
CMHK						
CSL						
HKT						
HTCL						
SMT						
MVNOs						

Source: OFCA data, LE/Plum analysis

As can be inferred from the tables above, the correlations change over the period. The figure below studies the evolution of these correlations over time, taking 8-quarter moving averages. Clearly, we are more interested in the behaviour of these correlations in the latter periods.

Figure 22: Evolution of CSL/HKT correlation in changes of market shares, 8-quarter moving averages



Source: OFCA data, LE/Plum analysis

In the 3G/4G segment, we observe a strongly negative correlation throughout. This is significant evidence of closeness of competition between HKT and CSL in this segment. For “all subscriptions” the correlation was [REDACTED]

There is therefore, nonetheless, a consistent pattern of CSL and HKT each losing significant subscriptions in quarters where the other gains more.

5.5 Upward Pricing Pressure indices

In this section we shall calculate a number of alternative upward pricing pressure (UPP) indices. UPP indices provide direct measures of the unilateral effects of the merger on prices through an assessment of the incentives that the merged entity would have to raise prices following the merger, assuming that rivals maintain their business strategies as prior to the merger.

The shift from the focus on market concentration to direct assessment of price effects through the lens of upward pricing pressure indices can be traced back to the recent publication of revised merger guidelines in the United States and the United Kingdom where the UPP is adopted as one of the important tools for analyzing unilateral effects in mergers⁵¹. Similar revisions are in progress in the European Union and New Zealand.

⁵¹ Horizontal Merger Guidelines issued jointly by Department of Justice and Federal Trade Commission, 2010, United States. The document could be accessed through: <http://www.ftc.gov/sites/default/files/attachments/merger-review/100819hmg.pdf> and the Merger Assessment Guidelines issued by Competition Commission and Office of Fair Trading, 2010, United Kingdom. The document could be accessed through: http://www.oft.gov.uk/shared_of/mergers/642749/OFT1254.pdf

5.5.1 UPP

The original Upward Pricing Pressure (UPP) index identifies a firm's incentive to raise prices post-merger by comparing its incentive to increase prices due to lost competition and the opposing incentive to decrease prices due to efficiencies such as cost synergies⁵².

$$UPP_1 = (P_2 - C_2) D_{12} - EC_1 \quad (1)$$

Where:

$P_2 - C_2$ is product 2's price-cost margin,

D_{12} is the diversion ratio from product 1 to product 2 and

EC_1 represents the efficiency credit, assumed to be 10% as a first approximation.

Intuitively, the incentive to increase prices that the merger between firm 1 and firm 2 creates for firm 1, is proportional to the sales that firm 2 gains when firm 1 raises prices (the diversion ratio from 1 to 2), multiplied by the unit profit on those sales. Efficiency gains provide an opposing effect to keep prices low.

If the value of the UPP index above is positive, it means the firm has an incentive to increase prices because efficiencies gains are not of a sufficient magnitude to offset the incentive to increase prices post-merger, if the value is negative, it implies that the efficiencies gains are large enough to offset the incentive to increase prices. It is however important to recognize that the magnitude of the UPP index does not correspond to a particular prediction as to the size of the price increase that the firm would select post-merger.

The table below provides a list of the variables, their values and respective data sources that will be used for the calculation of various UPP indices throughout this section:

⁵² The index is first proposed by two American economists in an academic paper. J. Farrell and C. Shapiro, 2010a. Antitrust evaluation of horizontal mergers: An economic alternative to market definition. The B.E. Journal of Theoretical Economics 10. See also J. Farrell and C. Shapiro, 2010b. Upward pricing pressure and critical loss analysis: Response. The CPI Antitrust Journal.

Table 29: Variables and data required for pricing pressure indices			
Variables	Notation	Values	Data sources
Diversion ratios	D_{12}	[REDACTED]	from porting out figures, average over 2012-2013
	D_{21}		
Margin per subscription	$p_1 - c_1$		EBITDA 2012 per average number of subscriptions over four quarters of 2012
	$p_2 - c_2$		
Average price	p_1		ARPU2 - total retail revenue minus handsets per average number of subscriptions in 2012
	p_2		
Average cost	c_1		ARPU minus EBITDA
	c_2		
Profit margin	$(p_1 - c_1) / p_1 = m_1$	EBITDA divided by ARPU	
	$(p_2 - c_2) / p_2 = m_2$		
Quantity sold	Q_1	Average number of subscriptions over the four quarters of 2012	
	Q_2		

Source: LE research

The two tables below show the calculated UPP for HKT and CSL under two different assumptions for the efficiency benefits of the merger: 10% and 5%. We note that a 10% efficiency credit is sufficient to remove any price raising incentives on CSL. This is however clearly not the case for HKT.

Table 30: UPP assuming 10% efficiency credit	
MNO	UPP
HKT	[REDACTED]
CSL	[REDACTED]

Source: LE/Plum

Table 31: UPP assuming 5% efficiency credit	
MNO	UPP
HKT	[REDACTED]
CSL	[REDACTED]

Source: LE/Plum

We can use the UPP index to ask the question – how much efficiency gain would the merger need to generate in order for the UPP to be non-positive? The UPP formula can easily be manipulated to solve for such efficiency level. In our case we obtained:

Table 32: Minimum efficiency gain for non-positive UPP	
MNO	Minimum efficiency gain
HKT	[REDACTED]
CSL	[REDACTED]

Source: LE/Plum

Confirming our earlier results on various measures of diversion ratio between HKT and CSL, we note that the upward pricing pressure that the merger exerts on HKT, as reflected in the UPP index in Table 30 and Table 31 above, is much stronger than that on CSL. For CSL, at a level of [REDACTED] efficiency gain, the merger causes no incentive to increase prices. For the same to be true in relation to HKT we would require efficiency gains in the order of [REDACTED]

The UPP index in (1) above assumes that when one of the merging firms raises price, the price of the other merging firm remains unchanged. An alternative UPP index takes into account feedback effects between the two firms. So in a merger involving two firms, A and B each selling one product, this index takes into account what happens to B's pricing decisions after A raises its prices and how A may in turn modify its pricing decisions in light of B's response and so on. Taking this feedback effect into account implies a greater incentive for the merged entity to raise prices post-merger. It is also a more accurate approach towards gauging the upward pricing pressure that the merger exerts, to the extent that it takes more fully account of all relevant factors which affect the merged entity's incentives to raise prices. We denote this modified UPP⁵³ with the subscript W:

$$UPP_{W1} = D_{12}(P_2 - C_2) + D_{12}D_{21}(P_1 - C_1) - EC_1(1 - D_{12}D_{21}) \quad (2)$$

The two tables below confirm precisely this. When we take into account the feedback effect discussed above we find that CSL has an incentive to increase prices post merger even with a 10% assumed efficiency gain. The level of efficiency gain required for CSL not to have such an incentive is [REDACTED]

Table 33: Werden feedback UPP assuming 10% efficiency

MNO	UPP
HKT	[REDACTED]
CSL	[REDACTED]

Source: LE/Plum

Table 34: Minimum efficiency gain for non-positive UPP – Werden feedback UPP

MNO	Minimum efficiency gain
HKT	[REDACTED]
CSL	[REDACTED]

Source: LE/Plum

Conclusions in relation to UPP magnitudes

A positive UPP index (in its various variants) for one of the merging firms indicates that the merger creates an incentive for that firm to raise its price. It is important to recognise that the different variants of the UPP indices are silent as to the likely magnitude of the post-merger price rise. In other words, gauging the merged entity's incentive to raise prices post-merger by the calculation of the different variants of the UPP indices does not equate to predicting the likely post-merger magnitude of price increase. However, the UPP formula can be interpreted in a more quantified

⁵³ Gregory Werden "A robust test for consumer welfare enhancing mergers among sellers of differentiated products", Journal of Industrial Economics, 409-413 (1996).

way by asking what magnitude of efficiency gain would be necessary to remove the positive upward pricing pressure. It bears reminding that that when calculating any variant of the UPP indices, rivals' strategies are held constant (as they were prior to the merger).

Our analysis indicates that low to moderate levels of efficiency gains resulting from the merger would give rise to a positive UPP for HKT. The various UPP results for CSL range from negative to positive so no robust indication of a positive UPP for CSL can be inferred.

The magnitude of the upward price incentives for HKT to raise price post-merger is likely to be large: only at efficiency gains in the order of █████ does the UPP cease to be positive.

5.5.2 GUPPI

An alternative measure of post-merger upward pricing pressure - similar to equation (1) but not directly allowing for cost synergies - is known as the Gross Upward Pricing Pressure index (GUPPI).

The GUPPI estimates the (gross) incentive of the merged firm to raise prices post-merger and can be interpreted as the value of sales diverted to Product 2, $\Delta Q_2(P_2 - C_2)$, as a fraction of the lost revenues on Product 1, $\Delta Q_1 P_1$. The higher is this fraction the higher is the post-merger entity's incentive to raise price. For example, a 20% GUPPI implies that 20% of the loss in product 1 revenues is recaptured in the form of increased product 2 profits.⁵⁴ As with UPP, GUPPI does not directly translate into a predicted magnitude for expected price rise.

The expression for the GUPPI of product 1 merging with product 2 is:

$$GUPPI_{1,2} = D_{12} \times \frac{p_2 - c_2}{p_1} \quad (3)$$

The GUPPI formula, like the UPP, does not rely on any assumptions on the shape of the demand function. However, unlike the UPP indices, the GUPPI does not explicitly consider merger specific efficiencies. Thus, any merger between firms selling substitute products would result in a GUPPI greater than zero. For this reason the GUPPI is often compared against some thresholds.

To determine these thresholds we need to make assumptions about the functional form of demand. For example if the competition authorities consider that a merger should be prevented if it is likely to result in a price rise greater than 5%,⁵⁵ we next need an assumption about the pass-through rate implied by the demand function⁵⁶ in order to determine an upper threshold for

⁵⁴ Another way to interpret the GUPPI is that it reflects the opportunity cost of selling product 1 in terms of foregone sales of product 2. See, for example, Shapiro, Carl, "The 2010 Horizontal Merger Guidelines: From Hedgehog to Fox in Forty Years", <http://faculty.haas.berkeley.edu/shapiro/hedgehog.pdf>. page 728 "The value of diverted sales is a measure of the extra (opportunity) cost the merged firm bears in selling units of Product 1. Higher costs give the merged firm an incentive to raise the price of Product 1. But further analysis is needed to determine how that cost increase translates into a price increase. That depends upon the rate at which costs are passed-through to prices, which in turn depends upon the curvature of the demand curve"

⁵⁵ The threshold of 5% is commonly used by competition authorities in other jurisdictions as it is considered a non trivial increase in cost for consumers. The 5% threshold is also intuitively related to the 5% SSNIP test often used in the context of market definition. In that context, the question is whether a given product range is sufficiently diverse from all other products to form a relevant market on its own. Applying this to the merger context, if a 5% price rise is profitable for the merged entity then it is as if the merged entity's products form a "relevant market" on their own and the merger would be equivalent to a 2 to 1 merger.

⁵⁶ The pass-through rate is a measure of what percentage of a seller's cost increase is passed on to consumers. For a seller, the choice of the pass-through rate depends on the demand function and, in particular, of the second derivative (or curvature) of the demand

GUPPI. There are certain demand functional forms for which this can be calculated analytically such as linear and iso-elastic demand.

In the case of linear demand, the pass-through rate is 0.5 and under certain conditions the predicted price rise is approximately 0.5xGUPPI. Consequently, if the competition authorities want to prevent mergers that have a predicted price increase greater than 5% then there is cause for concern when the GUPPI is above 10%.

Table 35 below shows the results of the GUPPI calculations for HKT and CSL.

Table 35: GUPPI	
MNO	GUPPI
HKT	20.0%
CSL	4.4%

Source: LE/Plum

Thresholds based on linear demand have been used in the US and thresholds based on iso-elastic demand have been used in the UK⁵⁷. The linear assumption gives a higher threshold for GUPPI so adopting that threshold would make mergers less likely to be blocked. On the basis of assuming a linear demand curve, the US uses a threshold of 10% for GUPPI so that GUPPIs above 10% (implying a corresponding price increase of more than 5%) are considered a cause for concern.⁵⁸

In other words, if the calculated GUPPI value exceeds the more permissive US GUPPI threshold value based on linear demand, then that calculated GUPPI value must also exceed the less permissive UK GUPPI threshold value based on iso-elastic demand.

In any event, the calculated GUPPI value for HKT is well above even the looser US threshold so, by this measure, again, we have a clear cause for concern about the effects of the merger on HKT's pricing incentives.

5.5.3 Illustrative Price Rise (IPR)

We next look at a measure that adapts the UPP indices discussed above to obtain an explicit prediction of post-merger price effects. This measure is known as illustrative price rise (IPR)⁵⁹. The IPR can be read directly as the percentage "predicted" change in price caused by the merger. In other words, for example, an IPR of 10% is equivalent to a predicted price increase of 10%.

function. The pass-through rate is not generally constant for all points in a demand function. The case of linear demand is a very special case in that pass-through rate is constant (for any quantity and price) and equal to 0.5. This is quite low when compared to pass-through rates that would result from other demand functional form assumptions.

⁵⁷ Isoelastic demand refers to a demand curve where elasticity is constant at all points on the demand curve.

⁵⁸ See, for example, Shapiro, Carl, "The 2010 Horizontal Merger Guidelines: From Hedgehog to Fox in Forty Years", <http://faculty.haas.berkeley.edu/shapiro/hedgehog.pdf>. page 750: "One good diagnostic measure relies on the fact that one can treat GUPPI1 as a post-merger opportunity cost for Product 1, and then apply a default pass-through rate to those costs, holding fixed the price of Product 2.156 Basing the default pass-through rate on linear demand gives a pass-through rate of 50 percent; (...) Using this method, a 10 percent value of GUPPI1 translates into an indicated price increase of 5 percent."

⁵⁹ The IPR, unlike the predicted price increase estimated reported in Table 35, has less stringent assumptions in the sense that the prices are not assumed to be equal. Moreover, for a two-product case as in equation 4, interactive effects of price changes between the two products are taken into account.

There are different IPR formulae for different assumptions on the demand functional form. The formula below is based on an assumption of linear demand and is therefore relatively permissive by comparison to, for example, an iso-elastic demand curve assumption, as well as many others. In other words, IPRs calculated under different functional form assumptions would be likely to lead to higher predicted price increases than IPR calculated under the assumption of linear demand.⁶⁰

$$\frac{\Delta p_1}{p_1} = \frac{2D_{12} \frac{p_2 - c_2}{p_1} + D_{12} D_{21} \frac{p_1 - c_1}{p_1} + \frac{(p_1 - c_1)^2}{(p_2 - c_2) p_1} \frac{Q_2}{Q_1} (D_{21})^2}{4 - 2D_{12} D_{21} - \frac{p_2 - c_2}{p_1 - c_1} \frac{Q_1}{Q_2} (D_{12})^2 - \frac{p_1 - c_1}{p_2 - c_2} \frac{Q_2}{Q_1} (D_{21})^2} \quad (4)$$

Table 36: IPR with assumed linear demand

MNO	% change in price
HKT	11.5%
CSL	4.6%

Source: LE/Plum

The values for the predicted price changes based on formula (4), i.e. under the assumption of linear demand, are reported in table 36 above. The magnitudes of predicted price rises are both relatively high, particularly for HKT. Bearing in mind that these estimates are made under the relatively more lenient assumption of linear demand,⁶¹ we consider that these results are a cause for concern. In fact, the predicted price increase for HKT would be considerably higher than 11.5% if the estimation were based on other functional form assumptions, an example of which is the assumption of iso-elastic demand.

To illustrate the difference between the linear and the iso-elastic demand assumptions, we apply the symmetric IPR formulas for each case⁶². Although the symmetric case is clearly not applicable to the facts of the present merger - given, in particular, the huge difference between the diversion ratios for the two merging parties - it illustrates quite clearly the extent to which the estimate of price rise under linear demand assumption can underestimate the actual effect.

