

## The Era of International Simple Resale: not waving, but drowning?<sup>1</sup>

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### Part 1: Introduction

International direct dial (IDD) is finished as the cash cow of the industry. The cushion of comfort offered by the growth of cellphone revenues is rapidly losing its air. A telecommunication licence, like a television licence before it, is no longer a licence to print money. Basic carrier services, such as voice or Internet email connections, have become commoditized and increasingly will be offered free-of-charge, or at marginal cost which is effectively the same thing. Thus, the economics of the entire industry has changed inexorably. While all this is, or should be, increasingly well understood within the industry, its major implications remain uncertain, and it is instructive to examine actual instances of the change to see how it works and what comes next. This paper, which illustrates and models the case of Hong Kong, is a contribution to that task.

The argument of the paper, simply stated, is as follows. The first wave, the analogue wave, of telephony was characterized by economies of scale, although to what extent is arguable, few if any economies of scope, and very stable conditions of demand and supply. During the second wave, the digital wave, economies of scale change dramatically in different markets ranging from local wireless to long-haul optical fibre networking, while economies of scope grow even more dramatically, and the conditions of demand and supply become much more variable. The shift from the analogue wave to the digital wave is the first paradigm shift, involving technological and regulatory upheavals paving the way for the entry of entrepreneurial capital into what was previously an industry dominated by state capital or by private monopoly capital. Now the industry is entering a second paradigm shift, which promises to be more radical.

The third wave is the Internet wave. The interconnection of networks and the interoperability of platforms throw economies of scale into doubt. Economies of scope are now mediated by the fragmentation of markets, by the need to differentiate products, by the emergence of new communities of interest, so the conditions of demand and supply become volatile. In the second wave, the digital wave, revenues from basic carriage were no-risk, and revenues from value-added services low-risk. In the third wave, the Internet wave, revenues from basic carriage, including cellphones and Internet access, will fall to the point of disappearance, while new sources of revenues will involve considerable risk (because of copyright piracy, exchange rate and payment risk, etc.) and high uncertainty (because of new entry, of process and product innovation, etc., on the supply side, while the hierarchy of future needs and desires is unknown on the demand side). In the Internet

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wave, the only certainty is uncertainty, and this ‘principle of uncertainty’ is expressed in many ways, for example in haphazard industrial restructuring, in the valuation of company assets, in the price of Internet stock. Because the Internet wave embraces far more than the telecommunication industry; it demands a fundamental rethink of the economics of the period.

The following sections in Part One of the paper give grounds for the comparability of Hong Kong as a case worth studying, and review the shifting economic paradigm of the industry from the analogue wave to the digital wave. Part Two of the paper presents a model of the impact on revenues of international simple resale in Hong Kong. Part Three considers some of the economic, policy and regulatory implications of the ISR model for Hong Kong, and suggests the idea of ‘tradeable knowledge’ as the way to think about the uncertainties associated with the Internet wave.

### Section 1: Hong Kong as a case for study

For the first time since its listing in 1987 Hongkong Telecom (HKT) posted a fall in profits for the financial year ended March 1999, from HK\$17.02 billion (US\$2.2 billion) to HK\$11.5 billion (US\$1.5 billion) in profits attributable to shareholders, while operating profits were down from HK\$13.3 billion to HK\$11.8 billion. The chief causes were a drop in revenue from international traffic by twenty-two per cent, and from mobile cellphone services, down by three per cent. The economic recession was a factor, as indicated by a fall of 1 per cent in business line connections, and by a fall in international traffic volumes, ‘although significant price reductions in the market stimulated an upturn in volumes for the total market during the first three months of 1999.’<sup>2</sup> A second factor was those price reductions, the result of the introduction of international simple voice resale (ISVR) from January 1999. By contrast, Internet and multimedia services earnings were up 146 per cent, but as yet they account for only two per cent of total revenue. The significance of these results extends beyond the purely financial, as they encapsulate the changes overtaking the entire telecommunication industry globally.

Hong Kong is therefore a good case to study because it stands at the forefront of many of these changes. Hong Kong has long been a weather vein for change. Now a Special Administrative Region of China, it is a small open economy of just 6.5 million people, most of whom are crammed into a high-rise area of barely thirty-two square miles.<sup>3</sup> Short

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<sup>2</sup> See *Press Release: Results for the Year Ended 31st March 1999 - Ready for the Internet Age*, Hongkong Telecom, [www.hkt.com/about/press/pressre199/990507.html](http://www.hkt.com/about/press/pressre199/990507.html)

<sup>3</sup> Over the decade Hong Kong has been a subject of the following papers in this journal: John Ure ‘The future of telecommunications in Hong Kong’ *Telecommunications Policy*, v.13.4, December 1989, pp.371-378; Tuen-yu Lau ‘From cable television to direct-broadcast satellite: emerging policy issues in the Asia-Pacific region’ *Telecommunications Policy*, v.16.7, September/October, 1992, pp.577-590; Paul Lee ‘Hong Kong as a communications hub: is deregulation enough?’ *Telecommunications Policy*, v.17.7, September/October, 1993, pp.475-480; Paul Lee ‘China’s role in Hong Kong’s telecommunications deregulation: a political and economic assessment’

distances within the local loop made it cost-effective in the late 1980s to digitalize completely the network ahead of the rest of the world. The challenge of its built-up environment makes Hong Kong a perfect test-bed for new mobile cellular technologies. (If it can be made to work in Hong Kong it can be made to work anywhere.) The Telecommunications Authority (TA) became the only quasi-independent (self-financing) regulator in Asia (excluding Australasia) when it was separated from the Post Office in 1993 by the creation of the Office of the Telecommunications Authority (OFTA), and has been in the forefront of reforms ever since. These include the early legitimization of callback, a technology-neutral licensing regime, an aggressively pro-competitive licensing of wireless networks,<sup>4</sup> the replacement of Hong Kong Telephone Company's domestic PSTN monopoly with four competing fixed telecommunications network services (FTNS) licences, and the world's first fully portable numbering scheme for fixed line as well as mobile cellular services. And, as to be discussed below, the opening of external telecommunications to international simple voice resale (ISVR) from January 1999 and the granting of multiple international gateway facilities (IGF) licences from January 2000.

On the business side, HKT has introduced the world's first commercial video-on-demand through its interactive media services subsidiary IMS Ltd, alongside an interactive television service, iTV. Hong Kong also has a cable television network, Hong Kong (previously Wharf) Cable Television Ltd, currently one-third hybrid fibre-coaxial and two-thirds MMDS. In exchange for the right to offer fast Internet and iTV services over cable modem, HKCTV is now committed to migrate entirely to cable. Although the government does not pursue a pro-active industrial policy, unlike Singapore where Singapore One is a state-initiated island-wide broadband multi-media network, the level of computer penetration and Internet usage seems to be at comparable levels.<sup>5</sup>

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*Telecommunications Policy*, v.18.3, April 1994, pp.254-264; Pun-Lee Lam 'Transition to competition in Hong Kong's local telephone industry' *Telecommunications Policy*, v.20.7, August 1996, pp.517-529; Keith Bernard and Tracy Sum 'Contestability and pricing flexibility: issues in Hong Kong' *Telecommunications Policy*, v.21.1, February 1997, pp.3-13; John Langdale 'International competitiveness in East Asia: broadband telecommunications and interactive multimedia' *Telecommunications Policy*, v.21.3, April 1997, pp.235-249; Pun-Lee Lam 'Erosion of monopoly power by call-back. Lessons from Hong Kong' *Telecommunications Policy*, v.21.8, October 1997, pp.693-695; Peter Lovelock 'China's telecommunications policy and Hong Kong, 1997: bargaining positions' *Telecommunications Policy*, v.20.9, November 1997, pp.685-698; Pun-Lee Lam 'The development of information infrastructure in Hong Kong' *Telecommunications Policy*, v.22.8, September 1998, pp.713-725; Xu Yan and Douglas C.Pitt 'One Country, Two Systems: contrasting approaches to telecommunications deregulation in Hong Kong and China' *Telecommunications Policy*, v.23.3/4, April/May 1999, pp.245-260.

<sup>4</sup> Six companies operate eleven mobile networks; over thirty paging licences have been issued.

