THE MARKET FOR VIDEOTEX TELETEXT AND RELATED SERVICES

DSS CONTRACT

IER: 36100-4-4211

WESCOM COMMUNICATIONS
STUDIES AND RESEARCH LIMITED
Suite 105, 853 Richards Street
Vancouver, B. C. V6B 4K5

November 1985

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CHAPTER I - OVERVIEW TO THE ASSESSMENT OF VIDEOTEX AND TELETEXT

1.0 Introduction

Since their inception in Canada in 1979, videotex and teletext services have received significant attention and scrutiny from the Department of Communications. This attention has taken the form of technical, economic, social, policy and market research studies. Of most relevance to this study are the previous market assessments which have been undertaken to forecast the opportunities and growth for videotex in Canada and North America.

Over the past five years the markets for videotex and teletext have in most cases not developed in a manner consistent with industry and government expectations. A variety of explanations have been advanced for this which emphasize the difficulty of appraising the course new technological innovations are likely to follow and the response of potential users to actual services.

The Department of Communications recognizes the continuing importance of videotex and teletext as well as a host of other specialized information services to various sectors of the Canadian and North American market place. Even though the technology is changing at a rapid pace and the needs and expectations of the market are constantly shifting, a more formal assessment of these and related technologies and their markets is required.

This report presents an in-depth market assessment of videotex, teletext and related services. The main focus of the study centers on the short and medium term opportunities for these technologies in the Canadian market along with a more general appraisal of international opportunities, including the United States, over a 15 year horizon.

1.1 Objectives

The stated objectives of this study are:

1. To carry out an in-depth market assessment for videotex and teletext-type services in Canada, and to provide a non-detailed market assessment for the international market, with a primary emphasis on the United States and a secondary emphasis to be placed on emerging European, Southeast Asian and other markets. This assessment will focus on technology, costs, services, pricing strategies, vendors, customers and ultimately market demand. The time frame determined for this assessment is the short, five year and medium term period (i.e. 5 - 10 years).

2. To forecast the likely new net economic activity which could be generated and to express this in terms of dollars, employment, jobs created and overall industrial impacts.

3. To review potential areas for further research and development, applications programs, and regulations which may maximize the industrial and social benefits of videotex and related services for Canada.

1.2 Procedures and Task Definition

To accomplish the stated objectives of this study a series of tasks were specified which formed the basis of our approach. These tasks were:

1. To identify the existing market situation for videotex, teletext and related services. This involved describing the various configurations of services, types of technologies including the pricing characteristics and level of current penetration.

2. To forecast, through an examination of market requirements the demand for videotex, teletext and related services. To develop specific models for the different types of services and applications which are forecast. These models encompass consideration of the types of services and hardware along with their costs and pricing strategies.

3. To formulate a demand methodology for developing an estimate of the market for videotex, teletext and related technologies.

4. To forecast the demand for videotex, teletext and related services according to the various classes of services. This aspect of the analysis is intended to provide an indication of the competitive position of videotex within the overall market environment.

5. To estimate the new net economic activity likely to be generated by the new services and to estimate the impact on various industries - notably the hardware, software and telecommunications sectors.

6. To provide recommendations and to identify services for which applications may be beneficial. To identify areas for further R & D and to identify requirements for regulation and standards that will assist in maximizing the social and industrial benefits to Canada.

1.3 Report Outline

Chapter one provides a brief introduction to this study and identifies the required tasks and objectives of the report. The structure of the succeeding chapters are then reviewed.

Chapter two of this report introduces the technologies being investigated and provides a description of their technical features and operating characteristics.

It defines what has been included within the generic terms of videotex and teletext and identifies their various forms. The history of the development of videotex and teletext in Canada is then reviewed with attention focussed on the emergent forms of delivery, standards, product configuration, software, hardware and applications.

Chapter three provides an overview of the current market for videotex, teletext and the related services identified in the second chapter. The analysis is based on the examination of secondary research reports, industry trade journals, interviews with industry service providers, hardware manufacturers, software producers, industry consultants and system operators.

The scope of this analysis encompasses the North American markets. The main market sectors were identified as residential, business services, public access, education and specialized applications. Within each of these subgroups we identified the dominant applications such as financial transactions, non-programming cable services, online shopping, information retrieval, home banking, shopping guide services, educational services, business services and government information services.

A number of case examples are introduced to illustrate the nature of the types of services being offered within the various markets for specific applications. This is complemented with an assessment of the number of services being offered, their penetration into particular market segments and in some cases the nature of the users and purchasers of the services. Future or planned services and applications are discussed according to the particular service types and market sectors.

Chapter four provides a review of the international market developments and focuses mainly on Europe and Japan since these represent the most active areas outside of North America. Other Asian countries as well as New Zealand are known to be implementing NAPLPS or NABTS videotex and these are also reviewed as part of this chapter.

Chapter five presents detailed discussion of the software, hardware and service model trends for the industry. Terminal equipment, display hardware, page creation systems, storage devices, peripherals and transmission technologies currently in operation and those planned for the near and medium term future are all assessed. This is presented for the different system configurations used for the provision of in-home cable or telephone based services, in-house business systems, public access services and specialized applications.

Chapter six presents the procedures and methods for deriving the detailed market forecasts for the various classes of videotex and teletext services identified in the previous chapters. A brief review of past approaches is provided along with an appraisal of the strengths and weaknesses of each. It must be appreciated that the approach used for a particular sector analysis is conditioned to a large extent by the degree of development of the sector and the availability of primary or secondary data. The approach adopted for this analysis is therefore based on a careful assessment of the relative merits of various methodological approaches and procedures given the unique characteristics of the specified technologies. This approach is then applied to forecast the market, both qualitatively and quantitatively over the short, medium and long term.

Chapter seven utilizes the approach developed in chapter six to provide forecasts within each of the primary market sectors. These include the residential or household sector, business closed user group sector, public access sector, online banking and shopping interactive services, education and training markets. The forecasts have been made for the 1984 to 1989 period.

Chapter eight provides an assessment of the economic impacts of videotex, teletext and related services for the North American market. This appraisal is tied directly to the market appraisal provided in the previous chapter.

Chapter nine provides a set of recommendations stemming from this study. These are focussed on issues of industry and market development, policy and implications for the broader high technology sector in Canada.

1.4 Summary

This chapter has provided the overview and framework within which this study has been conducted. The approach follows, in a general way, a technology assessment which attempts to integrate the emergent technological trends within a framework incorporating new applications, market forces, economic activity and regulatory structures. The purpose is to forecast the future course of the technology. The basic steps in this process have been introduced and their relationships specified.

CHAPTER II - REVIEW OF VIDEOTEX AND TELETEXT DEVELOPMENTS

2.0 Defining Videotex and Teletext

2.1 New Media

Advances in computer and communication technology have led today to the development and production of a whole set of hybridized systems for the delivery of information services to the home and office. The principal feature of these services is that various elements such as information data banks, indexing structures, computers, networks, and software are being integrated together to produce totally new products or services. Two such products, are videotex and teletext.

Many of the microprocessor based technologies which have emerged within the past few years are commonly referred to as "new media", and within this categorization videotex and teletext technologies represent "a combined media". New media are, in essence, those communication technologies typically involving computer capabilities (microcomputer or main-frame that will allow or facilitate interactivity among users or between users and information sources). As such, they require a two-way linking capability within the same transmission channel as exists with networked microcomputers. Another primary component of this system is the main-frame, mini or microcomputer. Joining the computer to a telecommunications transmission system enables interactivity among the systems components as well as human control over the pace, structure and content of the communications. Transmission mediums and storage mechanism could include twisted copper pair cable, coaxial cable, optic fibres, microwave transmission, satellites, video, laser and optic discs.