⁶⁰ In its decision on the acquisition of Orange 3G Austria by Hutchison 3G Austria in 2012, the European Commission had applied this same formula to calculate expected price increases for each of the merged entity's products post-merger. See EC Decision Case No COMP/M.6497 – HUTCHISON 3G AUSTRIA / ORANGE AUSTRIA, 12/12/2012. The decision could be accessed through: http://ec.europa.eu/competition/mergers/cases/decisions/m6497_20121212_20600_3210969_EN.pdf. The original reference to the formula, as also referred in the Decision is Hausman et.al (2011), equation 2.

⁶¹ Presentation by Amelia Fletcher, Chief Economist, OFT IPR, UPP, GUPPI: An 'alphabet soup' guide to merger assessment. See Slide 9: "Linear IPR = GUPPI/2; Iso-elastic IPR = GUPPI*2"

⁶² The reason why we illustrate the effect of iso-elastic demand on the IPP indices using the symmetric case is because there are no calculations of formulas for IPR in the case of iso-elastic demand and non-symmetry. Note that the formula in (4) does not assume symmetry between the two merging entities, i.e. diversion ratios, costs, prices and margins are not assumed to be the same. Under the assumption of symmetry, they are assumed to be the same.

Table 37: IPR for the case of symmetric firms

Assumed functional form	% change in price
Linear: $IPR = (P-C)D / 2(1-D)$	
Iso-elastic: $IPR = (P-C)D / (1-(P-C)-D)$	

Note: the variables P, C and D are defined as before but subscripts have been dropped under the assumption of symmetry

Source: LE/Plum

The IPR values reported in Table 37 lie somewhere between what would be predicted for each company if no symmetry were assumed as reported in Table 36.⁶³ In particular, the predicted price rise for HKT under iso-elastic demand would be larger than [REDACTED] if no symmetry were assumed. This illustrates the extent to which the 11.5% estimate from the IPR based on linear demand might underestimate actual price effects.

5.6 Reactions of competitors

In order to make a judgement as to how great the price effects discussed above are ultimately expected to be we need also to consider the likely reactions of competitors.

In principle, if nothing else changes for HKT/CSL's competitors, the response of HKT/CSL's rivals to a price rise on the part of the merged entity is likely to be also a price rise. In this case, the incentives to increase prices by HKT/CSL are further enhanced by the likely reactions of competitors.

However, competitors may opt for a more aggressive response to HKT/CSL's price increase if they have substantial spare capacity or if their costs decrease. Without remedies, it would be very unlikely that any of HKT/CSL's competitors would have sufficient spare capacity post-merger. Equally, there is no reason to expect a decrease in costs for competitors as a result of the merger.

Remedies that are targeted at increasing competitors' network capacity and lowering their costs have a significant potential to deal effectively with the competition problems identified in this Chapter. In particular, a remedy such as spectrum divestment would not only help ensure that rivals to HKT/CSL have sufficient spare network capacity post-merger but would also allow them to achieve cost savings. The extent to which this and other remedies might succeed in preventing an SLC is discussed in Chapter 10.

5.7 Telstra and New World non-compete clause

We also considered whether a substantial lessening of competition could result from the non-competition clause by which Telstra and New World both agree not to engage in competition with HKT/CSL in mobile wireless core operations including certain types of WiFi operations for three years from completion of the transaction.⁶⁴

⁶³ The symmetric outcome lies in between the higher value for HKT and the lower value for CSL (because HKT has a higher diversion ratio to CSL than the converse). In other words, the iso-elastic IPR for HKT is higher than the iso-elastic IPR calculated under symmetry assumptions and the converse is true for CSL

⁶⁴ Page 13 of HKT circular letter dated 31 December 2013.

Under the agreement to acquire CSL, Telstra and New World Group agree not compete in the supply of mobile or public Wi-Fi services in Hong Kong for three years. It is our view that this agreement does not raise concerns about lessening of competition given that:

- Telstra is unlikely to enter the Hong Kong mobile market again for the reasons set out in Chapter 7
- Telstra's joint venture with PCCW to operate Reach would be unaffected by the agreement
- Any effects on New World Group are likely to be of little significance because [REDACTED]

5.8 Conclusions from this chapter

We have presented ample evidence of closeness of competition between the two merging firms and of the strength of the competitive constraints exerted by CSL on HKT. This is confirmed by high values across a number of alternative upward pricing pressure and illustrative price rise measures.

The implication of this chapter's analysis is therefore that the loss of CSL as an independent competitor in the market for retail mobile services in Hong Kong creates a significant unilateral incentive on the merged entity to raise prices, in comparison to what this incentive would be in the absence of the merger.

Intuitively, the price rising effect of the merger is due to the fact that, prior to the merger, had HKT attempted to raise prices, CSL would have gained a significant percentage of HKT's lost sales. After the merger, however, such sales losses are internalised, i.e. they are re-captured because CSL is now part of the merged entity. This therefore makes price rise substantially more attractive.

Unless chapter 7 finds sufficient countervailing forces already operating in the market or likely to operate in the very near term, the findings in this Chapter indicate that that the proposed merger would give rise to a substantial lessening of competition in the market for retail mobile services in Hong Kong. According to 4.12 and 4.13 of the Merger Guidelines, "a substantial lessening of competition" is to be interpreted "in terms of the creation or enhancement of market power." And, "market power manifests itself when there is a firm (...) that is not constrained by other firms in its (...) ability to increase its price above competitive levels for a significant period of time (or to reduce output or quality)."

This chapter has shown that the proposed merger is expected to result in at least one of the merging parties being able to sustainably and profitably increase prices substantially above current levels: the predicted price rise for HKT ranges from 11.5% (under the more lenient linear demand assumption and not considering feedback effects from price rises by the merging partner) to [REDACTED] (the mid-point illustrative price rise in the case of iso-elastic demand). The merger therefore creates a position of market power and, according to the interpretation of the Guidelines, leads to a substantial lessening of competition - unless chapter 7 finds sufficient countervailing forces already operating in the market or likely to operate in the very near term.

6 Coordinated effects

6.1 Determinants of coordination

This chapter considers the possible effects of the proposed transaction on the incentives and ability for market participants to engage in coordinated behaviour.

The analysis of structural conditions which facilitate coordination and collusion encompasses the following aspects:

- Is a coordinated strategy easily devisable which makes coordination considerably more attractive than competition to all participants?
- Can deviations that would undermine the coordinated interaction be detected and ‘punished’?
- Are there no disrupting forces from outside the coordinating group such as a ‘maverick’ firm or potential entry?

In markets where only a few firms account for most of the sales of a product, those firms may be able to exercise market power by either explicitly or tacitly coordinating their actions. Accordingly, one way in which a merger may create or enhance market power or facilitate its exercise is by making such coordinated interaction among firms more likely, more successful, or more complete.

6.2 Coordinated effects in retail mobile markets

There are a number of factors, common to retail mobile markets in general that would lead us to consider coordinated behaviour unlikely to be effective. In the particular case of Hong Kong these include the following:

- Across the market as a whole, the proposed merger does not change market structure enough to make coordination significantly more likely. A market with 4 competitors is only slightly more concentrated than one with 5;
- Hong Kong’s mobile telephony market is competitive in many of the dimensions assessed in Chapter 3;
- A range of factors contribute to the complexity of defining a coordinated outcome that is agreeable to all participants and such that deviations from it are easily spotted:
 - The Hong Kong market is characterized by heterogeneity in costs, elements of service, and product offerings;
 - MNOs and to some extent MVNOs compete on multiple factors including handsets, plan features, service quality, and customer service;
 - There is significant uncertainty over how demand for voice, data, and advanced services will change in the near future.

There are, on the other hand, some factors that may give cause for concern:

- Even if the effect is small, coordination among 4 firms is easier than coordination among 5 firms. In addition, it is not the case that all MNOs serve exactly the same market segments. In particular our analysis in Chapter 3 suggests SMT targets more upmarket users and CMHK has so far more closely competed with MVNOs. In a “middle market” we would put, prior to the

merger, HKT, CSL and HTCL. There is therefore a concern that coordination at this level would be greatly facilitated by the merger, particularly given the strong competitive pressure that CSL exerted on both HKT and HTCL prior to the merger.

- In addition there have been instances in the recent past where the behaviour of all major MNOs appeared to have been coordinated
- We note also the existence of business ties between HKT and HTCL in the form of the Genius Brand joint venture. This pre-dates the merger but its possible implications for coordination are discussed in this chapter.
- Furthermore, coordination is facilitated in markets where prices are highly visible. This is indeed the case in the mobile retail market of Hong Kong even if the proliferation of tariffs and service plans considerably complicates price comparisons across competitors.

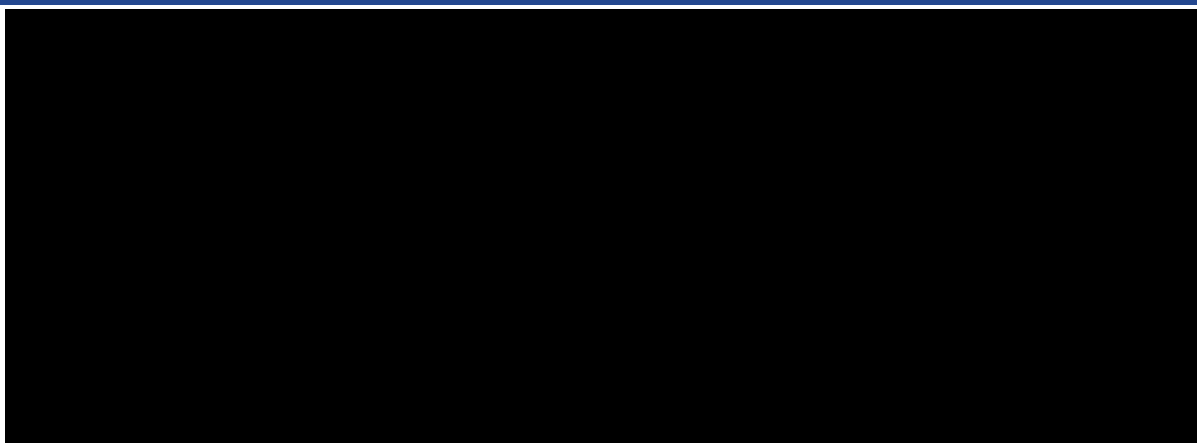
This chapter discusses the balance of these factors and their implications for the likely impact of the merger on incentives and ability to sustain coordinated outcomes.

6.3 Competitive position of HKT, CSL and HTCL

HKT, CSL and HTCL have been close competitors in terms of the type of customer segment that they serve. There could be a concern that the disappearance of CSL as an independent competitor in this segment would facilitate coordination.

There is some evidence that [REDACTED]. This can be supported by the bilateral diversion ratios between the two companies:

Figure 23: Diversion ratios from HTCL to its competitors



Source: HTCL data

Figure 24: Diversion ratios from CSL to its competitors



Source: CSL data

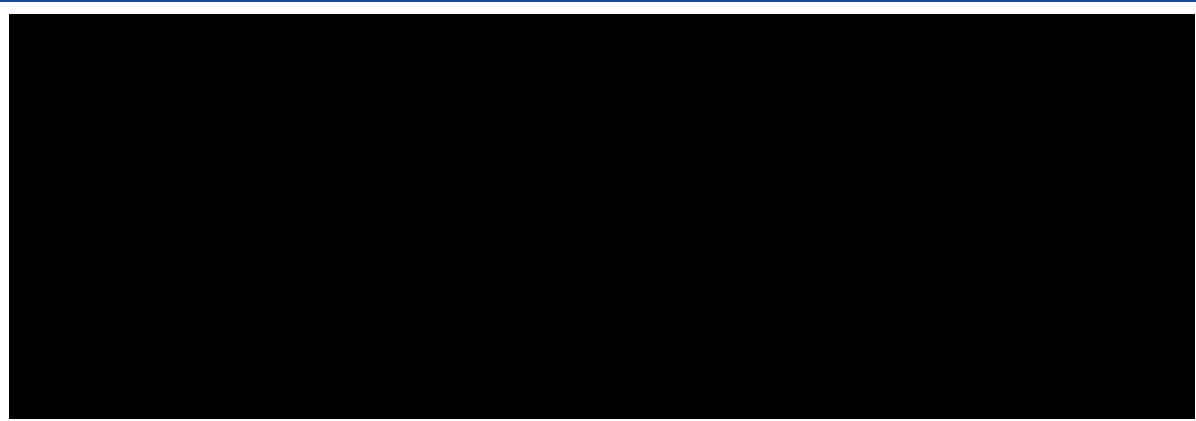
The diversion ratio from [redacted] while the diversion ratio from [redacted] Diversion predictions based on market shares would be [redacted] (see table below). [redacted]

Table 38: Diversion ratios predicted by market shares

market shares Sep 2013	[redacted]					
	Diversions to:					
Diversions from:	HTCL	CSL	SMT	HKT	CMHK	MVNOs
HTCL	[redacted]					
CSL	[redacted]					
SMT	[redacted]					
HKT	[redacted]					
CMHK	[redacted]					

Source: LE/Plum calculations based on OFCA data

Figure 25: Diversion from HKT to its competitors



Source: LE/Plum based on OFCA data

Taken together, the elements presented above suggest the following:

- [REDACTED]
- [REDACTED]

The proposed merger therefore removes an important competitive force from the ‘mid-tier’ market segment.

In order to consider the implications of the above, we next discuss whether other MNOs can have a role in the mid-tier market in the near future and indeed whether either is likely to behave as a ‘maverick’ in this market.

6.4 Prospective competitive position of CMHK and SMT

The presence of a “maverick” firm can be considered as a form of insurance against coordinated behaviour. A maverick firm is defined as a firm that has an economic incentive not to follow co-ordinated action.

A firm is more likely to be a “maverick” if it has excess capacity and low incremental costs (thus making it profitable to raise sales and charge low prices). It is a feature of network industries, including telecommunications, that services which are provided over networks tend to have low incremental costs. However, any excess capacity amongst the remaining co-ordinated firms may be used as an effective weapon to “punish” a “maverick” firm.

In the Hong Kong market CMHK could potentially play the role of a ‘maverick’ in respect of attempts at coordination. CMHK will have significant capacity at the 4G level and this may give it incentives to depart from any eventual tacit agreements with the other three operators and find its own path through significant gains in market share.

We therefore suggest that CMHK has the ability to play a significant role in preventing coordinated outcomes in the market segments where HKT/CSL and HTCL do most of their business. In particular, CMHK is well positioned to move into the mid-tier market segment if that segment has only two firms and if these two firms decide to raise prices. CMHK has an ample amount of spectrum to compete aggressively in 4G/LTE services at a mid-tier level if it so wishes. Positioning in that market segment is more likely to be of interest if competitors there attempt to raise prices.

[REDACTED]

In order to ensure that CMHK maintains its prospects as a potentially very strong competitor to HKT/CSL and HTCL it is important to ensure that HKT honours its network sharing agreement with CMHK post-merger and that this is not conditional on any of the remedies that may be introduced as a result of the merger.

We note also that, in the long run, SMT is projected to have excess network capacity (chapter 4, Table 17) with projected RAN capacity [REDACTED] vs. projected demand [REDACTED]. There is therefore also the likelihood that SMT will act as a maverick in the long run. This is further discussion in the Chapter 7, on countervailing effects.

6.5 Past instances of “coordination”

While there has not been any finding against MNOs in Hong Kong for engaging in collusive behaviour, we have considered the events around three incidents which happened in the past where MNOs’ conduct did raise some concern.⁶⁵ Examining the past incidents enables us to better assess the relative ease with which MNOs might be able to engage in coordinated conduct post-transaction and, in particular, whether the merger has a material impact on the likelihood of such behaviour being successfully implemented.

