The Mobile Data Surge in Hong Kong: Technical and Regulatory Approaches

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Executive Summary

Hong Kong has one of the most sophisticated telecommunication sectors in the world. It offers some of the highest broadband speeds regionally and globally and has the highest number of SIMs per hundred. Since the launch of the iPhone in Hong Kong the use of mobile data has risen exponentially. Given its advanced networks, technologies and unique regulatory regime, it provides examples of good practices for other economies yet to face the mobile data upsurge.

Its size and population are by no means an indication of the number of services providers. With five mobile operators serving a population of approximately seven million in a highly deregulated sector, the level of competition is intense. The island state has created a conducive environment for investment (including foreign investments) in the Information and Communication Technology (ICT) sphere. The national regulatory agency, OFCA, maintains minimal involvement in terms of exercising control. The limited land mass and population density does pose technical challenges to network operators, but makes it easy and inexpensive to roll-out networks and services within a short time frame.

Given the sophistication of the sector and its experience of having successfully dealt with a mobile data surge, this paper aims to provide recommendations to service providers and policy makers of developing economies. The key recommendations are presented by network segments or domains. The biggest challenges faced in the access network are the lack of spectrum and the efficient use of network resources. In order for mobile broadband to be utilizable, access to 3G networks at minimum is mandatory. Therefore, adequate 3G and 4G frequencies have to be released. However, recognizing the technical limitations, other means, such as small cell technologies (e.g. Wi-Fi) ought to be explored. Off loading the bulk of the data traffic will bring about efficiencies on the mobile network.

Although irrelevant to the case of Hong Kong, good practices such as open access to existing capacity in the domestic backhaul network is imperative to support the demands of the mobile networks. The use of Internet Exchange Points (IXPs) can reduce costs by eliminating the unnecessary use of third party networks to carry mobile data. By using local or regional peering points data can be exchanged much more efficiently. Finally, one of the major chokepoints - the price of international capacity. Although data of this nature is not widely published, based on publicly available data and feedback from Hong Kong based mobile operators, the prices of international backhaul are considered inexpensive and obtaining additional capacity is hassle free. This was a key factor that enabled operators in Hong Kong to deal with the rapid increase of mobile data use and is something that ought to be managed by other economies.

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1   Background

Developing economies are in the midst of a smart phone revolution. With more countries making 3G and 4G spectrum available, the momentum is likely to continue, especially if unit prices come down. The combined effects of lower handset and connectivity prices alone with the greater availability of services and applications are likely to result in even more users accessing the Internet through the mobile network. From the supply side, it is imperative that mobile network operators (MNOs) plan and provide for acceptable service levels.

According to Ericsson data representing approximately 180 countries, there has been exponential growth of data use over mobile networks since 2007 (Figure 1). Figure 2 is representation of the world's total mobile traffic across 2G, 3G and 4G networks (Akamai, 2013). This trend has already been seen in some developed economies; and as the use of wireless devices increase, it is likely that in developing economies too will experience exponential increases in mobile data use.
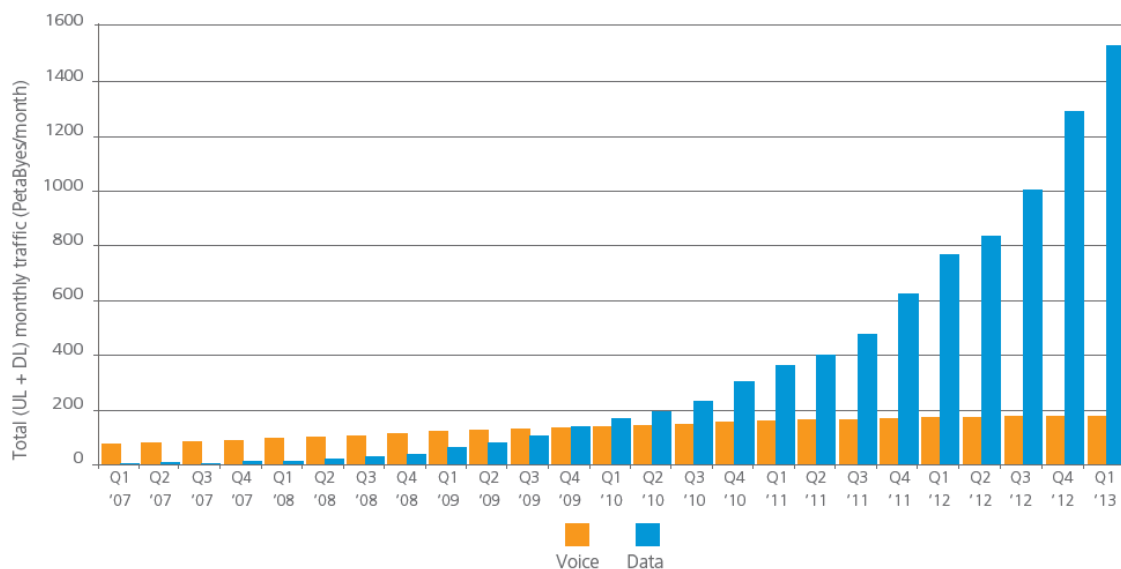

