

Convergence in Hong Kong

(M.Hukill, R.Ono and C.Vallath eds. ***Electronic Communication Convergence: Policy Challenges in Asia***, Singapore, 1999?)

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1998 marked a watershed for Hong Kong's information technology, telecommunications and broadcasting sectors. Just as mainland China was merging the Ministry of Posts and Telecommunications, the Ministry of Electronic Industries and the Ministry of Radio, Film and Television into a new Ministry of Information Industries (MII), the Hong Kong Special Administrative Region (Hong Kong SAR) was similarly merging regulatory functions. A newly created Information Technology and Broadcasting Bureau (ITBB) brings for the first time under one policy branch the functions of the Telecommunications Authority (TA) and the Office of the Telecommunications Authority (OFTA), the Broadcasting Authority (BA) and its administrative arm the Television and Entertainment Licensing Authority (TELA), and the government's own internal Information Technology Services Department (ITSD). The ITBB brings about administrative convergence of all aspects of telecoms, broadcasting and government IT expenditure, with the exception of the allocation of satellite slots which remains the prerogative of the Hong Kong SAR Chief Executive-in-Council to which the ITBB is policy and technical advisor.

Although the close timing of the ITBB's creation in Hong Kong to that of the MII in China stems from the same logic of convergence, the agenda of the Hong Kong government is very different. Unlike mainland China, and unlike Asia's other tiger economies, Hong Kong has no explicit industrial policy and only limited aspirations to develop a productive capability of its own in micro-electronics.² On the contrary, up to date Hong Kong is primarily a user of IT and a consumer of IT services, not a producer of IT, and it is in these terms that the debate about convergence has taken place in Hong Kong.

The ITBB released two key consultation documents, *The 1998 Review of Television Policy* and *The 1998 Review of Fixed Telecommunications*, which deal with policy towards convergence and the complete liberalization of the telecommunications sector which is seen as a precondition for successful convergence. The publication of these reviews, the key elements of which are discussed below, and the setting up of the ITBB itself, signify a decisive moment in policy-making in Hong Kong towards convergence. But it comes as Hong Kong travels a learning curve, and one important lesson is that converging technologies may be necessary, but are not sufficient, to make for successful business synergies. This theme is explored below by looking in turn at each of the sectors involved in the 'convergence' in Hong Kong.

Convergence and Business Synergy

The term 'convergence' is not only over-used but frequently misused. Too often it is loosely assumed that convergence implies the coming together of different technologies or business activities. Rather, what digitalization has done is to bring three broadly-defined industries -- telecoms, computer networking and cable TV -- into convergence so they 'acquire like character independently'. In turn, this 'like character' has brought about the possibility of

synergy, the 'combined or coordinated action',³ of these industries. It is not hair-splitting to make this distinction between convergence and synergy. Convergence implies a 'like character', such as computers and telecoms using the same binary coding or 'digital language' which opens up certain technological and business possibilities. Since these like characteristics are acquired 'independently', however, there remains a gap between the potential for synergy and its realization. At the engineering level, combining two technologies may end up trading-off efficiencies. At the business level this may be acceptable for some markets but not for others. For example, xDSL (Digital Subscriber Line) technologies digitally compress traffic from broadband TV transmissions to subscriber twisted-wire pairs at acceptably low costs to serve residential markets, but the trade-off of cost-with-quality is simply unacceptable for many business applications requiring wide-bandwidth/high data-speeds which only optical fibre can provide. The key business question is not whether technological convergence works but whether there is a commercial synergy.

An example, which has relevance to Hong Kong, comes from the cable TV and telecommunications sectors. The possibility that the sound and pictures of TV and the voice and data traffic of telecoms can be delivered down the same wires or cables does not necessarily make for synergy between television and telecommunications as businesses. They remain significantly different. For one thing, their investment profiles are markedly different. The shelf-life of a TV programme is short,⁴ so investment in the TV business is determined by the continuous need to source fresh programming. By contrast, investment in a telecoms network is lumpy and intermittent, determined by the needs of network upgrades and extensions. Also the management qualities and styles required to run a TV network and deal with programmers, film distribution companies and content providers are different from those necessary to handle network engineering issues or accounting settlement rate negotiations with overseas carriers or marketing of bundled value-added services to corporate customers. Differences in style may extend to management culture, including dress codes, inter-personal behaviour, and life-styles.⁵ Of all the issues over which business joint ventures based upon the promise of convergence ultimately fall apart, probably the most common is the issue of who has final control over capital investment, over the priorities and profile of investment expenditures, over the scale and timing of investment, and over how to assess the risk. Add to that differences in management style and realizing business synergy between companies from two industries becomes difficult in the extreme. This even applies to two firms from within the same company group.⁶

Hong Kong's first brush with convergence came in 1985 when the Broadcasting Review Board recommended that in addition to the two terrestrial free-to-air TV stations, TVB and ATV each of which offered one channel in Cantonese and one in English, a cable TV system be built to provide multi-channel choice to Hong Kong audiences. A side recommendation to government was to consider the possibility of licensing the cable TV network to carry telephony thereby introducing an alternative carrier to the domestic public switched telephone network (PSTN) monopoly of the Hong Kong Telephone Company (HKTC) -- part of Hongkong Telecom -- which was due to expire in 1995. The idea of using technology convergence to kill two birds with one stone -- competitive entry into both the TV and telecoms markets -- was highly attractive to the Economic Service Branch (ESB) which had the policy responsibility for telecoms. The ESB commissioned a consultant's report on the feasibility of the Broadcasting Review Board's suggestion, which was completed in 1988. The Hong Kong public never got to read what it had paid for, and was therefore not to know that the ESB's claim that the report upheld the case for the recommendation was stretching the truth. In fact the report argued that since the two networks would be serving essentially

different markets in different geographical areas, with cable TV aimed at residential markets and a new telecoms operator targeting the high-value business districts, the synergies of overlapping interests were quite small. So too, therefore, were the financial savings that could be expected to arise from building out a shared network.⁷

The paltry scale of these economies of scope did not deter the ESB from pushing ahead with a bidding contest to license a cable TV network. Ironically, Hong Kong was therefore about to adopt a duopoly policy towards the telecoms market at the very time when Britain, from where Hong Kong derived most of its policy ideas and practices, was preparing to abandon, as something of a failure, the duopoly model of licensing only Mercury Communications (Cable & Wireless) to compete with British Telecom. The bids included what was widely predicted to be a winning one from HutchVision, a subsidiary of Hutchison Whampoa owned by property tycoon Li Ka Shing. But, last minute disagreements with the ESB over the financial terms witnessed the withdrawal of HutchVision and by default a winning bid from Hong Kong Cable Communications Ltd (HKCC), a consortium led by Wharf Holdings, also owned by property and shipping tycoon, Pao Yu-kang (succeeded by his son-in-law, Peter Woo Kwong-ching) and including the giant US West telecommunications company, Shaw Brothers (owned by Sir Run Run Shaw, the owner of TVB), Sun Hung Kai, another Hong Kong property company owned by the Kwok family, and Coditel, a small Belgium cable TV company. HKCC collapsed within two years without laying a single cable. The collapse was triggered by the withdrawal of US West amid inevitable disagreements over management style and control over the scale, timing and direction of investment. US West decided investments in Europe were less risky.