2.2 Videotex

Videotex has a multitude of capabilities and characteristics, and in its most general terms can be viewed as a computer technology that enhances the way in which textual and graphic information can be displayed and handled. It simplifies the process necessary to accomplish remote access, retrieval and exchange of computer-stored information.

As Tyler (1979)[1] has stated, Videotex represents a technological advance in software development. It represents a new way of packaging computerized data and enables the widespread dissemination of textual and graphic information. By way of wholly electronic means, display can be provided on low-cost terminals which are under the selective control of the recipient, using control procedures easily understood by untrained users. There are two generic forms of videotex; broadcast videotex or teletext and interactive videotext.

Videotex-type systems can be considered within the structural framework of a computer communications system. The American National Standards Institute and the International Organization for Standardization (ISO) have specified a so-called reference model for open systems interconnection, wherein a computer communications system is said to comprise seven functional layers. The seven layers are, in descending order:

a. Layer 7 - application layer.
b. Layer 6 - presentation layer.
c. Layer 5 - session layer.
d. Layer 4 - transport layer.
e. Layer 3 - network layer.
f. Layer 2 - data link layer.
g. Layer 1 - physical layer.

Videotex, is in essence, a presentation layer (Layer 6), one layer out of seven that is needed to specify a computer communications system. The presentation layer defines the character set to be used for the system data, the text and graphics coding scheme (alphamosaic/alphageometric/alphaphotographic) and the attribute coding scheme (serial/parallel).

Videotex is simply one family of data packaging technology for computer communication systems. The log-on procedures, transmission medium and the particulars of other system layers must necessarily be specified before any videotex application can come into being, and such system trappings are not part of the technology of videotex itself.

In Canada, Telidon is the name that identified the particular configuration of videotex that was developed by the Communications Research Centre of the Canadian Department of Communications. Since its development in the early 1970s, changes have been made to the Telidon protocol, leading to the current configuration referred to as NAPLPS (North American Protocol Level Presentation System). This is a protocol level enhancement of the basic Telidon system.

With videotex, pages of information are created and edited on a page creation system, either a special unit or a suitably equipped microcomputer. The databases are generally designed to permit the accessing and rapid retrieval of specific items of information on the system. Transmission between the user and the computer can be accomplished on the public telephone network, cable CATV or hardwire LAN type system. Generally, a modified TV signal with a decoder translates the data and builds up the video image on the screen. Personal computers equipped with colour monitors and graphics software or decoder bound are now the most popular display devices. The decoder may be plugged into the antenna or RGB socket of a television. Page transmission is selected by the user through a keypad or a keyboard, and in some cases, touch screens or voice-activated systems are possible. The system generally has two-way capability, allowing the user to send messages to the computer, the database or another

terminal on a network. When telephone systems are utilized, transmission of data to the user is usually at a higher speed than transmission from the user to the system. In videotex systems, the databases are not routinely cycled, but rather are set up with search procedures for access to individual pieces of the database or specific pages. Access time is generally a function of the processing capacity of the computer, and the volume and pattern of usage on the total system.

Exhibit 2.1 and 2.2 present generic videotex and teletext system configurations.

EXHIBIT 2.1

Broadcast Teletext

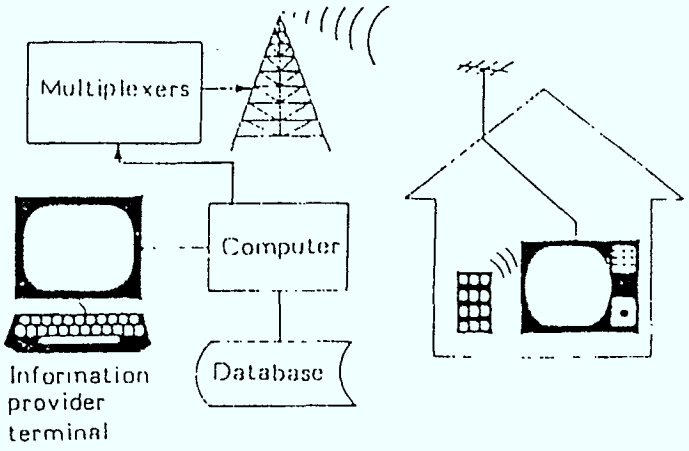
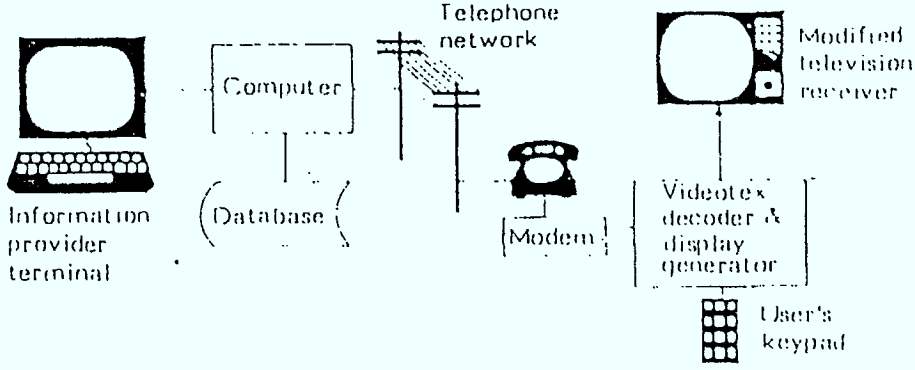


EXHIBIT 2.2

Videotex via Telephone Line



After: Tydeman et al., "Teletext and Videotex in the United States," 1982.

2.3 Teletext

Teletext refers to a system where information, consisting of alphanumeric characters or graphic images, is edited on a keyboard or generated from a computer-stored database. It is encoded in a bit stream of digital data at a transmission rate that is compatible with colour TV systems. In North America, this is represented by the NTSC standard of 525 scan lines on a standard television set. In Europe, this is on the basis of a 625 line picture. One format for teletext use is encoded data which is multiplexed onto a video signal and transmitted over the TV signal using the unused portion of the vertical blanking interval (vbi). In another configuration a full channel can be used.

Data sent using a TV signal is detected by a teletext decoder attached to the users television set or directly wired into the RGB beam circuits of the colour TV. The digital data is accepted, stored as one or more pages in a memory, and then displayed on the screen as directed by the user. This can be accomplished through utilizing a keypad or keyboard. A page of information received over the broadcast signal is transferred to the television screen via a character and graphics generator that is part of the decoder. The page remains on the screen until the replacement page is requested by the user, or the system is switched off.

In general, when utilizing the vbi, between 100 and 250 pages of information are capable of being broadcast. Full channel TV allows more pages and more access to be achieved, with up to 5,000 pages in some cases. Various transmission mediums can be utilized for teletext services including CATV, cellular radio, low-powered TV, direct broadcast satellite or FM radio. Point to point or multi-point distribution systems are also possible.