<sup>5</sup> Numerous surveys and survey organizations have come up with a range of different estimates on Internet access and usage for Hong Kong and comparable economies. For

Hong Kong is therefore an interesting case because it is comparable, it is a pioneer and it is in the forefront of a paradigm shift in the underlying economics of the industry affecting telecommunications globally. The purpose of this paper is to identify this paradigm shift, to model it with respect to international voice revenues in Hong Kong, and to consider some of the implications for the industry of the uncertainty associated with the third wave – the wave instigated by the Internet - about to engulf the industry.

## Section 2: The first paradigm shift

The periodization of this paper is deliberately simple and straightforward: the industry was swimming in the analogue wave until the 1980s. Then, a bit at a time, it began riding the tide of the digital wave and became more mobile into the bargain; and now it has to learn to surf the Internet wave, at the risk being drowned in it. The economics of the three periods are very different.

Littlechild records telephone engineers in the analogue era debating whether unit costs stabilized or rose with network buildouts and exchange size. Here we encounter the proposition, since referred to by some as Metcalf's Law, that 'the number of possible connections between subscribers increases with the square of the number of subscribers', but Littlechild adds the remark 'the fact that not all subscribers wish to use their telephones at the same time makes possible certain economies.'<sup>6</sup> This was at a time when call set-up costs were still meaningfully measurable, in time as well as money, even if most telephone companies were never required to measure them and lacked any real motive for doing so.<sup>7</sup>

The shift to tone dialing and digital networks marked in obvious ways the end of the first wave of telephony. In particular, the effects of Moore's Law<sup>8</sup> on the cost and processing

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some examples, see 'The Internet & Hong Kong's Future as a Financial Hub' *Telecoms InfoTech Forum: Briefing Paper, June 1999*, p. 2 @ [www.trp.hku.hk/tif](http://www.trp.hku.hk/tif). Research by the Telecommunications Research Project suggests household computer penetration in Hong Kong as of December 1998 at 48.8 per cent, and 26 per cent of households in Hong Kong actually use the Internet. See 'Home Computers and Networking in Hong Kong: TRP Surveys 1998, 1996, 1994' at [www.trp.hku.hk](http://www.trp.hku.hk). A.C.Nielsen ([www.nielsen.com/countries/hongkong/net-a.htm](http://www.nielsen.com/countries/hongkong/net-a.htm)) has come up with similar findings for comparable economies. Indeed, the similarities across economies is an interesting feature of the spread of home computer networking.

<sup>6</sup> S.C.Littlechild, *Elements of telecommunications economics*, Institute of Electrical Engineers, Peter Peregrinus, Stevenage, UK, 1979, p.49.

<sup>7</sup> This point is made strongly in M.Beasley and B.Laidlaw, 1989, *The Future of Telecommunications*, Institute of Economic Affairs, Research Monograph 42, London.

<sup>8</sup> If the cost of a micro-chip is roughly proportional to the square root of its processing capacity, then according to Gordon Moore of Intel costs will fall 50 per cent every 18 months. In his recent critique of Hong Kong's policy towards convergence Milton Mueller, 1997, *Telecom Policy and Digital Convergence*, Hong Kong Economic Policy

capacity of microprocessors has not only reduced financial barriers to entry, and arguably the operating levels needed to achieve economies of scale, but much more compellingly has spawned economies of scope. In particular, joint production is made possible by computerized intelligent telecommunications networks, giving rise to opportunities to market so-called value-added services to different customer segments.

However, the second wave consists not only of Moore's Law (economies of scope) tacked onto Metcalf's Law (economies of scale), but of much more besides. To make the point succinctly, changing economies of scale (which are influenced by regulations governing the right to lease, resell, interconnect and so forth, as well as by advances in technology) and new economies of scope offer completely original opportunities for entrepreneurship in what has been traditionally a conservative, monopolistic utility industry. Entrepreneurship is not quite the same thing as new entry. New entrants can be equally conservative, and oligopolies abound. Entrepreneurship is about innovation, usually associated with small beginnings. Entrepreneurship is also usually associated with high levels of independence on the part of the 'ideas person', who may or may not be part of the management team. The tradition of thought that best represents the 'entrepreneur' in economic literature is, of course, the Austrian school, and it is therefore not surprising that the work of Littlechild in particular has been a point of reference for this paper.

It is interesting to reflect upon how the challenges to the industry posed by the rising tide of the digital age was treated by economists at the time. The arguments were about the future role of monopolies, for example, about their pricing policies and about their right to remain monopolies. Whereas the very nature of the issues were about the dynamics of the industry, mainstream neoclassical economic analysis remained firmly routed in a static, that is to say equilibrium, mode of analysis. The classic contribution came from William Baumol and his colleagues<sup>9</sup> whose 'contestability' model investigated the necessary and sufficient conditions of 'natural monopoly' with joint production and shared costs, subject to selective competitive entry. Baumol's pioneering work arose out of AT&T's concerns with divestiture, which in turn arose from, among other things, the threat of new entry by companies using low-cost microwave technologies.<sup>10</sup>

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Series, City University of Hong Kong Press, stresses this cost-quantity aspect of the digital process as accelerating convergence. An alternative would be to place the stress on the common *language* of the digital process, and on technologies which enable the interfacing of software, as a parallel to the interconnecting of networks. Whereas Mueller then draws conclusions for competition policy regarding the *structure* of the industry (for example, vertical vs. horizontal integration) the alternative would focus competition policy more on the *standards* of the industry (for example, closed vs. open). Both sides are important.

<sup>9</sup> For example, see W. Baumol, J. Panzar and R. Willig, 1982, *Contestable Markets and the Theory of Industry Structure*, Harcourt Brace Jovanovich, New York.

<sup>10</sup> For reference, see W. Sharkey, 1982, *The theory of natural monopoly*, Cambridge University Press.

But in a dynamic context, rather than dwelling upon the conditions of entry that could produce a loss of allocative efficiency over a range of *given* outputs, it makes much more sense to focus on the opportunities economies of scope give rise to in terms of innovative, that is to say *new* services, commercially dubbed ‘value-added’ and technically dubbed ‘intelligent network’ services. We shall return to the importance of value-added services later because it is argued in this paper that this is the element that will be carried forward into the third wave, but the point to be stressed here is the economic argument. As a representative of the Austrian school, Littlechild foreshadowed the argument when he belittled attempts by government (in Britain) to impose a marginal cost pricing rule on nationalized, including telecommunications, industries, by pointing out that the socially efficient allocation of scarce resources in a dynamic context rested principally upon the view taken of the future, and of future opportunities, not on a view of the past,

since cost refers in principle to foregone future opportunities, it depends not on “facts” about the past but on conjectures about the future - specifically, about revenues and money outlays associated with the proposed plan and with other, rejected, plans. Here, again, to each and every view about the future corresponds a different collection of marginal costs’<sup>11</sup>

Conjecture introduces uncertainty, and the greater the uncertainty associated with future outcomes the more difficult it is to come to any determination of revenues, profits and therefore costs in terms of opportunities foregone. And the shift from the analogue era to the digital era to the Internet era is exactly that, a shift from low to high degrees of uncertainty. The uncertainty of placing values on assets is shared by all those associated with the industry, be they stock analysts, investment brokers or industrialists, and the same holds true for governments and regulators when it comes to estimating the commercial viability of policy options. Of course, the best that can be done is to get as good a grasp on the drivers of the industry as possible, and in the early 1980s, as at any other time, foresight was a scarcer commodity than hindsight. The policy-making process was forced to confront the changes without the benefit of too much conjecture about the future.

In his very graphic review of the 1982 Modified Final Judgment which led to the divestiture of AT&T, Peter Huber noted the differential effects of falling costs of switching relative to transmission, and how these, by incentivising the migration of small scale switching operations along the lines of transmission, were transforming the architecture of networks from a traditional telecoms pyramid to a typical IT network of distributed nodes:<sup>12</sup>

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<sup>11</sup> S.C.Littlechild, *Elements of telecommunications economics*, Institute of Electrical Engineers, Peter Peregrinus, Stevenage, UK, 1979, p.227

<sup>12</sup> The economics of this argument is entirely separate from the complementary effects of the rise of the Internet and packet switching which utilizes the existence of many nodal or switching points.