Quick to pick up the pieces from this debacle, the ESB commissioned a second report from the same consultants and this time sensibly took their advice. The cable TV license was to be separated from new telecoms licenses. This time Wharf Cable TV Ltd won the bid on its own while the ESB decided to issue four new Fixed Telecommunication Network Service (FTNS) licences, one to replace HKTC's monopoly, and the three others to Wharf-owned New T&T, to Hutchison Telecom and to New World Telephone, owned by property tycoon Henry Cheng Kar-shun. Up to date, the business and financial synergy between telecoms and property development seems more potent in Hong Kong than convergence of cable TV and telecoms technologies.

Broadcasting

The 1998 Review of Television is to date the government's most detailed statement on policy towards convergence.⁸ It is therefore appropriate to state in full the policy objectives as stated in the *Review*:

- to encourage and promote expansion, penetration and common use of the broadcasting and telecommunications networks and cross-fertilization of the markets;
- to create a fair, flexible, pro-competition and technology-neutral regulatory environment that would encourage and stimulate investment, technology transfer, diversification and innovation;
- to maximize consumer benefits in choice, service quality, affordability and accessibility;
- to facilitate the overall development of information technology and bring Hong Kong to the forefront of the Information Technology Age; and

- to promote Hong Kong as a pre-eminent regional broadcasting, information technology and telecommunications hub.

The *Review* also proposes the following four-tier regulation framework, with different degrees of regulatory oversight applied to each.

- *Domestic free television programme services* - heaviest content regulation and licensing to remain with the Chief Executive in Council because they ‘are the most pervasive and universally accessible and exert the greatest influence in society.’
- *Domestic pay television programme services* - licensing to remain with the Chief Executive in Council and parental locking systems required. But, given ‘that subscription is voluntary and is by choice, the protection of minors and public morality is more the responsibility of parents than the Government.’
- *Non-domestic television programme services* - licensing to be devolved to the Broadcasting Authority (BA) because ‘if these programmes do not primarily target Hong Kong, they are subject to much lighter control than free and pay television.’
- *Other licensable television services* - licensing to be devolved to the Broadcasting Authority (BA) and parental locking systems required for these services which ‘cover small scale, niche or localized TV programme services targeting specific viewer groups’ such as hotel guests, foreign nationals living or working in Hong Kong, small residential communities.

Sensibly, this regulatory framework focuses upon the social influence of different modes of broadcast rather than upon different technologies or different ownership structures. In the age of convergence, this is a step forward. Within the industry it is being called a shift from technology to economic regulation.

Almost all of Hong Kong’s population of nearly 6.5 million, or 1.9 million households, are able to receive the free-to-air broadcasts of ATV and TVB. In addition, Star TV is available in Hong Kong to around 550,000 households through 1,600 Satellite Master Antenna TeleVision (SMATV) systems. Star TV was launched in 1991 by the Li family using AsiaSat, Hong Kong’s first commercial satellite. The advent of regional satellite TV posed an immediate regulatory problem for Hong Kong as the right to uplink and downlink signals was, at that time, exclusive to Hongkong Telecom. HutchVision was awarded a licence to uplink for broadcasting only on behalf of Star TV. Subsequently a second uplink licence was awarded to TVB’s Galaxy in 1998 for broadcasting to Taiwan. Downlinking remained another regulatory issue, with some exceptions being granted to hotels for the sole purpose of serving their guests. Organizations like the Cable and Satellite Broadcasting Association of Asia (CASBAA) have been vociferous in their criticism of Hong Kong’s restrictive broadcasting policies, arguing that this has only worked to Singapore’s advantage as the rival regional broadcast hub. These are among the issues addressed by the new Broadcasting Review under the auspices of the ITBB and discussed below.

Star TV, which was subsequently sold to Rupert Murdoch, was initially restricted from programming in Cantonese, although this restriction has been lifted, and from carrying Hong Kong-focused advertising. These restrictions were designed to safeguard the advertising revenues of TVB,⁹ which as the dominant station are healthy, and ATV, which are not. Wharf

Cable TV was likewise restricted on advertising, although this has since been eased. Wharf was launched in 1993 using a multipoint microwave distribution system (MMDS) for fast start-up and had passed 1.6 million households by May 1998. The license commits Wharf to replace MMDS with a genuine cable system. By June 1998, Wharf's cable network passed 600,000 homes, its target commitment to government. It then promptly announced a halt to further buildout pending the outcome of the government's broadcasting review and subsequent policy recommendations. This left over half of Cable's TV audience dependent on MMDS. Generally, cable's performance has not lived up to early forecasts of the company. By summer 1998 Wharf claimed around 400,000 connected subscribers who pay HK\$250 per month for the basic service.¹⁰

Besides Radio Television Hong Kong (RTHK) which provides a very limited output of public service broadcasting over the ATV and TVB networks, and limited access (overspill) in the southern parts of Hong Kong island to Japanese Ku-band Direct-To-Home satellite TV broadcasts, the other entry into the broadcast market is point-to-multipoint Video-On-Demand provided by iTV, a service operated by IMS, a subsidiary of Hongkong Telecom.¹¹ IMS represents an important strategic development (discussed below), although as a business case it has yet to prove itself. iTV was launched as the world's first commercial VOD service at the beginning of 1998, but has been plagued by system failures and IMS has not been able to accommodate many of its potential subscribers. For this reason it is difficult to judge without company data how far 50,000 subscribers over half-a-year represents a poor response rate or constrained demand. This may yet be another example of technological convergence chasing engineering efficiency and business synergy.

IMS leases broadband circuits from its parent, HKT at HK\$500 per circuit per month, which is due to fall to HK\$120 per circuit per month as economies of scale kick in according to an agreement between HKT and OFTA.¹² The subscription rate for iTV is around HK\$200 per month, so on paper IMS is absorbing a loss of HK\$300 per subscriber per month. As a business case this could be justified in the launch of a service which is not just new to Hong Kong but new to the world, but the fixed line competitors of Hongkong Telecom and the Internet service providers who are competitors to IMS's Internet *Netvigator* service, cry foul. They see HKT and IMS shifting money from one pocket to the other, in effect subsidizing IMS -- as shareholder and investor HKT absorbs the losses -- and providing a financial return on HKT's broadband network build-out. HKT on the contrary argues the case for a risk rate of return on broadband investment which is pioneering Hong Kong into the digital broadband era and providing the backbone for Hong Kong's future information infrastructure. In contrast to Singapore, this is Hong Kong's market-driven approach at work. OFTA's requirement on HKT is to provide broadband capacity to all customers on terms equal to those it offers its associated companies. The Internet service providers argue that the price of a broadband circuit is a major constraint upon their entry into the digital broadband market. The major constraint on VOD services during 1998 has been the limitation on licenses to just two. The second licence was awarded to Star Interactive TV, renamed Hongkong Digital TeleVision (HKDTV), an associated company of Star Paging and Star Internet, two leading service providers. Litigation between Star and a third party held up the issuing of the second license. The 1998 Broadcasting Review consultation paper proposes to open this market in the future.