At the present time, two incompatible standards exist for Teletext: ois the UK World Teletext Standard based on the Teletext network of the British; the other is the North American Broadcast Teletext Specification (NABTS) evolved from

the Telidon and Antiope systems, which is becoming the de facto standard in North America. The NABTS standard is favoured by the French who are actively marketing a system in the US and worldwide through Videographics Systems of America. This standard is also supported by a number of very large communication companies including AT&T, CBS, NBC, RCA and PBS. All Canadian television networks working with the technology are committed to NABTS.

Several forms of Teletext have emerged, but in most instances the short term will see services similar to those planned by CBS, NBC and CBC, which can be considered as a more limited version of Teletext utilizing the vbi. In such cases, only up to about 250 pages of information are being transmitted.

2.4 Evolution of Telidon and NAPLPS Videotex In Canada

Telidon was invented at the Communications Research Centre (CRC) of the Canadian Department of Communications. Prior to Telidons invention, the CRC had been engaged for several years with interactive computer graphics and computer design for applications in Canada's space satellite program. Stemming from this previous experience, research was initiated into this new interactive visual communication system in 1969.

Between 1969 and 1970, effort was concentrated into building the requisite hardware and software to advance Canadian capabilities in this interactive graphics area. This research led initially to a new interactive programming language (IGPL) and to a preliminary definition of picture description instructions (PDIs).[2] In the intervening years, until 1979, both the Telidon hardware and various communication protocols involving PDIs evolved to a point where the Telidon terminal contained its own intelligence. A number of possibilities were examined for Telidon's display technology to transmit pictorial and alphanumeric imagery. To avoid developing a picture coding scheme which was tied to a particular display technology, the terminal independent alphageometric PDI coding scheme was defined.

In 1975, the CRC gave a contract to Norpak Limited to develop an interactive colour display technology which was based on the work that the CRC had previously done. This contract led to further work between the CRC and Norpak to develop specialized terminals and other colour display systems. By the end of 1977, the CRC research on interactive graphic systems resulted in three patent applications: one for a touch sensitive input mechanism for computerized graphic displays; one for a new interactive visual communication system; and the last for a new interactive graphics programming language.

The first Telidon terminal was publicly demonstrated in August 1978, and in that month the Department of Communications announced its first four-year Telidon development program which received $9.7 million in funding. Under this program, the Department of Communications instilled a number of incentives to encourage the private sector and government agencies to utilize Telidon. These included field trials and public demonstrations of the technology, lobbying in the videotex standards negotiations, international marketing efforts, and the formulation of policies to deal with social and economic effects of the new technology.

This first stage of the government's Telidon program also provided financial and technical support for the use of Telidon in trials by New Brunswick Telephone (Project Mercury), Manitoba Telephone System (IDA Project), Bell Canada Telephone System (Vista Project), Telecable Videotron, the Ontario Educational Communications authority, and WETA in Washington, DC. During this period, Telidon was successfully tested via the Canadian Satellite Hermes. This was soon followed by the first major Telidon sale to the Venezualan government.

In February 1981, the Department of Communications approved a $27.5 million increase in funding for the Telidon program for 1981 to 1983. Eventually, this time frame was extended to March of 1985, and accompanied by a further monetary committment from the Federal government of $23 million for content development, market penetration and government procurement. The motivation behind this investment was to increase the fiscal stimulation to the Canadian

Telidon industry and to encourage the private sector to assume responsibility for marketing and further industrial growth.

In addition to these technical and political developments, a considerable government and industrial infrastructure arose to meet the objectives of the Telidon program. The Telidon program's objectives were: "To promote development of a national Videotex infrastructure through appropriate standards, regulations and technology; to encourage the creation of a viable Telidon industry producing hardware, software, systems and services; to encourage joint government-industry research and development, product development, promotional activity; and to support market trials and operational systems."[3]

In Canada, the Telidon industry comprises a complex grouping involving commercial and public enterprises, regulated monopolies and government agencies. The main role of the government in this effort has been a catalytic one, to assemble these various elements into a working industrial infrastructure under a common Telidon standar. The primary purpose of this effort being to encourage the transfer of this government-developed technology to Canadian industry and business. The initial means the government used to accomplish this was through financial support of the Telidon field trials. Subsequent efforts to stimulate the adoption of Telidon included the Industry Investment Stimulation Program, the Public Initiatives Program, the Content Development Program, international marketing as well as direct procurement from Canadian companies.

While these industry and government programs were proceeding, important developments were similarily taking place in the area of standards specification. In 1979, the International Telegraph and Telephone Consultative Committee (CCITT), the United Nations agency responsible for standards for international telecommunications, recommended the adoption of Telidon's protocol as one of the three world videotex standards. By May 1981, American Telephone and Telegraph (AT&T) announced that it was adopting a Telidon compatible videotex protocol. This announcement was critical to the later establishment of a single videotex standard for North America.

In 1983, the AT&T Bell System, DOC and the Canadian Telidon Agency augmented the picture description instructions which had been published by the Canadian government. This led to the formation of the current standard NAPLPS. Corresponding developments in the Teletext market led to the NABTS standard.

2.5 New Directions for Videotex and Teletext

In order to set the stage for the ensuing chapters it is important to consider some of the more recent developments in this industry. These developments are setting the tone for the most important trends in service offerings and market developments which constitute the focus of this report. Significant alterations have occurred in almost every aspect of the videotex and teletext industry in the three years since its last major examination by the Department of Communications. Some of the most critical developments effect: standards, service providers, network providers, product configurations, applications and competitive services.

The initial introduction of Telidon into Canada began in 1979 and by 1982, 24 field trials were being carried out in different parts of the country under a variety of system and service conditions. Services were instituted as joint ventures under the federal government's 1983 Content Development program and the IISP program. Two of the more successful of these were the Teleguide system and the federal government's Cantel project with approximately 100 terminals distributed throughout the country. Teletext trials were undertaken primarily by TV Ontario and the CBC.

Over the past two years, dramatic changes have occurred in the nature and orientation of the videotex industry in Canada, the United States and elsewhere. This is the case for videotex and teletext and for a set of emerging technologies which have come about largely through the merging of other established electronic communication devices, such as video discs, high definition TV

(HDTV), large screen displays, personal computers, local area networks, mobile services, satellite broadcasting and FM broadcasting of videotex signals.

Presently, assessments of the market opportunities for videotex are beginning to focus on a number of areas quite different from those originally envisioned. No longer, for example, is a mass market for in-home standalone videotex terminals seen as a likely possibility. In addition to the high price of such terminals, a number of complementary technologies with higher market penetration lend themselves very nicely to videotex applications at a much cheaper price. In the business market, Telidon (NAPLPS) videotex is more likely to be seen as an add-on feature of a management work station, personal computer or as software within an office automation context.

The original players in this industry were telephone companies, newspaper publishers and the federal government. Today banks, financial service companies, software and high technology firms represent the key players. Specialty services for business, education, training and public service are all actively being pursued. Videotex NAPLPS software is playing a major role in these applications, available on a variety of microcomputers acting as display, page creation units and data base systems at prices ranging from $99 to $1,500. Within the hardware sector, the most significant developments have been the shift to the production of VSLI chip sets which can be placed into existing personal computers and decoders, providing both NAPLPS and NABTS capabilities.

Technology developments in transmission systems have also taken place, providing the capability for using telephone lines, CATV, satellite broadcast, microwave, FM radio and optic fibres. These transmission systems are utilized by a variety of display technologies which include adapted TVs using set top decoders, RGB monitors, microcomputers with colour terminals, digital television screens, touch screens, video laser discs and monitors.

