

VIDEOTEX IN HONG KONG

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What is Videotex?

Videotex

To discuss videotex in a comparative context we need some agreed meaning of the term, yet it becomes evident after a little investigation that there is no clearly delineated or universally accepted meaning. Some authors see the videotex as a generic term for "disseminating information electronically for display on terminals or modified TV receivers. The original systems were called Teletext and Viewdata." (Cakewell, 1991, p.698). The connotation 'video' seems to derive from the reference to the terminal as a video display unit, or VDU, since the use of video-tape is not strictly necessary in either broadcast (Teletext) or datacoms (Viewdata) or data transmitted by a telecommunications medium such as a telephone line or a cable which connects computers.

But, according to Chittock (1984) "In other parts of the world, the word videotex is being confusingly applied to denote viewdata; teletext remains the same; but in consequence no other word is used to embrace all systems." To add to the confusion, the provider of Viewdata services in Hong Kong, HongKong Telecom CSL, points out that only they in Hong Kong use a recognized videotex standard. The Hong Kong Telephone Company (HKTC) adopted the Prestel system of British Telecom (pioneered by the British Post Office before BT was corporatized) which set the accepted international standard for videotex networking. (CCITT X.430 protocols and T101 terminal standards). All other videotex-type networks in Hong Kong are run on proprietary systems. Does this mean Hong Kong only has one videotex system? This would be a short paper if we defined videotex according to this criterion.

Alber (1985), who retains the generic meaning of videotex, points out that Samuel Fedida, research engineer with the BPO, pioneered the Viewdata system during the mid-1970s as a complement to the BPO's early version of the videophone, called Viewphone. Fedida was bringing to telecommunications an application from computer reservation systems (CRSs), searching a way to pass directly into the hands of the customer the search functions previously undertaken only by travel agents. A CRS is an interactive system, the user sending out instructions to call up information from a remote database and then recording a reservation with that database. The interactivity of the Viewdata system sets it apart from the Teletext system. At the same time, because Viewdata involves a user accessing a database over a telephone line,

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there is a capacity constraint determined by (i) the number of ports available on the host computer, and (ii) the availability of the transmission medium. For example, a national videotex network (we are now using videotex to imply viewdata, a name in Hong Kong used exclusively by CSL) will usually require a nation-wide packet-switched data network to support it, although this may not be necessary within a city (or City-State like Hong Kong or Singapore). And for real-time market information direct digital data lines providing reliable point-to-multi-point data feeds are essential. By contrast over-air broadcast teletext, which takes advantage of the vertical blanking interval on TV screens to piggy-back data either as alphanumeric script or as still video pictures, has almost unlimited point-to-multi-point capacity.

Teletext

The limitations of teletext are its non-interactivity, its

slowness and data-capacity limitations. Interactivity is only simulated for the customer by the use of a black box which calls up from a memory the relevant 'pages' on the screen. Slowness is an attribute of the transmission cycle of up to 800 pages (the limit on the PAL system) which once took 15-20 seconds to complete, although only a few seconds are now required. Data updates have to await the turn of the cycle, and the more pages requiring simultaneous updating the less overall capacity is available for information.

Alber's Four Stages of Videotex

The issue of interactivity, which was perhaps the most decisive distinction used during the late 1970s and early 1980s to differentiate between videotex and non-videotex systems, is becoming clouded by advances in technologies and the growth of hybrid systems. The first generation of videotex systems, which Alber (1985) dates to 1983, only used dumb terminals. The second generation, 1984-88, spawned the use of intelligent terminals, PCs with software applications of their own to reformat and manipulate the data stream. The third generation, 1988-92, saw the growing use of micro-computers with multiple ports for distributed terminal data processing. The growing popularity of LANS (local area networks), of host-and-server configurations, and open network architectures, is creating by degrees a spectrum of interactive possibilities.

At one extreme the host data base may be located on the other side of the planet, or two-way data communication may be processed through intermediate regional or local databases, or the interactivity may be confined to within the LAN itself. Two way communication can be total, using a telecommunications circuit, or partial, using a broadcast medium and a telecommunications medium in conjunction. For example, Reuters real-time financial information comes into Hong Kong by satellite, but dealing is transmitted by

submarine cable. And for private professional users the stand-alone intelligent terminal (PCs) linked to a gateway service offers a range of options, from the use of Windows (currently the most popular software for these purposes) to interactive long-distance data accessing. Alber's fourth generation systems, which he forecast would start from 1992, are multi-media networks combining TV, telephone and computer applications. Multi-media, by definition, would seem to dissolve the absolute boundaries to the point where the term 'videotext' has lost any of its original distinctive meaning.

To add to, and complete, the confusion of names, teletex is a term used to describe the transmission of pages by telephone lines, using a keyboard at one end and a receiving terminal at the other. In discussing the CCITT F-series of standards governing teletex, Pujolle et al. (1988) explain "The Teletex service is defined as the transmission of pages memory to memory via a telecommunications network." (p.279)

Videotext, teletext, viewdata, teletex, multi-media: generic or specific, defined according to standards, or according to medium (broadcast or telecoms), or according to degrees of interactivity; or according to the format (pages or data-streams); the terminology itself threatens to get in the way. For example, how far is EDI (electronic data interchange) videotex? Or a videotex-type service? How far is any information service delivered electronically by screen videotex? Is an ATM (automatic telling machine) which provides a degree of interactive service videotex? And as the degree of interactivity increases does it become more videotex than before? Numerous texts attempt to classify videotex systems into private and public, corporate and personal, business and residential, those which use dumb terminals and those which use intelligent terminals, and so forth. But as the web becomes more finely defined it begins to embrace, by degrees, all forms of electronic information.