Other recommendations of the Broadcasting Review are also specifically targetted at convergence. The main one is to allow telecoms networks to carry television broadcasts, including pay TV and VOD and near-VOD services,¹³ and equally allow the cable network to

carry telecommunications services.¹⁴ Pay TV and VOD markets will be liberalized, as will satellite TV uplinking and downlinking as soon as Hongkong Telecom's exclusive rights expire on 1st January 2000.¹⁵ The MMDS radio frequencies will be returned to government as the cable network is completed, and cable TV's broadband network will be opened to interconnection on commercial terms in the same way as Hongkong Telecom's PSTN and broadband networks have to permit carrier and service provider equal access. Dominance regulation in telecoms has been used by OFTA (What does this mean?) to enforce this policy and all licences carry anti-competitive behaviour clauses.

Digital broadcasting technology is to be encouraged to enhance channel capacity and improve reception through the television-receive only (TVRO) and community antenna television (CATV) in-building aerial systems through which most of Hong Kong's residential tower blocks access free-to-air broadcasting.¹⁶ Dual analogue-digital broadcasting is anticipated by 2000, with analogue being phased out by 2005. The digital broadcasting era is also anticipated to see the arrival of Direct-to-Home (DTH) satellite services using four Ku-band Broadcasting Satellite Service (BSS) channels uplinking from Hong Kong. This development must be seen mainly in terms of the government's commitment to reinforcing Hong Kong's role as a regional broadcasting hub as stated in the policy objectives above.

Telecommunications

The telecommunications policy objectives of the Hong Kong government were laid down in a Position Paper issued in January 1994 by the Economic Services Branch. They were:

- that the widest range of quality telecommunications services should be available to the community at reasonable cost;
- that telecommunications services should be provided in the most economically efficient manner possible; and
- that Hong Kong should serve as the pre-eminent communications hub for the region now and into the next century.

These three guiding principles have become 'the blueprint for the sector's development' (*Telecommunications Review Consultation Paper*, ESB, March 1998, para 5), and are regularly restated in OFTA documents. They do not, however, specify the means of achieving these ends, nor do they refer to economic development, industrial convergence or the information infrastructure. The government's view has been that sector liberalization and competition are the preferred means, but they should be backed up by OFTA using its reserve powers of determination on issues such as interconnection and the sharing of essential information, such as customer billing, when commercial negotiations between disputing service providers fail.¹⁷ In essence, it is similar to the OFTEL model in Britain and the AUSTEL model that was in operation in Australia.

In 1996 the TA and Director-General OFTA at the time, Alex Arena explained that 'development objectives are not specifically stated. That is because Hong Kong is already in the fortunate position of having a very high teledensity of 52% (52 lines per 100 people), therefore, basic issues of universal service are essentially already met.'¹⁸ But this was taking a narrow view of development. By the time of the handback of Hong Kong to China in July 1997 the concerns of Hong Kong were beginning to focus upon the economy's ability to adjust to the information age. Thus the question was how Hong Kong could take advantage of developments such as electronic commerce to promote the territory's trade in goods and services, and how to promote Hong Kong as a centre of investment and innovation.

As we saw above, these were the themes of the Chief Executive's *Inaugural Policy Address* in October 1997. They were prefigured by various debates in Hong Kong over several years about whether the economy was sustainable. Hong Kong had seen a shift of manufacturing across the border to southern China and the transformation toward a service economy dependent for its prosperity upon a re-export trade in China-made goods. One proposal that arose from that debate, for example, was the decision for the Industry Department to commission a feasibility study on a science park for Hong Kong. The goal is to attract foreign IT multinationals, although the scale of the park and the financial incentives likely to be on offer look small compared to Singapore and Taiwan.¹⁹ One of the problems facing the Hong Kong government was the absence of any single policy bureau with overall responsibility for developing a national economic development strategy. In light of Hong Kong's commitment to 'positive non-intervention' by government many see this more as a virtue than as a problem, but in the field of information technologies and converging industries it has been a problem.

The poor grasp of broadcasting policy in an age of convergence, which was discussed above, illustrates the need for government to develop an expertise in policy and regulation. On the telecoms side this was achieved by the setting up of OFTA. In 1997, OFTA itself was used as the vehicle to take the initiative by setting up an Information Infrastructure Advisory Committee (IIAC). This was the first step towards officially recognizing the role of telecoms in the age of convergence, and its central contribution to the information infrastructure. The terms of reference of the IIAC were limited by the scope of OFTA itself:

- advise on the development and regulation of the information infrastructure in Hong Kong
- advise on the promotion of the effective use of the information infrastructure for various possible applications in Hong Kong
- advise on technical standards and related issues in the development of the information infrastructure in Hong Kong
- to advise on the formulation of Hong Kong's position at, and contribution to, international and regional fora on issues relating to the global and regional information infrastructure.

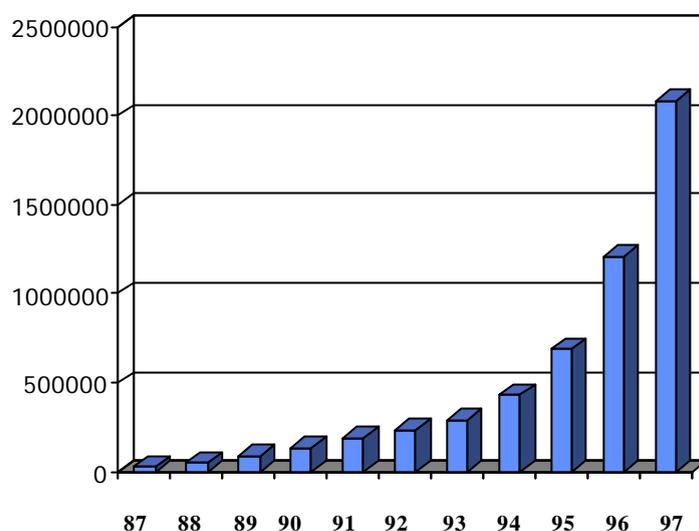
Discussion of each of these terms of reference was restricted in the committee meetings and in the various task forces set up to issues which converge with telecoms. For example, discussions of electronic commerce focused upon the physical and technical network requirements, and upon policy, regulatory and security issues involved, rather than upon specific commercial opportunities or industries, or issues such as taxation or the role of cybercash. In other parts of government other aspects are discussed, for example, the Hong Kong Monetary Authority discusses e-commerce issues with the banks, but rarely if ever are these issues all discussed within one forum or within one policy bureau. It would hardly be practical to do so, but in the absence of any kind of national development agency a holistic approach at a higher level may be necessary.