2.6 Standards Specification and NAPLPS

The establishment of the North American Presentation Level Protocol Syntax, or NAPLPS, must be considered one of the most significant industry developments of the past two years. Three standards exist and have been approved by CCITT for Videotex systems throughout the world. These are the alpha-geometric NAPLPS, the alpha-mosaic CEPT format endorsed by the Conference of European Post and Telecommunications Administration, and Japan's alpha-photographic Captain system.

Lum (1983),[4] in reviewing the history of the development of international videotex standards, points out that the United Kingdom was the pioneer in developing their Viewdata system, Prestel, based on the alphamosaic scheme. The French Antiope system was based on an alphamosaic parallel scheme while in Europe a merging has occurred with the definition of a CEPT standard, combining serial and parallel schemes by means of a time independent switch. While NAPLPS has only recently been promoted as the official standard in both the US and Canada, there has been unofficial acceptance of NAPLPS as the de facto North American standard for some time.

The relative merits of NAPLPS include:

1. It's independence from hardware technology. Terminals may have high, medium or low resolution and have different ranges of colour capabilities. NAPLPS allows for these variations and has what is referred to as a forward and backward capability. Forward capability means that existing terminals can receive all future command formats, including future enhancements at the current standard, while backward capability means that the future terminals will be able to access old data bases.

2. Since its incorporation of the Unix screen concept, coordinate systems are not expressed in physical dimensions or fixed grid formats, but rather in normalized units or binary code. This ensures that pictures will be displayed independent of the hardware configuration and that objects within pictures will remain in the same relative position with respect to each other, even though the resolution of the physical display may be changed.

3. NAPLPS code is based primarily on the use of point, line, arc, rectangle and polygon encoding schemes. With these one can draw very simple pictures such as graphs, pie charts, etc., or alternatively very complex pictures. The incremental point function allows photographical type pictures to be drawn. Dynamic redefinable character sets (DRCS) capability for NAPLPS is independent of hardware implementation of the terminal. This is achieved by a downloading process which uses the unit screen for the description of a symbol shape, which is then scaled down to the storage character size as implemented within each terminal. Only the shape of the DRCS character is stored.

4. Mosaics. A mosaic code table, which is the union of the French and British mosaic standard, is also included in NAPLPS primarily to facilitate the interworking with the European system.

5. Macro. Macro instructions are an efficient way of coding and transmitting information to a terminal which uses that same information several times. In the case of the transmit macro, it provides the user terminal with what has been called programmable function keys, i.e. functions of these keys depend on the macro instructions being sent back to the data base computer.

6. Alpha-numeric text. In NAPLPS the primary set is the 7 bit ASCII code table, which is the de facto world standard for ordinary computer terminals. The objective in using this is to ensure that NAPLPS Videotex terminals, if equipped with a keyboard, can be used as normal computer terminals, thereby enhancing the utility of the NAPLPS terminal.

Other key features of NAPLPS include its colour capabilities, blink capabilities, texture filling capabilities, character size scaling, rotation, scrolling and its wait command.

Additional conforming features have also been noted by Lum (1983):[5]

1. Videotex and Teletext services using NAPLPS can have blind interchange, i.e. the data base need not negotiate on the capabilities of the terminal before sending out the data. Data base information pages created for Videotex and Teletext can be easily interchanged, ensuring a widescale portability of data base pages.

2. A unified specification for Videotex and Teletext allows the design of one VLSI chip set and encourages manufacturers to build larger volumes of the product rather than small volumes for each of several specifications.

The specific features of the NAPLPS protocol are outlined in Exhibit 2.3

EXHIBIT 2.3

NAPLPS - Features and Implementation Requirements

Functions	SRM Requirements
1. Character Sets	- 94 Primary (ASCII) - 94 Supplementary
2. Geometric Drawing Primitives (PDIs)	- Point - Line - Arc - Rectangle - Polygon (256 vertices) - Incremental point - Incremental line - Incremental polygon - 256 vertices limit for Polygon and Spline
3. PDI Attributes:	
- Domain	- Single-value operand - Multi-value operand - 2 & 3 dimensional modes - Logical pel
- Text	- Rotation in 4 directions - Move in 4 directions - 4 inter-character spacings (1, 5/4, 3/2 and proportional) - 4 inter-row spacings (1, 5/4, 3/2 and 2) - 4 attribute combinations - 4 cursor styles - display formats (40x24, 40x20, 40x10, 32x16 and 20x10)
- Texture	- 4 line textures - 4 define & 4 programmable masks - highlight in all colours
- Colour	- 3 colour modes (0, 1 and 2) - 16 colours out of 512 palette
- Blink	- 16 simultaneous blink processes

EXHIBIT 2.3
(continued)

Functions		SRM Requirements	
3.	PDI Attributes: (cont'd)		
	- Wait	-	0 - 1/10 sec minimum duration
	- Reset	-	Selective
4.	Mosaic Set	-	65 codes
5.	Macro Set	-	96 macros
6.	DRCS	-	96 characters
7.	Control Sets:		
	- C0	-	Execute and present all
	- C1	-	Create macro, DRCS and programmable masks
		-	40 unprotected fields

Source: Chang, K., "Videotex through Microcomputers with a Review of Current Developments in Canada," Ottawa, April 1984.

2.7 World Standard Videotex

Efforts have recently been made by France, Canada and Japan to derive a universal videotex standard which represents the initial step toward a worldwide unified videotex standard (WWUVS). The principal idea is that the three conflicting standards would accept North American NAPLPS. In late 1982 and early 1983, it was announced that each of the three standards would be left intact, but that enhancement to these, such as the addition of audio or photographic capabilities, would be worked on jointly with a single standard to be developed at a later time.

2.8 Response to the NAPLPS Standard

Many observers believe that the settling of the NAPLPS standard is the key to the ultimate success of a videotex industry in North America. The setting of a standard has significantly reduced the uncertainty in the industry, and has already encouraged investment in the development and manufacture of VSLI chips and software on floppy discs for microcomputers. Computer manufacturers are also examining these chips sets with many, including Apple, IBM, and DEC showing interest. Related to this is the fact that the European CEPT standard and world standard Teletext incorporate the NAPLPS protocol. Likewise in the Southeast Asian markets, Japanese manufacturers are examining NAPLPS protocol for incorporation into their products and services. Overall, there has been gradual adoption of NAPLPS and NABTS in foreign markets such as Japan, Singapore, Korea and other parts of Europe.

Until recently, the uncertainty surrounding the Videotex industry was attributed to the lack of a North American Videotex standard. Decoder manufacturers, it was argued, could only benefit from economies of scale if a unified market environment were to exist. A report produced for the Videotex '84 Conference[6] in Chicago stated that while the adoption of NAPLPS by the relevant North American Standards Organizations ensures manufacturers the potential for

economies of scale, the short term production of reasonably priced full NAPLPS terminals is constrained by the nature and extensive scope of the NAPLPS standards. The development of a Videotex industry in North America, it is argued, may still centre on the issue of standards, but more specifically on the short term viability of the full NAPLPS standard.

NAPLPS reconciles the three major presentation systems - Telidon, Prestel and Antiope - by incorporating certain coding features of each, giving the standard a status of universality and at the same time becoming a standard with a number of redundant features. As a result, the requirement to incorporate all aspects of NAPLPS standards into Videotex decoders could lead to non-optimally priced products. The main stumbling block in terms of production is the high price associated with memory storage capacity requirements. A number of industry spokespersons have suggested that NAPLPS, or at least full geometric coding, is too advanced for the current set of applications likely to take place in the near future.