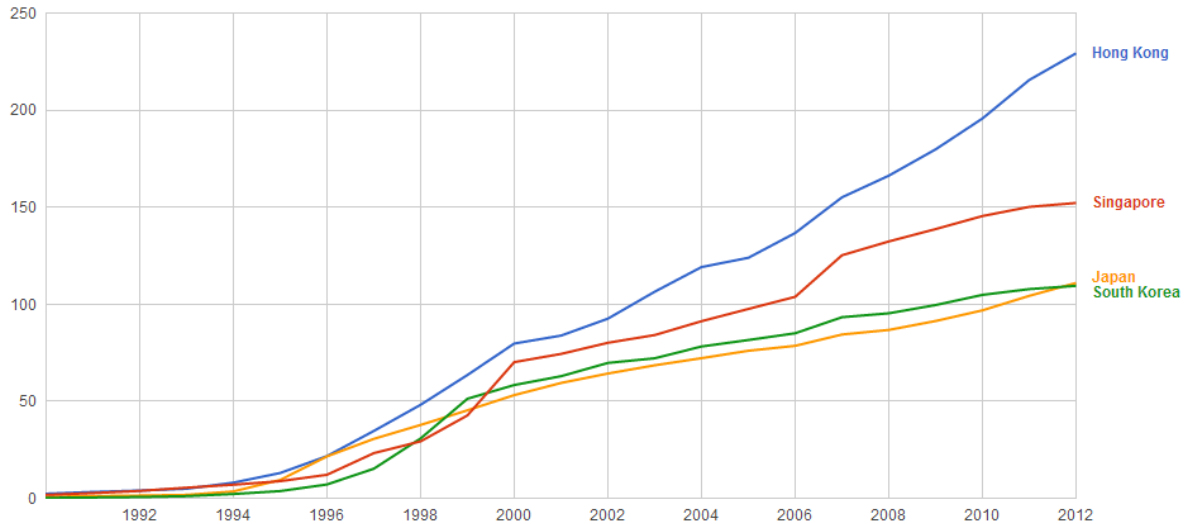**Figure 1: Total mobile voice and data traffic, measured by Ericsson**

According to Akamai research, Hong Kong based service providers offer some of the fastest broadband speeds in the world (Akamai, 2013, pp. 12 - 13). Further, mobile data use in the island state increased by 50 percent within one year (2013) and has grown approximately 90-fold in the last five years (2008 – 2013, see figure 5). The hypothesis is that the sudden upsurge of mobile data that occurred in Hong Kong was met with creative solutions developed by the MNOs

and/or the NRA (national regulatory authority). This study that comprised of desk research and stakeholder interviews aims to provide insights to the solutions that emerged from having to deal with the mobile data surge. The objective is to make evidence-based contributions in the emerging Asia Pacific, so as to minimize any negative impact on the access and use of mobile broadband.

2   A liberalized telecommunication sector

Hong Kong is unique is its geographical position. It has close proximity to Mainland China, a significant global market, and has the flexibility to operate some-what independently of China on economic matters. This distinctive feature has positioned Hong Kong as a hub in the Asia Pacific region, specifically for telecommunication services. The telecom sector in Hong Kong is one of the most advanced and sophisticated markets in the region and in the world. It is one that truly thrives on competition. With five mobile network operators (MNOs) serving a population of 7.155 million, the sector has been completely liberalized. In comparison with other Asian economies of similar economic classification (i.e., high income), Hong Kong also has the highest number of SIMs per hundred (Figure2). As a business and travel hub, Hong Kong attracts a lot of migratory mobile users.[1] The more astounding statistic however, is perhaps the fact that there are five MNOs to serve a relatively low population, especially in comparison with Japan, where five MNOs serve 127.6 million people. The unique regulatory regime and state of competition is discussed further in this report; however, it is perhaps this concentration of MNOs serving such a small nation that helps the sector to thrive.

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[1] There were 40.8 million visitors to Hong Kong in 2013. http://www.scmp.com/news/hong-kong/article/1407779/visitor-numbers-can-rise-70m-three-years-commission-says?page=all

	Population	Population Density (people/ Km²)	No. of MNOs	SIMs per 100 (2012)	GDP per capita (USD, 2012)
Hong Kong	7,155,000	6,786.60	5	229.24	36,795.82
Japan	127,600,000	350.7	5	110.91	46,720.36
Korea, Rep.	50,000,000	512.7	3	109.43	22,590.16
Singapore	5,312,000	7,405.30	3	152.13	51,709.45

Figure 2: A snapshot of East Asian High Income Economies - population, population density, MNOs & SIMs per 100, GDP per capita[2]

Hong Kong also has some of the highest average speeds for mobile broadband services (Akamai, 2013). In comparison with countries included in Akamai research it ranks 17th but ranks 1st among Asian economies with an average speed of 2.9 Mbps and a peak average speed of 45.6 Mbps for mobile broadband (Figure 3).

