

Telecoms Infotech Forum

Briefing paper

IP Networking: is there a case to answer?

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Telecoms InfoTechnology Forum

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The output of the TRP is public domain research into economic, policy and regulatory aspects of telecommunications and related sectors such as IT, new media, Internet and e-commerce.

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The objective of TIF is to stimulate informed interest in the policy and regulatory aspects of information and communications technologies (ICTs), to foster greater transparency and a better understanding of the economic and technological dynamics of the sector, and its impact on social welfare.

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IP Networking: is there a case to answer?

IP Viewpoints

The case for IP networking depends upon who you are. A **traffic engineer** is attracted by any efficient use of network resources, and sending traffic via packets rather than having to dedicate entire circuits has obvious appeal. It utilizes bandwidth more efficiently, intelligent switches and routers can find the least cost or least congested routes, and multiplexing is simple. But these attributes can be found using any cell form, for example frame relay over ATM, so IP simply establishes its place in the sun alongside other protocols.

For the **network engineer**, productive efficiency is important, but allocative efficiency is just as important, and so the key question is the relative cost of resources. If bandwidth is plentiful and cheap – and the spread of DSL, BFW and cable, to say nothing of international bandwidth, suggest that it is and it will be for some time to come - why move to IP and all the yet-to-be-fully-tried-and-tested quality of service protocols that require experimentation and a lot more software? Just stuff traffic down fat pipes at high speed, because wasting cheap resources is no great deal. At the same time, ATM has many years of good quality of life, so why accelerate its depreciation?

The **economist** will have much sympathy with this reasoning, although the **finance and accounting guys** may see advantages in accelerated depreciation, and so may the **regulatory staff** in the incumbent telecom companies who have an eye on network interconnection charges. Accelerated depreciation can only mean charging more for interconnection if the fees are based on cost. On the other hand, the **business strategists** and **sales staff** may take another position. IP networks offer lower cost and fast market entry, and promise many differentiated services, everything from VoIP for the consumer to new media and electronic data sharing services for the business market.

The **corporate business user** has yet another perspective. What does the cost-benefit look like? How secure is an IP network? How reliable? What legacy problems with pre-IP networks does it pose? What are the hidden costs of relying upon an increasingly software-driven system? Old manual typewriters had their advantages over electronic ones, but the word processor was a quantum leap, in both cost and benefit. Where does the new balance lie? Does the company outsource, and if so does it pass the decision onto the outsourcer? What happens in the wake of an M&A? How do the systems merge? And does the company have the IT skills to cope with a potentially unstable IP world? Corporate telecommunications managers are acutely aware that in an IP world if the system is congested all traffic suffers, not just the latest data, and to guarantee arrival even the Next Generation Networks (NGNs) effectively fall back upon *de facto* circuit switching.

The **vendors**, naturally, are full of optimism and assurance that IP is now stable, the security issues are solvable, if not entirely solved, the quality of service can be guaranteed, dynamic bandwidth assignment can offer total flexibility, including VPN over IP, resource reservation protocol (RSVP) can underpin SLAs as well as allow

service providers to offer differentiated service products with Diff Serv protocol, and so on. Each vendor will give these assurances with their own products, reminding skeptics that IP, unlike telecom, comes from an unregulated sector in which industry standards are not well established in most of the difficult areas of advanced protocols. Take NGNs, for example. As the protocols and standards of the core become settled, so there is a shift towards adding intelligence to the edges driven by changing relative costs as Moore's Law continues to reduce circuit-board processor costs, encouraging intelligence in remote devices, and as bandwidth cheapens, encouraging remote networking. Hard-wired intelligence in devices, soft switches, intelligent routers and mini virtual routers (made available to wholesalers of bandwidth) and more bandwidth in more gateways raise a host of proprietary solutions. Not until genuinely non-proprietary Next Generation operations systems software (NGOSS) is fully developed to enable NGN operators to mix and match based on common industry standards will the 'hidden costs' of IP networking become fully transparent.