For this reason the term videotex has lost currency over recent years. IS (information services) and ISPs (information service providers) are looser terms but ones which increasingly substitute as generics. In this context, a newsworthy item from Information Today (1992) was the

decision of the Videotex Industry Association of the USA, on December 6th 1991, to change its name to the Interactive Services Association. Embracing cable, broadcast and telecommunications transmissions, it will "concentrate on information, transaction, communications, and entertainment services for home and work-related use."

Videotex and Hong Kong

It is tempting to use definitions and trends from the USA when treating a subject such as this, but the dynamics and spread of electronic information use are far greater in North

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America than in economies even as newly developed as Hong Kong. Therefore, in the paper that follows, I shall be limiting my focus to a narrow range of information services. This keeps the paper manageable, but also reflects quite accurately I think the fact that the widespread use of electronic information in Hong Kong, that is outside certain key sectors, has not yet happened.

All of the companies I interviewed in Hong Kong for this paper, with the exception of CSL's Viewdata, denied they were providing videotex services. In some cases this is because they were providing teletext. In other cases they were just claiming to be providing information services, or data communications, or a CRS. I have therefore interpreted the term videotex in a way which embraces (i) interactive services which are, to some degree, in the public domain, (ii) semi-interactive information services or non-interactive versions of them which either use intelligent terminals or are migrating in that direction, (iii) teletext services, which in Hong Kong's case largely overlap (see below) with the second category.

Information Technology in Hong Kong

As Chen and Li (1991) argue, "except in the case of public utilities, such as telecommunications, most industries in Hong Kong do not enjoy a large degree of scale economies so as to bar any entrants." Also "the Government adopts a positive non-intervention economic strategy" (p.9), which translates into saying the Government provides cheap industrial land, a low taxation regime, public housing, promotes good communications by air, land and sea, administers a reasonably well-funded social services infrastructure from education to health care, and adopts a light-handed regulatory approach to public utility monopolies and oligopolies. Within this framework of public administration regulatory controls over private sector commercial activities are minimalist. The Government traditionally eschews notions of industrial policy as such, but does encourage, sometimes with seedbed funding, development bodies such as the Trade Development Council, the Industry and Technology Development Council, and the Hong Kong Tourist Association.

Electronic Data Interchange

The most recent example of private sector promotion by Government is the licencing of a consortium called Tradelink to run under exclusive franchise an EDI gateway between Government Departments and small companies, mainly textile firms applying for MFA quotas, certificates of origin, customs declarations, and other trade documentation. The monopoly rent which Tradelink will earn will be used to finance the promotion of EDI among other sectors of business and commerce. The medium-term impact this will have upon

the acceptability of using electronic communications networking among small and medium-sized firms will be studied with interest.

In the area of telecommunications, public fixed-wire network construction and operation, and private networks which cross public spaces or which require radio spectrum, are regulated in the sense of requiring a licence, but, with the exception of price controls on Hong Kong Telecom, telephone services beyond the basic ones (essentially defined as the installation and removal of lines, and voice transmissions) are unregulated. Thus, videotex and other information service providers who use leased circuits from Hong Kong Telecom are non-regulated service providers.

Broadcast and Telecommunications Regulatory Framework

Hong Kong became the first place outside Britain to start Viewdata when HKTC introduced the service in 1982. Telecoms regulation required new services and their tariffs be written into the Telecommunications Ordinance. From 1983 amendments to the Telephone and Telecommunications Ordinances liberalized the markets for both customer premises equipment and value-added services. Hence forth any new entrant could lease circuits from HKTC and offer public or private value-added networks services (VANS) such as videotex. The Telecommunications Authority (currently the Postmaster General, but soon to be the Director of the Office of the Telecommunications Authority, OFTA) does not require service operators to be licensed.

Before the end of 1993 it is expected that OFTA will oversee the issuing of new PNETS (public non-exclusive telecommunications services) licences in anticipation of the ending of HKTC's exclusive PSTN franchise in 1995. New entrants will require a licence to construct their own public networks, but again no separate licences will be required to offer services. And service operators leasing circuits from PNETS licence holders will continue not to require licences.

Viewdata and HongKong Telecom

Of Viewdata, HKTC's Annual Report for 1992 reads:

"Our initial sales activities have concentrated on Financial Vision, specializing in stocks, warrants, foreign exchange, commodities and other financial information, but further facilities, including electronic mail, banking, education, specialist information systems and domestic uses will eventually be offered. Progress is encouraging but it is unlikely that we shall see any dramatic upswing in this service until the cost of terminals,

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or adaptors, is reduced." (p.13)

Significantly, no further reference is made to Viewdata in the annual reports. Information service providers, like Sun Hung Kai Research and Postel 828 (The South China Morning Post), were the mainstays of Viewdata at this time, but shortly afterwards a gateway facility was added providing widespread access to databases around the world. For a videotex system to operate on a large-scale, with world-wide access, a data communications infrastructure is necessary and in 1985 HKTC officially launched its packet switched network, Datapak. And through interconnect with the Cable & Wireless Hong Kong (CWHK) Intelpak service, international packet switched data communications were available. In 1984 HKTC was bought out by Cable & Wireless plc. and HKTC, CWHK (renamed Hong Kong Telecom International or HKTI) and CSL became subsidiaries of a new holding company, HongKong Telecommunications Ltd (HKT).

