

Setting up an Internet Peering Hub in Hong Kong - Building an Economic Acceleration

"With our excellent telecommunications infrastructure, our unique position vis-à-vis the Mainland and our bi-lingual language capability, Hong Kong has a strong competitive advantage in seeking to serve as an information gateway."

- Chief Executive, Tung Chee-Hwa

Introduction

Peering is a relationship between two or more ISPs in which the ISPs create a direct link between each other and agree to forward each others' packets directly across this link instead of using the standard Internet backbone. Peering agreements establish direct connections between ISPs and allows them to exchange traffic without going through crowded public network access points. These direct connections help improve performance and offer higher quality of service. In general, this results in faster access since there are fewer hops.

Most of the Asia Pacific countries have direct or indirect connection back to the United States because the United States is the main Internet hub in the world. This means that at present Asia faces unnecessarily long routing distances and slow data exchanges. There is also an inefficient use of bandwidth and other network resources. Ultimately, all this has a cost implication. Further, charging for such connections is complicated and gives rise to disputes.

For better efficiency in terms of cost and network resources utilisation, instead of having each Asian country connect back to the United States, it will be better for Asia Pacific traffic to be exchanged directly amongst Asian countries and this would keep inter-Asia traffic within the region. Asian countries, such as Singapore, Japan and South Korea, have already shown interest in setting up an Asian-based peering hub in their respective countries.

Another issue that needs to be addressed is the overall shortage of IPv4 based addresses and the disproportionate allocation of this very-limited resource for use in the Asia Pacific. Nowadays, ISPs in the region are relying on such "band-aid" temporary solutions. Unless this situation is adequately resolved, it may become a foreseeable barrier to the deployment of peer-to-peer applications and the deployment of 2.5G and 3G mobile applications.

The Proposal

In view of the above situation, the Internet & Telecom Association of Hong Kong (ITAHK) proposes the setting up of an Internet peering hub for the Asia Pacific region, which will be based in the Hong Kong SAR of China. ITAHK also proposes that the government should assume a key role in setting up an Asia Pacific task force for establishing governance and standards pushing for the systematic implementation of IPv6 in the region. This would mirror the efforts and actions in this respect already being taken in the US and EU.

ITAHK and its members strongly believe this arrangement can not only provide the region with immense benefits in terms of cost and resource deployment efficiency, but that it can also provide considerable economic benefits to both China and Hong Kong.

The Asia Pacific Peering Hub can also be positioned as the Multi-media Data & Infotainment Hub, having all the required IT infrastructure and support logistics that would be able to handle all regional multimedia data and infotainment content. China and Hong Kong are in a very strong competitive position in the region and are uniquely placed in assuming a leadership position in this initiative. As such, the HKSAR government, backed by the its telecommunications industry, should actively and persistently pursue this initiative to fruition.

Why Should the Asia Pacific Peering Hub be based in Hong Kong?

The goal of an Asia Pacific peering hub would be to interconnect the local Internet exchanges in Asia Pacific countries so that intra-Asia traffic could be exchanged more efficiently. Other regions have established their own peering hubs. For example, in America, the NYIIX (New York International Internet exchange) serves the international and US Domestic ISP market. With over forty members worldwide the NYIIX has become one of the most robust exchange points in the world. Its participants hail from the United States, the United Kingdom, Germany, the Netherlands, South Africa, and Japan, and the list continues to grow.

In Europe, the Amsterdam Internet Exchange (AMS-IX) is the largest neutral and independent Internet Exchange and one of the largest Internet Exchanges worldwide. Currently 120 members exchange IP traffic with each other at one or more of the 4 current AMS-IX locations.

As of today, there is no equivalent Internet exchange for the Asia Pacific region. A recent research by Nielsen/NetRatings survey conducted in the first quarter of 2002, revealed that the number of Internet users in China had already surpassed that of other Asia Pacific countries to rank just second globally to the US. This figure represents only approximately 5% penetration of the market that leaves a lot of potential for future growth. Inevitably, the supply and demand between China and other countries will increase rapidly. This gives China a distinct competitive advantage to assume the role as a main Internet Centre in both in the Asia Pacific and globally. Hong Kong with its unique position as a part of China with an open market policy, a free flow of information, a well-structured regulatory environment and a trusted position as a leading financial centre, now has the opportunity to partner with China to assume this leadership position to set up such an exchange, and be able to compete and win against other Asia countries such as Singapore who is also vying for this position.

Hong Kong is uniquely placed to co-operate with China in providing such a hub. Hong Kong is the world's tenth-largest trading entity, a leading world financial centre, the ninth-largest banking centre and is one of the world's most open and dynamic economies. The flow of information and data is largely unrestricted nor monitored. Per capita, its GDP approximates that of Great

Britain's. It also has a well-developed world-class local, regional and international telecommunications network infrastructure that is continuously supported by the government. In addition, Hong Kong adopts an open market policy, has a well-structured regulatory environment and an internationally accepted legal system that provides adequate data security safeguards and intellectual property rights protection for in-bound traffic and content.