An alternative to a holistic approach is to adopt an historical perspective. In the case of telecoms this can be stated succinctly. After fifteen years of continuous market liberalization which has seen a boom for the telecoms carrier industry in Hong Kong a major source of revenue, namely international voice traffic, is about to fall precipitously. Globally, telecoms traffic engineers forecast a switchover of voice:data from 80:20 to 20:80 by the turn of the

century, and that 80 percent of 'data' covers a wide variety of services, everything from fax to file transfers, from e-mail to inter-active video-on-demand. It also includes voice which is packet-switched rather than circuit-switched as at present. There will be many new media service providers trying to corner different parts of these markets and it is not certain at all which types of companies will emerge as the major players. And even traditionally dominant telcos cannot be certain if their digital networks will remain dominant. New technologies are transforming the economies of scale of switching and transmission, and they promise to transform the means (devices) and the ways customers access networks and access service content. If content becomes the new source of value in the communications chain, then the trend away from vertical integration and towards horizontal competition may not be long lasting. Network operators like Hongkong Telecom and Wharf Cable TV need to find new sources of revenue to finance their investment in broadband networks and at the same time new media content providers are looking for ways to secure an outlet for their programming. In the United States it is becoming commonplace for content providers to take ownership stakes in cable companies, although none of them hold dominant stakes. A similar development could be facilitated in Hong Kong where one of the recommendations of the *1998 Review of Television Policy* is to drop cross-ownership restrictions on content providers and TV stations.²⁰

With the exception of the paging market which has been open since 1970, Hong Kong's telecoms market was closed until HKTC lost its stranglehold on customer premises equipment (CPE) in 1983. From its beginnings in 1985 the radio cellular mobile telephone market was open with three competitors, namely, CSL (a subsidiary of Hongkong Telecom), Hutchison and Pacific Link. When digital technology was introduced in 1993, a fourth competitor, Smartone was allocated spectrum for GSM. Today, CSL and Smartone offer GSM and Hutchison offers GSM and CDMA. The fourth operator, Pacific Link which offers digital AMPS, was acquired by CSL at the end of 1997. This takeover is widely seen within the industry as the first of maybe two or three 'consolidations' as the competition intensifies, especially following the introduction of PCN.²¹ OFTA introduced six new personal communications network (PCN) licences in 1996 using the 1.8 GHz frequency and the effects upon cellular prices (handsets and airtime charges) has been dramatic.²² OFTA's policy towards licensing is fairly straightforward. New licences will be issued to companies with viable business plans, but the number of licences will be restricted by OFTA's view of the bandwidth available divided by the anticipated critical mass for break-even, which maybe, for example, 200,000 subscribers. The policy is technology neutral in accordance with Hong Kong's role as a user and not a producer of the basic technology, although Hong Kong manufacturers do have some strength in radio telecoms components and products. Figure 1 shows the tremendous growth in cellular usage in Hong Kong for the past ten years.

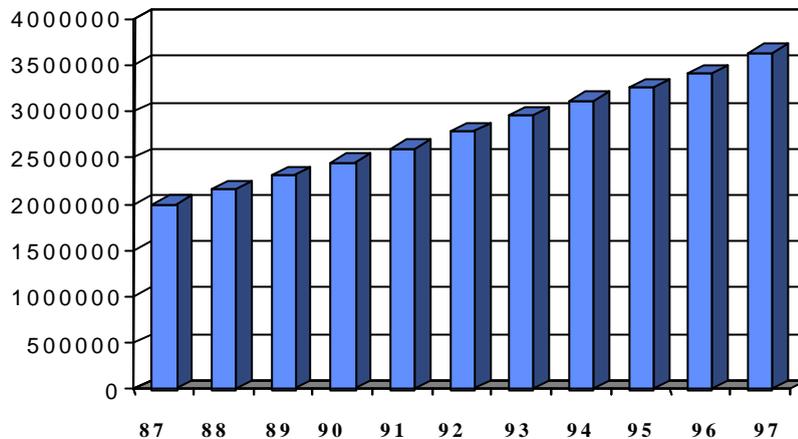
Figure 1
**Public Mobile Radiotelephone Subscriber Units
 1987-1997**



The dual monopoly of Hongkong Telecom over domestic and international fixed wireline telecommunications came to a partial close in July 1995 when four FTNS (Fixed Telecommunications Network Service) licenses were issued, as explained above. Then in March 1998 a Framework Agreement was signed between HKT and the Hong Kong government under which international telecommunications will be entirely open to competitive entry by January 2000. By January 1999 international simple voice resale (ISVR) will be added to other forms of international simple resale (ISR) and licenses will be available on demand to anyone who wishes to lease international circuits for resale, subject only to regulatory consent at the distant end. At the time of writing it seems likely that international gateway licenses will also be openly available to any company willing to buy indefeasible rights of usage (IRUs) on submarine cables or satellites and willing to invest in backhaul facilities in Hong Kong.

These are major reforms and are designed to meet Hong Kong's commitments to the WTO and to reassert Hong Kong's regional challenge to Singapore by opening the international market one year earlier. They also reflect HKT's concern that the value of its exclusive international licence was diminishing following the legalization of callback services by OFTA.²³ Within the industry it is estimated that callback accounts for around 30 percent of Hong Kong's international traffic, much of it is operated by the FTNS operators. In effect they have been using their domestic licences to make revenues from international traffic. The cost has been a slower pace of development of facilities-based competition within the local loop because their attention was focused on the international business market. The Telecommunications Review estimates the three new entrants' local market penetration at just 2 per cent after three years of operation. Figure 2 shows the growth of total exchange lines in Hong Kong.

Figure 2
Exchange Lines
1987-1997



The disappointing rate of local loop build-out is a controversial issue. The new entrants claim obstruction from HKT over interconnection and foul play in poaching customers with predatory discount prices and the unauthorized bundling of services. HKT claims three years is sufficient for the new entrants to make their mark, and accuses them of just going after the international market. The moratorium that OFTA placed on the issuing of new FTNS licences ends in 1998 and the lobbying to extend it for a further two or three years or to end it immediately is intense. OFTA and the new ITBB have to decide whether a trade-off between additional investment commitments and an extension of the moratorium is beneficial to Hong Kong. It is perhaps unlikely that any international telcos would wish to invest heavily in Hong Kong's local loop, although many would welcome the chance after 2000 to extend their lines to the Central business district. The main point of contention between the international-only operators and the FTNS operators is likely to be the level of the access fee for connectivity to the domestic subscriber. OFTA has determined this to be HK 31.3 cents, comprising HK 17.9 cents cost of using the local network and HK 13.4 cents universal service obligation. It will only apply to routes on which competition is fully established. The route to China, for example, would be currently considered non-competitive, and that accounts for 50 percent of Hong Kong's external traffic.

The Crossroads

The access fee raises a critically important issue which brings us back to convergence. Hong Kong is a small territory and around 50 percent of Hongkong Telecoms' revenues derive from international call traffic.²⁴ From 1st January 1999 international simple resale (ISR) will include voice for the first time. On competitive routes the access fee which FTNS operators will be able to charge international service providers for interconnect will be 'cost-based'. On non-competitive routes OFTA proposes a revised and lower accounting and settlement rate than is currently agreed between HKT and its corresponding carriers overseas. If we assume that all routes are competitive, the closest we can come to estimating what the real cost of interconnect may be is to use a figure close the interconnect fee paid to HKT by Internet service providers who hold public non-exclusive telecommunications services (PNETS)

licenses as determined by OFTA. In 1997 Internet service providers paid a PNETS charge of HK 4.6 cents per minute.