Datapak

Datapak remains the name of the data communications service today, with switched datalink connections (Datapak PSS or Packet Switched Service for point-to-point service) and non-switched datalines (Datapak DDS or Digital Data Service for

point-to-point, point-to-multi-point, polling and text broadcast) available. Digital telephone lines used for dial-up data transmissions, known as Datel lines, are also available for interconnect with Datapak services using a Network User Identity or NUI. Private users have the option of using the MiniLink service for PC users who may only want occasional access to Datapak services. The international PSPDN (packet switched public data network) link is provided by HKT's IDAS (international data access service).

Recently an ISDN service has been introduced, named ISDS (international switched digital service) which offers dial-up international public data communications with functions ranging from international file transfer to video-conferencing. In addition, HKT provides what are probably the cheapest digital leased circuits available in the Asia-Pacific region, offering domestic and international data speeds up to T1 (1.544 Mbps) and E1 (2.048 Mbps) and T3 (44.7 Mbps) standards. Inter-LAN connectivity is offered domestically by a LANline service, and internationally by a service called INFOLAN which operates on Novell's NetWare offering file transfer between Novell and Unix servers.

Spectrum Viewdata

With such a highly developed and technologically modern infrastructure, since 1990 Hong Kong Telecom has been offering, through its subsidiary CSL, a family of electronic information services, of varying degrees of interactivity, under the generic title of SPECTRUM. Viewdata, the original service, is now just one of several options available to

SPECTRUM subscribers. Access is either directly through Datapak, or through a dial-up Datel line from a PC, a TV or a dedicated terminal into Datapak using a NUI, or through

MiniLink using an ordinary PC.

Viewdata services include dial-up Interactive Viewdata (equivalent to the classic meaning of videotex) and additional options of Autoview for subscribers to Financial Vision, Gold prices, or Choi Ma Pui Lut (racing form, schedule, results and payout). Autoview is formatted into pages similar to teletex broadcast. After an initial registration fee, the basic monthly charge for Interactive Viewdata is HK\$50 for residential users and HK\$90 for business users, and with the addition of the Horse Racing service HK\$500 a month, or the addition of Financial Vision HK\$600 a month, and if Gold prices are also included HK\$760 a month. There is a usage charge of 5 cents for one minute (peak time: Monday-Fridays 9am -6pm), two minutes (shoulder time) and four minutes (off-peak: 9pm-9am and Sundays). Both include an option for a real-time Hong Kong Stock Quotations service at HK\$290 a month. In other words, Viewdata is a private service offered over the public network and aimed at the popular and lower income end of the market.

Spectrum Infokey

The videotex (that is, inter-active) facility of Viewdata arises primarily from its gateway functionality. At this point the unending alphabet soup of acronyms continues with SPECTRUM Infokey, the gateway service, accessible along numerous routes of which Viewdata is just one, which, as CSL's promotional literature has it, "puts more than 1,000 databases at your fingertips. Its the world's largest source of legal, managerial, scientific and government information." (Spectrum Infokey, CSL, undated). Charges include one registration fee, and usage. Databases (most of which can, of course, be accessed independently through direct subscriptions, or indirectly by other networks) include well-known international bases such as Dialog, Profile, CompuServe, Dun and Bradstreet, Knight-Ridder as well as local ones such as Tolfin, which provides individual and corporate records such as High Court actions and major property transactions, Medilink, an online health care information service, TDC-Link, the online information service of the Trade Development Council, and many others including countless local bulletin boards.

Spectrum Dialcom

Another SPECTRUM service is Dialcom, offering E-mail and PC-

fax-telex interconnectivity, document formatting but also selective business data base access. The data bases include Hang Seng and Sun Hung Kai financial information, Hong Kong Stock Exchange quotes, the Financial Times data base Profile, Asia trade information on Stryker Asia-Net, Xinhua News Agency economic information on China, TDC-Link, the Hong Kong

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Census and Statistics Department online information, the Official Airline Guide, travel information from the Hong Kong Tourist Association and the China Travel Service, and the US-based technology news service Newsbytes, as well as online Telephone and Fax Directory Enquiries for Hong Kong, Macau and Guangdong, and numerous other local data bases.

Spectrum Market Data

All Market Data, another SPECTRUM service, is a specialist 24-hour real-time electronic information service covering the North American and Hong Kong financial markets, from stocks and commodities to options and forex and leading indices. Low level interactivity is provided by a portfolio selection option which enables subscribers to select up to 100 stocks for monitoring across any of 13 exchanges, but otherwise these data feeds are one-way. They are therefore designed not primarily for dealers but for corporations, banks and finance houses needing to maintain their market knowledge and provide their own customers with current market analysis.

The name SPECTRUM is possibly apt given the range of overlapping information services it offers in one form or another. Product differentiation is clearly an important aspect of marketing strategy for CSL. Large corporations are able, and presumably willing, to pay more for more while private users will wish to pay less for less. Also businesses which are more information-dependent, such as large financial

corporations, will pay for real-time feeds, while businesses which are less information-dependent will be less willing to pay the higher rates. Tailoring the different services to these different needs and propensities to pay is revenue-maximizing behaviour in a business in which marginal costs are minimal and total costs are largely shared between these services.

