Telecommunications: The Other Hong Kong Report

With the ending of the Hong Kong Telephone Company's (HKTC) monopoly on the provision of the domestic public switched telephone network (PSTN) and basic voice services, 1995 marks a turning point in the history of Hong Kong's telecommunications. From 1st July four new Fixed Telecommunications Network Services (FTNS) licences came into effect, issued to HKTC, Wharf Holding's New T&T (Hong Kong) Ltd, Hutchison Communications Ltd and New World Telephone Ltd.

However the formal passing of monopoly is less real than apparent, in two senses. First, since the mid-1980s the monopoly had already been whittled away by the licensing of competing cellular mobile telephone services which constitute a partial substitute for what the industry likes to term 'the plain old telephone service' or POTS. **In Hong Kong mobile telephone calls sent to other wireless mobile handsets rather than to fixed wireline telephones remain below 10 per cent of the total, but in countries like Malaysia, where fixed wireline telephones are still scarce, the percentage is around forty.** Second, HKTC remains such a dominant service operator across the territory of Hong Kong that the new fixed wireline competitors will find it an uphill task to make a successful market entry. A widespread measure of telephone penetration is teledensity, that is the number of exchange lines in service per 100 population, which for the year ending March 1995 in Hong Kong stands at 51, the highest in Asia after Japan. This figure aggregates business and residential lines. A more helpful indicator of residential market demand is the number of exchange lines per household. According to the 1991 Census there were an estimated 1.58 million households in Hong Kong, and according to the 1995 *Annual Report* of Hongkong Telecom they were served by 1.9 million telephone lines - 1.6 million in 1991 - as well as 24,000 fax lines, so even taking into account that a growing number of households have more than one telephone line, it remains clear that few households are without access to a telephone.

Other markets, such as customer premises equipment (CPE) and paging, are openly competitive, and in addition up to six personal communication network (PCN) licences and four cordless access services (CAS) licences are due to be awarded by the Telecommunications Authority (TA) in 1995. The TA is defined in the Telecommunications Ordinance, and is also the Director-General of the Office of the Telecommunications Authority (OFTA), a body established in 1993 when the TA was transferred from the Postmaster General. The Economic Services Branch (ESB) remains responsible for government policy towards telecommunications.

Telecommunications services are governed under two ordinances: the Telephone Ordinance (Cap.269) under which HKTC exercised its exclusive concession, and the Telecommunication Ordinance (Cap.106) which regulated so-called non-basic and competitive services. The Telephone Ordinance was due to be repealed during 1995 and consolidating legislation, to be known as the Telecommunications Ordinance, was to have been put to Legco, but for reasons that may or may not[1] have to do with a crowded legislative agenda this has been delayed.

Among other provisions, the new legislation would introduce the concept of 'class licensing' permitting the TA to issue generic licenses, licenses which allow operators, who would not be required to hold individual licences, to provide any kind of telecommunications service they wish, for example paging, fixed-wire and mobile voice, facsimile and data, etc., that are within the prescribed categories of the licence. A class licensing regime would be a step forward, but it raises the obvious question: why have a licensing system at all? Clearly, the need for regulation will remain in some areas. For example, radio spectrum is a scarce resource and there is a strong public interest to see that it is used wisely. There are technical and safety standards that require regulation, and in a densely populated territory as Hong Kong way-leave rights, such as permission to dig up roads for cable laying, to enter buildings to provide customer access and to locate sites on buildings and hill-tops for base-stations and transmitters, have to be balanced against public inconvenience and environmental considerations. These are issues which will always require some regulation, but the eventual presumption must be that operating a range of telecommunications services is no different in principle from operating any other service industry.

OFTA has already flagged this future by announcing that from 1998 the distinction between fixed-wireline licences (FTNS) and public mobile radio telephone service licences (PMRS) will be reviewed with the ultimate intention of abolishing the distinction. What is intriguing about 1995 is that the next generation of mobile technologies, the personal communications systems, is being planned. OFTA has accepted a market forecast of 1.11 million telepoint (CT2) and cellular users by 1998[2] on which to base its initial assessment that the market can support at least six PCN operators and four CAS operators[3]. Less optimistic

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[1] The Economic Services Branch, under the leadership of Mrs Anson Chan - now Chief Secretary - promoted the cause of telecommunications reform with determination. More recently, however, telecommunications legislation seems to have slipped down the ESB's agenda.

[2] A consultancy study commissioned by OFTA forecast the market to double in real terms over 10 years, from $7 billion to $14 billion by 2003 in 1993 prices. The benefits of competition were estimated at $1.7 billion over the period. See OFTA. 1994. *Report on the Future Regulation of Mobile Telecommunications Services in Hong Kong. A paper for the Industry Workshop to be held on 1 July 1994*. Hong Kong: June.

[3] Personal Communications Network is a British term for the European personal communications standard for Digital Celullar System, or DCS-1800, which offers cellular telephone services

forecasts suggest maybe only four PCN operators can **survive**[4]**,** and there are severe doubts about the limited mobility functionality of some of the technology options coming under the term CAS. But dual-mode handsets could be the answer, making available different levels of service flexibility. The point illustrates both the market and technological uncertainties surrounding the future shape of the telecommunications industry, but if a combination of technology and competition drives down prices the market is sure to expand.