Using this figure we can use a model developed by the Australian Industry Commission (now the Productivity Commission) to calculate the impact on HKT's IDD revenues if this access fee replaced the settlement fee, a weighted average for which I estimate in 1995 at around HK\$4.50 per minute. (The model and calculations are reproduced in an appendix to this chapter.) The logic of the argument goes like this: a lower interconnect fee will reduce incoming revenue (incoming settlement payments), but it will also reduce outgoing costs (outgoing settlement payments) and reduce IDD prices which will stimulate demand. By how much will it stimulate demand? My own estimation of the elasticity of demand for IDD from Hong Kong is very low, -0.3²⁵ and this also happens to be the figure *assumed* by OFTA's consultants in their financial modelling for the Framework Agreement with HKT.²⁶ Using this low elasticity estimate, the model generates a new weighted average IDD tariff of just HK\$1 as against the weighted average IDD tariff in 1995 of HK\$6.70. HKT's total IDD revenues would have fallen from around HK\$11 billion to HK\$2.2 billion, an 80 percent drop!

These figures are a red light warning. They do not predict the exact financial outcome. For example, if all routes were non-competitive and a reduced settlement rate system was maintained, revenues would fall to around HK\$6 billion, still a huge fall of 45 percent, but, substantially different from HK\$2.2 billion. In larger economies where IDD revenues are a less substantial chunk of revenues, the effects of accounting rate reform will be less dramatic, although in the world's largest economy, the USA, international carriers could feel the cold wind. The Framework Agreement with HKT is about to usher in a new era of liberalization and a new economics for the industry. HKT has been planning for it, as its investments in value-added services, a broadband network and IMS/iTV demonstrate, but its dominance in the international market is no longer assured.

Hong Kong Telecoms' dominance in the domestic market remains the interesting issue. The government's and OFTA's strategy, as we saw above, has been to liberalize, regulate against anti-competitive behaviour by the dominant carrier, and wait for the market to do the rest. But these changing economics of the industry raise the prospect that the market won't be able to do the rest because it is just too small on its own. Convergence has emerged in the Television and the Fixed Telecommunications Reviews as a way to foster greater competition and investment in the local network by opening cable TV to telecoms and telecoms to TV, but can this work? The economics of the broadcast sector is facing similar difficulties, even to the point where the Television Review proposes to permit, if not to encourage, vertical integration between content providers and network operators. As telecoms shift into inter-active new media services, a similar vertical alliance and integration is highly possible. This throws all the assumptions into the melting pot. Hong Kong's policy towards convergence is therefore at a crossroads, and is a step into uncharted territory.

Computers and the Internet

In 1995, without fear of contradiction, I was able to write:

little effort has been made by government to encourage the use of on-line information. For example, the Government Information Service (GIS), which is the primary interface between government and the Hong Kong media, is not on-line, although file transfer is

available, and in 1995 the teleprinter service was replaced with a proprietary standard non-interactive on-line broadcast connection to the media, but not the general public - and only two government services, laws and the land registry, are provided on-line.²⁷

Three years later this view is quite out of date. A check of <http://www.info.gov.hk> will reveal that just about every government agency is now on the Web as part of the government's efforts to emphasize the importance of IT in building an information society in Hong Kong. This is a long step forward from 1992 when two principal members of the government's Information Technology Services Department, which is responsible for promoting civil service efficiency, wrote,

...no preferential treatment to the information technology sector has been given. The use of information technology in Hong Kong is requirement-driven rather than coordinated and promoted by the Government, apart from promotion through its own consumption. Such a stance is welcomed by the community and the IT industry at large.²⁸

There is now a growing debate as to the best means for government to promote the adoption and use of information technology in Hong Kong. In his 8th October 1997 *Inaugural Policy Address*, Mr Tung Chee-hwa, the Chief Executive of the Special Administrative Region of Hong Kong (China), made the following assessment:

To make Hong Kong a leader, not a follower in the information world of tomorrow, we need to bring together four things:

- * first, the hardware of high capacity communications systems;
- * second, a common software interface mounted on established communications networks, through which individuals, business and Government can interact easily and securely using their own systems,
- * third, people who know how to use the new technology, and
- * fourth, a cultural environment that stimulates creativity and welcomes advances in the use of this technology.

We saw above the absence of any government agency with specific focus on IT. The lead was left to OFTA, the office of the telecommunications regulator, to establish an Information Infrastructure Advisory Committee (IIAC), which issued its report in March 1998. The IIAC has been reconstituted by the new Information Technology and Broadcasting Bureau (ITBB) which is now the government's lead agency.²⁹ Among the government's initiatives is a plan to install an Electronic Services Delivery System which will enable private citizens and companies to undertake all their dealings with government offices electronically. The government is also taking the lead in appointing Hongkong Post to be the 'root public key' certification authority to provide infrastructure support for electronic commerce. The private sector is being encouraged to establish its own certification authorities, reflecting the government's philosophy of leaving as much to private sector initiative as possible. There is a conscious element of pump-priming in this approach, which belies the view that Hong Kong's 'positive non-intervention' equates with a classical 'laissez-faire' ideology. It does not. Hong Kong has for long been a pragmatic mix of public and the private, of free-wheeling capitalism and state-intervention.³⁰

This approach has had its problems. Tradelink was one of them. Tradelink is a consortium of large companies, including HKT, supported by a government franchise. Seed money was used to set up an EDI gateway between trading companies applying for trade declaration documents and government departments. Only after a decade of discussions has Tradelink begun operations, and now it seems that Tradelink should be fully operational by 2001 when all hardcopy documentation applications will be phased out. In the meantime a company called CargoNet and the Hong Kong Article Numbering Association introduced their own EDI services for transport and retail in 1995. Although these systems did not address the needs of small and medium-sized enterprises (SMEs) which are the focus of Tradelink, in 1988 CargoNet introduced a new e-commerce system, Arena, which does serve this market. Cooperation between CargoNet and Tradelink should greatly accelerate the use of e-trading among SMEs in Hong Kong and China, possibly leading to a new global EDI standard for SMEs.

The negative lesson from this episode is that where the government does intervene it needs to do so with some expertise and a clear mandate. In this case it seems that the resuscitation of Tradelink was largely due to the intervention of government in 1997 following a financial crisis at the company. The Secretary for Industry and Trade then began chairing Tradelink's meetings and clearly added urgency and direction to what was, up to that point, an enterprise drifting between the disparate interests of the consortium members, none of whom gave Tradelink much priority. Taking the example of OFTA, when government does commit expertise and resources, and defines a policy clearly and with timelines, the results can be very effective. Half-way initiatives lead to half-baked solutions. The positive lesson is that necessity is indeed the mother of invention. Arena is a web-based technology which did not exist when Tradelink was being formed, driven by the business acumen of an innovating company that also did not exist. Partly as a result of these experiences, the Hong Kong government is now firmly committed to outsourcing many of its IT initiatives.