When switching is expensive and transmission is cheap, the efficient network looks like a pyramid. One hundred million telephones converge into twenty-thousand end-office switches, which converge into a thousand tandem switches, and so on up to a handful of regional master switches at the apex. The system has comparatively few switches; it has many lines. By contrast, when switching is cheap and transmission expensive, the efficient network is a ring. The nodes (switches or computers) are connected along a 'geodesic' -- a path of minimum length.<sup>13</sup>

At the time of writing Huber had in mind the economics of IBM (Huber describes as the 'Lord of the ring') for whom transmission capacity was relatively scarce, compared to AT&T (Huber's 'Pharaoh of the pyramid'). He forecast a future convergence of the two models, like 'rings placed on a pyramid', and recent efforts by telecoms carriers to build or acquire packet-switched networks on top of their circuit switched networks using an ATM core would seem to validate his prognosis. Indeed, AT&T's acquisition in 1998 of IBM's global data network would fit it very neatly. At the same time the absolute drop in both switching and transmission costs has reduced barriers to entry, and it is therefore noteworthy in Hong Kong the new entrants are builders of rings, not fully-meshed multi-switched pyramidal networks. And the backbone rings have local loop rings going off them, providing for numerous customer equipment technologies, such as phones, fax machines, PCs, TVs, PDAs, and soon to come third generation mobile cellphones, for access.

Huber's second report was equally challenging. In it he concluded that economies of scale in the then new technology of optical fibre cable reinforced an element of natural monopoly in long distance traffic haulage, while the other new technology of that period, the civilian use cellular mobile telephony was allowing new levels of competitive entry in the local loop.

By 1982, the lawyers and economists had fully grasped the importance of microwave technology in the long-distance market. But they ignored fiber optics. By 1982, the lawyers and economists thought they understood the wire in the local exchange. But they ignored radio. The result was a divestiture decree that was obsolete almost from the day it went into effect.<sup>14</sup>

In other words, the Consent Decree divesting AT&T of its Regional Bell Operating Companies, leaving them as effective monopolies over vast swathes of state territory, and opening AT&T's long distance markets to competitive entry, was in logic, and with

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<sup>13</sup> Peter Huber, *The Geodesic Network: 1987 Report on Competition in the Telephone Industry*, US Department of Justice, Antitrust Division, Washington, D.C., 1987, p. 1.3

<sup>14</sup> Peter Huber, Michael Kellogg and John Thorne, *The Geodesic Network II: 1993 Report on Competition in the Telephone Industry*, The Geodesic Company, Washington, D.C., 1992, p.1.42. Justice Department funding for his study had dried up by the time of the second report.

hindsight, and in terms of priorities, exactly 180 degrees the wrong way about. At the risk of labouring the point, the aggregation of traffic on long distance, and increasingly global, routes gives enormous competitive advantages to carriers with high bandwidth capacity, while the lower level of scale economies required to provide a profitable wireless local loop offer a multitude of business opportunities.<sup>15</sup>

### Section 3: International Simple Resale: modelling the case of Hong Kong

By defining the second wave as digital the emphasis inevitably gets put on the technological and supply-side of the equation. On the other side, there are two key elements: the new demands created by the supply side, such as the demand for mobile telephony, and the demand created for existing (voice) and new (data) services because of expanding and changing markets. No doubt a major spur was what today would be referred to as the beginnings of globalization. Without entering into a debate as to the meaning of that term, it will suffice here to define it as the unfettered movement of capital brought about by the liberalization of the world's major capital markets in the 1980s, but its origins go back to the revival of the postwar economies and to the profits squeeze in the industrial economies of the late 1960s. The case of Hong Kong shows annual traffic growth of 34 per cent from the mid-1960s after a long period of stagnation

As a rapidly developing regional banking and financial centre Hong Kong was well placed to benefit, especially during the 1980s as the Hong Kong Telephone Company (HKTC) converted its entire network to digital switching and transmission, and Hongkong Telecom International (HKTi) added data circuits to its capacity. But in Hong Kong's case China's Open Door policy from 1978 also helped drive the growth rates of international traffic. The crisis-ridden years of the mid-1970s associated with oil price hikes lowered annual traffic growth for the decade to 25 per cent, but the rate rebounded to 30 per cent from 1978 to 1989 despite the recession and world debt-crisis of the early 1980s. And as the region's premier hub for freight cargo and passenger transport by air and by sea, as an important international media centre, as the location of choice as a regional headquarters of multinational companies doing business in Asian markets,<sup>16</sup> and as an entrepot to China, Hong Kong has maintained an annual growth rate of 20 per cent during the 1990s, over half of that traffic on China routes. By contrast, the next heaviest traffic stream, to the USA, accounted for just seven per cent of outgoing in 1993 before callback reduced it even further.

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<sup>15</sup> In this respect, ISR can be viewed as an alternative to divestiture, although in an era of intelligent value-added network services, effective service competition relies upon a degree of control over, or access to, intelligent network functions which can only be guaranteed with a level of facilities competition.

<sup>16</sup> According to the Industry Department *1994 Survey of Regional Representation by Overseas Companies in Hong Kong*, more than 7,000 overseas companies and 700 regional headquarters were located in Hong Kong, and over 2,000 regional operations run from Hong Kong. HKT's *Annual Report 1997* claims over 500 multinational customers.

In 1984 Cable & Wireless, then running the external services through Cable & Wireless Hong Kong (CWHK), took over HKTC.<sup>17</sup> CWHK was renamed HKTI, and along with HKTC in 1987 became a subsidiary of the new holding company, Hongkong Telecom (HKT). However the revenue sharing agreement between CWHK (now HKTI) and HKTC was, at government insistence, maintained, with the result that HKTC's local network has shared in the windfall revenues from international traffic. A report commissioned by the Hong Kong government in 1988<sup>18</sup> estimated this amounted to a cross-subsidy of HK\$518.5 million (US\$66 million) or the equivalent of HK\$21 (US\$2.7) per month per exchange line then in service. This in turn implied at 44 per cent increase in local tariffs to rebalance. A more recent 1996 estimate by the Office of the Telecommunications Authority (OFTA) put the monthly subsidy of residential lines at HK\$38 (US\$5) and business lines at HK\$10 (US\$1.3). Rebalancing residential would imply increases of 55 per cent.<sup>19</sup> And rebalancing is, of course, implied by the liberalization of the international market, first with the gnawing effects of callback, then with the full frontal attack of ISR, and finally, from 2000 onwards with full blown gateway facilities competition. But as we shall note below, the longer term outcome may not be a drastic increase in exchange line tariffs, but its opposite, a dramatic collapse.<sup>20</sup>

Before introducing a formal model of the effects of ISR, which became legal in Hong Kong from 1 January 1999, reference should be given to its context. When Hong Kong took part in the WTO talks there was some embarrassment that Singapore could leapfrog Hong Kong's offer to liberalize international by 2006, the expiry date of HKTI's exclusive facilities and basic services licence, by bringing forward their own liberalization to 2001. However the ground work had already been done as early as 1995 by the Telecommunications Authority (TA) in the person of the Director-General of the Office of the Telecommunications Authority (OFTA) who encouraged market forces to circumvent HKTI's exclusive licence for external telecommunications by making a determination that callback was legal, and by interpreting the scope of the licence in the

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<sup>17</sup> After HKTC won the right to raise its revenue share from 15 per cent of long-haul traffic of 100 miles and over, and 50 per cent of short haul traffic to southern China and Macau, to 40 percent and 60 per cent respectively. For Cable & Wireless the takeover kept all these transactions in-house, albeit a large proportion in Hong Kong. A useful account is to be found in Milton Mueller, 1992, *International Telecommunications in Hong Kong: the Case for Liberalization* (2nd edition) Chinese University Press, Hong Kong.

<sup>18</sup> Booz, Allen & Hamilton, 1988, *Telecommunications Development in Hong Kong*. Confidential. London. The figures are recalculated and summarized in J.Ure, 1992, *The Political Economy of Telecommunications in Hong Kong*, Ph.D Thesis, Polytechnic of East London and Centre of Asian Studies, University of Hong Kong, p.173.