From Monopoly to Competition

On the face of it competition seems naturally advantageous to consumers, offering a choice of suppliers, but for years the opposite view held sway within the industry. Telecommunications was held up as an example of a natural monopoly. A necessary condition for natural monopoly to exist within an industry is for the average cost to fall over the entire range of output; this is known as the economy of scale. From a natural monopoly it follows that the most cost efficient service can be provided by just one service operator. Of course, it does not follow that the service operator will actually run their business efficiently. Indeed, if they are protected against competition by government there need to be other pressures at work before they can be assumed to act efficiently. In the case of the HKTC, CSL and Hong Kong Telecom International (HKTI), all subsidiaries of Hongkong Telecom, the other pressures came from the principal shareholder, Cable and Wireless plc., which derives over two-thirds of worldwide earnings and profits from Hong Kong, and by competition from Singapore to be the premier telecommunications hub of the region.

Where more than one output is produced, and in the case of telecommunications many services are offered, ranging from 'basic' voice telephony to 'value-added network services' (VANS) such as mobile telephones, fax and data transmissions and video-conferencing, then a natural monopoly only arises when a set or 'vector' of outputs can be produced both singly and together more cheaply by one

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typically operating at 1.8 - 2 GHz. Standards from North America - Personal Communications Services, or PCS - and Japan - Personal Digial Cellular, or PDC - also exist operating on slightly different fequencies. Existing analogue and digital cellular services operate at either 800 MHz or 900 MHz which constrains their capacity. Cordless Access Service is a generic term for systems offering within buildings cordless telephony from private fixed-line base stations without additional tariffing, combined with localised outdoors mobility using public base-stations and charged at mobile telephony tariffs.

[4] The original estimate of a market of 1.1 million was composed 560,000 CT2 and 550,000 cellular, however by May 1995 the CT2 market had already shrunk to 156,000 from a December 1994 high of 179,000, reinforcing doubts about the speed of growth if not the market potential for PCN and future generations of personal communications services in Hong Kong. For a useful summary, see 'Telecommunications in Hong Kong' special issue *Business & Technology Information Quarterly* volume 1, Number 3, September 1995 published by the Hong Kong Industrial Technology Centre Corporation.

supplier than by several. This is known as the economy of scope. There has been considerable argument as to whether economies of scale and of scope ever have, or still do, apply to a telecommunications network. Over recent years the favoured view has been that modern digital technologies, which bring telecommunications into the computer age, have broken down any surviving barriers to competition in terms of the costs of entry into the market, and the costs of exit from the market. For example, a modern telephone network can be set up very quickly using wireless telephone technologies, although to offer high-speed (that is, high capacity) data transmissions, such as video-conferencing and data-imaging, or very high-volume voice traffic, wireless technology cannot compete with wirelines and optical fibre cables. It follows that some services, such a paging and cellular mobile telephones, offer easy entry opportunities which render a monopoly unnatural, while other areas, for example long-distance and international voice traffic over optical fibre cables, may still exhibit elements of natural monopoly.

In Hong Kong's case there are no long-distances, only local and international, although after 1997 the logic for calling traffic to Guangdong province and the rest of China 'international' rather than long-distance will look thin. The distinction is unlikely to survive 2006 when HKTI's exclusive licence to provide the international network and international basic voice services expires. Even where a strong case can be made to show that a single supplier could be more efficient, competition, or the threat of it, provides a motive to be efficient. Theoretically, efficiency, meaning minimizing cost for a given level of service, and productivity, meaning maximizing the level of service for a given level of input, are two sides of the same coin, but this is a static use of the terms. In a dynamic sense, productivity implies the mobilization of resources to offer higher levels of service -improved quality of service, or a wider range of service - at minimum additional cost, and this is usually seen to be the major benefit to consumers of introducing competition.

Competition, of course, tends to reduce prices and drive them down towards the real cost of providing the service, but there are limits to that process. Competition can take a variety of forms, and if it is not in the mutual interests of producers to embark upon cut-throat price competition, then competition takes on other forms, such as service innovation, special discounts or tariffing packages in which several services are bundled together, an increased number of sales outlets and improved customer service, and so on. In sum, if competition makes companies more responsive to customer needs, and more productive in a dynamic sense, then the benefits outweigh the costs of losing some advantages that come from having just one supplier.This is certainly the view of the Hong Kong Government.

How Competition Will Work

To enable the three FTNS new entrants to compete for HKTC's existing customers OFTA has 'nationalized' the numbering plan and in addition to geographical portability numbers will also be portable between operators to allow customers who wish to switch operators to take their existing numbers with them. This removes a major barrier to entry. The new numbering plan allocates as local access codes 210 to HKTC, 211 to New T&T, 212 to Hutchison and 213 to New World Telephone. For IDD calling 001 and 002 remain as voice and fax prefixes, and local FTNS access dial codes for IDD will be 006, 007, 008 and 009 respectively for the four operators.

But none of the three new FTNS operators will build a territory-wide telecommunications network. It would be too expensive to duplicate HKTC's network, so why do they build any network of their own? Why not use HKTC's network? Such an action would be resale, and clearly HKTC has no reason to offer its competitors the use of its network at less than commercial rates for resale. Resale does take place, for example facsimile services are available in shops and other outlets around the territory, but these services are not in competition with HKTC. Rather, they are convenience services for people away from their fax machines, and for people who do not have a fax machine of their own. There is no message rate in Hong Kong, that is to say besides the flat rate monthly rental, all local calls are free, including fax.[5] For this reason, the appeal of domestic resale of telephone line capacity is limited to the demand for the services on offer, and does not extend to the line itself as would be the case in a country chronically underserved by telecommunications.