Beyond government, IT has been embraced by Hong Kong society in ways which reflect its economic and social composition. Over 300,000 or 98 percent of Hong Kong companies are SMEs, often less than ten employees, and their strength lies in their adaptability to changes in market conditions. To catch market trends and avoid rising costs they switch products or their export markets or manufacturing locations frequently. Many are part of North American or European outsourcing chains, dependent upon original engineering and manufacturing (OEM) status, while the more innovative have ventured into own brand manufacturing (OBM) establishing a regional presence. They rely upon commercial flexibility, physical mobility and minimizing overheads and sunk capital. So flexible, mobile and inexpensive are the characteristics of IT that meet their needs. This explains the huge demand for cellphones and pagers and fax machines. It also explains the comparatively low level of computer usage by SMEs,³¹ and even lower usage of networked systems outside the sector of large corporates.

Very recent data is hard to come by, but Graham Mead and Associates for Datapro (Hong Kong) estimated around 500,000 business computers in use by the end of 1994. That figure is likely to have doubled. Undoubtedly the most sophisticated networked applications belong to banks and financial institutions, transportation companies including airlines, shipping companies and mass transit railway, as well as utility companies. Also, the Jockey Club which offers mass tele-betting and video-links between the two race courses, and the many multinational companies who have their regional headquarters in Hong Kong have extensive

networks.³² Convergence in this sector means essentially one over-riding issue: electronic commerce. As we have seen, this is now at the top of the ITBB's agenda with the immediate emphasis upon facilitation through the setting up of certification authorities and anticipating appropriate international law and regulation. SME entrepreneurs are already experimenting with web-sites, including an on-line Chinese bookshop, and supermarkets are offering on-line shopping, while two companies, Boom Securities (Hong Kong) Ltd and Celestial Asia Securities Holdings, pioneered the electronic trading of stocks in Hong Kong in 1998.

Convergence, we have noted, is not just a technological issue, it is an issue of business synergies, and it is also an issue of social acceptance and usage. Without question the major driver in the diffusion of home computing in Hong Kong has swung from games and video in the early 1990s to the rise of the Internet. The press media has been particularly influential in this process³³ and Hong Kong has seen a steady rise in household penetration since scholars began collecting data. In a general social survey scholars at the Chinese University of Hong Kong made estimates that 21.8 per cent of households possessed a computer in 1991 and 27.9 per cent by 1993, but they did not estimate how many had modems or were used for networking.³⁴ Table 1 are estimates by the Telecommunications Research Project³⁵ for the years 1994 and 1996.

Table 1

Computer Penetration in Households in Hong Kong

	<i>Households with at least one computer</i>	<i>Households with computer modems</i>	<i>Percentage of Households with computer modems actually using them for communications</i>
Valid Answers 1994	27.5%	20.2%	10.8%
Valid Answers 1996	40.2%	28.7%	38.3%

At face value, these figures suggest that of Hong Kong's 1.4 million households, around 8,000 were making use of computer networking, most probably by the Internet, in 1994 and by 1996 this had increased nearly fourfold to over 61,000. Most recent data published on OFTA's web site gives the number of individual customer account users of Internet service providers as 655,000 as of June 1998, with an additional 93,000 individual users of corporate accounts. A crude estimation would suggest the former figure represents an upper limit of around 180,000 households, a three-fold increase over 1996.

Data such as this relating to levels of computer penetration and usage has been compiled on an ad hoc basis to date and can therefore offer only limited insights into the IT environment. Yet understanding that environment is clearly necessary in order to understand the diffusion of both the technologies of convergence and the rate of adoption of applications which exploit convergence, such as e-commerce. One area that has been identified as a constraint is a shortage of people with the knowledge and skills to design and integrate IT systems and 're-engineer' the back-office organization to make it all work at the service level.³⁶ For this reason government is also placing emphasis upon an Internet for the schools in Hong Kong. The IIAC report found that over half the computers in secondary schools were being used for administration rather than learning.

Access to the information infrastructure is clearly key to the issue of the adoption and diffusion process. The IIAC has conceptualized access using the following four-tier model:

- Level 1 - Content Provision
- Level 2 - Service Provision
- Level 3 - Distribution Network
- Level 4 - Consumer Equipment

A level 0 has been suggested, intellectual creativity. Indeed, the age of convergence is really a short-hand for an era in which the creative integration and use of different information technologies for a range of innovative applications will become the major source of value in human activity. Living standards and the quality of life will be decided by the outcomes, although governments are driven by rather more prosaic concerns. In the case of Hong Kong these include international agreements the territory has entered into under the WTO to liberalize its telecoms market and with APEC to promote the concept of the Asia-Pacific Information Infrastructure (APII) and Society. The latter issue directly impacts on Hong Kong as a communications hub, and the government is actively pursuing policies to promote open trade in services as well as goods. Domestically, the territory's own information infrastructure consisting of an all digital fixed line telecommunications network, eleven mobile telephony networks, dozens of paging networks and over one hundred Internet service providers, in addition to the ubiquitous use of automatic teller machines, electronic funds transfer and swipe card machines, a public transport *Octopus* smart card, and literally hundreds of open-systems or proprietary networks offering electronic communications services is impressive. The key issue now is how to use it productively and in an inventive manner. The current reforms of broadcasting and telecoms and the government's promotion of IT policy give substance to *The 1998 Review of Fixed Telecommunications: A Consultation Paper* (ITBB, April 1998) stated intention 'to ensure that "convergence" issues are dealt with comprehensively.' (p.19).

Conclusion

In many ways convergence is less about technology and more about business synergy on the one hand, and the creative and innovative use of IT media and content on the other. Social as well as economic and industrial life is being profoundly influenced by it. Getting it to work right is the principal concern of governments, although as in other organizations it requires 'champions' to progress the IT and convergence issue up the agenda. Sometimes this happens more by reaction than insight. The threat of the 'millennium bug' is an example, especially if it threatens to affect the working of the state itself. In Hong Kong we have seen that the current concern with 'convergence' is a development of the last few years only, although the issues were known for a long time. The creation of the ITBB therefore marks a major step forward in government thinking.

Convergence implies also the interconnectedness of things, and this demands a holistic approach to thinking it through. Every aspect of national economy, for example, connects with the information infrastructure one way or another. Whether it is the electronic pricing of road transport as a means to reduce congestion and air pollution, or the zoning of residential and commercial areas to take into account teleworking, or the planning of public library facilities to provide on-line broadband community access, or the electronic payment of taxes, access to the information infrastructure and its applications are all pervasive issues. These issues are easier for academics to analyze and discuss than for governments to plan and coordinate, even with public-private sector co-operation. Hong Kong is no different in this respect. Hong Kong has really just begun to tackle these issues, and that makes it a landmark, or crossroads or watershed, whatever the preferred metaphor.

Appendix

We want to simulate what the Hong Kong world will look like after January 1999 when most callback traffic will be replaced by ISR.³⁷ The most complete set of figures available to the author are for 1995, when the weighted (by route) average IDD tariff was HK\$6.70 per minute.³⁸ Total revenue from IDD was around HK\$10.5 billion, probably \$0.8 billion less with callback which is estimated at around 15 per cent of IDD traffic in 1995. Using the estimates of the Federal Communications Commission (FCC) for Hong Kong's international switching and transmission costs, and using the domestic interconnection or access fee paid to Hongkong Telecom (HKT) by Internet Services Providers (ISPs) -- which was 4.5 cents HK -- to estimate the local loop connection cost, we arrive at an estimate of 61 cents HK per minute as the average cost of an IDD call. This compares with the weighted average IDD tariff of HK\$6.70 above!