<sup>19</sup> *Review of the Pricing of Local Telephone Services*, Legislative Council Economic Services Panel, Economic Services Branch, Government of Hong Kong, 27 March 1996.

<sup>20</sup> Contrary to the assumptions, for example, of Mark Scanlon, 'Why is the international accounting rate system in terminal decline, and what might be the consequences?' *Telecommunications Policy*, v.20.10, December 1996, pp.739-753.

narrowest terms possible.<sup>21</sup> C&W had a clear choice, either maximize shareholder value by cashing in the exclusivity and reallocating the resources to alternative lines of business, or risk an acceleration of competitive pressure from the arbitrage activities of callback operators, from refilers, and from the advent of voice over IP. According to industry sources, by 1995 already 15 per cent of traffic was estimated to be callback, and around 30 per cent by 1996.

What followed was the Framework Agreement between the government and Hongkong Telecom who surrendered the licence on 31 March 1998 in return for HK\$6.7 billion (US\$859 million) compensation, and the right to rebalance tariffs. The Framework Agreement thereby paved the way for Hong Kong to commit itself to international services and facilities competition, with ISR leading the way in January 1999.

## Part 2: the ISR Model<sup>22</sup>

ISR really marks the beginning of the end of the second, or what we have been calling the digital wave, with the disappearance of traditional voice IDD as the cash cow of the industry. The following section offers a model of the effects of ISR in Hong Kong. Its limitations will be discussed below, but the contention is that Hong Kong holds a mirror to the world. The model is an adaptation of a 1997 Australian Industry Commission (now the Productivity Commission) model<sup>23</sup> devised to investigate the relative effects of the accounting rate system and the degree of local competition on Australia's IDD calling charges. The paper concluded that lack of progress in introducing effective competition was the primary explanation for the slow decline in IDD tariffs paid by Australian consumers. The following analysis revises that same model to estimate in three stages the likely impact on IDD tariffs and revenues in Hong Kong of the introduction of competition and of a shift away from the accounting rate system to the introduction of ISR. The data used is available from Hongkong Telecom's annual reports.

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<sup>21</sup> 'The Regulatory Status of Call-Back Services: Statement by the Telecommunications Authority of Hong Kong', March 1995. Previously OFTA had given a very restricted interpretation of the scope of the Licence. See 'The Interpretation of the Exclusivities of Hong Kong Telecom International Limited' OFTA, 23 April 1996.

<sup>22</sup> This is a revised and updated version of the model which appears as an appendix in John Ure, 'Hong Kong' in M.Hukill, R.Ono and C.Vallath eds. *Electronic Communication Convergence: Policy Challenges in Asia*, Sage Publications, New Delhi, forthcoming 2000.

<sup>23</sup> 'International Telecommunications Reform in Australia', Industry Commission, 1997, [www.indcom.gov.au/research/other/phone/index.html](http://www.indcom.gov.au/research/other/phone/index.html).

The model first establishes that total cost (TC) as the sum of the local resource cost (RC) incurred - the economic cost, or cost *caused to occur*<sup>24</sup> - when outgoing (O) or incoming (I) calls are transmitted over the national segment to or from the gateway, switched and transmitted over a notional half-circuit to or from a distant carrier, and the settlement rate payable to distant administrations on the net outgoing traffic (O - I) balance. Total revenue is the average IDD tariff or price (p) weighted according to the size of traffic streams, times total outgoing traffic (O).

Equation A:

$$TC = RC(O+I) + S(O - I) \quad \text{A.1}$$

$$\text{and } TR = p(O) \quad \text{A.2}$$

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 second part of the model establishes the constraining condition that applies in a perfectly competitive market. In such a market, total cost, including the cost of capital,<sup>25</sup> would equal total revenue. Furthermore, a competitive price ( $p^*$ ) can be expected to fall below the monopolistic price ( $p$ ), and, depending on the price elasticity of demand, the competitive volume of outgoing calls ( $O^*$ ) measured by duration - million of minutes - will rise above the monopolistic level ( $O$ ). The proposition is formally given below, and states that the competitive level of outgoing traffic will exceed the monopolistic level according to the degree of competitive price reduction and the price elasticity of demand, subject to the constraint that the competitive level of total revenue equals total cost, or that total revenue minus total cost equals zero.

Equation B:

$$O^* = O + \{[(p^* - p)/p] \times \eta\} \times O \quad \text{B.1}$$

$$\text{subject to: } (O^* \times p^*) - \{RC(O^* + I) + S(O^* - I)\} = 0 \quad \text{B.2}$$

where  $p^*$  = competitive price;  $O^*$  = competitive level of outgoing traffic;  $\eta$  = price elasticity of demand.

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<sup>24</sup> The notion of causation is stretched to include fixed costs incurred in anticipation of future traffic growth. This may be justified on the grounds that it guarantees continuous quality of service to existing customers.

<sup>25</sup> In the case of the local access charge paid to Hong Kong domestic networks by international carriers, a cost of capital of 21.5 per cent has been used. This exceeds the usual 15 per cent used as the benchmark by the Hong Kong government owing to the assessed risk attached to the building of local loop networks by the three new entrants to Hong Kong's domestic fixed wireline market. The cost of capital is a problematic concept. Should nominal or real prices be used? At the time of writing the stock market capitalization of Hongkong Telecom is close to twenty times its book evaluation.

Applying equation A to Hong Kong, that is without the constraint of a perfectly competitive market, requires estimates of the resource cost (RC) and the weighted average IDD tariff (p). Determining the resource cost is the controversial part of the exercise. Accounting data cannot be used directly in economic analysis for all the obvious and known reasons, but above all because costs need to be seen as causal. For the purpose of this analysis it is convenient to use the 1996 benchmark estimates of the Federal Communications Commission, slightly revised as explained below. The FCC used known carrier tariffs and ITU estimates of switching costs<sup>26</sup> when compiling tariffs for the international transmission, international switching and national extension components of the resource costs for sixty five countries. The benchmark for Hong Kong was as follows:

International Transmission	US 5.1 cents
International Switching	US 1.9 cents
National Extension	US zero cents
Total	US 7.0 cents

The zero national extension figure arises from the fact that there are no local call charges in Hong Kong, however Internet service providers, cellphone operators and other holders of public non-exclusive telecommunications services (PNETS) licences<sup>27</sup> are required to pay an access fee, known as the PNETS charge. In 1996 for Internet Service providers this was HK 4.2 cents or approximately US 0.5 cents,<sup>28</sup> so using this figure we can estimate the resource cost of originating or terminating per minute IDD calls as US 7.5 cents for the period 1994-95, or approximately HK 59 cents. The weighted average IDD price for 1995 has been estimated by Ure<sup>29</sup> as HK\$6.70. So using 1995 data for Hong Kong in equation A we get:

Equation C: Hong Kong Actual Data 1995 (with callback)

$$TC = HK\$0.59(3,024,722) + HK\$4.5(132,072) = HK\$2.4 \text{ billion} \quad C.1$$

<sup>26</sup> Notice of Proposed Rulemaking, IB Docket No. 96-261, para. 36; see [www.fcc.gov/Bureaus/International/Notices/1996/fcc96484.txt](http://www.fcc.gov/Bureaus/International/Notices/1996/fcc96484.txt). See also Michael Tyler and Susan Bednarczyk 'International economic relationships in telecommunications: a painful transformation' *Telecommunications Policy*, v.22.10, November 1998 for a discussion.

<sup>27</sup> For a history of PNETS licensing in Hong Kong, see Milton Mueller, *Telecom Policy and Digital Convergence*, The Hong Kong Economic Policy Studies Series, City University of Hong Kong Press, Hong Kong, 1997, pp. 109-119.

<sup>28</sup> The earliest PNETS charge, HK 9 cents per minute, was paid from 1989 by mobile cellphone operators to HKTC for interconnection. In 1996 the PNETS charge was reduced to HK 6.7 cents for mobile cellphone operators and HK 4.2 cents for ISPs, a reflection of the fact that Internet calls had longer average holding times than cellphone calls and therefore lower average set-up costs per minute. PNETS charges were further reduced to HK 6.4 cents and HK 3.3 cents respectively in 1998.