The new FTNS operators need to win customers away from HKTC, and there are two ways open to them. They can either build out their own direct customer access network, or they can rely upon customers accessing their networks through HKTC. The former approach duplicates the network for existing customer premises but offers a surer foundation for long-term competition. The latter approach is more selective - more 'stand-alone' - but offers a fast-track to market entry. The former approach needs to **appeal to a wide** range of HKTC customers, but because HKTC does not operate local call charges - except for payphone calls - and commands such a dominant position in the market, the new operators will have difficulty enticing customers away from HKTC with packages that do include local call charges. Furthermore, the customers most likely to be attracted by such packages will be, by definition, low volume users, so the new operators have to look elsewhere for their revenues, and the principle source is international direct dialing or IDD.

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[5] Rental of a faxline, or a Homefax duplex line which distinguishes incoming telephone and fax calls, costs more, but there is nothing to stop a customer using a fax machine on an ordinary telephone line.

Under the new regulations, fixed wireline networks and wireless cellular mobile telephone networks which connect directly with HKTI's international gateway will share international call revenues **with HKTI.**[6] They therefore have an incentive to build out networks which make this direct connection, by-passing HKTC's network. Network development is therefore strategically important to the new FTNS operators, but only in areas of the territory, and only targetting markets, where the returns make it financially worthwhile. For example, the residential market, for which IDD calls are a relatively small proportion of total telephone calling, can be accessed indirectly through interconnection with HKTC's network, and there may not be much of an incentive to build out customer direct access networks. This is especially true for areas such as remote parts of the territory and lower-income housing estates.

Interconnection

Interconnection is one of the key issues in making competition work. The value of a network lies in the external economies it offers customers to make calls and receive them, and each additional subscriber therefore adds to the value of all subscribers. This is quite unlike a gas or electricity network, for example, where each individual subscriber's demand may help create internal economies of scale - average costs of gas or electricity fall as production increases - but adds no external benefit to other subscribers.

OFTA has recognized two types of interconnection: direct and indirect. Direct interconnection arises when one carrier terminates a call over another carrier's network, a situation which arises when a customer of one fixed wireline or wireless mobile network calls a customer of another network. In this case OFTA has determined that the originating network pays the terminating network an interconnection fee. An example of indirect interconnection arises when a customer of one network elects to send an IDD call through another network to the HTKI gateway. For example, if a customer of HKTC is attracted by a lower IDD charge offered by, say, New World Telephone, then New World Telephone would pay HKTC a fee for the delivery of the call to its network. In turn HKTI would pay New World Telephone a fee for the delivery of the call to its gateway and international network. The difference between the fee paid to New World Telephone by HKTI (minus any fee New World Telephone had to pay to another carrier for the origination of the call, HKTC in our example) and HKTI's normal IDD charge provides New World Telephone with a margin by which it can

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[6] Arrangements in force in 1995 give operators 8.19 per cent of outgoing IDD collection charges and $2.12 per incoming minute, sufficient to undercut HKTI's IDD call charge by less than 10 per cent. But by making use of callback (see footnote 13 below) they are able to offer larger discounts. Callback gives them more incoming traffic revenue at the Hong Kong end, in addition to the direct callback discounts.

undercut HKTI's IDD charges if it decides to do so. We have assumed it does decide to do so, otherwise there is no price incentive in this example for subscribers to choose New World Telephone in preference to HKTC.[7]

Interconnection is always a controversial issue. First, there is asymmetric information about the technology in the network because only the incumbent operator knows the full story. New entrants are suspicious that they will be interconnected to the least reliable lines and to faulty equipment, while the incumbent resents having to invest time and money in reconfiguring and re-engineering the network to provide effective connections and sufficient additional capacity. Second, there is always a dispute over what the interconnect fees should be. New entrants always favour cost-based fees, while the incumbent naturally prefers fees which reflect the proposition that circuits and switching capacity could have been used to generate other revenues (revenue foregone) had they not been required to provide interconnection, the so-called Efficient Component Pricing principle.[8]

OFTA has determined against this by deciding that, in the case above where network B receives an IDD call from network A and delivers it to the HKTI gateway, the delivery fee network B receives from HKTI will not be shared with network A. The basis of this decision is first, the value share of the IDD call going to network B is its source of profit, while for the foreseeable future, network A most likely will be HKTC, and HKTC already

> is the beneficiary of a very generous scheme which fully funds HKTC's access deficit. The existing ADC regime is designed to compensate HKTC for its costs of meeting its universal service obligations (USOs). However, by fully funding all of HKTC's access deficit, it is more 'compensatory' than equivalent arrangements in other countries." (OFTA *Interconnection and Related Competition Issues, Statement No 7* - 10 June 1995, p.11, para 25.);

Second, any revenue foregone, OFTA claims, is more than compensated for by the externalities of indirect calling, that is to say, network B by lowering IDD tariffs helps generate more demand for IDD, and, in addition, each new call tends to

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[7] For the full details and principles underlying these interconnection arrangements, see OFTA *Interconnection and Related Competition Issues, Statement No 7 - 10 June 1995.*

[8] Also known as the 'Baumol-Willig' pricing model. The New Zealand High Court in 1993 upheld the Efficient Component Pricing principle for interconnection between Telecom New Zealand and the Clear Communications Ltd. This was overthrown on appeal, but upheld by the Law Lords on the Privy Council in Britain acting as the Court of Final Appeal. For an account of the arguments, see Carl Blanchard 'Telecommunications regulation in New Zealand: Light-handed regulation and the Privy Council's judgement.' in Telecommunications Policy, August 1995, 19(6), 465-475.

generate further traffic, such as incoming overseas calls which benefit HKTI and HKTC directly.