Past concerns in the Hong Kong market include the following;

- Price coordination – in 2000 the then Telecommunications Authority (TA) investigated whether a simultaneous price change by all MNOs on the 2nd of January was an indication of coordinated behaviour. The TA “formed the opinion that on the evidence available to him at the very least some kind of “arrangement” must have existed which led to the simultaneous price adjustments that have taken place on 2 January 2000”⁶⁶. The TA wrote to all licensees on 15 January 2000, proposing to issue a direction but inviting representations. In their representations to the TA, all the operators agreed to rescind the price adjustments made on 2 January 2000 and as a result the TA pursued no further action.
- Unlawful exchange of business information – on 8 December 2009, PCCW submitted a formal request to the TA, alleging that (all) the MNOs had been colluding on a broad range of regulatory and commercial matters, including fixed-mobile interconnection charge, from at least 2002. In this instance, no section 7K investigation on the alleged MNO collusion was opened but the TA said it would further study and consult the industry on the issue of information exchange as a potential form of anti-competitive conduct in the telecommunications industry.
- In response to a 28 December 2012 OFCA consultation paper on the proposed arrangements for the 3G spectrum assignment, a number of 3G MNOs made assertions about the specific percentage of price increases that they would have to impose if a particular 3G spectrum assignment option was selected. OFCA noted that such public pronouncements potentially raised concerns regarding unlawful exchange of information among competitors.

Our view on the above incidents is that they raise the possibility of a capability for coordinated behaviour.

6.6 Family ties between HKT and HTCL

Some respondents to the CA consultation on the proposed acquisition have raised concerns that family ties between the owners of HKT and the owners of HTCL may have an adverse impact on competition in the post-merger market.

⁶⁵ Details for the three cases are: a) Simultaneous price increase by mobile operators (http://tel_archives.ofca.gov.hk/en/c_bd/completed-cases/rp20000120.pdf) b) Suspected collusive conduct among mobile operators (http://tel_archives.ofca.gov.hk/en/ca_bd/case_closed/T36_08.pdf) c) Price announcements made by mobile operators one after another (<http://www.coms-auth.hk/filemanager/listarticle/en/upload/387/06-05-2013.pdf>)

⁶⁶ http://tel_archives.ofca.gov.hk/en/c_bd/completed-cases/t2-00.html; paragraph 5

We have seen no evidence that the family ties in question have had an adverse impact on competition between HKT and HTCL in the past. We are also aware that HKT and HTCL have longstanding governance arrangements which monitor the relationship between them and we are not aware of any evidence that this process does not work.

From Table 38, Figure 25, and Figure 23 we conclude that HKT and HTCL have lost customers to each other [REDACTED], providing no indication of any explicit avoidance of competition between the two MNOs.

As we have no evidence to suggest that that the family ties in question may in future adversely impact on competition between the merged entity and HTCL, we do not consider this issue any further.

6.7 Coordinated effects in the other market affected by the proposed transaction

We considered also whether the merger between HKT and CSL would be likely to enhance incentives and ability to sustain coordinated outcomes in the other markets affected by the merger.

The wholesale market for access to public mobile networks

Coordination in this wholesale market is likely to be hampered by the lack of price transparency and the unequal conditions of access that the different MNOs would be likely to wish to offer to MVNOs. The merger reduces the number of possible suppliers but it does not alter the fact that this is a market where coordinated agreements would be difficult to devise and sustain.

The wholesale market for mobile backhaul services

Since only one of the merging entities operates in this wholesale market, coordination between this one and its competitor mobile backhaul providers is not expected to be affected by the merger.

The wholesale market for inbound and outbound international roaming

In the market for wholesale inbound roaming, pricing has low transparency and is likely to be the result of bilateral agreements between mobile operators internationally. This is therefore a market with a structure that does not readily lend itself for coordination. Furthermore, this aspect is in no significant way impacted by the merger.

The wholesale interconnection market

Coordination in this wholesale market would mean the MNO's agreeing with each other to charge high interconnection prices to each other. Therefore, there does not seem to be significant gains to be made from coordinated behaviour in this particular case. Again, this feature of the market is not affected by the proposed transaction.

Conclusions from this section

Given the above, we do not find that there are reasons for concern in relation to the possibility that merger may cause enhanced incentives or ability to coordinate in the other markets affected by it.

6.8 Conclusions

It is difficult to make precise judgements on the effects of the merger on the likelihood of coordination. However, we would note that:

- There are concerns raised by the disappearance of an important competitor in the mid-tier market segment – CSL [REDACTED]
- These concerns can be significantly reduced if CMHK and SMT have the ability to be strong competitors in many of the market segments where the merged entity and HTCL will operate
- Fears that coordination is facilitated by family ties between two major competitors and their collaboration through Genius Brand appear unfounded. Both situations are pre-existing to the merger and there is no evidence that they have in the past deterred effective competition in this market
- On balance we believe that, as long as CMHK's and/or SMT's ability to be a strong competitor to HKT/CSL and HTCL is ensured, there is no cause for significant concern with coordinated effects arising from the proposed merger

In light of the above we do not consider that the merger would have or be likely to have the effect of substantially lessening of competition due to coordinated effects and that there are sufficient justifications to consider remedies in relation to coordinated effects.

7 Assessment of countervailing effects

In this chapter we consider the potential for countervailing forces to restrain the upward pricing pressure that the proposed transaction gives rise to. In particular we consider:

- The prospects for entry by other operators which might increase the strength of competitive constraints on the merged entity
- The existence of any countervailing market power as manifested in consumer switching.
- Competitive constraints from MVNO
- Potential of China Mobile as a maverick
- Potential of SMT as a maverick

7.1 Entry prospects

7.1.1 Introduction

What are the prospects of a new mobile operator entering the Hong Kong market so as to increase the competitive constraints on the merged entity? There are four main options to consider here:

- A privately owned, profit maximising, operator wins some of the spectrum released by the 2.1 GHz reassignment and enters the market in 2016
- 21ViaNet uses its 30 MHz of 2.3 GHz spectrum to offer LTE-based services
- Another operator from mainland China joins CMHK in Hong Kong
- Public Wi-Fi access points are used to provide a no frills mobile service.

We discuss each of these options below.

7.1.2 Entry by a privately owned profit maximising operator

The analysis of Section 3 indicates that the mobile markets in Hong Kong are currently highly competitive. It also shows, in Section 3.7, that EBITDA margins⁶⁷ are low by international standards. Given the relatively low levels of profitability in the Hong Kong market and the high levels of competition, we would not expect market entry by a profit maximising operator from elsewhere in the world. We note that Network Strategies reaches a similar conclusion in its recent work for OFCA⁶⁸:

“We consider that on balance it is unlikely that there will be substantial interest from completely new market entrants in this spectrum” (Page 1).

It is possible that unilateral effects will lead to higher prices and lower levels of competition. But it is our judgement that, when considering where in the world into the mobile operator, an investor would be unlikely to choose Hong Kong, given its low levels of post-merger market concentration.

⁶⁷ A good indicator of an operator’s ability to generate cash flow once it has invested in infrastructure

⁶⁸ *Reassigning the spectrum in the 1.9 to 2.2 GHz band*, Network Strategies, August 2013

7.1.3 Entry by 21ViaNet

21ViaNet holds 30 MHz of unpaired spectrum in the 2.3 GHz band, [REDACTED] [REDACTED] Potentially 21ViaNet could apply for authorisation for provision of mobile services under its UCL, build its own mobile infrastructure, and offer 4G mobile services over this infrastructure. But, based on analysis of the information available from 21ViaNet's website we believe that such entry is very unlikely. Our reasoning is as follows:

- 21ViaNet's primary customer base is large businesses, ISPs network operators rather than consumers and small businesses
- 21ViaNet's expertise is on the provision of data centres and data centre services rather than mobile networks and network services. According to its website 21ViaNet provides five main services:
 - Managed hosting services that dedicate data centre space to house customers' servers and networking equipment and provide tailored server administration services;
 - Interconnectivity services that allow customers to connect their servers with
 - Internet backbones in China and other networks through 21ViaNet's Border Gateway Protocol network, or single-line, dual-line or multiple-line networks
 - Value-added services, including firewall services, server load balancing, data backup and recovery, data centre management, server management, and backup server services.
 - Content delivery network (CDN) services.
- 21ViaNet only has 30 MHz of spectrum in Hong Kong compared with over 100 MHz for each of the existing Hong Kong mobile operators. So its initial mobile network capacity would be limited
- 21ViaNet would need to acquire an extensive infrastructure of base station sites to compete in a mobile market where returns are low by international standards⁶⁹.

Given that 21ViaNet is a privately owned and profit maximising entity, it is likely to see the risks of such entry as significantly outweighing any potential returns.

On the basis of its core business in China, we believe that 21ViaNet is more likely to use its 30 MHz of spectrum in Hong Kong to supply fixed broadband connections to business customers rather than to enter the Hong Kong market as a mobile operator. It is possible that 21ViaNet will find it more profitable to transfer some or all of its 30 MHz of 2.3 GHz spectrum to one of the existing mobile operators - although the range of ways in which it can do this is restricted by the prohibition on spectrum trading in Hong Kong. In any case it is our view that it is highly unlikely that 21ViaNet will enter the mobile market itself.

⁶⁹ It is possible that HKT would dispose of a significant number of base station sites post-merger. But it is very unclear whether these would be sufficient to provide 21ViaNet with adequate infrastructure to compete effectively in the market

7.1.4 Entry by China Telecom or China Unicom

While it is unlikely that we will see a profit maximising mobile operator entering the Hong Kong market it is possible that China Telecom or China Unicom might enter for political rather than commercial reasons.

However recent press reports indicate that China Unicom has expressed an interest in bidding for 2.1 GHz spectrum in the reassignment auction. China Unicom is, according to these reports “studying (the possibility of) participating in the 3G auction to be held, in order to enhance the service quality in Hong Kong”. We note that:

- China Unicom is already a successful MVNO in Hong Kong. [REDACTED]
- China Unicom is a substantial mobile operator in China with around 20% of the market there. No doubt China Unicom would be able to leverage its expertise, systems, services, content and procurement power in the mainland market in entering the Hong Kong market as a mobile operator
- China Unicom was unsuccessful in the recent 2.6 GHz spectrum auction.

If it does enter the Hong Kong market then there is the possibility that China Unicom would become a disruptive player by moving its existing subscriber base to its own infrastructure and then expanding this customer base. Such a development could significantly increase countervailing competitive forces on the merged entity.

But it is far from certain that China Unicom will enter the market as a mobile operator given that:

- It would need to acquire a substantial number of BTS sites before it could profitably launch services at competitive prices and with competitive coverage (especially indoor coverage)⁷⁰
- Its spectrum holdings would be modest compared with rivals. The best China Unicom could hope for in the 2.1 GHz auction is 40 MHz (2x20 MHz). This is roughly 35% of the spectrum holdings of rivals. As a result China Unicom would not enjoy the same economies of scale as its rivals.

Were China Unicom to bid successfully in the auction, but then find itself unable to provide a competitive offering in the Hong Kong market, this would weaken the countervailing forces faced by the merged entity. The China Unicom bid would simply have diverted incremental spectrum from rivals which could otherwise compete more strongly with the merged entity.

7.1.5 Competitive pressure from a Wi-Fi-based entrant

It is now possible to run a “no-frills” Wi-Fi-based wireless broadband service which offers many of the features of an LTE based mobile service at a fraction of the cost. In the US, companies like

⁷⁰ It is possible that HKT would dispose of a significant number of base station sites post-merger. But it is very unclear whether these would be sufficient to provide China Unicom with adequate infrastructure to compete effectively in the market

Republic Wireless already offer such services which have attracted favourable reviews from journalists⁷¹. The figure below illustrates.

Box 1: Characteristics of the Republic Wireless Wi-Fi service

Uses a Motorola Android LTE smartphone priced at US\$299

The phone is modified for automated Wi-Fi access and handover to the Sprint mobile network when out of Wi-Fi range

Price plans include:

- US\$5 per month for unlimited Wi-Fi use
- US\$10 per month for unlimited use for voice and text with data on Wi-Fi only
- US\$25 per month for unlimited voice, text and data on Wi-Fi and 3G
- US\$40 per month for unlimited voice, text and data on Wi-Fi and 4G (compared with \$80 per month for the equivalent mobile operator package)

Source: Press reports

Given the concentration of the Hong Kong population and the wide availability of Wi-Fi access points there, such a service could become a powerful substitute for full-blown LTE services and exert significant downward pressure on prices⁷².

It is also possible that FNOs which are now acquiring significant networks of Wi-Fi hotspots will partner with one of the mobile operators to offer a Wi-Fi based mobile service like that of Republic Wireless and Sprint in the US. FNOs would have the advantage of being able to package mobile voice and data with broadband at home. However, given the already highly competitive mobile service market in Hong Kong, there is no evidence available suggesting that Wi-Fi based wireless broadband service entrant is going to appear in the near future.

There is also an important possibility of entry into the data-only market, which we discuss below.

7.2 Other forms of entry into the data segment

One important trend in the market is the explosion of data traffic, especially created by the rising use of streamed multimedia content and web services. Internationally, overall data traffic is expected to increase 12 times between 2013 and 2018, and mobile data traffic will rise at an even higher rate, to reach 11.7 exabytes per month in 2018⁷³. To remain competitive, operators will seek to reduce the cost-per-bit of supporting this demand.

⁷¹ http://allthingsd.com/20131126/smartphone-with-wi-fi-smarts/?mod=atd_reviewbox

⁷² We note that the current levels of use of public Wi-Fi services in Hong Kong are low compared with use of mobile broadband. But we also note that, when public Wi-Fi services involve automatic registration at each access point, a functionality which Telefonica recently launched in London, this can lead to a 10 to 100 fold increases in traffic carried on the public Wi-Fi network. See for example *Study on Impact of traffic off-loading and related technological trends on the demand for wireless broadband spectrum*, WIK for European Commission, 2013

⁷³ Wireless Broadband Alliance Industry Report 2013: Global Trends in Public Wi-Fi

Given the growing importance of data, both in terms of demand and in terms of revenue, and given the very small geographic spread of Hong Kong, the combination of home broadband with data access at a series of Wi-Fi hotspots is likely to offer or eventually offer a good substitute to the data services provided by MNOs. This is a market segment where fixed telephony providers are well placed to enter given their existing infrastructure.

Important on-going developments in the public Wi-Fi market include a noticeable expansion beyond simple offload strategies, and towards integration of Wi-Fi into the heart of the network and the business model.

Competitive constraints arising from quasi-mobile, Wi-Fi-based data services

Recent developments have seen the entry into the “mobile” data services market by data services bundles that offer both a home broadband line and a network of Wi-Fi hotspots. In some market situations, bundled offers of this type are likely to constitute particularly close substitutes to data services offered by mobile network and virtual network operators (MNOs and MVNOs).

It is also important to note that these home plus Wi-Fi offers have lower costs for their suppliers than the support of data services through the mobile network alone. As such, the entry of this new product into the market for mobile telecommunications services to end users is likely to significantly constrain the pricing power of MNOs in relation to data services. This competitive constraint effect is limited to data services and would not, in our view, constrain pricing power of MNOs/MVNOs in relation to voice services.

Examples

Two significant recent announcements about public Wi-Fi services in Hong Kong suggest the strong possibility of competitive pressure on the data segment arising from bundled offers by FNOs of fixed broadband combined with access to a network of Wi-Fi hotspots:

- HGC (affiliated to HTCL) has announced that it will expand its public Wi-Fi access point network to 12,000 access points by the end of 2013⁷⁴ and to 16,000 in 2014. Service plans will offer, for a fixed fee, movie streaming, online games and a platform for files upload and download freely with Hutchinson’s high speed Wi-Fi network which covers large-scale shopping malls, café chains, fast-food chains, restaurants, entertainment complexes, commercial buildings, private housing estate and tertiary education institutes all over Hong Kong. The Wi-Fi services can be used by smartphones, tablets, notebooks and all Wi-Fi equipped electronic gadgets. The services will be offered as a bundle to HGC’s home broadband subscribers. All subscribers will receive 100 minutes per month of free Wi-Fi usage and can upgrade to unlimited usage for a fee.
- HKBN has announced its acquisition of Y5Zone – the main Wi-Fi wholesaler to the mobile operators. It plans to grow the number of public Wi-Fi access points from 7,000 to 15,000 within 18 months and to bundle access to this network of access points with its fixed broadband offering. In addition we understand that it will continue to sell capacity on this Wi-Fi network to the mobile operators at the wholesale level

⁷⁴ <http://www.threebb.com.hk/eng/hgconair.html>

Once completed these Wi-Fi networks will rival the 12,000 access point network which PCCW-HKT already operates. HKT plans to increase this network to 25,000 access points in 2016. PCCW-HKT can be considered as one of the incumbent providers of public Wi-Fi services; it offers service packages bundling residential fixed broadband service with its out-door Wi-Fi service as an add-on, or the Wi-Fi service as a standalone service. The Wi-Fi services are available to both its existing fixed broadband customers and new customers.