<sup>29</sup> See '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).

$$TR = HK\$6.7 \times 1,578 \text{ million} = HK\$10.6 \text{ billion} \quad \text{C.2}$$

Equation D: Hong Kong Revised Data 1995 (without callback)

$$TC = HK\$0.59(3,024,722) + HK\$4.5(565,9770) = HK\$4.3 \text{ billion} \quad \text{D.1}$$

$$TR = HK\$6.7 \times 1,795 \text{ million} = HK\$12 \text{ billion} \quad \text{D.2}$$

The original data for total outgoing and incoming minutes - 1.578 mm and 1.446 mm respectively - included callback, estimated by industry sources as fifteen per cent of the market,<sup>30</sup> and two sets of data are presented here for comparison, the original data and the data with callback stripped out. Table 1 shows that in 1995 HKT received a gross revenue from international traffic of \$16.3 billion, that is before payouts to overseas administrations through accounting rate settlement charges. Outgoing traffic was 1,578 million minutes, so with a weighted average call charge of HK\$6.70, IDD revenue collection was around \$10.5 billion. The difference of \$5.7 billion was mostly incoming accounting rate settlements and other income, for example IPLC revenue.

Table 1

Financial Year	International Turnover	IDD Collection Revenues	Other Revenues
1994-95	\$16,310.5 m	\$10,575.4 m	\$5,735.1 m

The enormous gap between total cost and total revenue represents monopoly rent, distorted downwards slightly (nearly HK\$600 million) by net settlement payments. The rent has been a source of cross-subsidy to the local network as well as a primary source of global revenues and profits for Cable & Wireless. To simulate the effects of perfect competition on this model  $\eta$ , the price elasticity of demand, needs to be estimated. In 1995 Ure estimated  $\eta$  to be -0.3 and the relevant paper can be downloaded from [www.trp.hku.hk](http://www.trp.hku.hk).<sup>31</sup> The elasticity estimate is point elasticity, and while there is evidence

<sup>30</sup> According to industry sources callback traffic was around 216 million minutes (15%) in 1995, 318 million minutes (20%) in 1996 and 582 million minutes (30%) by first quarter 1997. Ure estimates that callback traffic saved the consumer over HK\$1 billion between 1995 and 1997. See John Ure's paper for Hong Kong Committee for Pacific Economic Cooperation, 'The Economic Benefits of Telecoms Liberalization in Hong Kong', Centre of Asian Studies, University of Hong Kong, April 1998, [www.trp.hku.hk](http://www.trp.hku.hk).

<sup>31</sup> The -0.3 estimate of price elasticity accords with the elasticity in the financial model used by the Hong Kong government during negotiations for the Framework Agreement with Hongkong Telecom to arrive at an estimated net present value of the future flow of IDD revenues assuming the exclusive licence had ran its full term under a regime of falling prices due to callback, refile and other downward pressures. Upon inquiry the author learns that the -0.3 was an assumption. His own estimation can be found in

that special promotions,<sup>32</sup> awareness advertising and competition itself can induce greater elasticities, the -0.3 also seems to accord with the company's own internal estimates at that time.<sup>33</sup> Using -0.3 for  $\eta$  in equation B, and estimating the weighted average settlement rate as HK\$4.50,<sup>34</sup> we get

Equation E: Hong Kong Competitive Data 1995 (without callback)

$$O^* = 1,794 + \{[(p^* - \$6.7)\$6.7] \times -0.3\} \times 1,794 \quad \text{E.1}$$

$$\text{subject to: } (O^* \times p^*) - \{\$0.59(O^* + 1,230) + \$4.5(O^* - 1,230)\} = 0 \quad \text{E.2}$$

$$\text{Results: } p^* = \$2.81 \quad O^* = 2,108 \text{ million minutes}$$

'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).

<sup>32</sup> An example, offered to the author by one of Hong Kong's carriers, cited a four per cent reduction in the price of weekend IDD calling which resulted in a twenty-four per cent increase in call holding time. Figures from Singapore for the first half financial year 1998-9 show total IDD minutes rose by eight per cent, although actual calls rose only 0.7 per cent, the difference arising from longer calls stimulated largely by the introduction of Budget Call, a service using a mix of callback, Internet telephony and compression techniques. The resulting average tariff reduction of thirteen per cent crudely implies an upper price elasticity of -0.6.

<sup>33</sup> My estimate separates demand for access from demand for usage, but does not attempt to estimate call stimulation effects of callback. Mark Scanlon 'Using call-back to demonstrate the discriminatory nature of the proportional return rule' *Telecommunications Policy*, v.22.11, March 1999, pp.913-930, quotes long distance elasticity estimates of -0.75 in the USA when the call stimulation effects (incoming and outgoing calls as complements) arise. P.Hackl and A. H.Westland 'On Price Elasticities of International Telecommunications Demand', *Information Economics and Policy*, v.7.1 April 1995 (pp.237-252) produce estimates as high as -2.2 for own-elasticity in the case of Norway. Teresa Garin-Munoz and Teodosio Perez-Amaral 'Econometric modeling of Spanish very long distance international calling', *Information Economics and Policy* v.10.2, June 1998, pp.237-252, come up with an own elasticity of -1.31. For a review and evaluation of earlier studies see Lester D.Taylor *Telecommunications Demand in Theory and Practice*, Kluwer Academic Publishers, London, 1994, and A de Fortenay, M.H.Shugard and D.S.Sibley, eds. *Telecommunications Demand Modelling*, North-Holland Publishing Co., Amsterdam, 1990 for working papers.

<sup>34</sup> Unlike the USA, the UK and New Zealand, Hong Kong does not publish accounting and settlement rates. In 1995 the USA-HK accounting rate was \$1 per minute (HK\$7.8). The rate between Hong Kong and mainland China was considerably higher, as was traffic volume at fifty-two per cent of the total compared with six per cent to the next largest, the USA. Incoming traffic patterns are not published. For purposes of this exercise I have assumed a weighted average settlement rate of HK\$4.50. The exercise is easily rerun (using Microsoft Excel 5.0 Solver) using alternative assumptions.

and substituting these values for  $p^*$  and  $O^*$  into equation A we get:

$$TC = \$5.9 \text{ billion} \quad TR = \$5.9 \text{ billion}$$

From these results it can be seen that a competitive IDD price in 1995, without callback but with the accounting and settlement rate still in place, would have been around HK\$2.84 compared with the weighted average of HK\$6.70. However the revenue implications are enormous, and although costs also fall to support profit margins, total profits slump if, as we believe, demand is price inelastic. At a price of HK\$2.84, actual total revenue would slump over 50 per cent, from HK\$10.6 billion (HK\$12 billion without callback) to under \$6 billion. This is more than a challenge to telcos facing a similar future to Hongkong Telecom, it is an irreversible trend, and will exist wherever there is callback and other forms of IDD tariff by-pass, such as voice over IP or V/IP. It is also the underlying compelling reason for the next wave of business models in the industry.

There is the third stage to this model, and that is the total by-pass of the accounting and settlement rate system brought about by the introduction of international simple resale, or ISR. Under the Framework Agreement with Hongkong Telecom, since January 1999 External Telecommunications Services (ETS) PNETS licences have been issued to any operator willing to pay just a little less than US\$100 to the Office of the Telecommunications Authority (OFTA), and by June 1999 one hundred and five had been issued. An ETS licence holder is permitted to lease international circuits from Hongkong Telecom International and offer international voice or other services to third parties at prices of their own choosing. Between 2000 - 2003 the Government will issue international gateway facility (IGF) licences to companies bringing new submarine cable landings to Hong Kong, and from 2003 to any company acquiring an indefeasible right of usage.<sup>35</sup>

Under ISR the operator bringing in traffic, or carrying it from Hong Kong, is required to pay an access charge to whichever domestic network operator interconnects. In Hong Kong there are currently four licenced fixed telecommunication network service (FTNS) operators<sup>36</sup> and three of these are among the six operators of eleven mobile networks, five of which are mobile cellular networks and six personal communications networks.