> To the extent that the operator accessed indirectly lowers the prices and provides better service, it will expand the market and increase the total number of calls. Indeed, if there are network externalities such that each call generates other calls, the increase in traffic would exceed that carried indirectly and would mean more traffic for the operator providing indirect access. (OFTA *Interconnection and Related Competition Issues, Statement No 7* - 10 June 1995, p.12, para 26.)

The Universal Service Obligation and the Access Deficit Charge

These points need some examination. The first concerns HKTC's universal service obligation (USO), the obligation to provide service upon demand to anyone anywhere in the territory at uniform installation and connection charges, despite the fact that it costs more to provide service to remote areas than to urban centres, and the uniform tariff does not always cover the costs of installation and connection. The current arrangement is for the new FTNS licensees, and the PMRS and new PCN licensees, to contribute a share of their IDD revenues in the form of an access deficit charge (ADC), that is a charge to cover the revenue shortfall against the cost of providing local access. The weighted average delivery fee - based upon 1991-92 data - that HKTI pays HKTC for originating or terminating IDD calls is $1.50 per minute,[9] and when another FTNS operator, or PMRS or PCN operator, delivers or receives a call from HKTI they will receive this $1.50 minus an ADC of $0.45 which is paid to HKTC.

The deficit part of the ADC is currently calculated by allocating a portion of HKTC's total revenues and total costs (including the cost of capital) to the provision of the basic PSTN (access) service. The charge part of the ADC is arrived at by expressing the profits from international services as a percentage (X%) of the total profits of the four non-basic PSTN categories of business - value-added services, international services, other PSTN services and non-telecom services - and multiplying the deficit by the resulting X%. (Note: categories such as cellular and paging, CT2 and other competitive services, are not included on the grounds that these services are not offered by HKTC.) This produces a percentage of the access deficit to be funded from international revenues proportional to the profitability of international traffic. Finally, this access deficit

[9] This figure was derived by the government from the existing cross-subsidy and not from a thorough examination of real cost. A review is scheduled, although the methodology has still to be resolved.

attributable to international services is divided by total of international call minutes to establish a per minute ADC.[10]

Behind OFTA's point (quoted above) are the questions: should the ADC cover the full cost of the USO, and is the current method of determining the ADC acceptable? Should the USO be redefined, and is the current method of costing the USO acceptable? The existing arrangements expire 1st August 1996, and the new FTNS operators have argued that in a revised scheme they too should receive an ADC for areas of Hong Kong where they provide 'universal service', but if 'universal' no longer means the whole territory, how are geographical areas to be defined which maintains a sense of equity and proportionality? In a small territorial area such as Hong Kong this seems to be pushing the argument too far. (But see below for a possible variant.)

The issue of the ADC is bound to be controversial. It is a compromise between the logic of untamed competition and of a regulated monopoly. It could be argued that by imposing an ADC on new entrants this places obstacles in their path at a time when policy should be granting them certain exemptions to promote effective competition. These exemptions can be lifted later as their market share rises. It can further be argued that by cutting tariffs and offering new services these companies stimulate the market to the benefit of all, including indirectly HKTC, and they should not be penalized - to the direct benefit of HKTC - for their efforts. Against these views, it can be argued that the ADC is a fair means of spreading a social cost from which the economy and the society derive benefits. One way to approach this vexed issue is to question what incentives exist for the new entrants to build out their networks as quickly and as extensively as possible. For example, if the ADC were inversely related to the scale of each FTNS operator's network then the operators which came closest to matching HKTC would pay the lowest ADC and retain the highest proportion of the IDD revenue-share.

A further argument against the current method of determining the ADC is that it falls primarily upon profits from international services. This is really an historical accident in the sense that the determination by government in 1980 which allocated a 60:40 revenue-sharing between Cable & Wireless Hong Kong (now HKTI) and HKTC for long-haul routes over 100 miles and a 40:60 revenue sharing on short-haul routes less than 100 miles (Macau, Shenzhen and Guangdong province) was worked out before the 1980's great surge in

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[10] See OFTA *Access Deficit Contribution and Delivery Fees: Context and Methodology*, Information Paper, October 1994. Conceptually two issues are involved. One is the revenue-sharing by means of delivery fees between operators, including HKTC, and the international gateway operator HKTI,and the other is the ADC to finance the universal service obligation (USO). The ADC could be funded in many different ways.

international traffic and revenues.[11] The surge produced a windfall for Hong Kong which has been jealously guarded by the government ever since and has been used to keep domestic tariffs low, a politically and socially popular outcome, and enormously beneficial to Hong Kong's economy. [12] Now the world is changing again, and despite HKTI's continuing exclusive licence until 2006, the international market is opening to competition from Hong Kong and overseas operators on value-added services, and from callback[13] and calling card operators on voice traffic.