Videotex and Teletext in Hong Kong

Datapak provides direct services to its customers and provides the infrastructure over which other information service operators provide services to their customers. Detailed information is kept confidential by HKT, and in view of the more competitive environment opening up in Hong Kong this is to be expected, but I can make some guesstimates. Taking into account direct Datapak customers, including MiniLink, PSS and DDS customers, and indirect customers served by lines made available to other information service operators and service providers, my estimate of the total number of terminals being serviced, directly or indirectly by Datapak, is 45,000. The true number is unlikely to be much less than 40,000 or more than 50,000. This figure is estimated from Datapak indicators. Below I shall arrive at a similar figure based upon Hong Kong Stock Exchange information.

Before leaving Datapak, which we remember is the only service in Hong Kong operating on internationally recognized videotex standards, and incorporates Viewdata, the original videotex service in Hong Kong, we can make use of the fact that it is the principal infrastructure for other service operators to conceptualize the forms of 'videotex' information services

over international telecommunications. It is now confined to the provision of circuits and the operation of basic voice services. So Hutchison and AT&T operate a joint venture called HANS (Hutchison-AT&T Network Services) which leases domestic circuits from HKTC, provides links to the HKTI gateway, and international connections by AT&T over half-circuits leased from HKTI. Most major overseas data bases are accessible.

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Hutchison Mobile-Data (HMD) was a service operated jointly by Hutchison and Motorola, although recently Motorola has acquired Hutchison's loss-making share. Mobile-Data is essentially a polling service, with most subscribers polling financial, stock market and, of course, horse-racing information. But mobile operators in Hong Kong now have the right to connect directly to the HKTI gateway, and to revenue-share for the domestic portion of the traffic they carry. Hutchison Information Services (HIS) offer wireless InfoTAC to connect terminals such as laptops, notebooks and scanners, to the mobile data network and, through a gateway, to Datapak, IDAS and overseas data bases. HIS also acts as the Hong Kong agent for CompuServe which becomes one of several independent access points to the HKTI gateway.

The third category I have called closed user groups (CUGs) who may operate with data bases of their own or access those offered by other operators. But this is not a strictly defined category. In the case of EDI (electronic data interchange), it has been effectively confined to CUGs up to now, especially in the shipping industry, although SPECTRUM Intertrade is a public EDI service which has been operating for several years. Electronic banking networks are definitely CUGs, but what of the case of CCTV (closed circuit

television) when it is run as a public service? For example, the Dah Sing Bank, using Datapak as a backbone, provides a Financial Information System as CCTV in all its premises for customers. Several major hotels offer similar quasi-public CCTV information feeds.

In the case of CRSs such as ABACUS, SABRE and GALILEO, the systems not only network the stockholding airlines, the ISPs (other airlines, hotels, car rental companies, weather bureaux, etc.) and the travel agents but, in an increasing number of cases, also the end customer. ATM networks also interface directly with the customers, and increasingly offer interactive possibilities. The varying degrees of closure involved in these CUGs calls into question the private-public division. This has potential regulatory and legal implications, and wider implications for entry and cross-over between public and private service operations.

For the rest of this paper I shall focus attention upon the first category of information service operators, noting the overlap with the second category, but I will also include reference to the CRSs in order to underscore the point that technological convergence (towards multi-media technologies) and service convergence (towards an integration of customer services, of which the one-stop shopping concept is an example) is beginning to change the thinking among what we shall continue to call videotex service providers.

Stock Exchange and Financial Information Services

I have referred several times to the importance of financial

information, including stock and commodity market information, in Hong Kong. The explanation lies partly in Hong Kong being a regional financial hub, but partly in the fact that local people have few inflation-proof savings and investment opportunities. The decision in 1983 to link the Hong Kong dollar to the US dollar effectively transferred monetary policy into the hands of the Federal Reserve Bank of America, and Hong Kong's interest rate cartel among the major banks is a corollary of this fact. See Jao (1991). In consequence the real rate of interest has been largely negative. The property market has absorbed a large proportion of the savings and investments of the wealthier citizens, but rising property prices are a barrier to entry for most working people. One consequence of this is a high propensity to consume out of disposable income (domestic rents rather than taxes the being prime claim on income) while others include the passion for betting on horse races, the Mark-6 lottery and Macau casinos. Yet another is the high level of turnover on the equities, options and warrants markets.

The demand for stock market information is therefore especially buoyant, and creates a broad-based market for financial information of different levels of sophistication. At the top end of the market are the international traders of the large financial institutions who require real-time world data and news and a trading system. At a similar level of immediacy, but more parochial, are the brokers and dealers of the Hong Kong Stock Exchange, and below them in terms of requirements are the corporate customers who need world or regional information on commodities, exchange rates or bond prices, but not necessarily real-time. Then there are local professional investment analysts and consultants who require intelligent terminals to process data feeds from the Stock Exchange, or from world information suppliers, into charts, graphs, models and financial ratios. And next in line come the Hong Kong punters, who may be serious enough to invest in a PC and MiniLink or some other information network, or may just rely upon a mobile data or a paging service to flash up price movements and trade volumes. As we shall see below, different service operators tend to focus upon different market segments.

Hong Kong Stock Exchange

Before turning to these operators it is instructive to place their activities within the recent history of the Hong Kong

Stock Exchange (HKSE). Service providers are licenced by the HKSE to relay the market data, which in a growing number of cases they enhance from their own databases, or with proprietary software run on intelligent terminals which they supply to the end user. The licensing system is a purely commercial arrangement of the Stock Exchange. There are two

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types of licence: (i) a service licence, and (ii) a device licence. Service licences are HK\$96,000 a quarter for operators offering the primary service, that is real-time full stock market information, and HK\$30,000 a quarter for the secondary service which does not offer real-time or does not offer full information. The primary device registration fee is HK\$200 per terminal, and the secondary device registration fee, which mostly refers to pagers, is HK\$60. According to HKSE information, there are approximately 3,400 primary device subscribers and 4,800 secondary device subscribers.