IP Networking in Action

These points of view (by no means exhaustive) serve to remind us that IP networking is still very much an emerging technology solution to traditional problems of network management, and to flexibility of service provision, which is seen as essential to future revenue growth.

Internet 2

The earliest applications of IP networking were obviously in the military and academia, and in this regard Hong Kong has decided to join in Internet 2, which will be available to universities and research institutions and schools in Hong Kong and to the private sector through research collaboration with the universities. Internet 2 is not a separate network but rather a guarantee of higher bandwidth donated locally. The international connections will still have to be paid for.

ISPs

Next in line were the ISPs offering mass consumption Internet notably emails, chat rooms and then Web access. Up to April 2002 Hong Kong had licensed 256 ISPs, the vast majority operating as third tier resellers. ISPs peer through Hong Kong's Internet eXchange (HKIX) but are required to enter hierarchical interconnection arrangements with top tier ISPs in the USA. While ISR in Hong Kong has brought down international leased circuit costs by over two thirds in the past two to three years, the real take-off for Internet economics in Asia will come when intra-regional traffic overtakes cross-oceanic traffic. The recent proposal by the Internet and Telecommunications Association of Hong Kong (ITAHK) for a peering IX to handle Hong Kong – China traffic is a nod in this direction. (See <http://www.itahk.org.hk/index01.htm>). For Hong Kong's Internet traffic statistics (available: http://www.ofta.gov.hk/frameset/facts_index_eng.html) see Appendix.

Carriers

Of course this development has not happened in time to save many ISPs from the bursting of the dot.com bubble, nor new carriers such as 360 Networks and Level 3 in the

Asia region. The result is a mix of consolidation of ISPs around incumbent carriers, such as PCCW/HKTC and Japan's NTT, and around new media giants such as Sony. Also very noticeable is the fact that consolidation in Asia is around Asian companies, not around non-Asian carriers and new media giants. Was talk of 'Death of Distance' premature? Perhaps 'Being There' is more important.

MPLS

This is not to say that globalization is a non-starter in Asia. For example, AT&T and WorldCom are notable for their customer base, a fact that may yet have a bearing on WorldCom's current uncertain future. The deployment of multiprotocol label switching (MPLS) allows traffic of different classes to be multiplexed, transmitted at very high speeds and connected any-to-any at guaranteed quality of service. MPLS is a technology that combines intelligent switching and routing, and allows international carriers to offer both circuit and packet switched services on a global basis. This is especially true if the carrier concerned is offering end-to-end services, because like the Internet itself, the transmission is as good as the worse link in the chain.

IP Networking and Markets?

IP Telephony

The first application in the pure telecoms world for IP was IP telephony, defined as Internet telephony if carried over the public Internet, and VoIP if carried over privately managed IP networks. VoIP became one of several technologies available to callback operators, helping to freeze-frame the image of a cheap but low quality service, but the effects have been dramatic. Nowhere more so than in China where the Ministry first tried to outlaw VoIP as a violation of the PSTN monopoly of China Telecom, then having lost a historic court case over the issue reversed its position and began licensing China Telecom, China Unicom, JiTong and Netcom, and finally China Mobile. The process spun completely out of the Ministry's control as fierce price competition broke out, by-passing PSTN long-distance call charges, with the result that (a) VoIP is not longer a viable stand-alone business in China, and (b) a scramble for market share in China has accelerated the entire process of sector reform which was in any case inevitable in light of China's WTO membership. In contrast, OFTA in Hong Kong went out of its way to encourage VoIP as part of its enthusiasm for callback as a way to prize open the international market before the monopoly of HKTI was finally surrendered. In this regard, IP was just a means to an end, not the end in itself, the essential point being that as voice transmission approaches zero marginal cost the entire industry is now looking for ways to bundle voice with other services that will generate revenues.

Wireless IP and Regulation?