On the other hand, there are a number of very special features of NAPLPS which enhance its capability and possibilities for commercial services. NAPLPS codes require only about 10% of the space used by equivalent presentation modes to define the same picture. This means that hundreds of pages of graphics can be stored on a floppy diskette and that NAPLPS frames can easily be transmitted in a reasonable length of time using normal voice grade telephone lines. NAPLPS is also display independent in that a vast range of terminals will display a minimal approximation of the intended picture.

2.9 Software Developments, Microcomputers and Videotex

Studies indicate that in 1982 there was an installed base of 4.5 million microcomputers in home and business markets in the US.[7] In 1983, the installed base had grown to an estimated 9.7 million units, while the 1984 base was projected to be 16.2 - 17 million units.

Evans[8] has predicted that in 1984, the Canadian computer industry will grow by 19%, well below the 25% annual growth rate of several years ago. Personal computers are expected to comprise almost $8.13 billion of the total predicted domestic computer market. During 1983, the installed base of microcomputers in Canada was estimated at 58,000 with a growth rate of 300% predicted for business micros selling for under $10,000.[9]

Given IBM's drive in the microcomputer market with the IBM PC, it seems likely that very shortly IBM and it's compatibles will control much of that market. This dominance will also increase the predominance of software vendors who furnish software which runs under the IBM PC's "DOS" operating system. Almost all business software now runs under DOS or it's clone, the MS-DOS. The range and versatility of software written for this operating system is increasing rapidly and it has many features which resemble those of IBM's Unix operating system, which is used for minicomputers and mainframes.

Telidon NAPLPS decoding software packages are available for a number of widely available personal computers including the Commodore 64, Apple II, IBM PC and other compatible machines. A number of microcomputer-based NAPLPS page creation and data base systems are also available. Software packages for NAPLPS page creation using microcomputers are being produced by Cableshare, Tayson, Limicon, Formic, Async, Microtaure and TV Ontario. These systems require the use of an NAPLPS decoder for display of the pages on a monitor. These new developments open up the possibilty of developing medium or large scale Videotex systems without using a mainframe data base computer. Such systems are particularly suited for public access or local area network oriented applications. A list of companies providing such products is provided in Exhibit 2.4.

EXHIBIT 2.4

Microcomputer-Based Telidon/NAPLPS Decoders

Company	Base Micro-Computer	Memory Required	Operating System	Language	Display Resolution	Simultaneous Colors	Extra Hardware Required	Remarks
AVCOR	Commodore 64	64K	C64 Kernal	Assembly	320 x 200	2/ch.cell 16 palette	No	Cartridge based
ASHCORE	Commodore 64	64K	C64 Kernal 3.2 or 3.3	C and Basic	320 x 200	8 colours or 8 grays	No	
	Apple II, II+, IIe	48K	Apple DOS	C and Basic	180 x 140	6 colours or 8 grays	No	
NORPAK/APPLE	Apple II, II+, IIe	48K	DOS 3.3	Pascal	128 x 96	15	Telidon Interface card	
MICROTAURE	IBM PC,XT	120K	PC DOS	Machine	256 x 200	16/512	Real Colour colour card	Features inc. downloading, slide show printing
MICROSTAR	IBM PC,XT	192K	PC/DOS	Basic & Assembly	320 x 200	16	Plantronics colour card	Also available for Hyperion, Compaq, Columbia, etc.
FDM	IBM PC,XT,PCjr	128K	PC DOS 1.1 or 2.1	Forth	320 x 200	16	Techmar or Plantronics colour card	
MICROPIXEL	IBM PC,XT	NIL	PC DOS 2.0	Machine	256 x 200 x4 planes	16 out of 16 million	EDT 100-based Board	Full SRM 16K Telesoftware, 8K Macro Composite video output
MANITOBA TELEPHONE SYSTEM	Commodore 64	64K	C64 Kernal	Machine	160 x 200	13 + 3	No	3 out of 13 colours and 3 gray scales per ch. cell
FORMIC	Apple IIe	64K	DOS 3.3	Machine	256 x 190	16	Taxan card	Also requires a 64K, 80 col card

Source: Chang, 1984.

2.10 Cable Industry and Videotex Services in Canada

The past few years have seen increasing activity and interest by cable TV companies in non-programming and interactive services. This stems essentially from the fact that revenues for programming services, particularly for such things as Pay TV and all movie channels, have not been as successful as initially anticipated. As a result, the cable industry is currently looking at ways to increase its service offering and to gain a share of the increasing market for interactive and non-programming services, such as in-home banking, shopping, games, downloading of computer software, interactive business graphics, stock market information, financial services and commodities exchanges.

Two types of cable networks can be distinguished: those comprised of residential subscribers, the industry's historical base; and the non-residential business and industrial networks. Although these business networks have not yet undergone intense development, they offer significant opportunities for the transmission of data and voice services. In the business market, however, two-way cable will be competing with suppliers of local area business networks such as Ethernet and Wangnet, which connect business equipment together using cable.

There are also significant opportunities for cable in providing broadband transactional capabilities for the residential market. The cable technology can provide such features as audio enhanced downloaded software, computer games, teleshopping and home banking, with content sent to specific subscribers via addressable terminals.

There is a considerable amount of uncertainty existing with respect to the regulation of non-programming services. The CRTC has postponed several regulatory decisions pertaining to cable in the last two years. At the present time the CRTC is, however, encouraging cable experimentation with non-broadcasting services. Both the CRTC and the Department of Communications are attempting to encourage cable services in order to delay the proliferation of satellite

dishes, since Canadian content can not be controlled on these. As well, the Canadian Broadcasting Act has served to restrict cable legislation. However, this is not immediately applicable to non-programming services such as teleshopping and banking.

A 1983 study conducted for the Canadian Telecommunications Research Institute by Nordicity of Ottawa estimated that approximately 20% of the cable industry revenues by 1990 will arise from the sale of non-video services.[10] It is anticipated that the cable industry, which in 1983 received most of its revenue from TV subscribers and pay TV services will by 1990 be receiving additional revenue from transactional services, Teletext, the downloading of software and games, and the users of personal computers. These are expected to generate revenues of close to $500 million.[11]

2.11 Summary

In this chapter, we have identified the major underlying forces affecting the course of videotex and teletext developments nationally and internationally. Some of these involve standards, software, ASCII videotex, VLSI chip developments and industry composition. The following chapters provide the detailed market assessment for videotex and teletext nationally and internationally.

CHAPTER III - CURRENT MARKET SITUATION

3.0 Introduction

This chapter provides a review of the current market situation for videotex and teletext services in Canada and North America. It is based on information gathered during the course of this project, up to the early part of 1985. Thus, developments and announcements after that time have not been included. In the first part of the chapter, the basic generic categories of these services are introduced and identified. In the second part, these are used to provide a description of current market activities in terms of the number and types of services, the extent of operations, and the applications being pursued. The majority of services are those which stem from videotex developments. The final section of this chapter addresses teletext which includes one-way services using the vbi in broadcast mode and cable.