It is a guess as to how many terminals (devices) on average a subscriber has, but market information suggests it is over ten for the primary category, and one for the secondary. We are therefore estimating around 40,000 terminals in the hands of registered HKSE information subscribers, of which 5,000 are pagers. Adding on an estimated 5,000 MiniLink customers we again arrive at a round figure of 45,000 terminals in a sense qualified to receive a level of real-time financial data.

The Carriers and the Information Service Operators

Rediffusion

The present HKSE, located at One Exchange Square, was formed in 1986 from the merger of four smaller exchanges. Exchange

information was posted on a board for dealers to follow, while a camera scanned the screen and distributed a broadcast video signal over one of two private networks to brokers situated in Central business district. Rediffusion was the first such carrier using ducted coaxial cables, although its main business remains in TV broadcast relay to areas of poor reception, and the marketing of CCTV services to hotels and clubs. Rediffusion today serves from the HKSE around 1,200 terminals. It is now part of Wharf Cable which has recently been awarded a Pay TV licence, exclusive for three years, so it is expected that Rediffusion's teletext services will become available to residential customers.

First Electronic

The other carrier, First Electronics, provides a mixed overhead coaxial and infra-red carrier network. It also feeds a CUG network serviced by CSL for the tenants of Exchange Square offices. Both Rediffusion and First Electronic operate carrier's licenses for their video broadcast teletext signals mostly serving local brokers. As on any PAL system an upper limit of 800 pages applies.

After 1986 First Electronic began a vendor service (requiring a HKSE licence) called FirstData, which takes computer feeds (digital signals) from the HKSE and relays them to dumb terminals. The terminals are sold, not rented, and connection charges are fixed on a sliding scale with discounts according

to the number of signal connections. A new service has been introduced called SPECTRUM FirstData using PCs, Windows software and a registration to CSL's SPECTRUM, although access to this dial-up gateway, and the inter-active services which lie beyond it, remains restricted to around twenty lines at present. Besides the HKSE once-off terminal

registration fee of HK\$200, subscribers pay HK\$50 per month and either HK\$6 per minute or HK\$500 for 120 minutes (HK\$4.16 per minute) and thereafter HK\$6 per minute. Around 60 per cent of customers take the teletext service, about fifty per cent being brokers and the rest banks and other financial institutions. Around half the customers of FirstData are commercial, again mostly brokers and bankers, but the other half are residential and it is this segment that shows the fastest growth.

AFE

Since 1990 the HKSE has permitted vendors to subscribe directly to its teletext (video signal) feed, and it also supplies digital feeds from its mainframe to some local and all the international vendors. The video feeds are to local vendors, such as ABC, AFE, Financial Telecom, Jade, Telequote, Teletrend, and these companies mostly reformat the signals into digital feeds for distribution down telephone lines. With over 4,600 terminals at 1,300 sites AFE, which stands for Acorn Far East Computer Services Ltd, is the most successful of the local vendors. The present company, which trades its service under the name The Stock Market Channel, has been run since 1987 by two ex-employees of Acorn, the manufacturer of the computer chosen by the BBC in the 1970s to provide educational services to schools in Britain.

AFE receives their video feed from the HKSE over optical fibre cable from Hong Kong Telecom. They use proprietary software to add value in the form of analysis, graphics, and other enhancements, and include Reuters' China News Service and forex service. AFE distributes its signal through HKT's Datapak network by broadcasting continuously at 9.6Kbps at monthly line rates of HK\$980 for a single line down to HK\$220 for over 50 lines. The company recently introduced a 19.2Kbps service at HK\$1,300 for a single line down to HK\$300 for 41 lines and over, and has plans to increase to 64 Kbps. The subscription rates are inclusive of Datapak charges.

The quality of AFE's software, which is written under commission in Cambridge, England, is clearly one of its selling points and the company targets the larger brokers, listed companies, banks and substantial private investors. AFE generally avoids the residential market. We may say that AFE's firm specific advantage (FSA), that is its source of competitive advantage, lies in its software applications, and

the company is already thinking in terms of adding interactive functions to its service range, such as company searches.

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ABC Communications

ABC Communications Ltd is one of Hong Kong's leading paging companies. Like AFE it receives direct teletext feeds from the HKSE and the Hong Kong Futures Exchange (HKFE) and other ISPs, such as Sun Hung Kai Research, and distributes digitalized signals over HKT's Datapak to customer IBM-compatible PCs. It markets its product, using proprietary software, under the name ProQuote Financial Service, offering HKSE and HKFE data separately or as a package. In addition to a Datapak monthly charge of HK\$620, subscription rates range from HK\$800 - HK\$1,000 for a single terminal, to HK\$430 - HK\$550 for five or more terminals. As yet there is not interactivity in the ABC network, the intelligent terminals doing all the work at the customer end. Having only launched ProQuote in 1991 the customer base is still small, with maybe not many more than 1,000 terminals in use by the beginning of 1993, of which half are likely to be professional business users, and half individual business people and residential customers. So the focus of ABC is even more local than AFE, and aimed at the more popular end of the market. But it is also more expensive than AFE and seems to offer less sophisticated software. This may reflect some economies of marketing and distribution by AFE in concentrating upon larger clients.