Wireless IP networks and access is one possibility in the mass consumer end of the market, in which case the interesting possibility arises of fixed-mobile convergence as a business proposition, whether through M&A activity, or through virtual network operations, or through joint ventures, unified billing systems, and so on. There are regulatory implications for such changes, for example, should the regulator allow spectrum trading to facilitate such co-operation? Should the regulator allow service

flexibility within certain frequency assignments and within certain emission levels? Should the regulator allow or even encourage a move from mobile party pays to calling party pays? Should the regulator be less concerned about dominance regulation *ex ante*?

e-Business and /or Systems Integration?

For telecom revenues another direction is in providing support for business IP networks, everything from managed networks to systems integration to bandwidth-on-demand, video-conferencing, and so on. Given the morass of protocols and proprietary systems, it may well be that system integration will be in greatest demand as business networks shift more of their networking to IP and intranets, and to metropolitan and wide-area extranets, and only later will the once heralded explosion in e-business really begin to show itself.

China and Hong Kong?

China's entry into the WTO, China's social market economy reforms and state enterprise reforms all point in this direction, as do China's five year plan priorities. But Hong Kong's companies may not be the best positioned to take advantage of this market, perhaps surprisingly. The reason is that systems integration is an IT job and Hong Kong's telecoms sector has little expertise in depth in this field. The IT companies that specialise all have direct entry to China and do not need to come through Hong Kong, so telecom-IT partnerships in Hong Kong are likely to be of limited value. Also, China's WTO commitments in the telecom area do not promise early market opportunities, while e-business, and therefore data traffic in China, and therefore e-business traffic to and from China, remains a long way off.

Business Networks

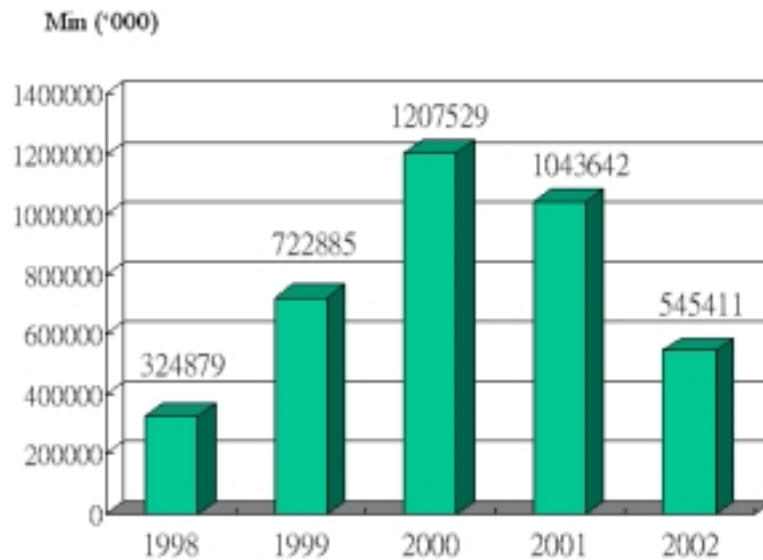
Perhaps the best way to stimulate it is through the linking of private business networks into China, but even here Hong Kong's telecom sector may no longer hold strong advantages. Market opportunity clearly exists for companies with close connections with carriers and networks in China, for example CITIC, but many national carriers around the region will be able to play this card. Companies like Reach could be well positioned as pure wholesalers, but others who are looking to provide managed network services will probably find it difficult to move out of their local markets. Which brings us back to the point that the real driving force for a regional market will have to wait the time when intra-regional Internet traffic strongly outgrows cross-oceanic traffic.

IPv6

IP networking in a broadband era will see the convergence of numerous services including an e-number that will unify the telecom and IP worlds. ENUM is supervising the conversion (see <http://www.itu.int/infocom/enum/>: also see <http://www.ipv6.org/>) although the usual controversy surrounds the question of who should issue these numbers. IPv6 is really a requirement of 3G and beyond, hence the proposal of the ITAHK mentioned above.

Appendix:

**Average Monthly (Jan-April for each year) Internet Traffic Volume
Customer Access via PSTN**



**Monthly Internet Traffic Volume
Customer Access via Broadband Networks**