Generic classes of videotex/teletext services have been determined from an examination of the activities currently taking place and from which specific applications have emerged. The classification scheme encompasses the following:

- residential services
- business services on-line
- public access services
- transactional services: banking, brokerage and shopping
- business closed user group services
- educational services
- specialized applications

One of the major problems with classifying services according to these generic terms is the degree of overlap which is inherent in the provision of videotex and teletext. Also, a further difficulty arises because specific applications may be

directed to more than one of the service sectors. For example, transactional services are considered as a distinct service for the residential and business markets and they can be provided using telephone lines, cable TV or satellite broadcast. At the same time, these services may be bundled into the more general on-line residential or business services. Thus, transactional services can be thought of as having their own primary market and a secondary market resulting from their inclusion in large scale integrated system operations. In such situations, a gateway function allows access to services on a selected basis.

3.1 Service Classes

For the purposes of this report, we have defined each of the generic service categories in the following manner.

3.2 Residential Services

These represent in home services providing a wide variety of information to the end user. The information could include on-line data bases, games, entertainment guides, transit schedules, transaction services, shopping guides and public service announcements. Services can be provided in a number of different protocols including NAPLPS, ASCII, Prestel, Telidon or CAPTAINS. Subscriber terminals could be a set top decoder, personal computer or stand alone videotex terminal. These services are usually provided by a system provider directly to the customer premises. In Canada, the largest service of this type is provided by Infomart through their Grassroots service. In the U.S. Keycom, Viewtron and Gateway are the primary service providers to the residential market.

3.3 Business Services

These services are similar to those of the residential sector with the exception that they are oriented primarily to the business market. Such services offer a variety of business oriented information on-line to subscribers. Information may

include stock market transaction information, statistical information, news items and market information. Services are generally available to subscribers through the telephone lines or using a data service such as Tymnet. ASCII, NAPLPS, Prestel and Antiope protocols are used in North America. In Canada, services currently available include InfoGlobe, INET and Marketfax. The Inet service utilizes a Gateway procedure to allow both ASCII and NAPLPS protocols to be used by subscribers. In the U.S., similar services are provided by Inner-Line, Dow Jones and VU/Text. Subscribers can access these services on-line directly from the system operator or in some cases through a gateway. Terminals can be either standalone videotex, adapted TV's, personal computers equipped with modems and videotex display hardware or software and management work stations.

3.4 Public Access Videotex

These types of systems are usually one of two types: those which are composed of two or three terminals in either standalone format or networked together and placed within a shopping mall or similar environment such as a library; the other type of system is typically composed of a larger number of terminals utilizing a central mainframe computer for storage of pages and for processing user enquiries. In these types of configurations, the end user is not required to pay for the use of the system since pages are subsidized by retailers, corporate sponsors or advertisers. System hardware can be composed of videotex terminals, microcomputers and videodiscs. These could be networked in a shared configuration or linked to a central processing unit. These systems are generally operated by a single system supplier but information can be provided by a variety of information providers. In some cases, a gateway facility is provided which allows access to remote data bases.

In Canada, the most well known of these systems is Teleguide operated by Infomart, while in the U.S. systems are offered by Infoview, Teleguide Phoenix and Directronix.

3.5 Transactional Services

Transactional services are provided on-line to end users utilizing a personal computer, set top videotex decoder or dedicated videotex decoder. In most cases, the telephone is the medium of transmission but increasingly cable TV networks are being used for delivery of signals. As well, teletext is now considered an ideal way to provide these services since two-way capabilities are possible and economically feasible.

Two types of transactional services have been identified for this study. These are shopping and financial services. Within the shopping category are those services which are provided directly to the home market and those which are provided in a public location. The most important services for this category are those which are provided directly to the end user in the home. In Canada, in-home shopping is part of the Grassroots service offering, while in the U.S. services are provided by large retailers such as JC Penny and Montgomery Ward.

Transactional Banking services can be provided as part of an on-line financial network to in-home and business computers or as part of a telebrokerage service providing electronic stock quotations and trading service. Personal financial transactions can also be carried out such as account balancing, funds transfer and money management. Services are provided by various companies in either ASCII or NAPLPS protocols. In some cases, the service is provided directly to the home user while in others it is provided through a gateway service as part of an integrated set of applications to the home. In Canada, on-line banking services are being developed by the Bank of Montreal, while in the U.S. services are provided by many organizations including ADP, Bank America, Chemical Bank and CitiBank. Brokerage services are provided by C.D. Anderson, Dean Witter Reynolds and E.F. Hutton.

3.6 Business Closed User Groups

Business closed user groups represent videotex operations dedicated to a single company or group of companies which are closed to the general public. Systems may be composed of sets of terminals, either PC's or standalone videotex, linked via a mainframe computer which provides all of the system management functions. In most cases, ASCII and NAPLPS protocols are used in the provision of these services thereby allowing the systems (using a gateway) to access remote data bases. Business closed user group operators include McLeod Young and Weir in Canada and Pacific Bell and Buick Motor division in the U.S.

3.7 Education

The education sector is composed of three parts: the in-home sector; the formal education sector; and the industry training sector. A variety of system configurations are possible ranging from standalone videotex to networked PC's and recently the use of laser discs has become increasingly common for interactive applications. Transmission mediums may include telephone lines, CATV or satellite broadcasting. In Canada, TV Ontario is the most well known provider of educational services using videotex and in the U.S., the University of San Fransisco.

3.8 Specialized Services

This sector includes a range of services which are designed for very specialized applications and which tend to be composed of a mixture of technologies. The various configurations could, for example, be comprised of videodiscs, PC's, videotex and artificial intelligence software. Applications can range from tourism and cultural services to health information and training applications. In most cases, these systems are not available on-line but serve very specialized and targeted users in defined locations. In Canada, one such application developed by ATN of Vancouver is used for driver training. In the U.S., specialized applications have been developed by CAT Interactive.

3.9 Market Overview

In this section a brief overview of the main features of the market developments for all sectors in Canada and the U.S. is provided. The overview is followed by a more detailed assessment of each of the market sectors based on the results presented in Exhibit 3.1.

Over the past five or six years, widely differing predictions have been made about the most appropriate applications and configurations for videotex/teletext services. Videotex was first promoted as an ideal home information system where users would have easy access to a wide range of information, banking, shopping and entertainment services. Early predictions called for a rapid penetration of in-home terminals, with hundreds of information and service providers supplying the necessary content.

There has, however, been a much slower market development for all videotex and teletext services than originally forecast. A variety of explanations have been offered to account for this situation which vary from observer to observer. Some fundamental problems have nevertheless been identified and include:

- poor quality data bases e.g. too general, information available more easily through other sources
- high costs for all parties, the consumer, the system operator, and information/service providers
- unifunctional terminals - videotex terminals are expensive and have little utility other than information retrieval
- lack of knowledge regarding content development.

There are presently only a handful of videotex services operating in North America which conform to the original view of a mass residential/consumer service. The three major NAPLPS based residential services in the U.S. offering

the basic components of a home service (general information, news, sports, games, banking and shopping) are Knight Ridder's Viewtron in Florida, Times Mirror Videotex's Gateway in California and Keycoms Chicago based service. In Canada, only Infomarts' Grassroots operation services the residential market where 2,000 subscribers are now enrolled.