The Model

If we follow the terminology of the Australian Industry Commission³⁹ and call this 61 cents HK the *resource cost* of making an IDD call, and take into account the net revenue (-/+) from accounting rate settlements, then total cost⁴⁰ is given by the formula:

$$TC = RC(O+I) + S(O - I)$$

and

$$TR = p(O)$$

where TC = total cost; RC = resource cost; O = outgoing traffic;
 I = incoming traffic; S = Settlement rate; TR = total revenue;
 p = average weighed IDD call charge.

The only unknown is the weighted average settlement rate. The USA publishes accounting rates (settlement rates are usually 50 per cent of accounting rates) and the UK and New Zealand have recently followed suit. In 1995 the USA-HK settlement rate was \$1 per minute (HK\$7.8). The settlement rate between Hong Kong and mainland China was considerably higher, as was traffic volume.⁴¹ For purposes of this exercise I have assumed a weighted average of \$4.50.⁴² This may be an inaccurate measure of total cost, but the exercise is easily rerun (using Microsoft Excel 5.0 Solver) using alternative assumptions.

Using the actual figures for 1995 we have:

$$TC = \$0.61(3,024,722) + \$4.5(132,072) = \$2.4 \text{ billion}$$

$$TR = \$6.7 \times 1,578 \text{ million} = \$10.5 \text{ billion}$$

A competitive price p^* would be one that equates total cost and total revenue,⁴³ where total cost includes the cost of capital, which is assumed to be 15 per cent in Hong Kong.⁴⁴ It is known that $p^* < p$, but the additional assumption that is now required is the price elasticity of demand h for IDD usage. I use a comparatively inelastic estimate of -0.3 which I derived from data from 1994-95. The financial model used by the SAR Hong Kong government in the determination of the Framework Agreement with Hongkong Telecom assumed the same figure.⁴⁵ A further assumption we can build into the model is that callback traffic, which is stimulated by price arbitrage when reversing the direction of the call takes advantage of lower overseas IDD call charges, disappears when p falls to p^* . In 1995 industry estimates put

callback traffic at about 15 per cent of total incoming traffic, so we can transfer this 15 per cent traffic to outgoing. With these assumptions we have the following condition:

$$O^* = O + \{[(p^* - p)/p] \times h\} \times O$$

subject to: $(O^* \times p^*) - \{RC(O^* + I) + S(O^* - D)\} = 0$

which says that at a new competitive price, p^* , outgoing minutes will rise from O to O^* , without violating the constraint that the new total revenue equal the total cost incurred (i.e., $TR - TC = 0$). Running these simultaneous equations provides the following result:

$S = \$4.5:$ $p^* = \$2.84$ $O^* = 2,106 \text{ million minutes}$ $TC = \$5.9 \text{ billion}$ $TR = \$5.9 \text{ billion}$
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From these results it can be seen that a competitive IDD price in 1995, without callback and with the current accounting and settlement rate in place, would have been around \$2.84 compared with the weighted average of \$6.70. The revenue implications are enormous. At a price of \$2.84, total revenue would slump over 40 per cent, from \$10.5 billion to \$5.9 billion. This could have severe implications for future investment in the network unless (a) other revenue opportunities are opened up, or (b) new entrants are prepared to drive investment.

Going one step further, we assume ISR has totally by-passed the accounting rate system. What then would be the 'access charge' for interconnect between the ISR operator and the domestic FTNS operator? Let us assume that the ISR domestic interconnect access fee is at cost, that is 4.5 cents HK, then we have the following results:

$S = \$0.45$ $p^* = \$1.35$ $O^* = 2,226 \text{ million minutes}$ $TC = \$3 \text{ billion}$ $TR = \$3 \text{ billion}$
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Conclusion

Under two sets of assumptions, first, that tariffs drop towards cost, and second, that in addition ISR replaces the accounting rate system, we see that total revenues from IDD would fall by over 40 per cent and by 70 per cent respectively. The model does not predict what the new tariff levels will be, nor total revenues, but it does dramatically illustrate how the economics of telecommunications, based as it was on the cash-cow of IDD, is about to change dramatically and permanently.

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² After the China's Open Door Policy in 1978 most of Hong Kong's manufacturing industry migrated across the border. Estimates suggest that Hong Kong manufacturers employ upwards of 500,000 people in neighbouring Guangdong province and the Pearl River delta area. The Industry Department, under the Trade and Industry Bureau, is progressing plans to sponsor a science park in Hong Kong to attract high-tech companies and especially international firms but Hong Kong only has a very small IT sector in electronics, telecommunications and broadcast equipment and components.

³ Chambers English Dictionary, Edinburgh, Scotland 1990.

⁴ The problem is exacerbated by off-air piracy, which is rampant throughout Asia and a major headache for regional broadcasters and programme makers.

⁵ A similar set of contrasts could be drawn between the image of high-octane but consciously casual young IT entrepreneurs in Silicon Valley running IT start-up companies, and the staid middle-aged image of the carefully

groomed, manicured and blue-suited telco executive. Image is a superficial category, but it may be a genuinely good signifier of substantial difference.

⁶ Horizontal integration may therefore be more difficult to sustain than vertical integration. In the former resources may be competed over, whereas in the latter resources may be complementary.

⁷ The report stated, *inter alia*, that cost savings of combining the two networks amounted to just four per cent, and that 'the viability of the second telecommunications network operation will not depend noticeably on the fact of its common ownership with a cable television network.' (Booz, Allen & Hamilton, *Telecommunications in Hong Kong*, 1988, p.vi)

⁸ For details of ITBB publications and releases See www.ofta.gov.hk

⁹ Non-Cantonese programming attracts very low audience ratings in Hong Kong, and therefore very little advertising revenue.

¹⁰ The performance of the Pay TV channels has been even more dismal, and predictably Wharf is making 'about 85 per cent of its pay TV revenue from Penthouse, Playboy and other adult channels...' Greg Manuel, *Sunday Post*, 6 September 1998, p.2

¹¹ IMS's trading company is registered as Hong Kong Telecom VOD Ltd or HKTVOOD.

¹² "In approving the tariffs, the TA has taken into consideration the full business plan of HKTC which forecasts that the monthly rental will drop by 35% to 45% per annum in real terms in the initial 2 to 3 years with a growth in volume per annum of 150,000 to 300,000 customers, and that it would approach the range of \$100 to \$120 in real terms per month when the demand reaches 1 million." OFTA Press Release 16 July 1997. (See www.ofta.gov.hk)

¹³ Real VOD allows full inter-activity where the subscriber can download any video from a menu of videos at any time of day. Near-VOD is only partially interactive, allowing the subscriber to view a video from a limited menu of videos only at preset times, usually every 15 minutes.

¹⁴ This follows the example from the USA of the Telecommunications Act, 1996.