On the international front, Hong Kong is an active member of the World Trade Organisation (WTO) and the Asia Pacific Economic Cooperation (APEC) forum, where it is an articulate and effective champion of free markets and the reduction of trade barriers. The establishment of an Internet peering hub for the Asia Region in Hong Kong is a natural extension of Hong Kong's continued involvement at the international level and would help enhance its image as an international, world-class and hi-tech city.

In terms of Hong Kong's suitability to be such a hub, the latest figures regarding Hong Kong's IT and telecoms development are telling:

- (a) the telecom industry was estimated to be directly responsible for 1.4% of GDP in 1999;
- (b) there are over 500 telecommunications-related establishments in Hong Kong, providing employment for over 30,000 people;
- (c) over 98% of households and more than 95% of business buildings are covered by broadband connections;
- (d) there are over 4.4 million Internet users for a population of around 7 million people;
- (e) 80% of the population has mobile phones;
- (f) Hong Kong is one of the first cities in Asia to introduce GPRS service; and
- (g) Hong Kong was the first city to introduce a broadband-based interactive television.

In addition, Hong Kong has committed to creating an IT flagship at the Cyberport, which is aimed at leveraging Hong Kong's unique position and capabilities as a key transportation, logistics and financial centre in Asia into becoming a key "info-communications" point. The Cyberport is almost completed and will boast state-of-the-art hosting and data centre facilities. Such facilities are ideal for an Internet peering hub.

In addition to having the support infrastructure already in place in the form of the Cyberport, Hong Kong also has substantial telecommunications expertise and already has in place agreed frameworks for inter-network accounting, verification measures and arbitration in the event of disputes. It also boasts a great number of trained personnel and comprehensive logistics and support facilities.

The HKSAR has also signed memoranda of understanding or agreements on IT cooperation with a number of countries, namely Canada, Australia, the United Kingdom, Finland, India, Israel, Republic of Korea, Germany, France and the Netherlands and these relationships could be brought to bear to negotiate upstream and downstream peering agreements for the Internet peering hub based in Hong Kong. The fact that these countries were keen to establish partnership with Hong Kong is an endorsement of the international perception of Hong Kong as a regional hub.

Finally, both the Economic Intelligence Unit and Forrester have ranked Hong Kong amongst the top in Asia with best e-business readiness and potential. This potential is ready to be exploited by creating an Internet peering hub for the Asia Pacific located at the Cyberport.

How will becoming an Internet peering hub site be beneficial to Hong Kong?

The Internet market continues to grow at explosive rates. With China's accession to WTO, more Internet bandwidth will be required due to more and more business activities between China and other countries. By building a high-speed information highway between China and other Asia Pacific countries, Hong Kong would increase its core competence and also attract investment from overseas service providers.

As in other international developed countries, there is a definite trend for Internet users in Hong Kong to switch from 56K dial-up to broadband connectivity. The Statistics in Hong Kong shows that already in Hong Kong:

- (a) about 60% of our households have installed personal computers;
- (b) Hong Kong broadband network reaches all commercial buildings and over 95% of households;
- (c) 50% of our households are connected to the Internet, of which 40% are using broadband;
- (d) all Hong Kong schools are linked to the Internet, with 90% by broadband or leased line; and
- (e) nearly 40% of Hong Kong businesses have made use of the Internet in their operation, and of which over 30% are using broadband.

Having an Internet peering hub based in Hong Kong not only makes sense from an infrastructure point of view, but would ensure that productivity gains from the information technology sector ripple through to the entire economy. Further, a regional peering point in Hong Kong that fully leverages on the clout of China's Internet traffic will also provide adequate incentive for large international carriers to land their connectivity in Hong Kong.

Despite the fact that the telecommunications markets worldwide are suffering a slowdown, China is the only major telecommunications market to defy the global slump. By becoming Asia's Internet peering point and by establishing peering with China first, Hong Kong would be able to exploit this growth and reap benefits for its own economy.

Multinational Internet companies would be attracted to Hong Kong if it can boast world-class infrastructure for ISPs and an Asian Internet peering hub. Statistics show that 70% of the telecommunications companies' costs are tied to the cost of local labour. Direct investment can be generated from these multinational Internet companies, which will create new job opportunities for Hong Kong's strong IT and telecoms workforce to support the influx of ISPs and content providers who will be establishing a presence in Hong Kong.

A peering hub would also foster a healthy and competitive business environment. It will help reduce costs to reflect the real market value of these services and increases connectivity for HK ISPs, especially for SMEs and provide business opportunities for Hong Kong EFTNS operators

and other associated value added services required for servicing this newly enlarged community of ISPs and content providers, e.g. hosting and facilities management services.