If this appraisal is expanded to encompass consideration of the established North American ASCII services, the situation alters considerably, since the Source, CompuServe and Dow Jones combined have close to 500,000 subscribers. Only recently however have ASCII services, providing information retrieval along with the emergent shopping and transactional services, been considered within the context of videotex. Recent studies of the North American markets by CSP, International (1984)[12] indicate that about 96% of all videotex, teletext, cable text and videotex - like terminals are ASCII while NAPLPS/Telidon accounts for only about 1% of the installed terminal base.

EXHIBIT 3.1
Market Situation Analysis
Sector Characteristics and Services

System Description	System Operator	Number of Subscribers	Protocol	Services: General	Services: Specialized
Residential Services	- Viewtron	- 2,800 Res. & Bus.	- NAPLPS/ASCII	News	Card Service
	- Gateway	- 2,000 plus	- NAPLPS	Weather	Movie Review
	- Keycom	- 2,000 plus	- ASCII, NAPLPS	Education	Electronic Gourmet
				Entertainment	Trivia
	- CompuServe	- 100,000	- ASCII	Sports	Horoscopes
	- Grassroots (C)	- 1,800	- NAPLPS	Travel	Program Rev.
	- Comp-U-Card	- 100,000	- ASCII	Shopping	Dining Guide
	- A-T Videotext		- ASCII	Banking	Personal Calendar
	- Control Video		- NAPLPS	Electronic Mail	Games
	- Startext	- 1,200 Res. & Bus.	- ASCII	Consumer Reports	Airline Guide
	- Delphi		- ASCII	Real Estate	Health
	- Gimcrax		- ASCII	Consumer Classied Advertising	
	- Integrated Communication Systems Inc.	- 200	- NAPLPS, ASCII	Library	
	- The Source	- 64,000 (40% Res)	- ASCII	Word Processing	
	- Electronic Editions			Typesetting	
	- Trintex	- (planned)	- ASCII, NAPLPS		
	- Vicom	- 50 and 12 schools	- Prestel		
	- The Shuttle Corporation		- ASCII		
	- Agridata				
	- Menutronics				

* (C) Denotes Canadian Services, all others are U.S. based.

EXHIBIT 3.1 (Continued)
Market Situation Analysis
Sector Characteristics and Services

System Description	System Operator	Number of Subscribers	Protocol	Services: General	Services: Specialized
Business Services: On-Line	- Business Computer Network		- ASCII	News Retrieval Weather Stock & Commodity Quotations Index Advertising Electronic Mail Electronic Messaging Conferencing Economic Surveys Medicine Industry Specific News Newsletters Insurance Investments Real Estate: Corporate Word Processing Typesetting	Card Services Geoeconomic Labour Congressional Activities Corporate Earnings Estimates Agricultural Reports Airline Schedules Travel Reservations
	- Agnet		- ASCII		
	- Agridata		- ASCII		
	- A-T Videotext		- ASCII		
	- Inet (C)	- 150	- ASCII, NAPLPS		
	- Infoglobe (C)				
	- Marketfax (C)				
	- Innerline	- 2,085	- ASCII		
	- Dow Jones	- 160,000	- ASCII		
	- Vu/Text	- 700	- ASCII		
	- Startext	- 1,200 Res. & Bus.	- ASCII		
	- Gimcrax		- ASCII		
	- Mardata		- NAPLPS, ASCII		
	- Telichart (C)		- NAPLPS		
	- Official Airline Guides		- ASCII		
	- The Source	- 60,000 (60% Bus.)	- ASCII		
	- Videolog				
	- Electronic Editions	- 60	- ASCII		
	- Viewtron	- 3,500 Res. & Bus.	- NAPLPS		
	- Electric Media Services		- ASCII, NAPLPS		
	- Videopress				
	- NewsNet		- ASCII		

* (C) Denotes Canadian Services, all others are U.S. based.

EXHIBIT 3.1 (Continued)
Market Situation Analysis
Sector Characteristics and Services

System Description	System Operator	Number of Subscribers	Protocol	Services: General	Services: Specialized
Public Access Services	- Yellow Data	- 7,000 callers/month		Entertainment	Consumer
	- Healthbase		- NAPLPS	Recreation	Health
	- Teleguide (C)	- 150	- NAPLPS	Services	Games
	- TeleQuest		- NAPLPS, ASCII	Consumer & Classified Advertising	Government
	- Fantasy Plaza			Tourism	
	- Infonorth (C)			Transportation	
	- Infotext			Rentals	
	- Cart-Aide (C)			Travel Safety	
	- Infoview		- NAPLPS	Dining Guide	
	- Vuformation (C)			Advertising	
	- Information On-Line (C)			Community	
	- Videopress (C)		- NAPLPS	News	
	- Ontario North (C)		- NAPLPS	Events	
	- 360 (C)			News	
	- Palais Des Congres		- NAPLPS	Sports	
	- Tribune		- NAPLPS	Shopping	
	- Videotimes			Crisis Alerts	
	- CompuFill Corp.			Weather	
	- A-T Videotex		- ASCII	Time	
	- Dominion Directories				
	- New Media				
	- CompuVision				
	- ByVideo				
	- Catalogia				
	- PC Telemart				
	- Teleguide Phoenix		- NAPLPS		
	- Melvin Simon		- NAPLPS		

* (C) Denotes Canadian Services, all others are U.S. based.

EXHIBIT 3.1 (Continued)
Market Situation Analysis
Sector Characteristics and Services

System Description	System Operator	Number of Subscribers	Protocol	Services: General	Services: Specialized
Transactional Services: Banking	Banks (Cont)				
	- First of America Bank Corporation	- 112	- NAPLPS		
	- First National Bank of Pennsylvania	- 200	- NAPLPS		
	- First Union National Bank	- 100	- NAPLPS		
	- First Wisconsin National Bank	- 150	- NAPLPS		
	- Florida National Banks of Florida	- N/A	- ASCII		
	- Huntington Bancshares		- ASCII		
	- Manufacturers Bank of Detroit		- NAPLPS, ASCII		
	- Marine Midland Bank	- 100	- NAPLPS		
	- Peoples National Bank	- 60	- ASCII		
	- Security Pacific Bank		- NAPLPS		
	- Shawmut Corporation	- N/A	- ASCII		
	- Southeast Bank	- 330	- NAPLPS		
	- United American Bank		- ASCII		
	- Western Savings and Loan Association	- 100	- NAPLPS		
	- Worthen Bank and Trust Company	- 200 During Trial	- ASCII		

* (C) Denotes Canadian Services, all others are U.S. based.

EXHIBIT 3.1 (Continued)
Market Situation Analysis
Sector Characteristics and Services

System Description	System Operator	Number of Subscribers	Protocol	Services: General	Services: Specialized
Transactional Services: Banking	Banks				
	- Home Banking Interchange				
	- Bancohio National Bank	- 200		Bill Payments Funds Transfer	
	- Bank of Montreal (C)		- NAPLPS	Account Balance	
	- Crocker	- 200		Inquiry	
	- ADP	- 12,000		Bank Information	
	- Bank of America	- 15,000	- ASCII	Home Budgeting	
	- Chemical Bank	- 15,000		Electronic Mail	
	- Citi Bank	- 600	- ASCII	Information	
	- Chase Manhattan		- ASCII	Services	
	- First Interstate Bank of California	- 200 • 50 employees	- ASCII	Check Ordering	
	- Security Pacific Bank		- ASCII	Electronic Messaging	
	- Toledo Trust Company	- 150	- ASCII	On-line Stock	
	- Huntington National		- ASCII	and option	
	- Madison National				
	- Manufacturers Hanover Trust Co.				
	- National Bank of Detroit	- 120	- Prestel		
	- NCR Universal Credit Union	- 100	- ASCII		
	- Video Financial Services				

• (C) Denotes Canadian Services, all others are U.S. based.