In 1995 OFTA also determined that self-provisioning would be available to companies who wished to lease transponders from private satellite companies, or from Intelsat - previously only available from state-run or state-approved companies, such as Cable & Wireless/HKTI. In theory, self-provisioning does not permit direct connection to the PSTN either in Hong Kong or overseas, but overseas jurisdictions cannot be regulated or policed from Hong Kong. All this makes for a much more competitive international services market, and the new FTNS operators will use their revenue-sharing with HKTI to drive IDD charges down further. Under these circumstances it becomes necessary to question the mechanism for the funding of the ADC. Put another way, as the new FTNS operators make in-roads into the other categories of service - value added, other PSTN services and non-telecom services - then the transfer payments to the basic PSTN service can be more widely sourced.

For example, the current domestic contribution of the PMRS mobile cellular telephone operators to HKTC is confined to a 9 cents a minute interconnection charge every time a call is delivered to or from a mobile telephone and the PSTN. This charge, which in theory is payable by all holders of public non-exclusive

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[11] For an account of the background to this determination, and its impact on HKTC's revenues and the issue of cross-subsidy, see M.Mueller (1991) *International Telecommunications in Hong Kong: The Case for Liberalization*, The Chinese University Press for the Hong Kong Centre for Economic Research, chapter 5; and J.Ure (1992) *The Political Economy of Telecommunications in Hong Kong: Information Technologies and the Management of Change*, Ph.D Thesis, Polytechnic of East London and Centre of Asian Studies, The University of Hong Kong, chapter 5.

[12] An issue not considered by Mueller (see preceding footnote) but one certainly relevant to developing economies.

[13] Callback happens when a subscriber from Hong Kong dials the number of an overseas telephone switch, usually in North America, which recognizes the caller's number and returns the call, saving the subscriber the outgoing IDD cost. The call can then be re-routed (refiled) to a third country destination. Outgoing calls are thereby transformed into incoming calls, which generates a larger revenue share from HKTI for FTNS and PMRS operators. Callback companies make their profits through (i) arbitrage, that is taking advantage of lower IDD rates from different originating and terminating locations; (ii) lower profit margins; and (iii) bulk discounts on leased circuits provided by overseas carriers. They are vulnerable to shifts in IDD rates and dependent upon bulk discounts, but will survive across Asia so long as IDD rates remain high.

telecommunications service licences or PNETS,[14] is due for review in terms of who should not have to pay it, and who should pay and how much should they pay. Since the profits from cellular services are a major revenue source, not least for HKT's CSL, should these services also contribute to the ADC? In other words, which groups of telecommunications users should contribute to the USO? Or should the public as-a-whole pay through taxation?

Should anyone pay? Should there be a USO? There are compelling reasons to answer, yes. The social benefits of having everyone within easy reach of a telephone are clear, especially for the elderly, who often live alone, and for the disabled, and also for people to alert public authorities to emergency situations, such as spreading fires or to acts of criminality or violence. The economic benefits are significant as well. The transactions costs of communications are greatly reduced, while a culture of communication is encouraged which stimulates an efficient information market. Telecommunications act as an effective substitute for time and energy consumed by journeys - which benefits the travelling public by reducing road congestion, making journey times shorter, and possibly reducing road maintenance costs - while simultaneously opening access to customers and clients for many professional and commercial activities. These are external economies, benefits shared by all existing network subscribers brought about by networking the marginal subscribers.[15] Unless it can be adequately demonstrated that market mechanisms alone are sufficient to cater for even the most marginal of needs in Hong Kong the presumption of a USO should remain in tact, although the scale and scope of it will remain open to question.

But it is worth asking the question should all deficits on the basic PSTN be covered by the ADC? Another way of asking this question is should the USO be redefined? What should it include and what should it exclude? For example, should it be extended to include the universal provision of computers with modems so that the entire community can network? No-one in Hong Kong would seriously suggest so, but in a generation or two most residents will have intelligent multi-media terminals in their homes, and will be capable of networking through

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[14] At the margins it takes a fine distinction to determine what constitutes a telecommunications service, which requires a $750 PNETS licence, and what constitutes an information service, which does not. There was a storm of protest in March 1995 when the Commercial Crime Bureau of the Hong Kong police raided the offices of the seven Internet service providers who did not have PNETS licences, leaving untouched the one that did, Hong Kong Supernet. After some hesitation on the part of OFTA, Internet service providers were required to have PNETS licences, but HKTC seems not to be enforcing payment, and the whole issue is to be reviewed. By April 1995 seventeen PNETS licences had been issued to Internet service providers.

[15] In cost-benefit analysis the next question would be: is the marginal cost more or less than the marginal benefit? However to quantify such nice questions degenerates into an arbitrary task since there are no objective criteria for judging, for example, how much benefit a warning against an act of terrorism is worth. It's like asking what is it worth to maintain an army or a police force?

the Internet, or its equivalent of the twenty-first century, and will use this medium for accessing information and for social networking, such as sending e-mail and speaking to relatives overseas on a video-telephone. The cost of providing this kind of access will be a fraction of what it is today, and the idea of including it under a USO will not sound so odd. Already, in the United States a debate has arisen over how far poorer communities should be guaranteed access to the information superhighway or National Information Infrastructure (NIII) by local exchange carriers.