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[2] Data from the ITU ICT Statistics Database
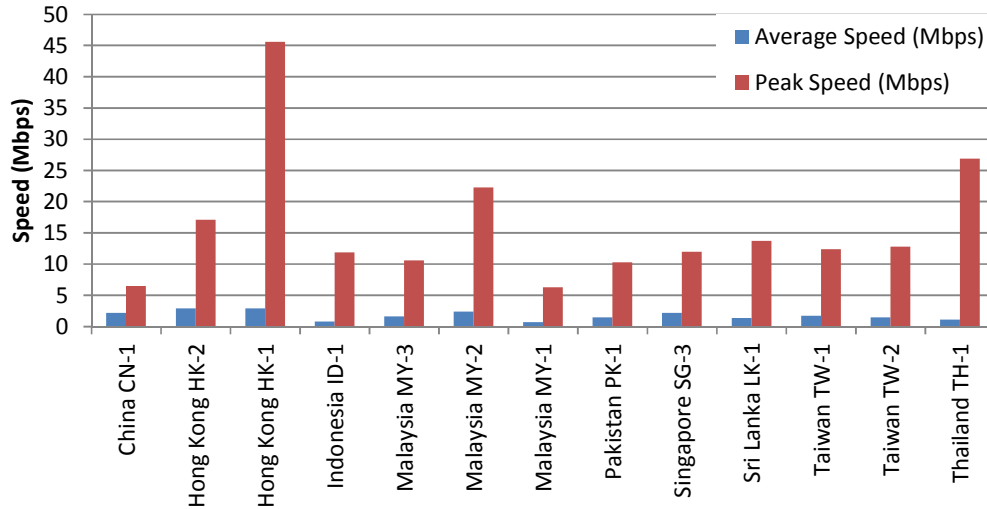
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Figure 3: Average and Average Peak Connection Speeds by Mobile Network Operator

It is also among the top three countries to offer high speed broadband connectivity defined as over 10 Mbps. According to the annual international price basket study published by the International Telecommunication Union (ITU), for postpaid hand-set based mobile broadband plans with a data cap of 500 MB Hong Kong offers some of the lowest prices (USD 8.1 on postpaid) in comparison with Japan and Korea (ITU, 2012). On average and in comparison with other economies the costs for broadband services in Hong Kong are relatively low.

2.1   The regulatory regime

OFCA (the Office of Communication Authority), the national regulatory authority in Hong Kong is unique in its position in that it lets the market forces operate with minimal or in most cases no interference. The ITU speaks of independence, transparency and consistency being factors of good governance (ITU, 2009). These are also factors that encourage competition. The European Competitive Telecommunications Association (ECTA)'s research links effective regulation to investment in the sector (ECTA, 2009). Hong Kong is a highly dense business and financial hub. With a land mass of only 1,104 Km^2 the cost of nation-wide infrastructure roll-outs are relatively low. In addition, OFCA's pro-market, pro-consumer approach creates conditions conducive for investment by not restricting foreign ownership and by adopting simple and transparent processes (e.g. re issuing of licenses); thereby making it an attractive location to invest in.

The HHI according to market shares (based on estimated number of subscriptions) published by Credit Suisse (Shum, 2013) is 2223.10. The HHI

denotes a concentrated market, with two of the five players claiming over 50 percent market share. Further, the telecom environment provides all necessary tools for an equal playing field and levels of competition among the MNOs are intense. For example, although OFCA does not set any minimum standards for broadband quality of service (QoS), MNOs conduct their own studies on benchmarking QoS on a regular basis.[3]

Mobile Number Portability (MNP) is another tool that fuels the competitiveness of the mobile market. The facility that was introduced in 1999 allows customers to switch operators while maintaining their phone numbers. The only hold on a customer that the MNO has is the contract that comes with a mobile handset (average validity of 18 – 24 months). With bundled plans and unlimited data plans on offer, service quality is the key differentiating factor. With the aim of decreasing churn rates that were at approximately 8 percent on average given the stiff competition (Prodata Partners Ltd, 2002), some MNOs introduced loyalty programs and invested in superior customer relationship management (CRM) systems. Additionally, without any regulatory pressure, MNOs actively monitor and optimize their networks. The limited land mass and extremely high population density is an issue for MNOs who say that they are running out of buildings to install base stations on. Again, infrastructure sharing is not mandated by the regulator, but some MNOs have collaborated on the sharing of base stations.

Proximity to the Mainland

Although Hong Kong operates as an independent administrative region there are cross-border implications that must be considered. For example, clearing the digital dividend is not something that can be done independently of mainland China. Due to its close proximity to the mainland, Hong Kong needs to rely on harmonization of frequency bands to avoid interference between mobile and broadcast services (ITU, 2012). This is particularly important when spectrum allocations are being made in Hong Kong and when alternate solutions to the ubiquitous issue of the lack of spectrum are being explored. In the current context where the right to refusal of two thirds of 3G spectrum will be exercised by the regulator during the renewal of previously awarded spectrum (discussed in section 3), operators seem to think that alternatives such the digital dividend ought to be explored. However, it is not something that can be carried out without the China taking the initiative for reasons discussed above.