Implications of “fixed-line plus Wi-Fi bundle” entry

There is a possibility that this market segment will grow and be in a position to serve some segments of the demand for mobile or quasi mobile data. Public Wi-Fi capabilities allow fixed-line suppliers to improve overall customer experience and enhance their ability to sign up users and keep them loyal. On the other hand, MNOs are also in a position to contract with Public Wi-Fi operators and use this Wi-Fi capability to reduce network costs, to improve indoor coverage and to achieve greater revenue generation. In addition, there is demand for mobile data that cannot be served by fixed-line based services. And when the 4G services are fully operational, the competitiveness of MNOs’ data services will improve considerably.

Likely developments that may be expected are as follows:

- HGC will follow PCCW-HKT’s and HKBN’s lead in offering nomadic Wi-Fi services bundled with their fixed broadband. Such offers will provide a substantial constraint on the data prices which the full mobile operators can charge in future
- HGC and HKBN will both sell capacity on their public Wi-Fi networks to other mobile operators to provide them with the Wi-Fi offload capacity they need to handle the growing demand for mobile data. This will greatly expand the number of public Wi-Fi access points available to MNOs.
- MNOs will continue to use and probably enhance their use of Public Wi-Fi networks to support their own services.

7.3 Conclusions on likely competitive constraints from entry

Overall we believe that:

- The prospects for a full new mobile operator entering the Hong Kong market are low; prospective entrants would, in the near term, have limited capacity and therefore exert a limited competitive constraint on the 4 main players.
- The use of public Wi-Fi hotspots bundled with fixed broadband might act as a substantial constraint on the data prices charged by mobile operators post-merger; this is noteworthy given the significant growth in consumer demand for data
- There is however no evidence to suggest that the emergence of a Wi-Fi-based mobile service operator partnering with a MNO - like Republic Wireless and Sprint in the US- is going to happen in the near future.
- Heavy reliance on a Wi-Fi network might also significantly lower entry costs for a potential entrant such as China Unicom as it requires less spectrum and fewer base station sites.

7.4 Competitive constraints from MVNOs

MNOs assigned with 3G spectrum in the 1.9 to 2.2 GHz band are subject to Open Access Network (“ONA”) requirement which obliges them to reserve at least 30% of their network capacity for access by non-affiliated MVNOs or content providers, with the terms and conditions of the access determined by the relevant parties through commercial negotiations. Spectrum assignments in other bands are not subject to such ONA requirement. So far, operators have been able to conclude commercial agreements with MVNOs on network access arrangements without the CA’s intervention. According to the information available to OFCA, [REDACTED]

In addition, [REDACTED]

MVNOs are therefore likely to continue to exert some competitive pressure on MNOs, at least in lower price market segment, so long as they continue to have wholesale access to MNOs’ networks post-merger. In particular, the Wi-Fi plus mobile entrants such as Republic Wireless in the US are an example of an MVNO-plus entrant and the type of market that they may be able to target. While MVNOs have traditionally targeted the lower price end of the market, Republic Wireless illustrates the possibility of a more mid-market entry (using higher-end smartphones). And such entry opportunities would be opened up post-merger would depend on whether MVNOs would have wholesale access to MNOs’ networks post-merger.

7.5 Consumer switching/churn and demand growth

An important engine of competition in many retail markets is customer switching or ‘churn’. By switching suppliers, customers can exert a competitive constraint on suppliers’ pricing and product offerings and provide strong incentives on suppliers to produce other desirable competitive effects such as improve service levels and new products.

In this section we look specifically at the strength of competition in the market arising from switching/churn and strong overall subscription growth. These are important elements driving competition among operators because, if at any point in time an operator does not have competitive offers in place it will lose market share of both new demand/subscriptions and switchers. If new demand and switchers constitute a significant percentage of the current customer base, then they exert a significant competitive pressure on suppliers.

7.5.1 Switching and churn

There are high levels of churn in mobile markets in general and in Hong Kong in particular. Data provided by three MNOs is reproduced below:

Figure 26: Churn as a percentage of total subscriptions, per quarter, annualised

Source: [REDACTED]

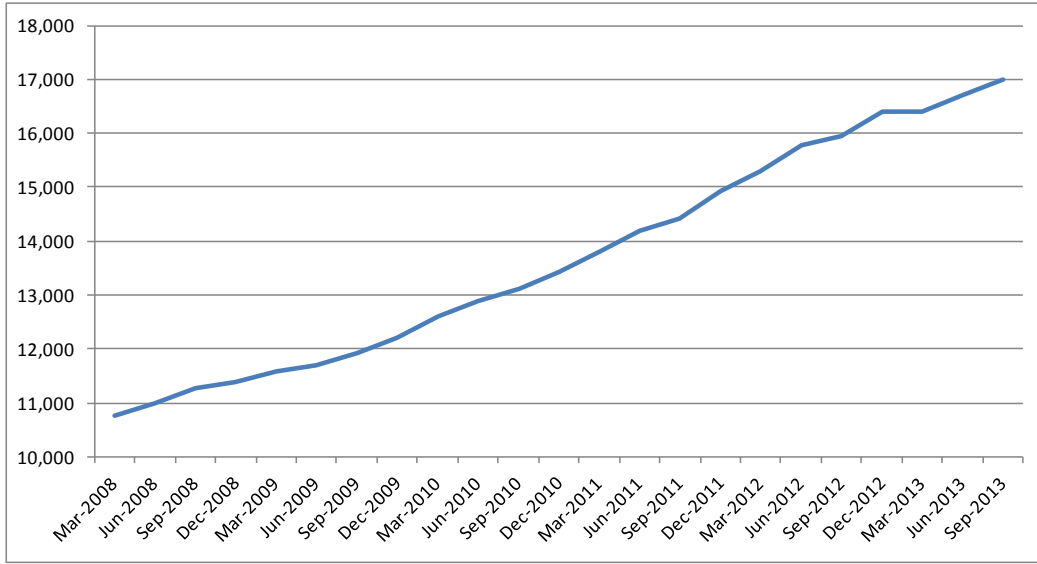
The figure indicates a very high level of churn. The weighted average indicates a level of annual churn [REDACTED] per year.

Since subscription numbers are increasing, both overall and for individual MNOs, we conclude that most of the churn volume represents customer switching. This is therefore likely to exert an important competitive constraint on the behaviour of MNOs.

7.5.2 Demand growth

Demand growth is an important driver of competition because it encourages firms to, at any point in time, put attractive offers in place or risk losing market share to their competitors. The Hong Kong mobile telecom market has seen very rapid growth in the number of subscriptions. However, it is unlikely that growth can continue at this pace in the medium term.

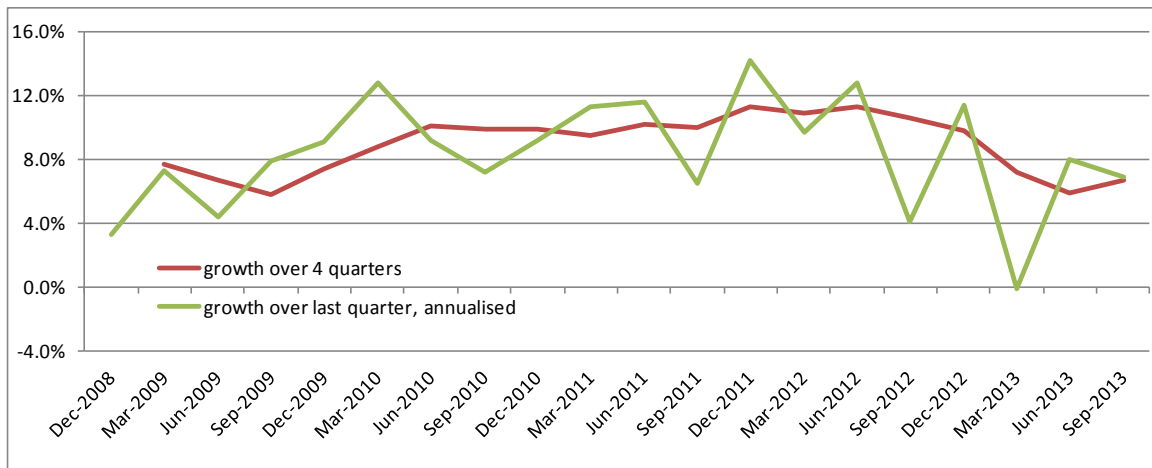
Figure 27: Number of mobile services subscriptions (000)



Source: OFCA data

We note that subscriber numbers, at just over 17 million by the end of the third quarter of 2013, greatly exceed the size of the Hong Kong population of just over 7 million. It must therefore be the case that individual subscribers have on average well over 2 mobile subscriptions⁷⁵. This suggests that growth rates may be trending downwards. The figure below provides some support to this conjecture but oscillation of growth rates is perhaps the most noticeable feature. Demand growth in the region of 6 to 7% per annum may be reasonably expected for the near term.

Figure 28: Growth rate of mobile services subscribers (change on 4 quarters prior)



Source: OFCA data, LE/Plum analysis

⁷⁵ Even after allowing for visitors with local SIMs

7.5.3 Conclusions from this section

In prospective terms, the trends discussed above indicate that the combination of new subscriptions and switching imply a significant percentage of the subscription base that is contestable. Based on the data available we would estimate this contestable share at around [REDACTED] per year ([REDACTED] from churn and 6% from demand growth).

Customer switching and demand growth are important indications of the contestability of a given market. In mobile phone markets this is particularly important because these markets have, at any point in time, a significant portion of customers tied to a long term contract.

Our assessment of switching and demand trends is indicative of a significant degree of competition pressure being exerted by the demand side of the market. [REDACTED]

For switching to continue playing its important disciplining role of competition in the market, it is important to ensure that, going forward, all competitors have adequate levels of network capacity to be able to continue to compete aggressively for each other's customers. The strength of switching is therefore dependent on the network capacity issues identified in Chapter 4 being resolved.

7.6 The presence of a potential "maverick"

It is possible that CMHK will become a "maverick operator" which exerts strong competitive constraint on rivals over the next four years, given that:

- CMHK currently has the [REDACTED] in the Hong Kong market
- CMHK now has substantial holdings of spectrum which are suitable for LTE (at 2.3 and 2.6 GHz)
- CMHK is able to leverage economies of scale from its operations in mainland China where it has a 70% share of a mobile market of 1200 million subscribers
- CMHK's behaviour to date in the Hong Kong market suggests that [REDACTED]
- We observe significant reductions in the price of smartphones. For example IDC reports a reduction in average prices of 13% per annum. This should make it easier for CMHK to convert its existing low-end subscriber base to data centric services.

It is also possible that SMT will become a "maverick operator" in future. Here we note that:

- SMT current focus is [REDACTED]. See Table 4.
- It is likely that, following the reassignment auction, SMT will have spare RAN capacity. See Table 17.

In these circumstances it would make sense for SMT to compete more strongly in the middle market where HTCL and the merged entity currently compete.

7.7 Efficiencies

7.7.1 The M&A guidelines

The CA's Merger Guidelines recognise that mergers can lead to efficiency gains and that these may enhance competition post-merger.⁷⁶ According to the merger guidelines, efficiency considerations are to be considered as a part of the SLC test, as follows.

"4.79 To the extent that an efficiency-enhancing merger increases competition by creating a more vigorous competitor, the [CA] may consider the efficiency gains to be a relevant matter to take into account in forming an opinion whether the merger substantially lessens competition. However, the [CA] would need to be satisfied on the following points:

- The efficiency gains must occur as a direct result of the merger ("merger specific efficiencies");
- The efficiencies must be clearly identified and verified ("recognizable efficiencies"); and
- The efficiency gains must translate into a more effective level of competition from the merged entity than the level that was offered by the merging parties separately ("translated efficiencies").

4.80 It must be demonstrated that the efficiencies will be achieved by the merger and would be unlikely to have been achieved without the merger (for example, internal re-organisation) or by another means having comparable or less significant anti-competitive effects (for example, a joint venture arrangement).

4.81 Efficiencies are often difficult to verify and quantify, in part because much of the information relating to efficiencies is uniquely in the possession of the merging firms. Moreover, efficiencies projected reasonably and in good faith by the merging firms may not be realized. Nonetheless, efficiency claims must be substantiated by the merging parties so that the TA can verify by reasonable means:

- The likelihood and magnitude of each claimed efficiency;
- How and when each efficiency would be achieved;
- How each efficiency would enhance the merged firm's ability and incentive to compete; and
- Why each efficiency would be merger-specific."

7.7.2 HKT's claim in relation to efficiencies

In its application for prior consent under Section 7P of the Telecommunications Ordinance in respect of the proposed acquisition of CSL New World Mobility Limited by HKT Limited, HKT makes claims in relation to efficiencies as follows.

⁷⁶ Guidelines on Mergers and Acquisitions in Hong Kong Telecommunications Markets, 2004, paragraphs 4.75 to 4.85.

“5.2 Efficiencies and synergies from the Transaction

The Transaction will enable HKT over time to realize operating cost savings via economies of scale and rationalization of assets and activities. HKT intends to progressively achieve post-transaction operating cost savings, efficiencies and synergies in the following manner:

- *Rationalization of network assets:* While the HKT and CSL networks do not use the same network vendor, a significant benefit of the Transaction from a cost savings perspective arises from the ability to rationalize the HKT and CSL radio access network and associated transmission assets post completion (including cell sites).
- *Realizing economies of scale:* Economies of scale could be realized in both capex and opex.
- *Access benefits:* Access to CSL’s below 1G spectrum and LTE network, *[passage removed in public version of document]* and a comprehensive set of roaming agreements is a plus for HKT’s customers. Access to HKT’s WiFi facilities to off load traffic and usage of innovative apps such as KingKing is a plus for CSL’s customers. Both sets of customers gain from additional base station sites and HKT ultimately being a more efficient and sustainable competitor in the mobile market.

There will also be synergies and efficiencies arising from the rationalization of the “back end” of the respective businesses of CSL and HKT.”

HKT also make reference to efficiencies in their discussion of the benefits to the public arising from the transaction, as illustrated in our discussion of benefits to the public in this report.

7.7.3 Assessment of HKT’s claim

It does not seem to us that HKT’s claim in relation to efficiencies has met the requirements of paragraphs 4.79 to 4.81 of the CA merger guidelines for the following reasons.

- HKT does not demonstrate why the efficiency gains will be achieved by the merger and would be unlikely to be achieved through other means that have less significant anti-competitive effects.
- HKT does not provide information about the likelihood and magnitude of each claimed efficiency gain.
- HKT provides a very limited amount of information about how some efficiency gains would be achieved, but with insufficient substantiation to allow CA to verify the claims.
- HKT provides a limited amount of information about how each efficiency gain would enhance the merged firm’s ability and incentive to compete, but with insufficient substantiation to allow CA to verify the claims.

In relation to the possibility that claimed cost efficiencies, e.g. rationalisation of network assets and economies of scale, could be achieved without a merger, we note that network sharing is a well-established and pervasive approach to improving efficiency in the mobile services market. To illustrate this point we tabulate below a list of network sharing arrangements in Europe, all announced in the period of just one quarter in early 2012. This suggests that at least some part of the claimed efficiency savings could be achieved through mechanisms other than mergers or acquisitions that would not give rise to the same competition concerns.