But the debate has another direction also. As per capita incomes rise and as the cost of technology falls, and cheaper wireless technologies become available, should the USO not shrink to the point of disappearance? Why treat telecommunications significantly different from, say, television or a washing machine? Historically, telecommunications came to be regarded as a utility and treated like gas, water and electricity, being made available as widely as possible. But as telecommunications becomes more of a supermarket commodity, with the market ranging from luxury business items, such as video-conferencing, to basic public items, such as the public callbox, why should the presumption be that everyone needs guaranteed personal private access?

So in terms of the ADC, should all deficits on the basic PSTN be covered? The ADC represents a transfer payment from users of other services, particularly international services, and significantly it covers both access, which includes installation, removals and connection charges, and usage, which includes a flat-rate rental covering, among other things, maintenance costs. Currently the level of transfer is decided by the price-cap formula which permits HKTC to raise overall annual prices by the consumer price index CPI-X, where X = 4 per cent, but two sub-caps set X= 4 per cent for installations, and X =3 per cent for residential rentals. The sub-caps, which were opposed by the Economic Services Branch, was a political intervention by Legco. Should usage charges, as represented by rentals, remained subsidized, or should the subsidy be confined to access (installation) charges? By gradually rebalancing (raising) residential rentals against falling IDD charges the ADC could be confined to access alone.

A further objection that can be raised against the current arrangements, and one that echoes a point made above, is that the transfer payment as levied by the ADC comes only from the users of international services, yet this is the one area in which the new entrants hope to make substantial early revenues. In the other categories of domestic service HKTC is dominant, and the argument can be easily made that HKTC should receive less from the ADC and transfer more from the profits it makes from these services. This seems to be the underlying message of the observation from OFTA.

We may also note that the method for allocating total costs between the five categories of service sector has to be scrutinized, otherwise new entrants will accuse HKTC of loading additional costs onto the basic service - and demanding a high ADC to subsidize it - while artificially reducing costs of the other competitive services, and engaging in predatory pricing to the detriment of the competitors. This issue is being addressed by OFTA in the form of an Accounting Manual[16] which lays down the ground rules for allocating stand-alone and joint costs. OFTA is also undertaking a series of studies into the ADC, interconnection charges and delivery fees or revenue-sharing mechanisms.

Nagging away at all these issues is the tension between, on the one hand, a fully competitive model, which would drive prices across the board towards costs, eliminating subsides even at the expense of external economies - and social benefits - and, on the other hand, the reality that some areas of the market are more competitive than others, and that free market entry and exit may be necessary conditions for effective competition, but they may not be sufficient conditions. What is clear is that no competitor wants to pay ADC to HKTC, and the less they pay the more they can drive down IDD charges. One suggestion, mentioned above, is that they should all receive ADC for their respective areas of coverage, a seemingly impractical argument. (But see the following paragraph for a possible variant of it.)

Another argument favours tariff rebalancing to reduce and ultimately get rid of the subsidy, or replace it with another mechanism. New entrants would certainly benefit from the introduction of call (usage) charges, allowing them to make money from the local service, while leaving installation (access) charges to be subsidized to a level that is thought to be economically efficient and/or politically acceptable. This approach would give an opportunity to new entrants to attract customers by offering tariff packages such as a low call charge for low volume users, and a flat rate tariff with free calls for higher volume users. HKTC would probably stay with fixed rentals and zero call charges, but the rentals would have to rise. To make this system work an agreement would require that the ADC was limited to installation costs. It could be extended to saying that any FTNS operator would qualify for an ADC share according to the number of new installations they made, subject to verification that these installations were losing money. The picture becomes even more complex when we look ahead a few years to when wireless local loop (WLL) becomes a substitute for the fixed wireline telephone.

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[16] OFTA *Accounting Manual for Fixed Telecommunications Network Service Licensees*, 11 March 1994. The principal cost concept employed for interconnection pricing is long run average incremental cost (LRAIC) which measures the addition total cost, including the cost of capital, of expanding total service provision. Conceptually LRAIC pricing equals marginal cost (MC) pricing in cases where only a single service is offered.

Then installation costs will fall dramatically, and the justification for an ADC will become questionable.

The Price Elasticity of IDD

The second argument of OFTA against the Efficient Component Pricing principle is that the new FTNS networks, by cutting IDD charges will stimulate greater IDD usage, which in turn will stimulate return call traffic. Is this likely? Intuition tells us that consumer demand is more likely to react strongly to price reductions when initial prices are high than when they are low. We know that IDD charges are not as low as they could be because of the cross-subsidy they provide to the basic PSTN, but by international standards they are on the low side, so price elasticity of demand[17] for IDD is more likely to be low than high.

But this conclusion has been challenged by recent research from Sweden[18] which appears to show price elasticity on IDD calls to Germany, UK, Denmark, Norway and Finland rising from low (inelastic) levels in the 1970s, around -0.1 (implying that a 1 per cent decrease in price would lead to a 0.1 per cent increase in usage) to high levels by 1991, ranging from -0.9 to an astonishing -2.2 in the case of Norway. Only traffic to the United States conformed to expectations, where elasticity fell from -1.6 to -0.2. On the face of it, this result is surprising. One view is that what counts is not so much price as price awareness, so factors such as growing competition and aggressive marketing can increase elasticities. Certainly there is evidence from many countries that special IDD discounts for highdays, such as Christmas Day or Mothers' Day, and holidays promote a surge in usage. But the explanation for the result almost certainly includes factors beyond prices alone, such as the increased access to telecommunications in Sweden and the destination countries, especially since the data did not distinguish between residential and business traffic.[19] And since only outgoing calls were measured there may be some substitution of outgoing calls for incoming calls as a result of Swedish prices falling relative to prices in the destination countries.