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[3] Revealed at stakeholder interviews

3 Connectivity in Hong Kong

The introduction of the unified carrier license in 2008 allowed some of the existing fixed service licensees to provide cable-based external fixed services. The external facilities based telecommunication market was liberalized in 2000. Since then an open license regime has been adopted with no restriction on the number of external fixed licenses (OFCA, 2010). As with internal / external mobile telecommunication services there is no restriction on foreign ownership of licenses.

To further support the provision of telecommunication services in Hong Kong, operators may either lease backhaul capacity on existing submarine cables or land their own submarine cables by using existing cable landing stations (CLS) or building new ones. OFCA has set aside land for the latter. The shared use of existing CLS is also permitted, subject to the lease conditions, land agreements and other statutory requirements. Direct negotiations with existing CLS operators on sharing of the facility are encouraged with assistance provided by OFCA on a need basis to facilitate negotiations; another example of OFCA's light-handed market approach.

With nine submarine cable systems[4] already in place, Hong Kong is well connected with the rest of the world. Access to multiple international gateways provides added network resilience to natural disasters and boosts the available external telecommunications capacity (NTT, 2012). According to the statistics published by the ITU, Hong Kong ranks among the highest in terms of international Internet bandwidth per Internet user (ITU, 2012), approximately double that of Singapore in 2011. With the aim of positioning Hong Kong as a telecommunication and Internet hub for Asia Pacific, OFCA made attracting new submarine cables a policy priority.

The challenge in Hong Kong in providing mobile services stems from its terrain and thereby dealing with issues related to signal propagation. The mountainous landscape and high rise buildings create blind spots. Therefore, MNOs are constantly taking measures to optimize networks. In addition, the MNOs use high transmission backbone networks for the routing of traffic within the country, with a recent USD 90 million investment by Hutchison for a 100 Gbps network (Perez, 2014). The extensive WiFi network is also used by some operators to ease congestion by offloading mobile data. There have been some large scale deployments to ease the burden of the cellular networks during peak times and to support the delivery of new more-than-voice services. The population density

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[4] Asia-America Gateway Cable System ("AAG"), Asia Pacific Cable Network 2 ("APCN-2"), Asia Submarine-Cable Express ("ASE"), EAC - C2C, FLAG Europe Asia ("FEA"), FLAG North Asia Loop ("FNAL") / REACH North Asia Loop ("RNAL"), Sea-Me-We 3 ("SMW3"), South-East Asia Japan Cable System ("SJC") and TGN-Intra Asia Cable System ("TGN-IA").

and the potential interference issues in having multiple access points within a geographically restricted area are a concern for some operators, despite the benefits of integrating mobile infrastructure with WiFi (Greenpacket, 2012).

3G & 4G Spectrum

The 800–900MHz, 1700–1900MHz, 1.9–2.2GHz and 2.5–2.6GHz frequency bands are currently being used by the MNOs in Hong Kong (Network Strategies, 2013) (Figure 4). In total 572 MHz has been awarded through auctions for the provisions of mobile services.
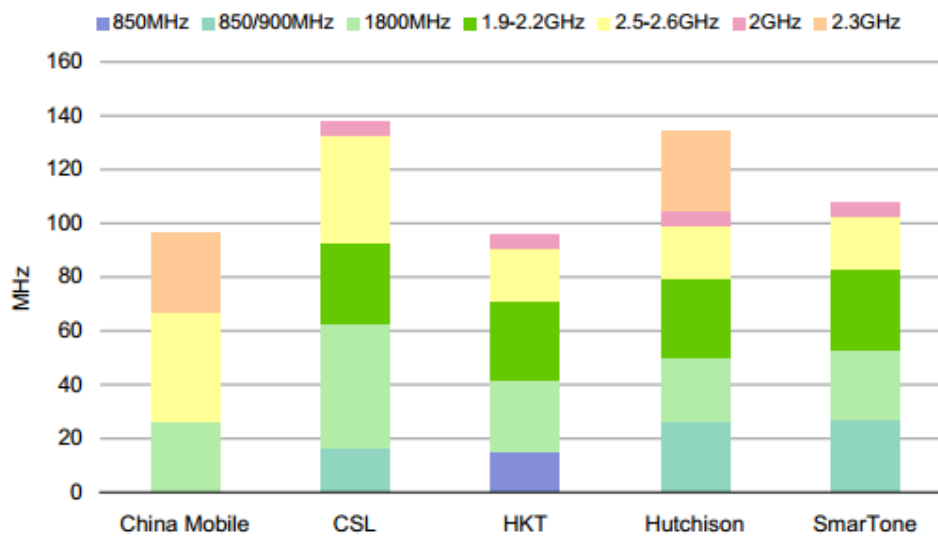

Figure 4: Spectrum Allocation in Hong Kong, OFCA

The uptake of mobile broadband services following the introduction of the iPhone 3G was immense. Due to the demand for mobile data services, some of the spectrum originally intended for the provision of 2G services (in the 850 – 900 MHz and 1800 MHz band) has been re-farmed (Network Strategies, 2013). With the aim of supporting the rapid development of this sub-sector, in February 2012 the Government released 90 MHz of spectrum in the 2.3 GHz band for the use of Long Term Evolution (LTE). An additional 50 MHz was in the 2.6 GHz band was auctioned in March 2013 (OFCA, 2013). At present, the MNOs provide Time Division (TD) LTE services. At the end of 2013 there were 2,207,119 subscribers of LTE, far less than the number of 3G users, however, with a positive and steady growth (also see Section 4, Figures 4-6).