Table 39: Network sharing deals announced in Q1 2012

Date and firms involved	Description
Mar-12 Denmark Mobile Telenor + TeliaSonera	TeliaSonera and Telenor to build a joint mobile operation in Denmark to cover 2G, 3G and 4G technology. The mobile operators have notified the Danish Competition and Consumer Authority about plans to share radio access networks.
Feb-12 Russia Mobile, Fixed-line MTS + Rostelecom	Mobile operator MTS and fixed operator Rostelecom have agreed to share part of their network infrastructure including towers and optical fibre cables. Both companies are set to save 10% in capital expenditure as a result.
Feb-12 Poland Mobile T-Mobile + Orange	Polish mobile operators confirm Huawei and Nokia Siemens Networks to upgrade network of their 50:50 joint venture NetWorks, using a single radio access network (RAN) solution for LTE.
Jan-12 Austria Mobile T-Mobile + 3Austria	Roaming deal that allows 3 Austria customers to use T-Mobile's 2G network and T-Mobile customers to use 3 Austria's 3G network in rural areas. However, the two mobile operators will continue to develop HSPA+ and LTE infrastructure separately.
Jan-12 France Fixed-line France Telecom + Bouygues Telecom	France Telecom to share FTTH network in densely populated areas in the last mile to the building. In more sparsely populated areas, Bouygues will subscribe to a wholesale cable-sharing offer, enabling access to 8.9m homes.

Source: Inside Telecommunications, Quarterly talking points from Ernst & Young's Global Telecommunications Center, January to March 2012

Competition authorities in other jurisdictions have taken different views on how to treat the efficiencies which might arise following the merger:

- In some cases competition authorities have considered that efficiency gains such as better capacity utilisation and lower network maintenance costs are fixed costs savings and these are less likely to be passed on to consumers and even less so in mobile services markets where an existing subscriber base has already agreed prices for a period of time.⁷⁷
- In other jurisdictions⁷⁸ competition authorities have undertaken substantial analysis and allowed for consideration of effects such as improved service quality and coverage, more rapid access to innovative services, improved scale and operating efficiencies, and improved inter-modal competition. Some of these efficiencies can be expected to result in lower marginal costs including lower costs for backhaul traffic, costs for IT, billing, customer care, sales, marketing costs and roaming expenses.

We think it possible that the merger will give rise to some efficiencies and that some of these can impact on marginal costs and as such create incentives that mitigate some of the upward pricing pressure identified in our discussion of unilateral effects. However, we have no direct evidence to support this. We note that HKT/CSL has made no attempt to quantify these effects or the extent to which they would be likely to be passed on to consumers. Efficiencies are difficult to verify and quantify, in part because much of the information relating to efficiencies is uniquely in the possession of the merging firms. That is why merging firms in this and other jurisdictions are generally required to substantiate efficiency claims, through assessing the likelihood and magnitude of each asserted efficiency, how and when each would be achieved, how each would enhance the merged firm's ability and incentive to compete, and why each would be merger-specific.

⁷⁷ The European Commission, for example, has generally rejected claims of merger-specific efficiencies in the mobile sector. In its T-Mobile Austria/tele.ring Decision, the Commission held that any cost reductions would relate to fixed costs which were unlikely to be passed on to consumers.

⁷⁸ Notably the FCC has identified efficiencies in relation to a number of mobile mergers, e.g. the Sprint/Nextel merger.

7.7.4 Conclusions on efficiencies

There is insufficient evidence to support a conclusion that any efficiencies deriving from the proposed merger are sufficient to offset the anti-competitive effects of the merger, which are assessed in Chapters 4 and 5, and so lead to a conclusion that there is no substantial lessening of competition from the proposed transaction.

7.8 Conclusions on countervailing forces

Our assessment of countervailing forces points to low likelihood of new entry into the mobile telecommunications services market in Hong Kong as they are currently structured. An eventual new entrant would in any case initially have limited network capacity which would limit its role as an effective competitive threat to existing MNOs.

We have considered whether particular forms of entry would constrain the pricing incentives of the merged entity in at least some of the market segments where it operates. In particular we considered whether the increasing depth and breadth of Hong Kong's public Wi-Fi networks and the "quasi-mobile" data service that they can provide might have a constraining effect on MNO data services pricing. We argued that, while this development is likely to be significant, it works in conjunction with a number of other trends that are expected to lead to decreasing prices for data services regardless of whether the merger takes place or not. Public Wi-Fi is also actively used by MNOs to keep network costs low and provide high quality of indoor services. The adoption of 4G technologies will mean significantly lower data costs for MNOs. As such, competition in the post merger world is likely to occur in a context of decreasing costs. But this is true whether the merger occurs or not so does not specifically affect the analysis of the competition effects of the merger.

We also consider that at the lower ARPU end of the market CMHK and MVNOs will continue to exert significant competitive pressure. It would probably be into this segment, at least initially, that a new player would enter the market. However, for CMHK and MVNOs to have a competition enhancing effect on the market it is necessary that they have access to network capacity at competitive cost. This is considered further in the Chapter 10.

At the other end of the market, we note that SMT, following the reassignment auction, is likely to have spare RAN capacity.⁷⁹ In these circumstances it would make sense for SMT to compete more strongly in the middle market where HTCL and the merged entity currently compete, thus also exerting a significant potential constraint on the merged entity.

Significant competitive pressure is also likely to continue being exerted through high levels of consumer switching between MNOs – with sustained demand growth likely to add to this effect. Again, for consumer switching to have a disciplining effect on pricing behaviour it is important that going forward there are strongly competing MNOs for customers to choose from. And the ability to compete aggressively on the part of rival MNOs in turn hinges upon whether they have sufficient network capacity post-merger. How this can be safeguarded is also discussed in Chapter 10.

⁷⁹ According to Table 17, SMT is in fact predicted to have spare RAN capacity under all 4 spectrum scenarios.

Finally we analysed the extent to which merger efficiencies could be taken into account as a countervailing effect for otherwise existing upward pricing pressure but we found insufficient evidence to allow us to identify such countervailing effects.

In conclusion, we find some indication of possible countervailing effects but we consider that for these countervailing forces to be effective the conditions discussed in Chapter 10 have to be put in place.

8 Vertical effects

8.1 Introduction

In this chapter we consider the possible effects of the merger in vertically related markets. Given that coordinated effects in the various markets covered in this chapter are already dealt with in Chapter 6, this chapter assesses only unilateral effects of the merger.

As the incumbent fixed network operator in Hong Kong, PCCW-HKT has a strong position in the fixed telecommunications markets of Hong Kong. This chapter considers whether proposed merger may enable HKT to leverage this market power into the retail mobile services market to the detriment of consumers. We consider three such possibilities:

- PCCW-HKT increases backhaul prices to unaffiliated mobile operators
- PCCW-HKT increases its interconnect charges to unaffiliated mobile operators
- PCCW-HKT uses fixed-mobile bundling to leverage its strong position in the fixed sector into the mobile market

We also consider the impact of the merger on:

- PCCW-HKT's position in new data retail formats
- The wholesale market for network access and market position of MVNOs
- The inbound international wholesale roaming market
- The outbound international wholesale roaming market

8.2 Will the merger affect the wholesale market for backhaul?

Backhaul from each BTS to the core network is a key component of a mobile operator's network and generates a significant proportion of its costs. Moreover, with the move to 4G, mobile operators will need to increase the capacity of their backhaul in order to carry more traffic.

Table 40: The main market players in the fixed broadband markets

Operator	No. of fixed BB subs (9/13)		% of fixed BB subs (9/13)	
	Consumer	Business	Consumer	Business
PCCW-HKT				
i-Cable				
HKBN				
HGC ⁸⁰				
Others				
Total	2015769	219872	100%	100%

Source: OFCA

⁸⁰ Owned by HTHK which has a 76% share in HTCL

Following a merger:

- Would PCCW-HKT raise backhaul prices to the mobile operators which compete with the merged entity so as to raise their costs and give the merged entity a competitive advantage over them?
- Would other suppliers such as HGC, with its affiliation to HTCL, follow PCCW-HKT and raise their own backhaul prices?
- Would the same effect apply to the prices charged by PCCW-HKT and HGC for other leased transmission components which mobile operators use within their networks?

In answering these questions we need to consider whether the merger will make any difference to PCCW-HKT's profit maximising set of prices for backhaul and leased lines.

Focusing on backhaul, we understand that, premerger:

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- Backhaul contracts are negotiated between fixed and mobile operators. There are no requirements for non-discrimination and prices are set on commercial terms and kept private

In such a market PCCW-HKT's backhaul prices are subject to competitive constraints and it is reasonable to assume that its prices are set at profit maximising levels. Following the merger:

- CSL would become a captive customer of PCCW-HKT
- Sales of backhaul by other fixed network operators to CSL are likely to reduce significantly
- The network capacity of these fixed operators would remain unchanged
- This would create downward pressure on the backhaul prices of other fixed operators as they attempt to fill spare capacity with revenue earning traffic
- These effects are likely to be short lived as mobile operators demand more backhaul capacity to meet 4G demands
- In the longer term the competition faced by PCCW-HKT in the backhaul market would remain broadly the same as it was before the merger given that CSL does not supply backhaul. PCCW-HKT would gain market share relative to other fixed operators and this could improve its cost efficiency through economy of scale effects. But these are likely to be minor given that:
 - The backhaul supply market forms only a small proportion of the fixed telecommunications market overall
 - PCCW-HKT may well have exhausted economy of scale effects already.

It follows that the prices which would maximise PCCW-HKT's profits would be similar to those set in the absence of a merger and we conclude that there are unlikely to be any significant price rises for backhaul following the merger.

The same set of arguments and conclusions would apply to the market for leased lines used by rivals to the merged entity.

8.3 Will interconnect charges increase?

PCCW-HKT has a strong market position as a fixed network operator. Could it leverage this position into the mobile market by renegotiating interconnect charging arrangements? In particular might it raise its interconnection charges for origination or termination to mobile operators following a merger? Such an increase in interconnection charge would form only an internal transfer charge within the merged entity and would not affect its profitability. But it would materially raise the costs of rival mobile operators— giving the merged entity competitive advantage and leading to upward retail pricing pressure.

The current regulatory situation on interconnect charging arrangements in Hong Kong is as follows:

- All operators, fixed and mobile, are obliged through their licence to comply with an any-to-any interconnect obligation – under which they are required to ensure any customer in any one network to have access to any other customer in any interconnecting network
- In the case of mobile-to-mobile interconnect charging there are no additional regulations and, as far as we know, voice traffic is exchanged on a bill-and-keep basis
- In the case of fixed-mobile interconnect charging, the former Telecommunications Authority withdrew its guidance in 2009. This has led to fixed and mobile operators exchanging traffic on a bill-and-keep basis. In 2013 the CA promulgated that the remaining guidance on fixed-to-fixed interconnect charging arrangements would be withdrawn in October 2014. After that the terms and conditions of interconnection agreement between FNOs will be subject to commercial agreements between them.

In the light of this observed market behaviour it is likely that, were PCCW-HKT to raise its interconnect charges for fixed origination and/or termination to a rival mobile operator the rival mobile operator could respond by demanding a correspondingly higher origination/termination charge on its own network. This should deter PCCW-HKT from attempting to raise its interconnect charges. In addition the merger would not appear to affect the bargaining position of PCCW-HKT. CSL does not have a fixed arm. So the bargaining position between PCCW-HKT and rivals to the merged entity on interconnect charges should not change following the merger.

We note that we may see a move, during the merger analysis period, from circuit switched core networks which interconnect using CSS7 gateways to IP interconnect. But, as the Plum report of 2012 indicates⁸¹, such a transition would not change the argument set out above.

We conclude that HKT is unlikely to be able to leverage its strong position as a fixed network operator by raising its origination or termination charges to rival mobile operators following the merger.

⁸¹ *Next Generation Networks: Next Generation Regulation?* Plum for OFCA, January 2012

The **local access charge (LAC)** is a form of interconnect charge which is specific to Hong Kong. It is charged by all local network operators (LNOs), whether fixed or mobile, to ETS providers (ETSPs) for all inbound and outbound international calls. All international calls use an ETSP. The biggest ETSPs are affiliated to LNOs⁸². The LAC is set through commercial negotiation. But if negotiations fail, the parties can ask the CA for a determination of the LAC. The CA has issued guidance to show that it would then set a cost orientated price.

Following the merger HKT might decide to raise its LAC to ETSPs. For inbound international calls such an increase would lead to increased profits. Foreign operators/ETSPs would have no choice but to pay the increased LAC in order to deliver the call to a PCCW-HKT subscriber, whether fixed or mobile. But this is unlikely to raise competition concerns for two main reasons:

- ETSPs would be likely to seek a determination of the LAC if they believed that the increase did not reflect increases in the cost base of HKT post-merger. We have no reason to believe that the merger would lead to such cost increases
- The likely incentive on the part of merged entity to raise LAC post-merger is likely to be small given the that the percentage of total revenues and profits generated by the LAC is small when compared with the revenues and profits generated by the merged entity overall.

For outbound ETS calls from MNOs, we understand that the MNOs have agreements with FNOs that [REDACTED] from the date the LAC regime was de-regulated in July 2013⁸³. We have no evidence to suggest that the merged entity will have incentives to unilaterally renege on those agreements. As such, no competition issue should arise following the merger so far as the LAC is concerned.

8.4 Will HKT use fixed-mobile bundling to leverage its strong position in the fixed sector?

8.4.1 The key issue

PCCW-HKT has a very strong market position in the fixed network services market. If fixed-mobile bundles became popular in Hong Kong then PCCW-HKT might leverage this strong position to gain competitive advantage in the retail mobile market. It would be in a strong position to offer such bundles whilst many of its rivals would not.

While [REDACTED] it is likely that such leverage would have a positive effect on competition in the mobile market by strengthening HKT's position in the mobile market. But the merger would give HKT a substantially stronger position in the retail mobile market and the leverage effect might then lead to serious competition concerns.

⁸² ETS services can be provided by FNOs under their carrier licences. Non-facilities based services providers may also provide ETS by obtaining an SBO licence. MNOs all have SBO licences for the provision of ETS.

⁸³ For details of the new LAC regime, please refer to the former TA statement on the matter: http://tel_archives.ofca.gov.hk/en/tas/interconnect/ta20111223.pdf

8.4.2 Fixed-mobile bundling in other markets

There is a general trend towards bundling of telecommunications services over time. Dual play bundles⁸⁴ and triple play bundles⁸⁵ are now very popular in the telecommunications markets of most developed countries. But demand for quadruple play bundles⁸⁶ is much less certain and varies considerably from country to country.

There are strong theoretical arguments in favour of operators promoting quadruple play. Once sold such bundles reduce customer churn and hence reduce subscriber acquisition costs⁸⁷. And according to a survey by MobileSQUARED⁸⁸ the number of operators offering quadruple play bundles in Europe will double from one third in 2013 to two thirds by 2017. At the same time we see Vodafone buying (Virgin Media) and attempting to buy (Kabel Deutschland) cable companies so as to be able to offer fixed-mobile bundles.

On the supply side there is strong pressure to offer fixed-mobile bundling. But take-up is far from certain. Fixed-mobile bundling offers have been around for eight years and, as yet, there is little evidence of strong take-up. For most countries analysts see fixed-mobile bundling as a promising market development which is still to become significant. This position has changed little over the past five years, since Plum did a study on bundling for Vodafone.

There are three possible reasons why fixed-mobile bundling has not taken off in most developed countries in the same way as triple play bundles:

- Decisions to purchase fixed voice telephony, fixed broadband and TV over broadband are all made at the household level. Decisions on purchase of mobile services are typically made by individuals
- Content rights are usually very different for fixed and mobile platforms
- Triple play bundles share a common access network. Quadruple play bundles required two access platforms – fixed and mobile.

There are exceptions however to this general picture. Analysys Mason⁸⁹ estimates that 42% of fixed broadband households in France bundled mobile voice contracts with their fixed broadband service at the end of 2012, and that this will increase to 75% by the end of 2017.⁹⁰ But according to the Analysys Mason report the success of fixed mobile bundling in France depended on:

- The high mobile service prices and low mobile penetration before fixed-mobile offers were launched

⁸⁴ Of fixed voice telephony fixed broadband

⁸⁵ Of fixed voice telephony, fixed broadband and TV over broadband

⁸⁶ Triple play plus mobile

⁸⁷ According to press reports the churn of Virgin Media's quadruple play customers in the UK is below 8% per annum. This compares with 20 to 25% per annum churn for a typical mobile operator.