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<sup>35</sup> An IRU is obtained by buying into an existing cable consortium. All forms of satellite telecommunications to and from Hong Kong are to be opened completely from January 2000. Government policy was first announced in a Legislative Council Brief, ITBB CR 7/4/6 (99) XV issued by the Information Technology and Broadcasting Bureau, 5 May 1999. See [www.itbb.gcn.gov.hk](http://www.itbb.gcn.gov.hk).

<sup>36</sup> No new FTNS licences will be available before 2003, but from January 2000 local mobile cellphone operators will be able to offer wireless local loop services.

OFTA's original consultation paper in February 1998<sup>37</sup> foresaw access fees being determined purely by commercial agreement. This need not be a baseline price. For example, international carriers may prefer corresponding relations which guarantee minimum or proportional returns of traffic between them, and are therefore prepared to pay a premium over and above absolute cost.<sup>38</sup> But for the purposes of our model we will assume that the ISR domestic interconnect access charge is at cost. As we shall see below, OFTA subsequently modified its hands-off approach to determine a local access charge of HK 24.7 cents per minute on ISR routes, principally to incentivise further investment in the local loop,<sup>39</sup> but by its nature this will be a transitory arrangement. We can therefore illustrate the longer-run outcome, which assumes that *all routes* are open to ISR competition, by again using the local PNETS charge for ISPs.

By assuming that all routes are open to ISR we are also assuming that Hong Kong international operators would replace their accounting rate out-settlement payments with access fees to the far end operators. These access fees could be approximated by a weighted average of the FCC's 'national extension' component price. For purposes of illustrating the argument, we weight mainland China's 'national extension' of US 4.2 cents and the UK's 'national extension' of US 8.7 cents (as representative of the Rest of the World) fifty per cent each to arrive at an average US 6.45 cents or around HK 50 cents. Unlike the accounting rate regime whereby Hong Kong normally pays and receives equal settlement rates, under the ISR regime Hong Kong would on average pay HK 50 cents on outgoing traffic and receive HK 4.2 cents on incoming traffic.<sup>40</sup> We therefore need to revise the formula as follows:

Equation F:

$$O^* = O + \{[(p^* - p)/p] \times \eta\} \times O \quad \text{F.1}$$

<sup>37</sup> See OFTA's consultative paper *Review of the Delivery Fee Arrangements* (P 025(98)) on the website [www.ofa.gov.hk](http://www.ofa.gov.hk)

<sup>38</sup> The accounting rate between HKTI and AT&T 1995 to 1999 has fallen from US\$1 to 0.5 SDR, about US\$06 cents, or around HK 5 cents, compared with a 1999 Hong Kong PNETS charge for ISPs of HK 3.3 cents.

<sup>39</sup> According to FCC benchmark estimates, an access fee as high as US 15 cents or HK\$1.20 could be applied to all high-income economies. OFTA's choice of access charge was criticized by the three new entrants to Hong Kong's domestic fixed wireline PSTN who had argued for between US 8-10 cents per minute. However, it is worth noting that even using US 15 cents in equation F, total revenue rises only HK\$0.2 billion which underscores the point that effective competition rather than the accounting and settlement rate regime is the prime mover.

<sup>40</sup> The danger that ISR could open the door to one-way bypass and whipsawing by external monopoly carriers prompted OFTA to consult the industry on the pros and cons of a proportional returns requirement. 'Safeguarding Measures for the Prevention of Practices which Distort Competition in the Market for external Telecommunications Services: Industry Consultation Paper' 1 April 1999, [www.ofa.gov.hk](http://www.ofa.gov.hk)

$$\text{subject to: } (O^* \times p^*) - \{RC(O^* + I) + S^1(O^*) - S^2(I)\} = 0 \quad \text{F.2}$$

where  $S^1$  = access fee outpayment;  $S^2$  = access fee inpayment

Running these equations we get:

$$\begin{array}{lll} S^1 = \$0.50 & p^* = \$1.39 & O^* = 2,221 \text{ million minutes} \\ S^2 = \$0.042 & TC = \$3.1 \text{ billion} & TR = \$3.1 \text{ billion} \end{array}$$

It is evident from these results that a universal ISR regime will dramatically further reduce prices, in the case of Hong Kong's 1995 data knocking off anywhere between HK\$7 billion and HK\$9 billion per annum from IDD charges, and revenues, that is a reduction of over seventy percent.

### Part 3: The second paradigm shift

The third wave, the Internet wave, really got going after 1994 with the invention of the World Wide Web.<sup>41</sup> During the 1980s Hongkong Telecom offered international email services, but they remained a curiosity and threatened to rival videotext as damp squib; and even as of 1999, as reported in Section One above, Internet and multi-media related services accounted for only two per cent of HKT's total revenues. This suggests the impact of ISR is unlikely to be countered by Internet business-related revenues for several years, but as the first section below makes clear, the impact of full-blown ISR presented in the model will be moderated in practice. The final two sections look first, at the economic benefits of ISR to Hong Kong, and then try to answer the questions: if basic carriage services will cease to be key revenue earners, where will the future revenues come from? And what are the economic implications for the industry?

#### Section 3.1 ISR in practice in Hong Kong

There are several reasons why the data used in the above model has to be treated with caution. The first and most important is that it assumes all routes from Hong Kong are open to ISR, which is not yet true. Only 'A' routes are designated by OFTA as open to effective competition, which is initially interpreted to mean routes over which ISR is allowed at both ends, although routes over which refile provides competitive pricing will be placed on an observation list for possible reclassification as 'A' routes.<sup>42</sup> According to

<sup>41</sup> For an excellent summary of its origins and the role of the World Wide Web, see Jim Savage, Rob Frieden, et al. 'The Internet' chapter 2, Module 1, International Charging for Internet Services, APEC Telecommunications Working Group @ [www.apii.or.kr/telwg/ICAIS/icais.html](http://www.apii.or.kr/telwg/ICAIS/icais.html).

<sup>42</sup> OFTA permits refile by Hong Kong External Telecommunications Services (ETS) carriers only on 'A' routes. HKT has since argued for the reclassification of eleven of the 'B' routes, including those where ETS providers have IPLCs, which include India, Indonesia, Malaysia, Philippines, Singapore, Taiwan and Thailand, and other destinations

OFTA the 'A' routes listed in Table 2 constitute perhaps ninety per cent of bothways non-China traffic,<sup>43</sup> although data in HKT's *Annual Report 1998* would suggest no more than one-fifth of HKT's normal *outgoing* traffic streams. They include most of Western Europe, North America and Japan, together with some rather exotic routes.

**Table 2**  
**ISR routes from Hong Kong (classified as 'A' routes)**

Australia	Germany	New Zealand	United Kingdom	French Guyana
Austria	Ireland	Norway	United States	French West Indies
Belgium	Italy	South Korea	Liechtenstein	Mayotte
Canada	Japan	Spain	Puerto Rico	Reunion
Denmark	Luxemburg	Sweden	San Marino	Saint Pierre & Miquelon
Finland	Netherlands	Switzerland	Vatican City	

Source: www.ofa.gov.hk, 24 December 1998

The largest traffic stream, to mainland China which accounted for sixty-two per cent of HKT's outgoing traffic minutes in 1998, is classified as a 'B' route, but given that callback operators accounted for perhaps more than one-third of total traffic by 1998 this figure overstates the proportion of China traffic. Second, all traffic is assumed to be direct, with the effects of refile ignored. Refile arises principally as a complex arbitrage opportunity where proportional returns, for example, between countries B and C secure for the refiler in C of traffic coming from A-to-C-to-B a return traffic stream from B, the inpayments from which outweigh any below-cost transit payments C has agreed to receive from A as an inducement to A to reroute the traffic.<sup>44</sup> So if Hong Kong became a centre of refile, under the right circumstances net inpayments could be higher. However, in an ISR world the opportunities for arbitrage should be less; indeed refile should speed up the arrival of an ISR world. Third, the only cost savings associated with this model are those of reduced outpayments. In reality, a more competitive environment will almost certainly speed-up the search for allocative and organizational efficiencies and other measures to cut operating costs. This is a signal for the transition to mass, low cost transportation of traffic, and ultimately to marginal cost or zero-pricing. The Internet model is already throwing up examples of this form of commodization.<sup>45</sup> We may also

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to which HKT's competitors have sent zero traffic through HKT's gateway since 1st January, indicating alternative means of transmission and routing.