Following a consultation, OFCA decided to provide the right of refusal for 2/3rd of the spectrum (so as to ensure service continuity) and request for the release of the remainder from each licensee. According to the Radio Spectrum Policy Framework, OFCA has the right to "vary or withdraw any spectrum assigned by reasonable notice" (OFCA, 2007). OFCA has reason to believe that as customers

increasingly migrate to LTE, MNOs will not require the current allocation of 3G spectrum for the provision of existing services. It also exerts pressure to strive for spectral efficiency. However, from the MNO point of view, users cannot be compelled to migrate to LTE.

OFCA intends on taking a hybrid market-based approach and an administratively-assigned-based approach for the reassignment of the 2 x 59.2 MHz of spectrum in the 1.9 – 2.2 GHz range that will be returned by the operators (Communications Authority, 2013). The right of first refusal will be exercised for a total of 19.8 MHz, but with a high spectrum utilization fee (either 2016 price levels or based on the re-auctioned spectrum fee). The re-auctioning of the spectrum is expected to be carried out in 4th quarter of 2014, using the Simultaneous Multi-Round Ascending (SMRA) format. To foster the level playing field, upper limits on acquiring spectrum have been imposed on current licensees and those who may exercise the right of first refusal. Network roll out and service obligations will be imposed only on new entrants.

4   The soaring use of mobile data

In December 2013 the number of mobile subscribers rose to 17.19 million and Hong Kong continues to have one of the highest mobile SIMs per 100 rates in the world. Out of the 17.19 million, 9.64 million were 3G customers while 2.2 million were 4G customers (Figure 5). Given that the LTE networks were rolled out in 2012 / 2013, the number of 4G subscribers is understandably significantly lower than the number of 3G subscribers; however, the growth from January 2013 to December 2013 is approximately 140 percent.
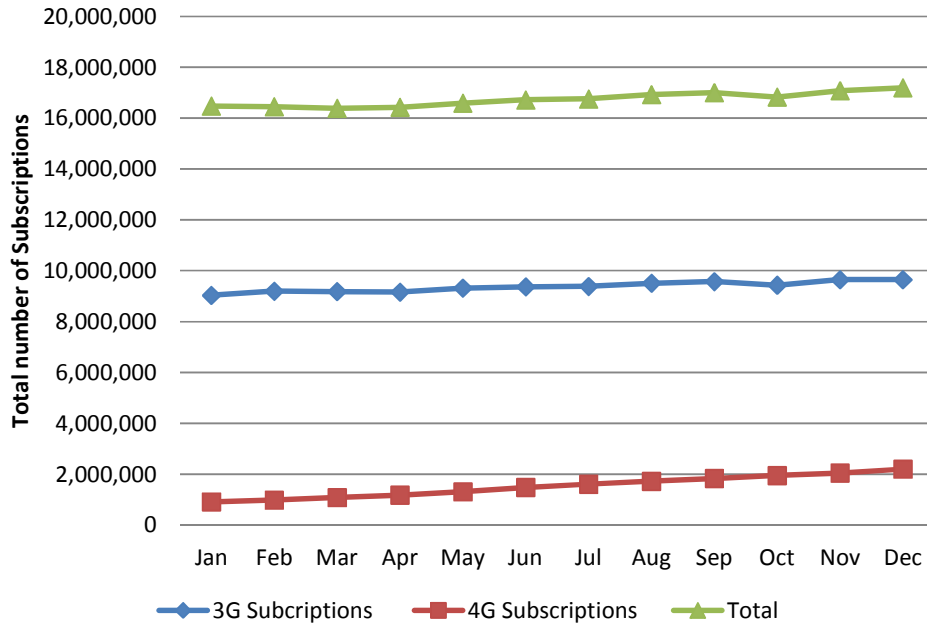
Figure 5: Number of subscriptions by month in 2013, Hong Kong (OFCA)