But what of the Hong Kong evidence? We now have to turn to some basic arithmetic to make sensible 'guestimates.' The figures are all culled from HKT's annual reports, and as the details behind them are commercially sensitive we have to be content with working with ballpark figures, hoping that they are not too far

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[17] An elasticity of -1.0 ($\varepsilon^D = -1.0$) would imply that a one per cent decrease in price stimulates a one per cent increase in demand. $\varepsilon^D < -1.0$ is price inelastic, $\varepsilon^D > -1.0$ is price elastic.

[18] P.Hackl and A.H.Westland 'On price elasticities of international telecommunication demand.' in *Information Economics and Policy*, 7 (1995) 27-26.

[19] The spread of telephone availability and affordability among households usually comes later than among businesses, so residential IDD calling could be a significant growth factor.

out. We can start with the IDD call charges as set out by HKTI's list of tariffs, using as weights the proportion of outgoing calls to various destinations as given in the *Annual Report 1995*, from which we derive the weighted average IDD call charge for 1994-5 as $6.7 per minute.[20] Since we have a published breakdown for only 87 per cent of the individual traffic streams, and we do not have a breakdown of peak: off-peak calling, the best we can claim is to be within range.

Since total outgoing minutes in 1994-5 were 1,578.4 million, revenue from the above estimated weighted average IDD collection rate was around $10,575.4 million. As gross turnover on international services was $16,310.5 million, it follows that other revenues came to $5,735.1 million. Most of these other revenues, perhaps two-thirds, consisted of incoming traffic revenues, or incoming accounting rate settlements, from other telephone administrations, with income from international private leased circuits (IPLCs) and other services making up the rest. From the *Annual Report 1995* (p.27) we know that outgoing traffic (collection rate) revenue and incoming traffic (accounting settlement rate) revenue grew by 9 per cent and 7 per cent respectively. From this we can estimate the 1993-94 collection rate revenue as $9,702.2 million. From the *Annual Report 1994* (p.25) we know that IDD collection revenues and incoming traffic revenues were respectively 13 per cent and 5 per cent higher than 1992-93, so we may estimate collection revenues for the previous year at $8,586 million. We can summarize our estimates as follows:

Financial Year	International Turnover	IDD Collection Revenues	Other Revenues
1994-95	$16,310.5 m	$10,575.4 m	$5,735.1 m
1993-4	$15,164.8 m	$9,702.2 m	$5,479.0 m
1992-3	$13,588.9 m	$8,586.0 m	$5,002.9 m

Note: Apart from international turnover, **all figures are estimated only.**

We shall estimate price elasticity using two different methods. The first will simply evaluate the estimate implied by the *Annual Report 1994*. The second will distinguish between revenue reductions and revenue growth resulting from the IDD rate cuts, separating the demand for IDD access and the demand for IDD usage. To make these estimates we shall first estimate the weighted average IDD rate for 1993.

[20] The weighted average for China and Macau was HK$4.8 and for the rest of the world HK$9.1. These weighted averages were then weighted according to 53 per cent and 47 per cent, that is the proportions of these two outgoing traffic streams.

We know that HKTI was obliged to cut its average IDD rates by 8 per cent from August 1993, and by 2 per cent from August 1994. Our estimate of a weighted average IDD rate for 1994-95 of $6.7 implies an average IDD rate before August 1994 of $6.8 per minute and before August 1993 of $7.4 per minute. These rates apply August - July, and do not correspond to the financial year of the annual reports which runs from April - March. What, then, is our estimated average IDD rate for the financial year 1993-4? Dividing the collection rate revenue of HK$9,702.2 million by total outgoing minutes in 1993-94 of 1,376.9 million, we arrive at an estimate of HK$7 per minute.

The *Annual Report 1994* (p.25) tells us that the 8 per cent IDD reduction generated additional traffic to the tune of HK$120 million, which divided by our estimated average IDD rate of HK$7 per minute translates into 17.1 million minutes of additional traffic, or an increase over 1993 (1,136.6 million minutes) of just 1.5 per cent. This represents a price elasticity of demand of just -0.2. If we assume that the HK$120 million was generated over the financial year, the IDD decrease averages 5.3 per cent, and elasticity rises to -0.3. In other words, a 1 per cent reduction in price produces only a 0.2 (or 0.3) increase in an IDD call of 'average' duration. On this evidence, contrary to OFTA's view, IDD seems price inelastic.

What happens if we try to isolate the effects of increased access to IDD calling from decreased IDD call charges? IDD line connections grew from **1.8 million** in 1993 to **2 million** in 1994 (to 2.1 thousand in 1995). The net effect of a weighted average 5.3 per cent IDD rate decrease is the combined effect of (i) the direct effect which is to reduce revenue, and (ii) the indirect effect which is to raise revenue according to the price the elasticity of demand. We estimate (i) by assuming no traffic increase during 1993-94. That is, we multiply the 1992-93 traffic (1,136.6 million minutes) by the IDD rate cut, which is the difference between the average IDD rate before the 8 per cent cut - estimated at $7.4 - and the weighted average after the cut - estimated for the financial year at $7 - which is $0.4. This results in a revenue loss of $454.6 million. The *Annual Report 1994* (p.25) rounds this up to $500 million.[21]

We estimate (ii) according to increased IDD usage, distinguishing between usage and access. IDD line growth in 1993-94 was 9.3 per cent, and the average duration of outgoing calls increased from 10.24 hours to 11.35 hours,[22] an increase of **66.7**

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[21] An alternative, but equivalent, procedure was to multiply 1992-93 outgoing traffic by the difference between the pre- and post-8 per cent IDD reduction ($7.4 minus $6.8 = $0.6) and weight the result by 2/3rds to conform to the financial year.