<sup>43</sup> See OFTA *Delivery Fees Determination, Statement by the Telecommunications Authority of Hong Kong*, 7 October 1998, para 17. See www.ofa.gov.hk.

<sup>44</sup> For a more formal exposition of the relationship between arbitrage and proportional returns, see Mark Scanlon 'Using call-back to demonstrate the discriminatory nature of the proportional returns rule', *Telecommunications Policy*, v.22.11, December 1998, pp.913-930.

<sup>45</sup> Most notably in Britain where the Freeserve model relies upon a revenue share with Energis, a new entrant carrier, and 'to match Freeserve's membership terms, more than 40

note that on 1st January 1999 Hongkong Telecom choose not to rebalance its local tariffs, citing the economic recession as a reason. However, as it enters the third, or Internet, wave, a growing awareness of the importance of local branding, information about customers, and the ability to sell complementary services could become compelling reasons for not doing so.

Fourth, the model effects would at first seem to be more dramatic on small open economies like Hong Kong or Singapore or Taiwan where IDD revenues constitute close to fifty per cent of turnover, and the author was at first tempted to conclude that in economies such as the United States the effects might be muted and drawn out. However, there are obvious backward linkages between IDD rates and long-distance national rates in the sense that a fall in the one is likely to place downward pressure on the other from the customer demand-side, and more open long-distance carrier markets will result in competitive supply-side pressures. For example, competing backhaul facilities and services are an integral part of the competitive strategy of international carriers.<sup>46</sup> As a consequence there are mechanisms through which the effects of ISR and other forms of accounting rate by-pass will be transmitted to economies of all sizes,<sup>47</sup> regulatory obstacles notwithstanding. In sum, the foreshortening effect of the model used above illustrates and highlights a change in the economic fundamentals of the industry.

The change is ubiquitous, being led by pressure from the FCC for accounting rate reform and WTO compliance, driven by market forces which find their way around regulatory obstacles, and aided increasingly by technology, including most recently the availability of voice/Internet Protocol. As competition forcibly reshapes the regulatory landscape arbitrage techniques, such as refile and callback, will likely to forced back to the margins. For example, between 1994 and 1998 the ratio of incoming to outgoing traffic USA - Hong Kong went from 1.5:1 to almost 10:1 due to callback in Hong Kong, but from the 1st January 1999, with the start of ISR, the ratio flipped back to its original overnight. An ISR regime really supercedes all others.

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UK internet service providers have followed suit.' Christopher Price and Louise Kehoe, 'Pioneers in search of net profit', *Financial Times*, 19 May 1999, p.22. Price and Kehoe cast doubts on the sustainability of the model, but go on to say that 'price structures for telephone services in various countries appear to be dictating, more than anything else, how much consumers are willing to pay for internet services and what business models are applicable in different markets.' If so, then the commodization of the one implies the commodization of the other.

<sup>46</sup> Michael Tyler and Susan Bednarczyk, 'International economic relationships in telecommunications: a painful transformation' *Telecommunications Policy*, v.22.10, November 1998, pp.797-816, discuss five forms of 'new modes of operation' outside the settlement rate system, including foreign points of presence and points of interconnection in overseas markets.

<sup>47</sup> Michael Armstrong, AT&T's chief executive, is quoted as reckoning 'that long-distance will make up only 13 per cent of revenue by 2004, down from 42 per cent in 1998.' *The Economist*, 1 May 1999, p. 63

### Section 3.2 The economic benefits of ISR

Although OFTA licensed three new domestic PSTN entrants in July 1995, by end 1998 they had captured no more than two per cent of the local market. Minimum network build-out requirements, subject to a performance bond, were met, but in the absence of local call charges and tariff rebalancing market incentives naturally pointed to the IDD market, and in particular to callback. The lack of progress in facilities and in domestic services competition has become a cause for criticism, but it is also true that for new entrants building a network from scratch, at a time when technologies and network architectures are undergoing such rapid changes, is not an overnight process. The design of a network is especially challenging, not just to configure it in a way that allows for scalability and upgradability, but also to allow for flexibility of function. In the third Internet wave the nature of future demand for services is uncertain because the nature of the environment is innovative.

Oligopolies will usually handle uncertainty by trying to influence policy in a protective direction, and in Hong Kong the property companies that support the three new entrants have used their substantial lobbying power to have government impose a freeze on new domestic fixed wireline licences until 2003. At the same time, international gateway facilities licences beyond HKT would be restricted until 2003 to the three new entrants and international carriers willing to commit to the landing of new cables.<sup>48</sup>

But the real story behind the policy dodging and weaving is not captured in a formal presentation of events. The real story is that Hong Kong, like many other economies, began liberalizing its fixed wireline market at just the moment when the digital second wave for telecommunications was playing itself out. This is not to argue that the markets were saturated, although fixed wireline access was pretty well met already, except for second and third lines for facsimile machines and computers. The market for services will continue to grow strongly, driven by all the features of the emerging third wave, the Internet and access to web-content and other inter-active services. But these are, and will be, 'value-added' services, not basic carrier services. In one sense, a 'value-added' service is tautological, namely a service for which customers will pay, probably handsomely.

Cellphone services in mature markets already work on this basis. Operators make money not from providing voice connections, but from call waiting and forwarding, voice-mailbox, short-message services, secretarial services, conferencing, alerts, call blocking, customer line identification, online information, downloading music and a host of other value-added network services. This is why new entrants who do not own facilities are at the mercy of those who do. Owning facilities means controlling and managing the functions of network intelligence, the ability to target audiences with service options tailored to their desires and needs. This is the importance of networks in the Internet third

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<sup>48</sup> But satellite and wireless local loop communications were derestricted. See *Legislative Council Brief, ITTB Note 5 May 1999*, [www.info.gov.hk/itbb/new/index.htm](http://www.info.gov.hk/itbb/new/index.htm)

wave, a paradox in light of the fact that the Internet itself is not a facility owned or controlled by anyone as such.

To temper the effects of ISR on the local operators OFTA has determined an access charge payable by interconnecting international carriers.<sup>49</sup> The access charge consists of two elements: the interconnect fee and the universal service contribution (USC) which is redirected from each domestic network to HKTC as compensation for serving ‘uneconomic customers.’<sup>50</sup> The interconnection fee has been set at HK\$15.8 cents per minute (US 2.02 cents), which includes an estimated industry average cost of capital of 25.5 per cent. This is determined only for HKTC as the declared dominant local carrier, but acts as a benchmark for the other three, and as it is based upon forward looking costs it is designed to provide an economically efficient incentive to them to continue investment in their networks. On a forward-looking cost basis the USC element was estimated to be HK 13.4 cents per minute (US 1.7 cents) which would be appropriate for the new entrants, but as currently only HKTC carries this obligation and its network build out mostly already exists, an historical cost basis has been used, including a pre-tax cost of capital of 18 per cent, to determine the USC element at HK 8.9 cents per minute (US 1.14 cents). Thus, the total local access charge is HK 24.7 cents (US 3.2 cents).<sup>51</sup> The USC contribution is anticipated to fall.

The degree of local IDD competition following the introduction of ISR in January 1999 has been intense. HKT’s tariffs on some routes have fallen up to 30 per cent, while HKT’s competitors have reduced peak and off-peak tariffs to North America and Europe by as much as 62% and 89%, and 46% and 91% respectively. As of May 1999 it was possible to phone off-peak to these destinations at a cost of HK 78 cents per minute (US10 cents). Reductions of 39% and 34% respectively were available to Australia and New Zealand, and Japan. Even calls to mainland China, where strictly speaking no ISR or even callback is permitted, reductions ranging up to 23 per cent and 58 per cent for peak and off-peak rates were on offer. An off-peak ‘introductory offer’ by a cellphone operator using ISR was offering HK 38 cents (US 4.9 cents) to Australia, Britain and North America. These rates represent a price war, but with low service barriers to entry the commodization of basic carriage is here to stay.

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<sup>49</sup> Wholesale prices for IPLCs from IGF licencees after 2000 are to be determined by market forces.