The use of data services over the mobile network has seen tremendous growth over the years. According to data reported by OFCA, the average consumption per customer grew from 1.7 MB in 2004 to 996.6 MB in 2013 (Figure 6). The total mobile data consumption has grown over 5000-times, between 2004 and 2013 with a total of approximately 11,514 Tb (nearly 12 million Gb) being consumed up to date (December 2013, Figure 7).
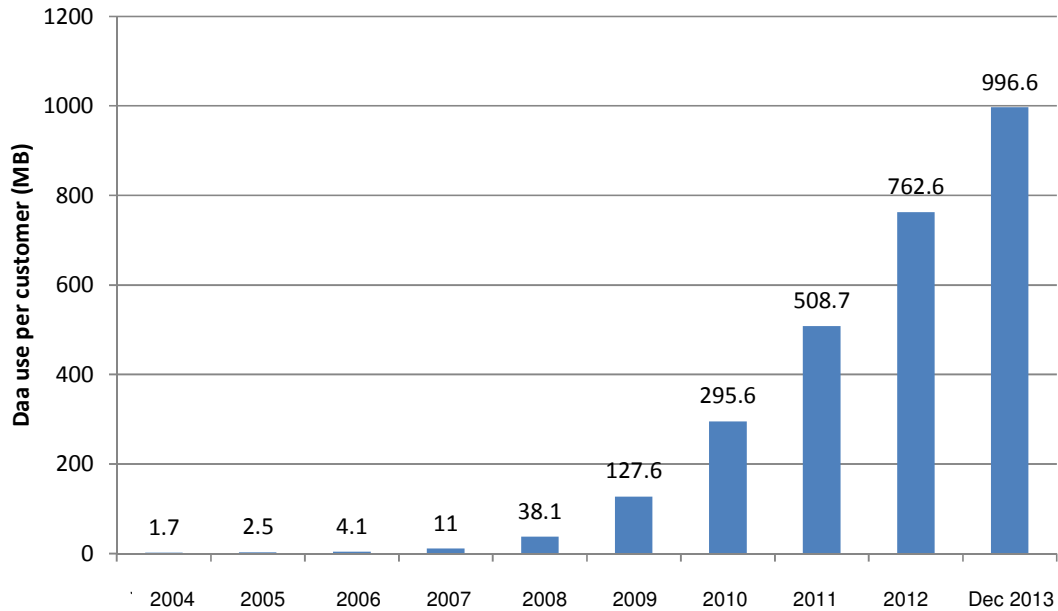
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Figure 6: Data use per 2.5G + 3G + 4G Customer in MB, Dec 2004 – Dec 2013

The fact that the introduction of Apple's iPhone 3G marks the start of active mobile data use has already been established. However, in the preceding years, data use was negligible despite having access to 3G networks since 2004. The use of the network was so scarce (Figure 7), that some operators started offering home broadband solutions in order to generate revenue. In addition, unlimited data plans were also offered with the aim of stimulating use of the 3G networks. The speed available for uploading and downloading also plays a significant role in service adoption. As illustrated in Figure 7, the rapid increase in download and upload speeds with HSPA technology over the years has also contributed to the growth in use of mobile broadband.
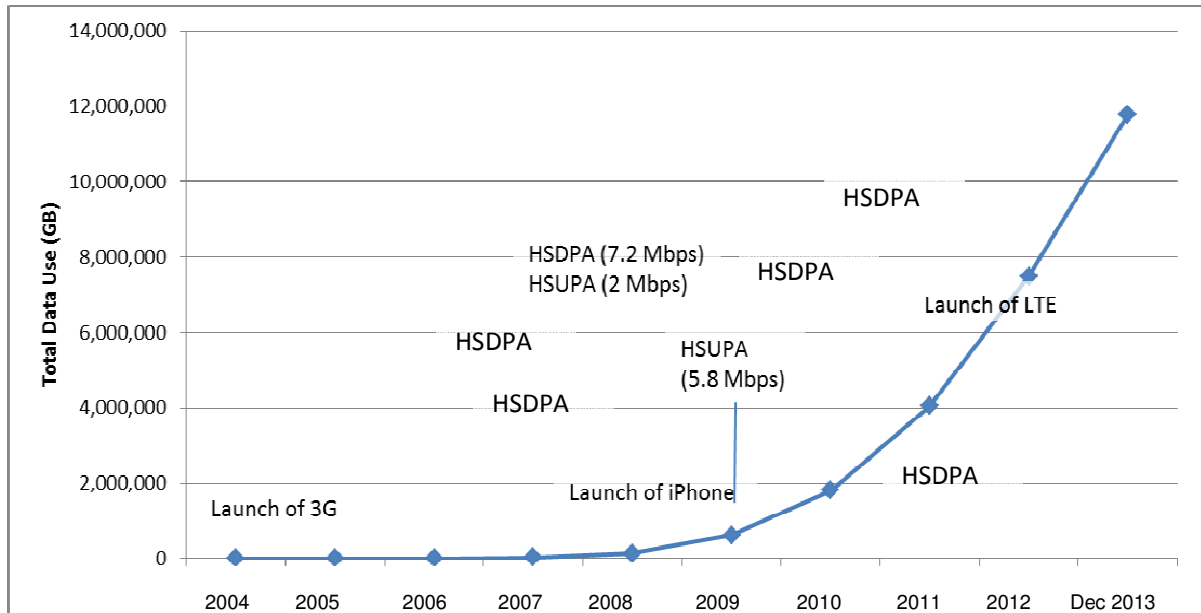
Figure 7: Total use of mobile data in GB, Dec 2004 – Dec 2013

Enabling Factors for Intense Mobile Data Adoption

As with the introduction of any new technology, one of the barriers to adoption is the capability of the device. Since the launch of the iPhone 3G other handset manufacturers have produced sophisticated 3G phones on par with Apple's design and functionality. The development and release of LTE capable handsets has been timely; however, with the infiltration of relatively new 3G handsets the uptake, as expected, has not been drastic. Most customers are on contracts with MNOs that include a handset. A fair number of customers opt to minimize switching costs by abiding by the terms and upgrading when the contract ends.