⁸⁸ <http://www.eurocomms.com/features/analysis/8161-quad-play-bundles-to-dominate-as-access-trumps-provision-for-digital-content>

⁸⁹ Multi-play services in Europe: forecasts and analysis 2012–2017, Analysis Mason

⁹⁰ Iliad launched disruptive mobile tariffs in January 2012 under the Free Mobile brand – an 'unlimited' tariff (with a 3GB per month fair usage limit on mobile data) for EUR19.99 per month and a basic tariff (60 minutes and 60 SMS messages per month) for EUR2 per month.

- The fact that one operator (Iliad/Free Mobile) found a business case to make the first move to reduce the profitability of the industry with a disruptive fixed-mobile tariff
- A number of strong converged operators with relatively healthy profit margins which responded pre-emptively to the disruptive player.

8.4.3 Fixed mobile bundling in Hong Kong following the merger

The prospects for fixed mobile bundling in Hong Kong are not especially promising:

- The market conditions in France are not apparent in Hong Kong where retail mobile prices are low by international standards.
- At the same time we are told that in Hong Kong demand for fixed-mobile bundling to date is limited. HGC and PCCW-HKT both offer such bundles. But these offers are not especially attractive.

More importantly for our merger analysis the ability of PCCW-HKT to carry out fixed-mobile bundling is not significantly enhanced by the merger. We note that, while PCCW-HKT could use its strong position in the fixed telecommunications markets Hong Kong to sell fixed-mobile bundles in future, it could do this whether or not the merger took place. It is important to note that the main way in which operators in France and the US have sold fixed-mobile bundles is by persuading existing fixed broadband customers to add mobile services to this bundle rather than the other way round. This makes sense given that a purchase of fixed broadband is a household decision while a purchase of a mobile service is typically a decision for an individual member of a household. The merger does not appreciably strengthen PCCW-HKT's ability to sell fixed-mobile bundles.

Overall we conclude that:

- Demand for fixed-mobile bundles in most developed countries is currently limited. Hong Kong is in this category
- There are exceptions where fixed-mobile bundling is substantial like France and Spain. But the market conditions which have formed the basis for successful fixed-mobile bundling do not exist in Hong Kong
- The merger does not appreciably strengthen HKT's ability to sell fixed-mobile bundles. The main way to grow fixed-mobile bundling is to cross-sell mobile services (individual purchases) to fixed broadband customers (household purchases) rather than the other way round.

Given the limited current demand for fixed-mobile bundles in Hong Kong, uncertainty over future demand, and the fact that growth in such bundling is not merger specific, we consider that fixed-mobile bundling is not a serious merger concern.

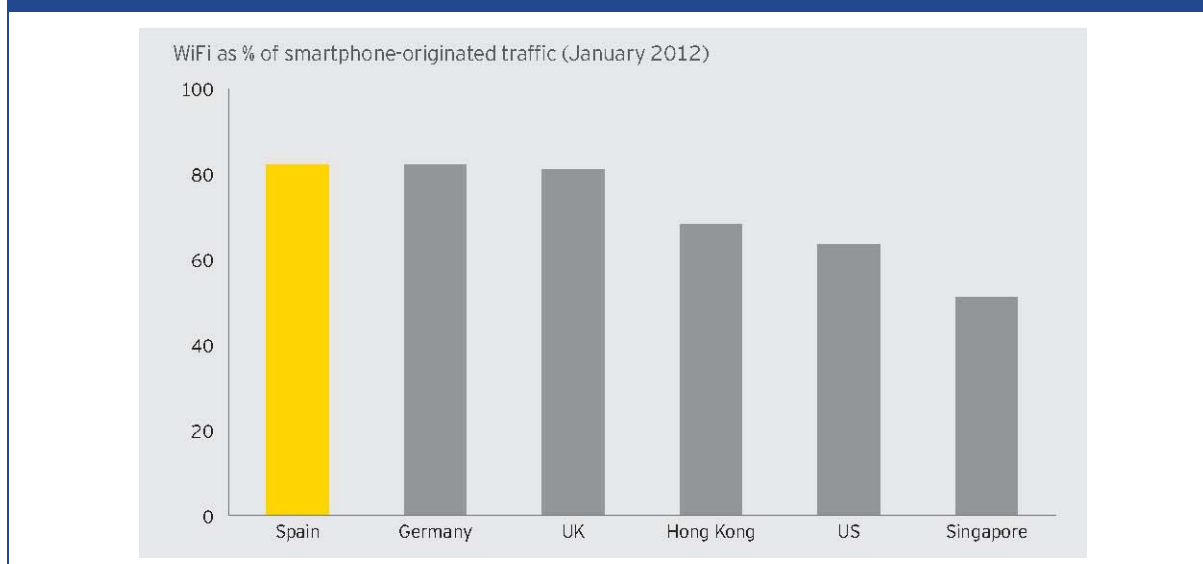
8.5 Possible vertical effects through use of Wi-Fi

As we have already identified in Chapter 7 (on countervailing effects) there is increasing interaction between Wi-Fi based on fixed broadband and mobile services. So we need to consider whether PCCW-HKT can use the merger to leverage its strong market position in the fixed broadband market to substantially lessen competition in the mobile market. In particular, we consider whether there is basis for a concern that HKT would deny access (or raise the price of access) to rivals to its public Wi-Fi network post-merger. Our analysis is as follows:

- Wi-Fi is now used extensively to complement fixed broadband in homes and offices (private Wi-Fi). Such Wi-Fi offers a convenient way to connect devices to fixed broadband access points without the need for cabling. Virtually all new smart phones and tablets use Wi-Fi in this way. As a result a high proportion of traffic generated on mobile devices now uses Wi-Fi. Figure 29 illustrates
- There is growing use of public Wi-Fi hotspots to carry traffic generated by mobile devices (public Wi-Fi). Such services can provide a partial substitute for mobile data services
- There is now considerable market activity to implement public Wi-Fi services in Hong Kong. See Section 7.2 for a brief summary. The main suppliers of these services are currently PCCW-HKT, HGC and HKBN. It is as yet unclear which of these suppliers, if any, will succeed best in this market
- It is possible that PCCW-HKT will become the strongest supplier of public Wi-Fi and that, through bundling of access to public Wi-Fi with its mobile services, it will strengthen its position in the mobile market as well
- This outcome, while possible, is not attributable to the merger. CSL is not in a position to offer credible public Wi-Fi services since it does not have the network fixed broadband access points required. In other words, the competitive landscape of fixed broadband service providers has not changed post-merger given that CSL is a mobile operator, and that fixed broadband service providers are the main providers of the public Wi-Fi access service.

Given this analysis we conclude that there are no vertical effects from the merger or any competition concerns in the public Wi-Fi access market raised by the merger.

Figure 29: The role of Wi-Fi in Smartphone data traffic origination



Source: "Understanding today's Smartphone user: Demystifying data usage trends on cellular & Wi-Fi networks," Informa telecoms & media, 28 February 2012

8.6 How will the merger impact the MVNO wholesale market for access?

Wholesale network access is provided by mobile operators to MVNOs. This includes the provision of a range of wholesale telecommunications services on a mobile telephone network for the purpose of providing retail mobile telecommunications services to end customers. These services include wholesale network access and call origination, call termination and international roaming, whether for voice, SMS or data services. The wholesale market for these services is therefore (i) on the supply-side, the MNOs who own their mobile networks and (ii) on the demand-side, the MVNOs who seek access to the mobile operator network in order to provide their retail services.

The position of MVNOs in Hong Kong can be characterised as follows:

- All MVNOs in Hong Kong taken together currently hold 7% of the retail market by subscription. This percentage has changed little since 2008. We note that MVNOs are less important in Hong Kong than in many other markets⁹¹
- The customer base for MVNOs is mostly prepaid and [REDACTED]. As a result the MVNOs hold [REDACTED] market share by revenue⁹²
- Despite their modest share of the overall retail mobile market, competition from MVNOs is important as a way of holding down retail mobile prices in certain segments of the market. This source of competition is dependent on MVNOs being able to strike reasonable commercial deals with their host mobile operators
- The terms on which the mobile operators host the MVNOs are determined by commercial negotiation.
- MVNOs are able to switch host mobile operator relatively easily [REDACTED]. MVNOs can bring with them a significant number of customers. For example [REDACTED]. So MVNOs should be attractive customers for host mobile operators at the wholesale level.
- According to the information available to OFCA, three out of five MNOs provide most of the supply of network access services to seven MVNOs for the provision of 2G and 3G services. HKT, CSL and HTCL are the most active hosts. CMHK plays a relatively minor role and SMT is currently inactive
- Mobile operators with 3G spectrum at 2.1 GHz are currently subject to an Open Access Network requirement⁹³. This obliges them to reserve at least 30% of their network capacity for access by non-affiliated MVNOs or content providers, with the terms and conditions of the access determined by the relevant parties through commercial negotiations. Spectrum assignments in other bands are not subject to such a requirement.

Given this starting point how will the merger affect the MVNOs' ability to compete in the Hong Kong mobile market in future?

⁹¹ In the US MVNOs hold a 10% market share by subscribers, in the UK and in Austria close to 20% and in the Netherlands a market share of over 30%

⁹² [REDACTED]

⁹³ This will cease in the next 2.1 GHz reassignment in October 2016

For an MVNO to strike a favourable deal with a host mobile operator depends upon some combination of two main conditions:

- The MVNO has retail market reach, often in specific niches, which the host mobile operator's retail arm has difficulty in reaching
- The host mobile operator has spare capacity on its network and the incremental revenue generated through MVNO sales is therefore very profitable

The data explosion over the next few years is likely to reduce the spare capacity available on potential host networks. But this effect is not merger specific.

HKT, CSL and HTCL are the main hosts for MVNOs. The merger would reduce the number of active hosts from three to two and could make it difficult for MVNOs to find new hosts on reasonable terms. In principle, both CMHK and SMT should have incentives to offer competitive deals to MVNOs in that MVNOs generate significant revenues for them whilst requiring relatively little network capacity⁹⁴ - provided that the future balance of network capacity between the mobile operators is not unduly distorted by the merger.

Given the analysis set out above we conclude that the merger could aggravate further the already negative outlook for MVNOs in this market. This would lead to a weakening of the potential competitive pressure that MVNOs might be able to exert in the market for retail of mobile services. For example:

- In the absence of remedies requiring the merged entity to divest spectrum, rivals would probably face capacity constraints (for the reasons set out in Chapter 4). Given these capacity constraints the merged entity would then face only a small loss of demand if it raised its prices to MVNOs.
- The loss of bargaining power by MVNOs (due to the compounded effect of lower MNO spare capacity and the HKT/CSL merger) would weaken competition in the retail market.

Chapter 10 considers a number of possible remedies that the regulator and the competition authority may take to minimise these effects.

8.7 The impact of the merger on the wholesale inbound roaming market

MNOs in HK handle traffic from visitors and receive payments from the visitors' operator for doing so. Wholesale roaming revenues in Hong Kong have declined in importance between 2008 and 2012 from 8% of retail mobile revenues to 4%.

CSL and HKT have a combined market share in this market [REDACTED] as the figure below illustrates.

[REDACTED]

⁹⁴ Given the voice centric nature of their subscribers

Table 41: Wholesale roaming revenues market shares in 2012

Operator	Wholesale
CMHK	
CSL	
HKT	
HTCL	
SMT	

Source: OFCA data

In terms of the wholesale roaming market:

- The merger would lead to some upward pricing pressure on wholesale roaming rates in Hong Kong since this wholesale market would become more concentrated
- These price rises would affect foreign MNOs and potentially their (also non-resident) customers
- These price rises would lead to increased profits for the Hong Kong mobile operators
- Wholesale roaming revenues do not impact on marginal costs of MNO retail services so this would be unlikely to translate into lower retail prices for mobile subscribers in Hong Kong.

Overall the consequences of the merger on the wholesale roaming market are likely to be neutral for Hong Kong residents.

For non-resident visitors to Hong Kong, it is possible that the merger will lead to increases in roaming retail prices to a small extent. But we have no firm evidence here and, in any case, the effect is likely to be minor one. We therefore conclude that the merger raises no serious concerns in this market.

8.8 The impact of the merger on wholesale outbound roaming

Mobile operators in Hong Kong charge their customers for roaming on networks in other countries and pay wholesale roaming charges to the operators which their customers use as visitors (retail roaming)

Retail roaming revenues in Hong Kong have declined in importance between 2008 and 2012 from 18% of total retail revenues to 10%. CSL and HKT have a combined share █████ of these revenues as the table below illustrates.

Table 42: Retail roaming revenue market shares in 2012

Operator	Retail
CMHK	
CSL	
HKT	
HTCL	
SMT	

Source: OFCA

The owners of CMHK (China), CSL (Australia), and HTCL (EU and parts of Asia) all run significant mobile networks outside Hong Kong. This may allow these operators to negotiate favourable roaming deals and offer favourable roaming rates to their Hong Kong customers. We note that:

- [REDACTED]
- [REDACTED]
- With the exception of CMHK's links with mainland China, the effect of these links on the overall price packages offered to HK customers is likely to be of little significance
- For regular visitors, and especially those moving to and from China, dual-SIM phones and prepay offer an attractive substitute for roaming services. In addition, subscribers may use "one-card-multiple numbers" services. These are popular service for those travelling across the border into mainland China⁹⁵

The likely impacts of the merger in this market are that:

- The merger would lead to Telstra losing ownership of any mobile operator in Hong Kong
- Once existing roaming contracts come to an end, the merged entity would lose the benefit of Telstra's bargaining power in negotiating roaming contracts
- This would probably lead to the merged entity paying higher roaming wholesale prices overall which, in turn, would lead to higher retail roaming prices for the merged entity's retail customers (and perhaps to higher retail roaming prices across the whole sector)
- These effects are unlikely to be significant for Hong Kong's mobile users given:
 - The shrinking importance of retail roaming revenues in Hong Kong
 - The small impact which loss of Telstra's bargaining power in global markets would have. Telstra has 15 million subscribers out of a total of 4,500 million subscribers world-wide.

We therefore conclude that the merger raises no serious concerns in this market.

8.9 Conclusions from this Chapter

As a result of the analysis presented in this Chapter, we concluded that the merger was likely to lead to a substantial lessening of competition in the MVNO wholesale market for network access.

In relation to all other markets and vertical relations analysed in this Chapter, we concluded that the merger was unlikely to have any significant detrimental effects.

⁹⁵ See for example http://www.hk.chinamobile.com/en/global_services/1CNM/global-services-multino.html

9 Benefits to the public

9.1 The M&A guidelines in Hong Kong

According to the merger guidelines, if the CA concludes that the proposed acquisition is likely to have the effect of substantially lessening competition then it is required to consider whether the acquisition is likely to have a benefit to the public and whether that benefit outweighs any detriment to the public that is likely to be constituted by the anti-competitive effect.⁹⁶

Any claim of public benefit arising from the merger or acquisition must be justified by the parties, so that the CA can verify by reasonable means, that the benefit is one which should be taken into consideration. The parties will need to show the following:

- That the public benefit will occur as a direct result of the merger;
- The likelihood and magnitude of the claimed benefit;
- How and when the benefit would be achieved; and
- How the benefit would be passed on to consumers, in whole or in part.⁹⁷

The party claiming benefits to the public also needs to state the timing of the benefit and needs to provide detailed and verifiable evidence of such benefit.⁹⁸

9.2 HKT's claim of public benefits

9.2.1 Introduction

A substantial element of the HKT claim for public benefits relates to cost savings and efficiency gains. We took account of all of HKT's claims in respect of these items in our assessment of SLC, which is discussed in our chapter on countervailing effects. Further details on the HKT public benefits claim and the extent to which it overlaps with matters considered as a part of our assessment of SLC are provided below.

9.2.2 HKT Application

In its application for prior consent under Section 7P of the Telecommunications Ordinance in respect of the proposed acquisition of CSL New World Mobility Limited by HKT Limited, HKT makes claims in relation to public benefits in several places, notably in Sections 1.4, 2.5, 5.1, 5.2 and 13.⁹⁹

The most comprehensive statement of the claim is in Section 2.5, as follows.