[22] IDD lines grew from 1.8 million to 2 million which divided into 1,136.6 million minutes and 1,376.9 million minutes respectively and divided by 60 gives the annual average duration of IDD per line in hours.

minutes per year, or nearly 10 per cent. On this basis, of the increase in outgoing traffic (approximately 240 million minutes) 49 per cent was due to IDD line growth (new IDD lines x duration of calls) and 51 per cent to the increased duration of calls (existing IDD lines x increased calling time). Falling IDD rates affect both access (line growth) and usage (duration), but if we assume that IDD rates affect mainly usage, and we factor out line growth, then outgoing traffic in 1993-94 would have been 122.4 million minutes (as opposed to 240 million minutes) or an increase of 11 per cent, and revenues would have increased 122.4 million minutes x $7 per minute = $856.8 million.

We can summarize the (i) direct revenue loss and (ii) indirect revenue gain for 1993-94 as follows:

Revenue loss due to IDD cut of 5.3 per cent	$454.6 m
Revenue gain due to price elasticity of usage	$856.8 m
Net revenue gain	$402.2 m

Our estimate of IDD collection revenues for 1992-93 was $8,586.0 million, so the net revenue gain represents an increase of 4.7 per cent. Using the weighted average IDD reduction of 5.3 per cent, elasticity rises to -0.9. This is a dramatically different conclusion. Elasticity is close to unity.

Of course, not all increase in usage can be put down **to IDD rate cuts, non-price factors influencing usage include the state of the economy and trade levels and rising telephone penetration rates in overseas destinations, so -0.9 will be an exaggeration, but some of the increase** could be in response to incoming calls generated by usage stimulated by price cuts. As we noted above, there is also an argument that the significance of a price cut lies primarily in how aware of it customers really are, and that the publicity the new FTNS entrants are likely to give to price cutting will stimulate a greater customer response. Against this argument is the view that ‘elasticity of choice’ will result in price elastic demand for some FTNS operators but price inelastic demand for the industry-as-a-whole as the new entrants simply win market share. Finally, we should note that the opportunity to make IDD calls across the Asia region will show strong growth over the coming decade, not least to China, as networks are built out, although it will take time before new subscribers have the income levels, or the business and social motives, to become IDD users.

Conclusion

A competitive era is opening for telecommunications in Hong Kong which may promise, but cannot guarantee, benefits for consumers in terms of lower prices and a wider choice of services and tariffing schemes. Hong Kong is crowded with markets which look more competitive than they really are. Mobile

telecommunications has provided an example of this in recent years. Under these circumstances the regulatory and monitoring role of OFTA is unlikely to diminish, and the transparency of the consultative procedures it has put in place must not be allowed to wither. The scrutiny of consumer organizations, like the Consumer Council, welfare organizations such as the coalition under the Hong Kong Council for Social Service and trade union organizations, and pressure groups like the Hong Kong Telecommunications Users Group, should be encouraged to continue.

Competitive entry will be an uphill struggle for the three new FTNS licence holders, and the issues of the scope of the universal service obligation, the calculation of the access deficit charge, and revenue-sharing arrangements are likely to be strongly contested. The effects of competition are already evident in IDD tariff reductions since 1st July 1995 on contested routes, and in the new personal services on offer.

Hongkong Telecom has reacted to the threat of competition by attempting to take the battle to Wharf/New T&T by pushing ahead with plans to introduce Video-on-Demand (VOD) and by signalling its intention of applying for a cable TV licence when Wharf Cable TV's period of exclusivity expires in 1996. The significance of these moves appears to be two-fold. First, it is text-book management strategy to keep your opponents off-balance, and perhaps underscores a concern by HKT that its ultimate strength lies in its territory-wide penetration, a hegemony that could be seriously eroded by a cable TV/ telephone alternative from Wharf/New T&T. Second, the future lies with multi-media, yet nobody knows the exact forms of technology or the take-up rates that will come. For example, will broadband inter-active multi-media services push open the market for home shopping, home banking, teleworking, or will the Internet be the breakthrough? If the security issues can be solved, how will the use of credit cards and smartcards transform the way people transact their daily business and social lives? The company that is best prepared to keep its options open, which can acquire expertise and develop firm-specific competitive advantages, either through its own endeavours or through carefully chosen alliances, is the most likely to succeed. Adaptability will be the critical success factor for HKT.

For the three new FTNS entrants, adoptability is the key, that is to say how quickly can they adopt the technologies of intelligent networking, of high-speed data network services, and how far will they be able to exploit the synergies between the forthcoming generation of wireless personal communications systems and their fixed wireline networks? Personal communications will work from small end applications, such as cordless access for home and neighbourhood use and miniaturized communications systems built into children's toys and executive's toys, to large end applications, such as satellite mobile systems and global positioning systems. These technologies will break beyond national frontiers and

local regulations. The way of the future is towards a combination of universal and niche telecommunications service companies. 1995 is merely the first step in the transition.

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