Financial Telecom

Financial Telecom Ltd. (FTL), was established in 1983 by entrepreneurs with a banking background to offer financial Viewdata. And it was among the first to offer financial

updates on its paging service, Financial Pager. In 1989 it began offering FINTEL, real-time financial information for PCs, offering information on forex, securities, precious metals, financial news and comment, all supplied by local ISPs, including local banks. A Chinese character set was introduced in 1991, under the name Chin-NET, the first available in Hong Kong. Today the FINTEL/Chin-NET information service is widely used by banks in CCTV public display terminals.

A new product was introduced an upgrade in 1993 called SPIDER LINK, which includes a non-financial news and information service, including weather reports, sports results, shopping news, aimed at both the residential and business markets and the media. FINTEL is one-way communication to intelligent terminals, while information on SPIDER LINK is called up from a host by keyboard, but the format is still described as Teletext pages. As in the case of AFE and ABC, the company receives HKSE video feeds and uses Datapak for distribution, but individual users access the SPIDER LINK host through the MiniLink connection.

The customer base breaks down at around 70 per cent in the financial community, around 25 per cent independent

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investors, and around 5 per cent the wholesale media, with 1,200 terminals in use. Since 1990 FTL has been in an agreement with CQI (Commodity Quotation Inc., owned by McGraw-Hill) to offer Standard & Poors SNP COMSTOCK coverage of the four major New York commodity and stock markets. The feed comes into Hong Kong from the London data base over a cable leased by Associated Press from HKTI. This gives FTL a differentiated product in the battle for the attention of the professional local investor in addition to its position in

public display terminal market. The monthly service charge for SPIDER LINK, including a Dataline charge of HK\$420, is HK\$1,250.

Other Local Companies

Other local companies either take the Stock Market video feed directly, like Jade and Teletrend, or indirectly from HongKong Telecom, such as Bartech Pro Trend and Telequote, and operate in essentially the same way as the major local players discussed above. Some have business arrangements to retail the services of larger players. For example, Telequote, which claims several thousand individual subscribers, retails the forex information services of Telerate by providing an Olivetti home screen, which they call an Enhanced Terminal Unit (ETU), attached to the telephone. They charge a flat rate monthly subscription of HK\$1,188 for this service, but HK\$1,388 if the customers use a PC. Stock market information is charged at HK\$200 a month, and other information, such as horse racing results from Hong Kong and Macau, is charged at HK\$100 a month.

These companies are targetting lower income individual investors and speculators. For example, Jade's inclusive monthly subscription rates, range from HK\$970 for a single terminal to HK\$250 for more than twenty terminals, although it is very doubtful there are any such large subscribers. Sometimes the operations of smaller vendors are clouded in some mystery and within the industry rumours of information piracy abound, but if it does it seems to be tolerated.

Paging Companies

Finally, we should mention the activities of the paging companies. We saw above that upwards of 5,000 paging devices were registered to receive real-time HKSE prices, although many of the over 1 million pagers in Hong Kong receive some kind of financial, as well as racing and weather information. Star Paging, one of the largest, also provides Hewlett Packard home terminals to receive real-time broadcast radio signals. These services could expand in the future as radio-based telecommunications networks increasingly interface with radio-based data networks, although as the experience of Mobile Data illustrates, this market is not yet economically significant.

The International Players

Reuters

Reuters is clearly leading the market in financial information services in Hong Kong. Satellite and submarine cable WANS bring data into a distributed network node in Telecoms House, which is then disseminated through the PSTN as dial-up data or as on-line real-time services over leased circuits. Reuters also provides trading systems, interactive by definition. Reuters estimates around 5,000 video screens are receiving its services, ninety per cent in financial institutions. Worldwide stock market and banking information is comprehensive and therefore commands the premium market among Hong Kong - based banks, especially in the currency markets. But for the most part this is not a true videotex service insofar as interactivity goes little beyond calling up page references alphanumerically. Reuters also supplies ABC's paging service.

Telerate

This is equally true of Telerate's page-based transmissions over its digital network. Telerate operates a similar international WANS, with a node in Singapore and a sub-node in Hong Kong. A bit stream of data is turned into pages, with analysis, graphics and so on at the customer's intelligent terminal using Telerate software. With around 4,000 terminals, 99 per cent of which are in the dealing rooms of brokers and banks, Telerate is Reuters' main rival at the top end of the market, competing to produce faster and more elaborate analytical software, although global economies of scale and scope give Reuters the edge, especially in trading

systems. Telerate also wholesales to ATV (Asia Television) for Teletext trial transmissions, to Telequote, to Star Paging, and to the CCTV Hong Kong Channel for tourist hotels. Telerate is also seen regularly in Hong Kong on CNN International broadcasts. Telerate, like Reuters, charges marginally higher monthly prices for dedicated terminals than local companies, starting at around HK\$1,500. Dial-up charges are US\$200 (HK\$1,540) per month plus 50 cents per minute. But international operators can also spread their costs over much larger markets than local vendors, so operating margins also must be higher, reflecting the greater value of their product.