Establishing a first connection with China would increase the chance of Hong Kong's SMEs to make use of their skills in developing and customising commercial applications and in exploiting their English and Chinese language skills to target value-added services and Internet business in the mainland.

The expansion in China's trade and investment activities throughout the world should benefit Hong Kong in all aspects of its economy, as more and more companies are using the Internet as a network to conduct their businesses. Being the channel for such communications with the mainland can only help to enhance Hong Kong's profile as a world city.

Hong Kong must continue to improve its advancement in technology and cannot afford to stand still. Hong Kong has all the technical superiority in telecommunications and Internet infrastructure, but cannot afford to become complacent. By setting up Asia's first Internet peering hub, Hong Kong's competitive edge over other Asian countries would be maintained.

As the markets and applications served by the Internet continue to expand, the demand for bandwidth will grow exponentially. An increasing problem is the inability of users in Asia to obtain reliable connections at data rates needed for basic Internet access. There is a growing demand for high-speed access that needs to be addressed.

Added to this are the difficulties in carrying out peering among ISPs. Setting up a peering hub in Hong Kong, fully supported by the government, would solve this problem.

The Growth of the Internet in China

There is no doubt that the Chinese government and business leaders appreciate the historical significance of the information revolution and do not want China to lag behind more developed countries in this area.

The number of Chinese Internet subscribers is nearly 35 million, and growing over 100% each year. According to the CNNIC, the number of domestic Internet users grew to 33.7 million by the end of 2001. The number of computers connected to the Internet in China also increased substantially during this period - up 40.6% to 12.5 million.

In 1994, China launched its own "national Information Infrastructure" projects, generically known as the "Golden Projects," aimed at building a national information superhighway, improving the flow of administrative information and exercising greater control over provincial authorities.

The telecommunications market of China has enormous potential for further development and the prospects for the Internet in China are still bright. Foreign manufacturers of services and other equipment see big opportunities and growth potential in information technology and the Internet due to the vast geographical span and population distribution in China.

How can an Asia Internet peering point located in Hong Kong be beneficial to China?

However, despite the encouragement given by Chinese authorities to the migration of Chinese businesses online, in reality China has a long way to go before the full effect of the Internet is

exploited and realised. For example, the "Enterprise Online Project", launched in June 2000, aimed to have 7 million online enterprises by the end of 2002. Only some 10% of China's state-owned enterprises (SOEs) are now online, out of which only a tiny fraction use the net to do business. One of the reasons for this is that users of China's data networks continue to have to pay high fees for low connection speeds.

Since 2000, China has constructed 3 Network Access Points (NAPs) in Beijing, Shanghai and Guangzhou. However, only the Beijing NAP has so far actually seen any traffic exchange. Hong Kong, with its existing support framework on inter-network accounting, verification measures, supervision and arbitration, can help speed up the deployment of the other NAPs in Guangdong and Shanghai.

The Internet market and infrastructure in China is far from being mature. Consumers have yet to show interest in technology. In Shanghai, for example, the city's optical network has capacity for some 3.2 million users. However, it only attracted 117,000 subscribers by the end of 2001. Other problems include the lack of suitable content, a continuing uncertainty generated by the break-up of China Telecom and new MII restrictions on local broadband network operators. These create uncertainties for foreign investors who are unwilling to explore a market that is not fully mature and ready to cope with technology advances in its daily business.

With China's vast geographical span and dispersed population in rural areas, particularly in the western region, new technologies are needed to reach them faster. If this problem is not dealt with, the gap between the social classes will only widen, making the poor, poorer and the rich, even richer. This is the digital divide, the gap between the information-haves and the have-nots. Therefore, bringing the rural areas of China up to speed with technology is critical not only for moral reasons but also for economic ones. The aim is to spread knowledge and bring relevant information, such as medical advice, accelerate the development of technology, policies and applications for pervasive socio-economic deployment to rural China through shared computers or even phones.

The result of course will be advancing development goals, creating wealth and alleviating poverty, especially in the less-developed regions of China. Job opportunities, too, will open once the rest of China is wired and connected.

There is no doubt that China's entry to the WTO will herald new opportunities, especially for foreign investors in the Internet and e-commerce sector. However, there still exists a perception, overseas, of China as a place where government regulators nurture protectionist sentiments, legal structures of many existing FIEs are doubtful and the applicable market access provisions after China's accession to WTO are ambiguous. This all appears to point foreign investors to a difficult path for the implementation of WTO reforms.

The Chinese government's general policies toward the Internet and e-commerce are a blend of encouragement and control. E-commerce is viewed as means for China to remain competitive in foreign trade and to improve efficiency in the domestic economy. To counter the perception and scepticism, China needs a link to enhance a more positive outlook of its economy overseas.