"2.5 Significant potential public benefits

⁹⁶ Mergers and Acquisitions in Hong Kong Telecommunications Markets, Telecommunications Authority Guidelines, 2004, Paragraph 5.1.

⁹⁷ As above, paragraph 5.6.

⁹⁸ As above, paragraph 5.2.

⁹⁹ Application as included in Annex A of the CA consultation on the application (public version) at: http://www.coms-auth.hk/filemanager/en/content_880/cp20131223_e.pdf [Downloaded 11 March 2014]

HKT does not consider that the transaction will result in a substantial lessening of competition, but for completeness, HKT also submits that the transaction is likely to result in material public benefits.

- *Greater cost efficiency:* Network efficiencies, cost savings and economies of scale will provide scope for HKT to better compete in the Hong Kong mobile market, to the ultimate benefit of Hong Kong consumers.
- *New mobile technologies:* The larger subscriber base of HKT and CSL will provide economies of scale in relation to the development and implementation of new mobile technologies (e.g. advanced 4G and LTE data applications and technologies), potentially resulting in their earlier and broader introduction to Hong Kong consumers.
- *Higher quality services:* The overall quality of service will be increased via progressive rationalization around the best network sites, technologies and infrastructure; leading to increased quality of services to the benefit of Hong Kong consumers.
- *Wider environmental benefits:* Rationalization of networks over time will reduce unnecessary duplication of infrastructure, resulting in wider environmental benefits.

For CSL and HKT customers: Both CSL and HKT customers will benefit from the proposed transaction. CSL customers will have access to HKT's WiFi facilities in order to off-load traffic (including 3G traffic) which will significantly improve service quality. HKT has the most extensive WiFi network in Hong Kong with over 12,000 locations which will reach about 25,000 locations in 2016. This WiFi network extends to dense urban areas including in the MTR stations. CSL customers will also have access to innovative apps such as KingKing which will allow them to manage their roaming costs. HKT customers will gain access to CSL's below 1G spectrum. This will result in better indoor coverage and increase service quality. HKT customers will also obtain access to improved roaming arrangements under CSL's broad set of international roaming agreements. HKT customers will further gain access to CSL's LTE network. Both CSL and HKT customers will have access to more base station sites, improving service quality. As HKT becomes more efficient, the benefits of this will be flowed through to users in terms of greater investments in innovation, network up-grades, new services, better service quality and customer care.

HKT will take particular care to ensure that CSL customers experience a seamless transition. This will begin with a strong commitment to maintaining service continuity and service quality. On the one hand, CSL's network will continue to provide service to these customers as it does today. On the other hand, these customers will have access to HKT's WiFi hot spot facilities as soon as possible, and thus their mobile experience should be enhanced over time. Additional base station access and improved MTR coverage will also occur, enhancing the mobile experience for the CSL customer.

CSL customers will continue to have all the rights and obligations they now enjoy under their CSL customer contracts. These contracts will remain in effect, and HKT commits that these contracts and the license obligations of CSL will be fulfilled by

HKT. All of CSL customers will be contacted, assurances given re their contracts and services, questions answered, etc. HKT has the strongest possible incentive to ensure a smooth transition. Anything less could adversely affect HKT's revenues. HKT is confident that it can manage both the near term transition in 2013/2014 and the 3G transition (although not without pain and additional costs) in 2016 to the benefit of its customers."

Two additional points are also made in Section 13, as follows.

"13.5 All licensees will become more competitive

As HKT becomes more innovative and efficient, its competitors will be encouraged to do the same, creating a win-win situation for consumers and the economy."

And

"13.7 The above benefits would be quickly passed onto consumers. Such benefits (in terms of innovation, service quality and environmental improvements) should be reflected in the market within the short to medium term."

9.2.3 Consultation response

In its response to the CA consultation document, HKT includes a section called 'Public Benefits'.¹⁰⁰ Together with the section called 'Consumer Benefits' this broadly covers the same points as those raised in the Application.¹⁰¹

9.3 Assessment of HKT's claim

It does not seem to us that HKT's claim has met the requirements of paragraphs 5.2 and 5.6 of the CA merger guidelines (which are summarised above) for the following reasons.

- Other than stating that the proposed transaction will lead to substantial public benefits, no attempt is made to show that these benefits will occur as a direct result of the merger and could not, for example, occur in any case without a merger.
- Other than stating that the benefits "will" happen and that they will be "substantial" there is no clear evidence presented on the likelihood and magnitude of the claimed benefits.

We therefore do not consider that detailed, verifiable evidence has been provided in support of the claimed benefits to the public.

The HKT claim in relation to public benefits makes reference to a number of items that have been addressed in our consideration of efficiency effects in our assessment of SLC. These are discussed in our chapter on countervailing effects. Reconsidering them in the context of benefits to the

¹⁰⁰ The 'Public Benefits' section is on page 11 of the HKT consultation response of 4 February 2014. That section also cross-refers to further material on 'Consumer Benefits' on page 4 of the response.

¹⁰¹ See, for example, section 2.5 of the Application.

public would not change our conclusions in respect of benefits to the public. These items which relate to efficiency include:

- **Greater cost efficiency (network efficiencies, cost savings and economies of scale).** HKT also make claims in relation to cost savings from network efficiencies and economies of scale directly as a part of their efficiency claim.
- **New mobile technologies.** This is a further reference to economies of scale as above.
- **Access benefits for CSL and HKT customers.** These are discussed in HKT's claims for both efficiency and public benefits
- **All licensees will become more competitive.** This benefit is attributed to innovation and efficiency gains and is naturally a part of the consideration in relation to SLC.

The remaining potential benefits to the public are **wider environmental benefits** and **higher quality services** for customers. Arguably, even the latter is hard to distinguish from the SLC questions since it is closely related to network efficiencies and access benefits.

9.4 Conclusions on benefits to the public

There is insufficient evidence to support a conclusion that any benefits to the public from the proposed merger are sufficient to mitigate the significant lessening of competition from the proposed transaction.

10 Competition effects of the merger and proposed remedies

In this chapter we present our conclusions on the competitive effects of the proposed merger and suggest remedies which, in our view, adequately and proportionately resolve the competition concerns raised.

10.1 Conclusions on the competitive effects of the proposed transaction

This report's detailed analysis of the competition effects of the proposed acquisition of CSL by HKT has reached the conclusion that the merger gives rise to a substantial lessening of competition in the market for retail mobile services in Hong Kong and in the market for wholesale access to MNOs' networks.

According to the merger guidelines, a substantial lessening of competition is to be interpreted as the creation or enhancement of market power. "Market power manifests itself when there is a firm (or a group of firms in coordination) that is not constrained by other firms in its (or their) ability to increase its price above competitive levels for a significant period of time (or to reduce output or quality)."¹⁰²

Our main findings can be summarised as follows:

- The merger removes an important competitive constraint on HKT in the market for retail mobile services in Hong-Kong, giving rise to a significant upward pricing pressure for this company.
- The merger significantly increases the concentration of spectrum holdings and network capacity, thus leading to a relative weakening of the competitive position of the remaining operators.
- The merger removes 1 of 3 currently active suppliers of wholesale network access services to MVNOs weakening the bargaining position of MVNOs in this market.

All of the above effects in combination are likely to allow the merged entity to sustain an increase in prices and/or worse terms of service post-merger relative to current (more competitive) levels both in the market for retail mobile services and in the wholesale market for network access - given reduced competitive pressure from other market operators, no appreciable efficiency benefits that could be directly attributable to the merger, and the low likelihood of new entry. The proposed merger, in the absence of any remedies, would thus result in a substantial lessening of competition in both markets, according to CA's merger guidelines.

We have also found that:

- By removing CSL from the 'mid-tier' market segment, the merger could facilitate coordinated behaviour within this segment. However, we believe that CMHK will be in a strong position to counteract this effect - as long as its network capacity and network capacity costs are not substantially affected by the merger. In addition, SMT is expected to have some spare capacity after the spectrum reassignment auction as a result of the remedies discussed below

¹⁰² CA merger guidelines para 4.13

(in particular the 30 MHz spectrum divestment) and can therefore also be considered a potential competitive constraint on the merged entity.

- The merger's impact of possibly weakening the bargaining position of MVNOs on the market for wholesale network access services is addressed as long as either CMHK or SMT are considered credible potential suppliers of these wholesale services. The potential for CMHK and/or SMT to act as credible supplier(s) of wholesale services post-merger again hinges upon the remedies discussed below. It should also be noted that the merger leads to additional network capacity due to the combination of HKT and CSL networks. The merged entity will therefore have more capacity to offer wholesale services to MVNOs than HKT and CSL would have had separately. In light of the upward pricing incentives identified in Chapter 5, it is far from certain that the merged entity would have the incentive to make use of its enhanced capacity to offer wholesale services.

We have further found that there is insufficient evidence to support a conclusion that the merger gives rise to public benefits that could justify allowing the transaction to go ahead as proposed in spite of the SLC finding.

It is therefore required that we next give consideration to remedies.

10.1.1 What the remedies should seek to achieve

The main competition problems identified are linked to the fact that the merged entity would be able to raise prices and/or decrease service levels compared to competitive levels in the mobile services retail market and in the wholesale market for network access. Remedies to be considered must seek to eliminate or avoid the effects of SLC in those two relevant markets.

To design and assess the strength of different remedies it is generally necessary to consider what the main drivers of competitive strength in a particular market are and what the requirements for successful new entry may be. Taking into account also the feasibility and effectiveness of particular interventions, they must then seek to achieve some degree of re-balancing of competitive strength away from the merged entity and towards other competitors and/or potential new entrants.

In mobile retail markets, a firm's competitive position is strengthened when it has larger network capacity (spectrum and/or base station sites) relative to its rivals, when it has lower network capacity costs (more spectrum rather than more base station sites) and when the available network capacity is suitable for providing the services that correspond to the most important and fastest growing market segments. In this case the requirement is for spectrum for 4G/LTE services, which most experts believe will gain in importance very rapidly relative to 3G.

In the market for wholesale network access, the merger reduces the number of potential suppliers but at the same time creates the potential for more network capacity. It is therefore likely that the bargaining position of MVNOs vis-à-vis MNOs in this market will be safeguarded as long as there is at least one additional supplier of wholesale access. Direct regulation of network access conditions is often considered as a remedy to enhance the market position of MVNOs but has very significant enforcement costs and appears disproportionate relative to the competition concern in question. Similarly reservation of additional network capacity for MVNOs, beyond what is currently in place, raises the question of what is the right reserve level to ensure that no inefficiencies are created as a result. Such a remedy is, in our opinion, disproportionate in view of the predicted effect of the merger on MVNOs.

10.2 Examples from other jurisdictions

To ensure that we have considered the widest range of relevant possible remedies, we have taken account of solutions implemented elsewhere in comparable cases.

10.2.1 Remedies aiming to rebalance network capacity

These include:

- Network sharing requirements
- Divestiture of base station sites
- Spectrum release
- Spectrum release at particular frequencies

Past decisions where examples of the above remedies were required include: a requirement on Telekolmio, of Finland, to sell 15 of its base stations to one or more competitors; H3G's commitment to divest radio spectrum and additional rights to an interested new entrant in the Austrian mobile telephony market; and OFT's requirement for release of spectrum in a 2G frequency band that could soon be refarmed for LTE services in the UK.

10.2.2 Remedies aiming at facilitating wholesale access

There is a range of remedies which have been used in other jurisdictions:

- Obligations of non-discrimination
- Granting access to network interconnection points on fair conditions
- Obligations to reach national roaming agreements
- Obligations to reach network sharing agreements
- Reservation of network capacity and commitment to provide wholesale access to MVNOs on agreed terms
- Provisions to prevent termination/erosion of a RAN-sharing agreement

Different combinations of these remedies have been introduced across a wide range of jurisdictions illustrating the importance attributed to effective access to incumbent network assets.

10.3 Proposed remedies

10.3.1 Unilateral effects and network capacity issues

Our analysis of upward pricing pressure and of post-merger distribution of network capacity indicates that a remedy to increase network capacity outside the merged entity is required.

Network capacity and, in particular, costs associated with delivering a given level of network capacity depend on:

- The amounts and frequencies of spectrum held by each MNO,

- The number and location of the base station sites that each MNO operates,
- The use each MNO might make of existing networks through network sharing agreements and
- The extent to which traffic can be off-loaded to a Wi-Fi network.

In order to counteract the concentration of spectrum that the merger creates and its consequences in terms of potentially insufficient network capacity and/or higher network costs for the merged party's competitors, combinations of spectrum divestment, base station site divestment, sharing of HKT/CSL's network with their competitors, and granting of access to HKT's Wi-Fi network could be considered. However, the most effective remedy is, in our opinion, spectrum divestment. The reasons are discussed below.

First for potential new entrants access to a combination of spectrum, base station sites and network sharing arrangements would be the fastest and lowest cost way to build up the required capacity. But, as discussed in Section 7, new entry at a sufficient scale to exert competitive pressure on the merged entity seems unlikely at present.

Secondly for all existing MNOs in the Hong Kong market, there are lower costs associated with increasing network capacity via additional spectrum rather than via additional base station sites. Spectrum divestment is therefore a more effective remedy to restore competitive pressure on the merged entity from existing MNOs than base station site divestment.

Thirdly existing MNOs are unlikely to benefit from network sharing agreements with HKT/CSL beyond those that are already in place. Network sharing as a remedy is more complex to design, implement and monitor than spectrum divestment and provides less scope for competitors to be innovative in their capacity building.

Finally a remedy that mandates access to HKT's public Wi-Fi network has the same implementation drawbacks as mandated network sharing. It assists MNOs with only a part of their network capacity requirements and seems, in any case, unnecessary given that there are other owners of public Wi-Fi networks from whom similar services could be purchased.

In conclusion spectrum divestment from the merged entity to its rivals has clear advantages over other forms of re-balancing network capacity and maintaining competitive network capacity costs for the remaining MNOs. Furthermore spectrum divestment, by endowing rivals of the merged entity with more network capacity, will enable them to become more effective competitors and enhance the likelihood that any one of them will step in to serve as a more direct competitor of HKT/CSL similarly to how CSL was a direct competitor to HKT prior to the merger. In other words, the principal function of spectrum divestment by HKT/CSL is to increase competitiveness of rivals and enable one of them to replace the competitive constraint on HKT that was exercised by CSL prior to the merger.

We discuss below the particular form that such divestment should take by considering two options:

- The voluntary remedy offered by HKT of divestiture of just under 30 MHz of 2.1 GHz spectrum or
- The above plus (for example) 2 x 10 MHz of 1800 MHz spectrum

The analysis in Chapter 4 suggests that, on balance, spectrum divestment of around 30 MHz is sufficient and that this spectrum can be at a range of frequencies, including 2.1 GHz. Our analysis

also suggests that divestment levels significantly above 30MHz could jeopardise the ability of the merged entity:

- To provide a good quality of services to its subscribers and hence its ability to compete effectively in the market
- To fulfil its commitment to honour all pre-existing agreements such as wholesale access agreements and network sharing agreements , and
- To fulfil its commitment to honour the consumer contracts of CSL (while maintaining high levels of quality of service).

Timing of spectrum divestment

As for the timing of this spectrum release, the spectrum auction already planned for 2016 is a possibility. This would allow time for the network capacity sharing arrangement between HKT and CMHK to be safe-guarded. In addition our analysis in Chapter 4 indicates that the three competitors of HKT/CSL will not be capacity constrained in the short term so long as the merged entity continues to honour its network sharing agreement with CMHK and wholesale access agreement with MVNOs post-merger. The only motivation for the spectrum release to be implemented in a shorter timeframe is if there are buyers outside the 4 post-merger MNOs that would be able to immediately start using this spectrum to enter the market. We have found little evidence to suggest such imminent entry is likely but we discuss below the extent to which a package of remedies might be used to facilitate entry.