Knigh-Ridder

Knigh-Ridder is the third key information provider in the financial markets in Hong Kong having entered the market about eight years ago. The company provides terminals to banks, other financial institutions and retail brokers, who act to aggregate the investments of small savers in Hong Kong and invest on their behalf in markets which place impose thresholds. Knigh-Ridder probably services over 4,000

terminals in Hong Kong, but rather than a substitute to Reuters or Telerate, Knigh-Ridder tries to be a complementary product, although Knigh-Ridder has particular strength in its commodities coverage. To differentiate its product Knigh-Ridder adds value through its own news service. Dealer positions in financial institutions usually have between two and three terminals providing information, and if one is either Reuters or Telerate, Knigh-Ridder try to be one other. The company's open access network allows customers to use their own PCs with Windows software, and LANS applications. When both terminal and software are provided by Knigh-Ridder monthly fees begin at around

US\$2000 and typically fall by discount. Knight-Ridder also supplies service to Hutchison paging and Mobile Data.

Quotron/ADP

Until this year Quotron Information Business Ltd was a Citicorp Bank subsidiary providing data feeds from the New York and other leading stock markets, along with financial news, and also a forex trading system, FX Trader, offering an inter-bank dealing system over a Digital network. Recently ADP (Auto Data Processing) has purchased Quotron, leaving FX Trader with Citicorp. ADP runs an open access network in Hong Kong, based upon Windows software. ADP has added Asia-Pacific feeds to its world's leading stock market feeds and currently supports around 80 terminals in Hong Kong. The main customers are brokers, fund managers and research departments. Like Reuters, Telerate and Knight-Ridder, APD also acts as a gateway for other services, such as AP-Dow Jones and Standard & Poors. Terminal access fees are around US\$1,300 per month.

Other international players are less strongly represented in Hong Kong, but the fiscal crisis of States around the world during the 1980s which has led to universal divestitures and privatizations of State industries is rapidly creating new and enlarged financial markets. Hong Kong is a natural centre for selling these opportunities to local, regional and international investors. So companies like Japan's Quick Corporation has gained a foothold, and Bloomberg, operating from Singapore, is now trying to establish a bond marketplace in Hong Kong. As is clear from the outlines provided above, product differentiation will to a large extent determine the success of new entrants.

Teletext in Hong and the China Market

Teletext and China

Over-the-air broadcast Teletext as a public service has not generally been available in Hong Kong, but Asia Television (ATV) and Television Broadcasts (TVB) are currently working in collaboration with China's Institute of Broadcast Science on a Chinese Character System Teletext (CCST) which conforms to the World System Teletext (WST) standard. Trials are expected this year across the Pearl River Delta area, with

both simplified and traditional Chinese characters which should allow future customers to choose their preferred character set. Using digital broadcast technology reception has been found to be good even in Hong Kong. A card-adaptor will also allow reception on a PC as well as a TV screen. If successful, CCST will prove to be the first of its kind. But all the signs are that this enterprise is still at the stage where it is engineering driven. Teletext has proved a commercial flop in most countries and considerable analysis of the China market will be necessary before this venture gets off the ground. And, of course, cable TV may keep it grounded.

Videotex and China

Another development in China which could present long-run opportunities for ISPs and operators in Hong Kong is the collaboration underway between France Telecom and the China Academy of Posts & Telecommunications in Beijing to develop a videotex network. The current upgrading of Chinapac, China's packet switched data network, and the long-distance optical fibre cabling being constructed between all major cities in China, will provide a backbone at least down to provincial levels. China's Vsat programme will also help. But the lack of data bases in China will have to change, which poses difficult informational issues for the PRC. But already Reuters, Telerate and Knight-Ridder are supplying financial information between China's new stock markets and Hong Kong, and ADP has plans to enter the China market.

Computer Reservation Systems

Three CRSs operate in Hong Kong and all require licences from the Travel Agents Licence Registrar. The Travel Industry Council (TIC), a voluntary industry body, regulates the CRSs, along with other aspects of the travel business including agents' commissions and insurance. The largest CRS, because

it includes Cathay Pacific, is Abacus, a consortium formed in Singapore in 1989 which began life piggy-backed upon the NorthWest Airline system WORLDSPAN. The host data base remains in Kansas City, although Abacus plans to configure the WAN to allow local agents to operate discrete data bases for confidential customer information. Abacus operates 2,400 terminals for around 660 agents at around 750 locations. This represents around ninety per cent of agents involved in airline bookings. These are dumb terminals but will be changed to PCs on a LAN using a Unix workstation and IBM-compatible file servers. Monthly charges for terminals start at HK\$1,250 and fall to HK\$180 for five or more terminals. A Dataline fee of HK\$810 is added. There are no usage charges. Agents receive a nine per cent commission from the airlines.

Galileo, the United Airlines network, which includes British Airways, is the second CRS in Hong Kong in terms of 120 locations. TICTAS, which is owned by the Hong Kong Travel

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Agents Association, is the agent for the American Airlines network, Sabre, the third CRS, with 75 locations, but with 350 workstations it may outstrip Galileo. Asian systems used to employ dumb terminals, but the trend is towards workstations which offer opportunities for integrating the accounting and client information stored in local agent data bases with the host computer data base, including airline schedules, hotel reservations, weather reports, car hire information, so a reservation may be printed out with information combined into one statement. And for the future, video pictures of holiday locations, and similar services will become available. And clients will be able to interconnect through their own PCs, possibly making their own reservations, or in-putting their requirements for processing by the agent.

The separate existence of three CRSs is also likely to give way to an integrated system. The original separations were defensive postures by smaller airlines which felt threatened. Now each system can book for all airlines, so separation looks increasingly irrelevant. Integration and greater interactivity, with the CUG character of CRSs also breaking down seems to be indicated for the future.