For this, China needs a mature player in the Internet and telecommunication industry that will assist and foster a positive image. With Hong Kong being already a deregulated and its long history of operating under free-market principles that has allowed it to become a well-wired, developed country, Hong Kong has all the technological resources and capabilities to take on this role. With its status as a gateway to China for the outside world, the perception and confidence in China's Internet will also be strengthened. This is because China's Internet market will be perceived to be supported by Hong Kong's advanced service industry.

No financial outlay is required from China for the Internet peering hub in Hong Kong. The project is envisaged to be funded completely by the Hong Kong government and will play a vital role in assisting the Mainland to develop its telecommunication and Internet industry. The fact that Hong Kong is the window to China, and with the necessary hard and soft infrastructure including the rule of law, independent Judiciary, free flow of information, free market economy, will allow multi-national companies and overseas SMEs alike to position themselves strategically for exploring the Mainland market.

Further, Hong Kong's edge in having an advanced mobile telecommunication network, including the 3G mobile service soon to be rolled out, broadband and its experience in building sophisticated network makes Hong Kong the best candidate to explore and assist with the development of China's Internet market in various ways including forming joint ventures with mainland enterprises undertaking individual service contracts to help technology expansion in the mainland market.

In many ways, by riding on Hong Kong's experience and competitive edge, China can benefit from Hong Kong's development and integrate this into its economy, thus creating a win-win situation for both Hong Kong and China.

IPv6 Starting Point

IPv6 is a new version, which is designed to be an evolutionary step from IPv4. It is a natural increment to IPv4, but with optimised specification that follows the good practices of IPv4 while removing its flaws and obsolete items. It's many advantages, which makes it a good environment for the future 3G mobile network and the next-generation Internet, can be summarised as follows:

- Scalability: IPv6 supports 128-bit address space (3.4×10^{38} available IP addresses) which solves the address-space-shortage problem of IPv4.
- Peer-to-peer communication: NAT (Network Address Translation) is one of the ways to extend the address space of IPv4 logically, but it also creates hurdles for application to support bi-directional communication. With larger address space, IPv6 does not need the NAT solution, thus in turn able to support true peer-to-peer communication.
- Security: IPv6 supports encryption of packets (ESP: Encapsulated Security Payload) and sender-packets-authentication (AH: Authentication Header), data is securely transmitted through any IP media, and in addition, non-repudiation can be supported.
- True mobility: IPv6 supports auto-configuration such that devices can switch from one domain to another domain easily and automatically.
- IPv6 includes flowlabel in the specification, so that real-time traffic performance can be improved as the routers identify which end-to-end flow the packets belong.

As an example, with the IPv4 address space problem solved, each mobile device can have its own identity (IP address). As a result, individual mobile devices running applications such as video conferencing can communicate with each other instantly, easily and securely. Performance of multi-cast video streaming to these mobile devices can be improved. Given these advantages and with the imminent deployment of 2.5G/GPRS and 3G mobile IP data applications for which peer-to-peer applications holds special importance, many developed countries such as the United States and Belgium are putting effort in building up an experimental IPV6 network as well as IPV6 private peering points. In Asia Pacific, countries such as Japan, Korea and China have varying

degrees of development in this area. In line with the drive to capture the opportunity to establish a HK-based peering hub, the HKSAR government should, together with China, take positive measures toward co-ordinating a concerted deployment of IPv6 in the Asia Pacific region as a whole instead of creating individual IPv6 islands.

As a first step, Hong Kong can also started to partner with China Internet providers such as China Telecom and Hong Kong local providers to build up an experimental peering Hub site first. When the protocol become mature, we can invite other providers to join the network. IPv6 can be installed as a normal software upgrade in Internet devices and is interoperable with the current IPv4. Its deployment strategy is designed to not have any flag days or other dependencies. IPv6 is designed to run well on high performance networks (e.g. Gigabit Ethernet, OC-12, ATM, etc.) and at the same time still be efficient for low bandwidth networks (e.g. wireless). In addition, it provides a platform for new Internet functionality that will be required in the near future.

Summary

Hong Kong and China have a unique opportunity to set up an Internet Peering Hub for the Asia Pacific region.

It is hoped that with the support of the Government of the Hong Kong SAR this project can be carried through to fruition.

In particular, government funding and other resources need to be allocated to kick-start the project.

Leveraging on the existing "Mainland / Hong Kong Closer Economic Partnership Negotiation", it is expected that the Government of the HKSAR would lead this project and initiate discussions with mainland authorities.

The Government of the HKSAR would have the full support of the ITAHK in this project. ITAHK would ensure the active participation of members from both the IT and the telecoms industries, as well as the participation of academics who would be able to advise on commercial and technical aspects of the project.

The project presents a unique opportunity for Hong Kong and China to work together and take the lead in providing the best Internet standards for the Asia Pacific region.

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