Conclusion

It is therefore our opinion that the SLC in the market for retail mobile services could be adequately alleviated by means of the following remedies:

- The voluntary remedy offered by HKT to divest 30 MHz of 2.1 GHz spectrum
- HKT/CSL continuing to honour, without conditions regarding its holdings of 2.1 GHz spectrum, its network sharing agreement with CMHK

10.3.2 Loss of competition in the wholesale market for network access

We concluded in Section 8.6 that the merger would likely aggravate the already negative outlook for MVNOs in the wholesale market for network access. Furthermore we considered that, in the absence of remedies requiring the merged entity to divest spectrum, rivals to the merged parties would have little spare capacity to offer alternative sources of supply to MVNOs. As a result HKT/CSL would face only a small loss of demand if it raised its prices to MVNOs or otherwise worsened their access conditions.

In addition, it is important to bear in mind that MVNOs are competitors in retail mobile services and as such their loss of bargaining power in the wholesale market (due to the compounded effect of lower MNO spare capacity and the HKT/CSL merger) would have the additional negative effect of further weakening competition in the retail market.

The potential for competitive harm is therefore substantial and it is necessary to consider a range of remedies to address this. We consider the following four options:

- HKT's voluntary offer to honour existing MVNO agreements. This is helpful in the short-term prior to the 3G spectrum re-assignment in 2016. [REDACTED]
- Remedies discussed above to re-balance network capacity among all remaining MNOs. Such measures are required if rivals to the merged entity are to have sufficient network capacity to be able to offer commercial MVNO deals
- CA requiring HKT/CSL to reserve network capacity for MVNOs to shift some degree of bargaining power in favour of MVNOs. Such a remedy could prevent the efficient utilisation of network capacity while having little effect in enhancing the competitive pressure exerted by MVNOs if no significant entry or expansion occurs. Given the likelihood of network capacity being scarce as demand for data increases, such a remedy leads to the risk that a significant portion of such capacity remains unused. This could result in a less, rather than more, competitive market. Such a remedy would therefore risk significant inefficiencies and appears disproportionate since there are more effective alternatives which are likely to adequately re-balance the MVNOs' bargaining position.
- A remedy requiring HKT/CSL to offer MVNOs wholesale network access on fair reasonable and non-discriminatory (FRAND) terms. Requiring FRAND access terms for MVNOs has the significant drawback of large enforcement costs. There is little to assure us that the competitive pressure that MVNOs are likely to exert on MNOs, even if FRAND regulation were successfully implemented, would be significant enough to justify such an interventionist remedy.

Given that spectrum divestment is considered an adequate remedy for the SLC in mobile retail services, we assess the extent to which a similar remedy might be effective in the wholesale access market.

Since the loss of competition, from the MVNOs' perspective, is the result of the smaller number of potential suppliers, spectrum divestment is likely to be effective as it opens the possibility of other suppliers joining the market. In particular, both CMHK and SMT might well be in a position to supply wholesale access to MVNOs, post spectrum divestment by HKT/CSL.

Given that spectrum divestment is proposed to occur at the time of the 2016 spectrum auction, there is a question of how to deal with the loss of competition between now and that date. In the interim, our analysis indicates that capacity constraints are not yet binding on suppliers and we consider that the position of MVNOs will be adequately safe guarded as long as HKT commits to honour all pre-existing agreements such as wholesale access agreements with MVNOs and its network sharing agreement with CMHK.

Conclusion

It is therefore our opinion that the bargaining position of MVNOs in the wholesale market for network access is adequately protected by remedies already suggested elsewhere in this chapter (Sub-Section 10.3.1), namely:

- The voluntary remedy offered by HKT to divest 30 MHz of 2.1 GHz spectrum
- HKT/CSL continuing to provide wholesale access to MVNOs for a reasonable period of time based on pre-existing agreements on wholesale access agreements with MVNOs.

10.3.3 Could a package of remedies facilitate entry?

Given that new entry would be a very effective way of maintaining competitive pressure on HKT/CSL post-merger, we next consider the question of whether a package of remedies could be designed in such a way as to facilitate entry. Such a package of remedies would have a somewhat different focus and would probably differ from the above in at least the following:

- Divestment of spectrum would be combined with divestment of a package of base station sites and/or with network sharing agreements
- A shorter timeframe for spectrum divestment by HKT/CSL would be required, e.g. up to 12 months from the time of the merger

The divestment of a package of base station sites could facilitate entry or expansion of competitors at relatively low cost to HKT/CSL. Our analysis of base station sites held by each of the 5 existing mobile network operators suggests that [REDACTED] sites is adequate, in combination with the appropriate spectrum holdings, for the provision of good quality mobile services in Hong Kong. HKT's application to acquire CSL also indicates that the merged entity is likely to be able to rationalise its network of base station sites.¹⁰³ Some of these could be transferred to rivals at little cost to HKT/CSL¹⁰⁴.

The advantage of a combined spectrum and base station sites divestment is that this is likely to be a more efficient way of building network capacity for new entrants than spectrum divestment alone since access to a network of base station sites is a significant barrier to entry in Hong Kong.

Network sharing agreements have the advantage of making entry possible in a very short timeframe. Their effectiveness as a remedy is however dependent on the conditions that HKT/CSL would offer to users of their combined network. This is therefore a remedy with significant enforcement costs which could only be justified if there were a high level of certainty that it would help create a new entrant.

The extent to which a package of remedies designed to facilitate entry would be effective depends ultimately on whether entry at a sufficient scale to competitively constrain the merged entity would indeed occur. Our discussion in Section 7 leads us to the view that this is unlikely in the short term. We therefore recommend that remedies are designed to re-balance competitive strengths among existing MNOs rather than with the express aim of facilitating new entry. We therefore do not propose divestment of base station sites as an appropriate and effective remedy to counter the competitive effects of the merger.

Nonetheless, we would suggest that HKT/CSL commit to making an announcement prior to shutting down existing base station sites so as to give other MNOs or eventual new entrants the option to take on those contracts, subject to the approval of respective site owners. This would, we believe, generate very little cost for HKT and could have significant efficiency benefits in the

¹⁰³ Point 13.6 of HKT's submission to OFCA, Application to the Communications Authority under Section 7P of the Telecommunications Ordinance Regarding the Acquisition of CSL Limited.

¹⁰⁴ We understand that there may be problems with novation of contracts between HKT/CSL and respective base station site landlords which may complicate the divestment of base station sites to other operators. But we believe that, faced with loss of BTS site revenue because of closure of a site, many landlords would be keen to find an alternative tenant

event of new entrants trying to set up their own networks or existing MNOs enhancing some areas of their existing networks. In this respect we note that:

- It is likely to be much easier for an existing MNO to acquire an existing base station site than it is for it to set up a new base station site from scratch
- There is a likelihood that rival MNOs will want to expand the number of base station sites they use as demand for mobile data grows.

Conclusion

Given its low cost and potential efficiency benefits we propose the following remedy as an additional means to enhance the competitive position of the remaining MNOs and, potentially, to facilitate entry:

- Prior to closure of any base station sites, HKT/CSL should announce the proposed closure and provide relevant information on the basic technical characteristics and ownership of the site. This would allow other MNOs or potential entrants to enter into negotiations with site owners for the respective leases and thus enhance their capacity to provide service in the relevant markets.

10.3.4 Proposed remedies

In conclusion, the remedies that we would propose to re-balance competition among existing MNOs and address the SLC in the market for retail mobile services as well as the SLC in the wholesale market for network access are:

- HKT to divest the 30 MHz of 2.1 GHz spectrum as per its voluntary remedy offer
- HKT to honour all pre-existing agreements such as wholesale access agreements with MVNOs
- HKT to honour, without conditions regarding its holdings of 2.1 GHz spectrum, its network sharing agreement with CMHK.

In addition, given its low cost and potential efficiency benefits, we propose that HKT/CSL agree to make public their intention to close base station sites and to provide relevant information on the basic technical characteristics and ownership of the site to potential competitors/entrants.

Annex 1 Spectrum supply for mobile services

A1.1 Current spectrum holdings

Table 43 shows the current spectrum holdings of the five mobile operators in Hong Kong. It indicates the size of contiguous blocks and whether the spectrum is paired or unpaired.

Operator	800 MHz/ UHF	900 MHz	1800 MHz	2.1 GHz	2.3 GHz	2.6 GHz
CMHK	None	None	26.4=2x10 + 2x3.2	None	30	40=2x5+2x15
CSL	None	16.6=2x7.5+2x0.8	46.4=2x1.6+2x21.6	34.6=2x14.8+5	None	40=2x20
HKT	15=2x7.5	None	26.4=2x11.6+2x1.6	34.6=2x14.8+5	None	40=2x20 shared through Genius Brand
HTCL	None	26.6=2x5+2x4.8+2x2.6+2x0.9	23.2=2x1.6+2x10	34.6=2x14.8+5	30	
SMT	None	26.6=2x0.8+2x7.5+2x5	26.4=2x1.6+2x10+2x1.6	34.6=2x14.8+5	None	20=2x10
21ViaNet	None	None	None	None	30	None
HKMTVN ¹⁰⁵	8 for mobile TV	None	None	None	None	None

Source: OFCA

In assessing market share by spectrum holdings it is important to distinguish between spectrum which is useful for competing in the mobile market and that which is not. Here we make the following assumptions:

- The 8 MHz of spectrum assigned to HKMTVN for mobile TV is not useful for provision of mobile telecommunications service. We therefore exclude this spectrum from effective spectrum holdings
- The 2x7.5 MHz in the 800 MHz assigned to HKT for use by visitors using CDMA mobile services from the Chinese mainland is of limited and diminishing value in its current use.
- The fragments of paired spectrum at 900 and 1800 MHz will be used to provide 2G voice capacity over the time horizon of our analysis (to 2017). We therefore include it in the effective spectrum holdings
- The 5 MHz blocks of unpaired spectrum at 2.1 GHz are not currently used and are of limited value in their current assignment. For example their use for TDD-based services technology is limited by the need for substantial guard bands between the blocks
- The spectrum at 2.3 GHz is eminently usable for TD-LTE based services and there is already a significant ecosystem of smartphones available to use such services. This includes the iPhone 5 and the Samsung Galaxy. In addition we note the recent announcement that the authorities in mainland China have released 90 MHz of 2.3 GHz spectrum to China Mobile (50 MHz), China Unicom (20 MHz) and China Telecom (20 MHz). We anticipate a ready supply of low priced mobile devices from Chinese manufacturers to supply this ecosystem.

¹⁰⁵ Hong Kong Mobile Television Network Limited.

Given these assumptions we estimate the current effective spectrum holdings of the five mobile operators is as shown in Table 44. We note that, in combination HKT and CSL hold:

- A 39% share of all effective spectrum
- A 24% share of sub 1 GHz spectrum.

Both holdings are important. The first measures the relative long-term effective capacity of the merged entity relative to each of its rivals. The second measure gives an indication of the ability of the merged entity to offer in-building coverage relative to rivals. This is important if subscribers are to enjoy a seamless experience. The multiple high-rise buildings in Hong Kong create a complex radio network environment which makes the availability of sub 1 GHz spectrum for in-building coverage especially important. We note that neither HKT nor CMHK currently hold sub 1 GHz spectrum.

Table 44: Effective current spectrum holdings

Operator/B and	MHz of effective spectrum						% holding	
	900 MHz	1800 MHz	2.1 GHz	2.3 GHz	2.6 GHz	total	all spectrum	< 1GHz
CMHK	0.0	26.4	0.0	30.0	40.0	96.4	18%	0%
CSL	16.6	46.4	29.6	0.0	40.0	132.6	25%	24%
HKT	0.0	26.4	29.6	0.0	20.0	76.0	14%	0%
HTCL	26.6	23.2	29.6	30.0	20.0	129.4	24%	38%
SMT	26.6	26.4	29.6	0.0	20.0	102.6	19%	38%
No use for mobile			30.0			30.0		
Total	69.8	148.8	148.4	60.0	140.0	567.0		
Total useful	69.8	148.8	118.4	60.0	140.0	537.0	100%	100%

Note: Assumes 40MHz of 2.6 GHz spectrum held by Genius split 50:50 between HKT and HTCL

Source: OFCA

A1.2 Spectrum holdings by 2017

A1.2.1 Introduction

There are a number of potential sources of additional spectrum which might be assigned to mobile operators in Hong Kong by 2017 and which might affect competition between existing players and/or provide opportunities for entry into the market. Our assessment of each of these sources is set out below.

A1.2.2 Additional sub 1 GHz spectrum

The prospects for release of significant sub 1 GHz spectrum for mobile use by 2017 are limited. Release of any significant spectrum at frequencies below 1 GHz depends on the clearance of TV broadcasting in the UHF band. This in turn depends upon digital switch-over in mainland China. We understand that the coordination required with the spectrum authorities in China make it unlikely that such spectrum will be available much before the time horizon for the merger analysis.

A1.2.3 Reassignment of 2.1 GHz spectrum in 2016

The recent CA decision on reassignment of 2.1 GHz spectrum in 2016 creates significant opportunities for changes in spectrum holdings between existing mobile operators (and for possible market entry). Under this decision:

- The four existing 3G operators have right of first refusal to 2x9.9 MHz of their current 2x14.8 MHz holdings of 2.1 GHz spectrum when reassignment takes place
- Two sets of 2x9.9 MHz of spectrum will be auctioned to the highest bidder
- There is a spectrum cap on any operator holding more than 2x20 MHz of 2.1 GHz spectrum
- The 5 MHz of unpaired spectrum held by each of the 3G operators will be returned to CA for reassignment.

In addition HKT has agreed, as a voluntary condition of the merger:

- Not hold more than 2x15 MHz of 2.1 GHz spectrum
- Not to participate in the auction for the reassigned spectrum at 2.1 GHz.

In combination, the reassignment process and the HKT voluntary commitment would reduce the effective spectrum holdings of the merged entity from 59.2 MHz (CSL and HKT today) to 29.6 MHz. It would also lead to release for reassignment of 49 MHz of 2.1 GHz spectrum.

In theory the release of the four blocks of unpaired 5 MHz spectrum could lead to an increase in the spectrum holdings of the merged entity's rivals. But we judge that this spectrum, along with unused spectrum at 2010 to 2020 MHz is of little use for mainstream mobile services in Hong Kong. We are not aware of any regional or global initiatives to harmonise use of this spectrum for mobile services. We understand that the spectrum is used in China the TD-SCDMA. But this is now a legacy technology and we do not expect that the Hong Kong operators will upgrade their base station sites to use this technology for mainstream services.

A1.2.4 Supplemental downlink at 1.4 GHz

In other parts of the world spectrum authorities have recently allocated 40 MHz of spectrum at 1.4GHz as a supplemental downlink for mobile broadband services using carrier aggregation techniques. Qualcomm recently announced that it expects to have the chip sets required to implement such a service available and in commercial production by 2015.

There is the potential to implement such a supplemental downlink in Hong Kong and mainland China. But it is unlikely this will happen within the timescales of our analysis and we do not consider it further.

A1.2.5 Other spectrum release

We have reviewed the spectrum released plan issued by OFCA in March 2014.¹⁰⁶ This sets out OFCA's plans for spectrum release to the end of 2016. Based on this review we are not aware of any spectrum release opportunities in addition to those described above.

¹⁰⁶ http://www.ofca.gov.hk/filemanager/ofca/common/Industry/broadcasting/spectrum_plan2014_en.pdf

Annex 2 Calculations and data for upward pricing pressure measures

Table 45: EBITDA						
EBITDA (HK\$ million)	2008	2009	2010	2011	2012	1H 2013
HTCL						
CSL						
SMT						
HKT						

Source: OFCA data, collected from companies' annual reports

Table 46: Revenues : retail ex handsets	
(HK\$ 000)	2012
CSL	
HKT	
HTCL	
SMT	

Source: OFCA data, collected from MNOs

Table 47: Subscribers		
Average number of subscribers over period ('000)	2012	1H 2013
HTCL		
CSL		
SMT		
HKT		

Source: OFCA data

Table 48: EBITDA per average number of subscriptions over 4 quarters, 2012	
(HK\$)	2012
HTCL	
CSL	
SMT	
HKT	

Source: OFCA data, collected from MNOs



71-75 Shelton Street, Covent Garden
London WC2H 9JQ, United Kingdom
info@londoneconomics.co.uk
londoneconomics.co.uk
[@LondonEconomics](https://twitter.com/LondonEconomics)
+44 (0)20 7866 8185