Marketing and the Future of Videotex

The Market

Neither the Census and Statistics Department nor the Computer Society seem to have any estimate of the number of households who own a PC in Hong Kong, but some industry people believe it may be as high as three out of five. Hong Kong schools frequently offer computer courses and parents are reportedly keen to buy PCs for their children. Cloned PCs are very cheap and easily available. So is software. A senior executive of one of the local companies was seriously convinced that virtually every household would own a PC within one to two years.

This reinforces the widespread view among local companies that the residential and private markets for financial, news and racing information services is the fastest growing sector of terminal connections. Cantonese is the mother tongue of nearly 98 per cent of Hong Kong residents, so Chinese character sets are overwhelmingly in demand. But there are certain constraints on demand. Among more sophisticated PC users bulletin board services are much more popular than the services of the IS operators. The window-shopping habits of Hong Kong citizens defy efforts to introduce home shopping. There are no charges on local telephone calls so directory enquiries and some other information services are free, while others are cheaply available. Home fax machines are becoming widespread and fax polling will become more popular.

According to CSL, most current users are male and beyond their mid-twenties, as the pattern of demand for services might suggest, but females are starting to become customers in greater numbers. It is clear that the main thrust of vendors to these lower end markets is advertisement, including introductory offers, and roadshows, for example at shopping malls. Demonstrations are offered by CSL at its central training centre. One view was that the keyboard, which has been a key development in technology of information systems, remains a problem for many users and needs to be replaced to stimulate the market.

Several local companies felt that the business markets were close to saturation. Advertisements were used, but direct mailing was more common and, among the smaller companies, cold calling. AFE, which targets larger companies, was more systematic in its approach, categorizing companies according to whether listed or unlisted, and the size of listing. And as we move up the market the business sector becomes the focus of marketing, advertising becomes less important, except perhaps where new products are being introduced, cold calling drops away, direct mail remains important, but personal contact by salespeople becomes very important. This is often accomplished through regular visits which include maintenance and consultancy advice.

The importance of software and hardware upgrades seems significant in this process, because advising a company on upgrades is an important point of contact for building intimate customer relations. All the international companies try to build upon this type of relationship. The larger companies were also involved in sponsorships at exhibitions, public occasions and on display at trade fairs. But this was widely regarded as more to do with public relations than sales as such.

Finally, the China market remains an enigma, but one which more and more companies are looking to unravel. The growth of stock markets and property markets in China are the first

targets.

The Future

In the residential market Wharf's plans to build a broadband cable TV backbone has obvious implications. The other major catalyst for the use of electronic communications in Hong Kong may be EDI. The nature of demand in Hong Kong remains undeveloped and skewed. Hong Kong thrives on trade, including services such as banking and shipping, in which highly sophisticated electronic networking is essential. Yet beyond these international sectors most of Hong Kong's industry and commerce remains in the hands of small and medium-sized businesses employing below 50 or below 500 workers. See Sit and Wong (1989), and Ure (1992).

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The requirements of these sectors for electronic information systems and access to data bases are currently bounded (i) by their real needs in the light of easily available, cheap and reliable substitutes, such as social networking, telephone, telex, fax and mobile communications, courier services, and relatively inexpensive local travel; (ii) by the preponderance of long established family ownership of companies in which time-honoured management practices are slow to give way. Any significant change in the use of information technologies in these sectors will require shifts from two sides. A younger generation of entrepreneurs familiar with the use of PCs and computer programmes will slowly change the culture of management in these businesses. But the information service operators have to design their services in ways which appeal to both the imagination and the pocket of these business people.

Among the established users of financial data the trends are

already evident. First, is the demand for more information, for example, for more regional or European financial data. Second, the demand for software which can offer ever more sophisticated analytical modelling of data, but third, ever faster systems, and fourth, easier systems to use. There will inevitably be a race between upgrading and cost reductions, with the latter being subject to a growing intensity of competition between vendors. The challenge at the corporate level will also be to bring back office and front office into integrated systems of office automation, for example, accounts and customer service, increasingly within a Unix environment. Telecommunications speeds will also need upgrading from their current 9.6Kbps for most domestic links, and the standard 19.2Kbps and 64Kbps for international networking. So software, hardware and telecoms developments will continue to leapfrog each other.

Lip serve is paid to multi-media developments, but while all players are thinking about it, few anticipate its imminent application. Research and development in Hong Kong does not, for the most part, involve the technology but rather the service applications. But most vendors do anticipate the growth of inter-active service capability and demand, and are planning for it. So the original videotex concept may yet be reborn in the wider context of information systems moving towards multi-media applications.

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APPENDIX

Vendors Connected to HKSE Real Time Digital Data Service
(As at 1st January 1993)

ABC Communications Ltd
All-Quotes, Inc.
Bloomberg
Bridge Information Systems (HK) Ltd
Financial Telecom Ltd
HongKong Telecom CSL Ltd
HongKong Bank
Hutchison Information Services Ltd
Knight-Ridder (HK) Ltd
Quick Information (HK) Ltd
Quotron Information Business Ltd
Reuters (HK) Ltd

Telekurs (Singapore) Pte Ltd
Telerate Financial Information Network (HK) Ltd

Vendors Connected to HongKong Telecom's Port

Bartech Pro Trend
Epro Paging Services Ltd
Hong Kong Trade Development Council
Hutchison Paging Ltd
Kantone Paging Company Ltd
Telequote Data International Ltd