<sup>50</sup> An ‘economic’ customer is defined by the TA as ‘one for which the total revenue derived from services delivered over the customer access line exceeds the total cost of providing the line and services.’ (*Local Access Charge and Modified Delivery Fee Arrangements, Statement by the Telecommunications Authority, 25 November 1998, para 31, fn. 7. Available at [www.ofa.gov.hk](http://www.ofa.gov.hk).) This leaves open the possibility that a line which fails to generate cost-covering revenues during one year may do so in subsequent years.*

<sup>51</sup> Approximately 64 per cent of the USA rate. Predictably, during the consultation process international carriers and some users argued for a lower rate; the three new entrants argued for a higher one.

Ure has estimated the direct economic benefits to consumers of falling IDD prices brought about by intensive callback competition from July 1995 to October 1997 to be around HK\$1,230 million (US\$158 million). From the figures above it can be estimated that with ISR from 1995 onwards consumer savings over the same period would have been at least ten times greater, and around twice as great as the estimated savings from falling cellphone access and usage charges over the same period.<sup>52</sup> Unquestionably, it is not the reform of the accounting rate system that has and will produce the big savings, but its abolition or complete by-pass.

### Section 3.3 Waving or Drowning?

The third wave promising and threatening to overwhelm the industry is summed up in one word: Internet. Uncertainty underlies this third Internet wave, and that takes us back to Littlechild who pointed out that without certainty it is just not possible to reach a determination of the opportunity cost of some future investment, or future direction. Evolutionary economics tells us that different trajectories embarked on by firms also produce different futures, and since these usually rather than seldom take the form of options with uncertain outcomes, the criteria for making choices becomes non-deterministic. In operational terms, these issues can be witnessed in the constant ebb and flow of mergers, amalgamations and acquisitions, partnerships cemented and partnerships dissolved, within the industry and across related IT and new media industries. Strategic positioning takes on a value of its own. It can be seen in the roulette of Internet-related stock prices, and in the love affair stock analysts have with any .com company that promises to achieve brand-name recognition on the back of sensational losses.<sup>53</sup>

What lies at the root of the commercial value of the Internet? Perhaps it is best thought of as tradeable knowledge (and tradeable services complementary to that). Knowledge about information and sources of information. Knowledge about how to do things, about formulae, about prices, and weather trends and crop forecasts, in fact about anything that is commoditized. Tradeable knowledge becomes very large, extending in all directions, and into the far future. And if (let us assume) there is more far future for historical (that is, literate) society-as-a-whole than there is past, and since the future is uncertain, then there is more uncertainty, certainly more uncertainty available than ever before. And unlike risk, we cannot insure ourselves against uncertainty. Telecommunications companies, which have played such a vital role in opening up this Pandora's box, now face a sea of uncertainty. They stand to be inundated by it unless they learn to sail through it. What then offers value in the face of uncertainty? The ability to migrate to tradeable knowledge-based businesses.

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<sup>52</sup> John Ure 'The economic benefits of liberalization of telecoms in Hong Kong' paper for PECC Hong Kong, April 1998, @www.trp.hku.hk.

<sup>53</sup> Even accountancy notions are adjusting to this era of uncertainty, for example, valuation methods which use shareholder funds adjusted by the cost of equity to derive the economic value-added of an enterprise. Enterprise profits are no longer seen as necessarily so important.

The only sure thing is that telecoms companies know they don't know much about any of the businesses they need to migrate towards. This points up an important distinction between technological convergence and business synergy. The former is an easily established identical state of being driven by digitalization, while the latter is more of an equation, requiring the right formula on both the business (supply) and market (demand) sides. If the analysis offered above is close to the mark then the thing carriers were best at, namely carrying traffic, will become the least value-added part of the business model. For that very reason, the most likely role for merger and acquisition will be carrier-to-carrier, for example, the Cable & Wireless agreement to acquire MCI's Internet network, or the purchase by carriers like AT&T of non-carrier networks like IBM's data network. These are easily digested systems which enhance the core capabilities of the carriers and edge them towards critical mass in the third wave of data-dominated traffic. But these acquisitions are strategic in the sense that they position the carriers to meet future market demand and allow the carriers to configure and provision their own networks with whatever levels of intelligence they wish. To that extent they guarantee future revenues, but what they do not guarantee are future profit margins.

Colombo and Garrone<sup>54</sup> have recently argued that the core competences of carriers lies in specialised assets, such as network management for differentiated customer requirements, customer information, cash-flow to fund new enterprises, and managerial experience of vertically-integrated systems which can be used to support the multi-media value chain. On the other hand they are not expert, for example, in the use of user-friendly interfaces to navigate among applications. Colombo and Garrone use 1990-1995 data from MOSAICO, which covers reports from the *Financial Times*, *The Wall Street Journal* and its Asian editions, to confirm that most carrier alliances are indeed moving towards what they term a 'multi-media service provider' strategy, but they argue that gaining access to the complementary assets needed for entry into a multi-media business is less warranted through acquisition than through alliances, noting 'it would be quite difficult to agree ex-ante on the value of services provided by complementary resources...' (p.84). In the third Internet wave the uncertainty of valuation will be a recurring theme.

The uncertainty attached to Internet-related business cannot be easily calibrated, but at least some of the necessary and sufficient conditions for its growth can be identified. It is not the purpose of this article to do this, but clearly the embedded base of Internet-enabled computers in homes and offices is one factor, the spread of non-English language and translation software and voice-operated systems is another, and the spread of local area networks/intranets and wide area networks/extranets is another. The nature of the business and supply chains intruding and extruding an economy is yet another, and the role of government in the use of the Internet for procurement and the provision of public services is still yet another.

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<sup>54</sup> M.G.Colombo, Paola Garrone 'Common carriers' entry into multimedia service' *Information Economics and Policy*, v.10.1, March 1998, pp.77-105

## Part 4: Conclusion

According to one international consultancy group report, international traffic growth across 195 countries to the period 2008 is forecast to more than double to 195 billion minutes, but voice revenues from it will fall from US\$60 billion to US\$30 billion.<sup>55</sup> The mechanisms of market by-pass of monopoly and accounting rate prices, aided by technology, and reinforced by regulatory shifts, for example those being undertaken in the European Union and in Japan, ensure forecasts of this kind ring true. They ring the death knell of the second 'digital' wave of telecommunications, in which basic carriage services, such as IDD and cellphone voice traffic, were the cash-cow sectors. Indeed, the carriage of basic services is likely to gravitate more towards an Internet model which puts commercial emphasis upon tradeable knowledge and complementary services, and basic service provision instead becomes the means of gaining access to a large subscriber base. The third 'Internet' wave replaces the certainties of the second wave with uncertainty, and in so doing shifts the fundamental underlying economics of the industry, and the way it is valued.

The full implications of this shift are little understood because little analysis of it is available. In this regard, Hong Kong represents an interesting case for study. Up to this point we can discern the death of stage two and the efforts by Hongkong Telecom to reinvent itself for stage three. Circumstances place Hong Kong very much in the forefront of these developments, albeit on a far smaller scale than in the USA. Hong Kong is not alone. Other economies, notably Australia in the Pacific rim, are confronting the new uncertain realities, and Singapore and Japan are joining the pack. But the process is in its infancy, as is our understanding of it, and its implications for value-creation and realization. Not least, it probably requires among economists a fundamental re-examination of information economics and its dialectical opposite, the economics of uncertainty.<sup>56</sup>

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<sup>55</sup> 'The Rise of Cost Based Interconnection and the Collapse of International Accounting Rates', Ovum, July 1998, quoted by lead author Stephen Young, *FT Telecoms World*, 1st Quarter 1999, pp.16-23.

<sup>56</sup> For example, tradeable knowledge implies the commoditization of information and, '[i]f, as would seem to be the case, there has been and will continue to be a significant substitution of codified knowledge for tacit knowledge, induced by the change in relative costs resulting from the combined effects of technological change in communications and computing, there will be far-reaching implications for industry and governments, for economic growth and structural change, for employment and income distribution.' Donald Lambertson (ed.) *Communication and Trade: Essays in Honour of Meheroo Jussawalla*, Hampton Press, New Jersey, 1998, p.14.