Apart from the smart phone revolution, there are several other factors that fuel the implementation and use of high speed data networks in Hong Kong. 3G network coverage, at minimum, is required to be able to really make use of the Internet. Its limited land mass and intense population density has allowed MNOs to deploy networks to serve all of Hong Kong including network coverage in the underground transportation system. In a competitive environment, looking for means of efficiently manage the networks is priority. Although the evolution of technologies stem from the need to run networks more efficiently while catering to consumer demands, there is a finite limit to the degree of efficiency technology can reach. Given limitations of spectrum, deploying small cells increases the capacity of mobile networks (CISCO, 2012). Wi-Fi is widely available in Hong Kong and is a cost-effective way of off-loading traffic generated on the mobile network. Efficiencies can also be achieved by using Internet

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Exchange Points (IXPs) that allow for traffic to be routed in-country thereby reducing the latency[5]. It also helps in cost reductions as service providers do not have to pay for and rely on third-party networks.

A vital enabling factor is the cost of international backhaul capacity. In comparison to North America and Europe, IP transit prices in Hong Kong are high. However, there has been a steady decline over the years (with a CAGR of -16% and -30% during 2010-2013 for GigE and 10GigE[6]) and has the lowest median price per Mbps (Telegeography, 2013) (Figures 8 and 9). MNOs in Hong Kong consider the purchasing of international capacity to be inexpensive. Therefore, additional bandwidth is obtained whenever the need arises to foster the use of mobile data networks.

	2010	2011	2012	2013	CAGR 10-13
Hong Kong	$28.00	$22.00	$16.00	$16.49	-16%
Seoul	$49.16	$37.00	$25.00	$20.00	-26%
Singapore	$39.00	$31.00	$14.40	$13.51	-30%
Taipei	$43.50	$39.33	$25.00	$21.34	-21%
Tokyo	$31.76	$30.01	$20.00	$18.00	-17%

Figure 8: Median Asian IP Transit Prices per Mbps, Gigabit Ethernet, Q2 2010-Q2 2013[7]

	2010	2011	2012	2013	CAGR 10-13
Hong Kong	$20.50	$12.00	$8.20	$7.00	-30%
Seoul	$31.00	$13.50	$15.00	$14.50	-22%
Singapore	$22.00	$16.00	$8.60	$7.00	-32%
Taipei	$35.00	$14.33	$17.00	$16.55	-22%
Tokyo	$27.00	$14.75	$9.00	$11.25	-25%

Figure 9: Median Asian IP Transit Prices per Mbps, 10 Gigabit Ethernet, Q2 2010-Q2 2013[8]

Setting up a business in Hong Kong is straightforward, unlike in most other economies. There are no barriers for foreign companies to set up operations in this island state and new companies can be registered with bank accounts set up in two days (Denlinger, 2010). In contrast to China where operators are under obligation to China's State Council and the Cabinet when taking major business

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[5] Also known as Round Trip Time (RTT) is the time taken for a data packet to traverse the network from the client to the server and back. It is a vital quality metric for web browsing / the time taken to load web pages.

[6] GigE = 1,000 Mbps and 10 GigE = 10,000 Mbps

[7] Source (Telegeography, 2013)

[8] *Ibid*

decisions, in Hong Kong the operators are free to introduce new services and are not held back waiting for political decisions to be made.

In comparison to the mainland where Internet use is heavily monitored and restricted, Hong Kong has a captive market for sites like Facebook and related data-intensive gaming apps. Although Hong Kong was never considered a software development hub, the heavy investment in Cyberport (a state of the art technical campus), the proliferation of sophisticated smart phones and the fact that such sites and mobile apps are unrestricted means they can be openly developed and deployed. This fuels the development of localized mobile apps and thereby the use of mobile data.

Further, with five MNOs currently active in the mobile subsector, the severe competition ensures MNOs provide and adhere to quality standards sufficient to retain their customers. Of course the regulator does not get involved in setting minimum speeds or service standards, however, the public have access to the service pledges made by operators and a tool that measures download speeds through the OFCA website. There is a well established complain and redress processes that OFCA has established where operators are held accountable if promised service standards are not maintained. In comparison, Singapore's NRA, the Infocomm Development Authority of Singapore (IDA) operates differently in terms of degree of regulation. For example MNOs are mandated to measure and publish typical speeds (as opposed to theoretical speeds that are usually advertised), on a quarterly basis (IDA, 2012). Although not reported in Hong Kong, internally, MNOs perform network diagnostics and keep reconfiguring networks during peak times. OFCA has provided guidance to MNOs on offering unlimited data plans as consumers complained about the slow speeds on plans advertised as unlimited. Operators were advised that Fair Usage Policies (FUPs) have to be clearly stated and speeds cannot go beyond 128 Kbps. To deal with the data upsurge MNOs are moving away from offering unrealistic unlimited plans.