¹⁵ A government supported teleport is being built at Chung Hum Kok in the south of Hong Kong island for this purpose.

¹⁶ Modern residential tower blocks in Hong Kong are built to the height of 32 stories, so block-wiring or cabling for telecoms or cable TV, alongside high-density occupancy, is an important feature determining the economics of transmission in the territory.

¹⁷ Regulating interconnection and predatory pricing by the incumbent, Hongkong Telecom, has proved difficult in practice, with the new entrants calling upon OFTA to act more decisively and with enhanced powers.

¹⁸ Regulation - its role and evolution' World Telecom Conference, McKinsey & Company, Hong Kong, May 1996.

¹⁹ For two very contrasting views on policy directions for the Hong Kong economy, see Richard Lester et al. *Made By Hong Kong*, and Michael Enright et al. *The Hong Kong Advantage*, both published by OUP, Hong Kong, May 1997.

²⁰ In 1998 a controlling interest in ATV, the weaker of Hong Kong's two free-to-air broadcasters, was bought by a consortium led by Bruno Wu Zheng, who has owned and operated a programme distribution company in the USA, with mainland Chinese businessmen Feng Xiaoping and Liu Changle who is chairman of the Phoenix Satellite Channel, and Wong Po-yan, chairman of the Hong Kong Airport Authority. ATV's salvation may require financial support from programme makers or distributors eager to secure a broadcast market, especially if this can be widened to include mainland China and Taiwan.

²¹ The decision was influenced also by the Asian currency crisis to which Pacific Link's parent company was exposed, and by the fact that Pacific Link had been awarded a PCN licence - although it had not started service - and CSL had not. CSL now becomes the only operator to hold GSM, digital AMPS and a PCN licence.

²² Handset prices have fallen by around HK\$4,500 since 1995, while monthly rentals plus airtime charges have probably come down on average around HK\$200. See J.Ure 'The Economic Benefits of Telecoms Liberalization in Hong Kong', Hong Kong PECC, 1998 at www.trp.hku.hk

²³ Callback is traffic originating in Hong Kong but the direction of the call is reversed and for the purposes of accounting and settlement rates between international carriers is treated as an overseas incoming call. Callback operators cut prices by arbitraging different IDD rates, by buying bulk capacity in the USA at discount, and by shaving profit margins. ISR will replace callback from January 1999.

²⁴ In anticipation of falling IDD revenues HKT has shifted its business focus to other value-added services, such as cellphones, and longer term investment in a broadband network. As a result IDD revenues fell from 63% of the total in 1993 to 48% in 1998.

²⁵ See J.Ure 'Telecommunications' in Cheung Y.L. and M.H.Sze eds. *The Other Hong Kong Report 1995*. Hong Kong: The Chinese University Press (pp.380-401)

²⁶ By diminishing the estimated net present value of future revenues from falling IDD tariffs the assumption of a low price elasticity of demand effectively reduced the value the Hong Kong Government placed upon the early surrender of the HKT licence for purposes of compensation. Compensation was finally agreed at HK\$6.7 billion.

²⁷ Petrazzini B. and J.Ure 'Hong Kong's Communications Infrastructure: The Evolving Role of a Regional Information Hub'. In J. Burn ed. (1997) *Information technology and the Challenge for Hong Kong*. Hong Kong University Press, (pp. 61-90).

²⁸ C.C.Greenfield and E. Lee 'Government information technology policy in Hong Kong' in J.King ed. *Informatization and the Public Sector: Special Issue v.2.2 1992* (pp.125-132)

²⁹ The Education and Manpower Bureau and the Trade and Industry Bureau are also represented on the IAC, which lends weight to its role, although it remains entirely advisory.

³⁰ A helpful way to understand the nature of Hong Kong is to see the neo-classical free-market pump-primed by Keynesian social and infrastructure public expenditure, the whole thing underpinned by a Ricardian socialist state-owned land policy the revenues from which keep taxes low.

³¹ 'Francis Ngai, general business manager of IBM Hong Kong/China, estimated that four out of 10 SMEs might not have a single computer installed in their office, with many others only partly computerized.' *Technology Post*, 24 February 1998, p.1

³² More than 70% of all major American multinationals operating in the Asia-Pacific region have their headquarters in Hong Kong.

³³ See *Hong Kong Internet User Survey 1996*, <http://www.nielsen.com/countries/hongkong/net-a.htm>. A related report was published by www.asiaonline.net.hk/srh/a.htm.

³⁴ Lau Siu-kai, Lee Ming-ku, Wan Po-san, Wong Siu-lun (eds) *Indicators of Social Development: Hong Kong 1990 and Indicators of Social Development: Hong Kong 1993*, Institute of Asia-Pacific Studies: Chinese University of Hong Kong, Research Monographs.

³⁵ John Ure and Chan So Kuen, 1996, 'Home Computers and Networking in Hong Kong', Telecommunications Research Project, www.trp.hku.hk

³⁶ Hong Kong's acute embarrassment over the technical and organizational chaos of the opening of the new airport at Chek Lap Kok on Lantau island in July 1998 is testimony to the problem. That the problems were sorted out is also worth remembering.

³⁷ ISR in Hong Kong is being extended to include real-time voice services, or international simple voice resale, ISVR.

³⁸ Estimated in J. Ure 'Telecommunications' in Cheung Y.L. and M.H.Sze eds. *The Other Hong Kong Report 1995*. Hong Kong: The Chinese University Press (pp.380-401).

³⁹ The following analysis is based upon procedures adopted by the Australian Industry Commission *International Telecommunications Reform in Australia*, March 1997, <http://www.indcom.gov.au/research/other/phone/index.html>

⁴⁰ An accountant's view of cost is different from an economist's view of cost. A settlement rate outpayment is an accounting cost, but economically it is not a cost, rather it is a redistribution of income according to an agreed procedure that could easily not exist.

⁴¹ Traffic outgoing to the USA was 6 per cent of total, whereas China outgoing traffic was 52 per cent of total. Incoming percentages, and therefore traffic balances, are not published.

⁴² Outpayments divided by outbound minutes for 1995 gives a mean settlement rate of HK\$5.09.

⁴³ This is a static assumption. In a dynamic world, especially of telecommunications, the incentive to invest in an increasingly competitive and risky environment raises the question of what risk-premium should be built into the cost of capital. See also the following footnote.

⁴⁴ This raises the important question of what rate of return on capital has been assumed in the FCC's figures. It also raises the question of what should be considered a competitive rate of return in Hong Kong. It is standard practice for the Hong Kong government to use 15 per cent (nominal) as the benchmark for utilities. A private estimate of the return to equity (the real rate of return on capital + quoted-share capital appreciation) suggest rates of return closer to 11 per cent. (Correspondence with John Whitman, School of Business, University of Hong Kong.)

⁴⁵ See Economic Services Bureau 'Provisional Legislative Council Supplementary Briefing on the Surrender of the HKT Licence' Annex A p.3. Also see J. Ure 'Telecommunications' in Cheung Y.L. and M.H.Sze eds. *The Other Hong Kong Report 1995*. Hong Kong: The Chinese University Press (pp.380-401).