The fact that MNP is available in Hong Kong means that customer loyalty is fluid. The only real hold the MNOs have is when new bundled services are used with handset based contracts to lock-in customer for a year or two. The latest smart phones, namely the iPhone and Samsung mobiles are what customers would opt for as opposed to selecting an MNO based on standard factors such as network coverage, price, friend and family plans etc., that are usually the cause for selecting a service provider.

5   Recommendations and Conclusion

There is no doubt that the mobile networks in Hong Kong have experienced a sudden and substantial data upsurge. The study began with the notion that the rapid increase of mobile data created solutions led by both the market and the regulator. It was therefore the intention of the author to document this phenomenon and using Hong Kong as a good example, provide recommendations to operators and regulators of emerging Asia on how to deal with the inevitable mobile data surge.

The paper exemplifies the rapid growth of data use over the mobile network, especially as new devices and apps are introduced to the market. Therefore, in order to sustain, the telecom sector in developing economies that are yet to experience such an upsurge can benefit from creating a conducive environment so that the sector is not impacted negatively.

When it comes to the access network the biggest issue is spectrum. In fact, at the time of this study the renewal of 3G spectrum was a major concern for operators. OFCA intends on re-auctioning a portion of the previously allocated 3G spectrum (1/3rd from each licensee in the 1.9 – 2.2 GHz range). This decision was followed by a consultancy and is aimed at MNOs to achieve spectral efficiency, while also providing an opportunity for new entrants. Operators however feel that other means such as spectrum trading ought to be explored. The Communications Authority has conducted a private consultation on spectrum trading, that is yet to be disclosed publicly. It is not recommended that the same is practiced in other economies, however, measures must be taken in order to release spectrum for the supply of 3G and 4G services. With limited spectrum in mind one solution to increase the capacity of the mobile network is to deploy small cells. Wi-Fi can be considered a cost effective technology that can be used to off-load mobile data traffic particularly in locations where significant amounts of data are generated (CISCO, 2012). To do this, Wi-Fi networks must be widely deployed.

The domestic and international backhaul networks are the other potential bottlenecks. The case of Hong Kong provides good practices of the latter (as the domestic backhaul networks are not present in Hong Kong); both network segments are important for the transmission of data within the country and globally. On the domestic front it is recommended that open-access to the domestic backbone is promoted to facilitate the demands of the sector avoid duplication of existing infrastructure (Singh & Samarajiva, 2008). It is also imperative, costs and other complexities aside, in light of the time taken to roll-out backhaul networks. The demand for mobile data services is inevitable. Growth will be sudden and rapid. If the fostering of access to mobile data services is a priority, then ease of access to backhaul networks is essential. Unlike in other developing economies the cost of international backhaul capacity

is not a concern for operators in Hong Kong (Figures 7 and 8). Therefore, purchasing additional capacity is not given a second thought and is a fairly straightforward process that is executed within a span of approximately two weeks.

The use of IXPs is another way to ease the burden on the backhaul networks. It allows for networks to interconnect directly without having to rely on third-party networks which often result in the need to route traffic out of the country or region at high costs for in-country or in-region traffic. It also allows for the freeing-up of existing long-haul capacity, reduces transmission costs and latency of data packets. From a policy perspective it is essential to understand the contrast between the Internet model that is based on voluntary agreements and the traditional voice traffic exchange that is typically regulated. Some OECD countries have taken the initiative of reforming existing regulations of the traditional circuit-switched networks that will also facilitate the transition to IP based packet-switched networks (Weller & Woodcock, 2013).

High levels of competition in Hong Kong prompt the service providers to stay ahead of the game at all times. Therefore, operators are constantly managing the traffic flow, using Wi-Fi offloading in some instances and carrying out their own quality checks to ensure the networks are capable of providing services offered. The geographical landscape of Hong Kong – its terrain, high rises and densely populated land mass in any case calls for constant network maintenance and management to deal with potential issues caused by interference and signal propagation in general. Dealing with the data surge therefore, was not considered a significant issue.

Although the modus operandi of the regulator works very well in Hong Kong, it is not something that has been replicated in other economies. The landmass, population density, strong economic position and culture, all play a role in making this highly deregulated regime work in a highly competitive market. Therefore, as with all other telecom related affairs, the regulator let the market forces handle the data upsurge. In their view it was not necessary to set any further policies in this regard. In its pro-consumer approach the regulator has taken measures to inform consumers of caveats to take note of while consuming mobile services, particularly data. However, this is not specific to the data surge and is business-as-usual.

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