EXHIBIT 3.1 (Continued)
Market Situation Analysis
Sector Characteristics and Services

System Description	System Operator	Number of Subscribers	Protocol	Services: General	Services: Specialized
Transactional Services: Banking	Brokers - Dean Witter Reynolds - EF Hutton Co. Inc. - C.D. Anderson and Company - North America Investment Corp. - Trade Plus		- ASCII - ASCII - ASCII	Portfolio Management Tax Record Keeping Stock & Option Quotations Stock Research Electronic Mail Transactional Services for On-Line Businesse and Selling Account Statement Inquiry Loan Information Stop Payment	

* (C) Denotes Canadian Services, all others are U.S. based.

EXHIBIT 3.1 (Continued)
Market Situation Analysis
Sector Characteristics and Services

System Description	System Operator	Number of Subscribers	Protocol	Services: General	Services: Specialized
Transactional Services:					
Shopping	- Gateway	- 2000 plus	- NAPLPS	Consumer Reports	
	- Startext	- 1200	- ASCII	Limited Time Only Sales	
	- Grassroots (C)	- 1,800	- NAPLPS	Bill Payments	
	- JC Penny	- 200	- ASCII	Ordering	
	- Mongomery Ward	- 2,800	- NAPLPS	Funds Transfer	
	- Comp-U-Card	-	- ASCII	Electronic Statement	
	- CompuServe	- 100,000	- ASCII	Electronic Catalogue	
	- Fantasy Plaza		- ASCII		
	- Menutronics				
	- CompuFill				
	- Sears		- ASCII		
	- Dow Jones (CompuStore)				

* (C) Denotes Canadian Services, all others are U.S. based.

EXHIBIT 3.1 (Continued)
Market Situation Analysis
Sector Characteristics and Services

System Description	System Operator	Number of Subscribers	Protocol	Services: General	Services: Specialized
Business Services: Closed User Group	- McLeod Young Weir - Pacific Bell - Buick Motor Division - Oasis - Source - Canadian Hospital Association (C) - Tribune - IBM - General Electric - General Plastics Corporation - Digital Equipment		- NAPLPS - NAPLPS, ASCII - NAPLPS - NAPLPS - NAPLPS - ASCII, NAPLPS	Electronic Mail Market Information Stock & Commodity Quotations Funds Transfer Balance Inquiry Statement Bill Paying Management Financial Planning News Retrieval Tax Preparation Budgeting & Accounting Investment Classified Advertising Real Estimate: Corporate Money Management Electronic Messaging	Agriculture Reports Ordering Retail Merchant Library Education Corporate Pension Plan

• (C) Denotes Canadian Services, all others are U.S. based.

EXHIBIT 3.1 (Continued)
Market Situation Analysis
Sector Characteristics and Services

System Description	System Operator	Number of Subscribers	Protocol	Services: General	Services: Specialized
Education	- Humber College (C) - Agnet - TV Ontario (C) - University of San Francisco - Learn Alaska Network - The Open University (C) - University of Wisconsin - ATN Adaptive Testing (C) - Universite du Quebec (C) - University of Alberta (C) - Manitoba Tel System - University of Nebraska - University of Florida - San Diego State University - Ohio State University	- 80 - 90,000 - 250 sites	- NAPLPS, ASCII - NAPLPS - ASCII, Satellite - Prestel - ASCII - NAPLPS	Electronic Encyclopedia Audio-Visual Library Electronic Mail Electronic Messaging News Retrieval University Events Instructional Videotex Products Word Processing Electronic Publishing Newsletters Student News Electronic Blackboard Automatic Page Creation Correspondence Events Conferences	

* (C) Denotes Canadian Services, all others are U.S. based.

EXHIBIT 3.1 (Continued)
Market Situation Analysis
Sector Characteristics and Services

System Description	System Operator	Number of Subscribers	Protocol	Services: General
Specialized	- CAT Interactive			Specialized Newsletters
	- NewsNet			Electronic Publishing
	- New York State Urban Development Corporation			Health
	- Weather Radar (C)		- NAPLPS	Tourism
	- Cord (C)		- NAPLPS	Medicine
	- Telichart (C)		- NAPLPS	Training Applications
	- Halifax Defence Complex		- NAPLPS	Cultural Services
	- TABS (C)			Weather
	- RIDS (C)		- NAPLPS	Population
	- Oasis (C)		- NAPLPS	Employment
	- Canada Post (C)		- NAPLPS	Music
	- Edimedia		- NAPLPS	Automative Defence
	- Healthcare Information Services (C)		- NAPLPS	Aquatic
	- Infodata (C)			Government
	- Medbase			
	- Tele-Sante (C)		- NAPLPS	
	- Mediagro (C)		- NAPLPS	
	- ATN (C)		- NAPLPS	
	- Communication Studio			
	- Infotel		- ASCII	
	- Newwork Technologies Inc.			
	- United Videotex		- NAPLPS	
	- IBM			
	- RCA			
	- Honeywell			
	- Sony			

* (C) Denotes Canadian Services, all others are U.S. based.

3.10 Canadian Market Situation Analysis

3.10.1 Residential On-Line Services

A review of Exhibit 3.1 reveals the various services in this category.

Grassroots is the largest videotex based NAPLPS service in full commercial operation in North America. While not strictly a consumer service because of the specialized nature of most of its contents, it is nonetheless accessed by users primarily from their homes. It is a full NAPLPS service although it can be accessed through the INET gateway by ASCII subscribers who receive the information stripped of its graphics. Grassroots, in its fourth year of operation has slightly over 2,000 subscribers who access the service through standalone videotex terminals or personal computers with decoder software.

The majority of the information on the Grassroots data base is agricultural in orientation, but its other components place it in the realm of consumer interest. Its targeted audience, the agricultural community, enables Infomart to sell the service to potential providers of both agricultural and consumer information. Grassroots provides agricultural information, financial services, on-line banking and business information to subscribers at prices which range from $2 per page to $6 per page. In addition, subscribers pay a $150 yearly fee and have the option of purchasing an AT & T Sceptre terminal for $850.00.

Two other system operators, either currently offering residential services or proposing to, include InfoNorth Computing and Videotron. InfoNorth offers two types of services to the home user in Sudbury. The first is a videotex service which includes messaging, education, shopping (non-transactional) and community information and is accessed by home users with Commodore 64's equipped with decoder software. This service costs users $20 per year plus 10¢ a minute. The second service is available only on Channel 32 to home users with a cable converter. (Company spokesmen were unable to reveal how many subscribers were using either service).

The most ambitious undertaking for a residential service in Canada is that being planned in Montreal by Videotron. This coaxial cable delivered NAPLPS service is scheduled for startup in September 1985. Videotron have committed to purchase 100,000 subscriber decoder units from Videoway (Canada) and expect to have this number of subscribers within a year of startup. For the first year the service will be one way, but thereafter, it will be two way, complete with transactional services. The basic service will consist of applications commonly offered in other residential operations e.g. news and general information, education courses, games, community information (religion, health, etc.), and an events calendar. This service will be quite attractive to potential subscribers, since it will have a relatively low cost i.e. a maximum of $12 per month.

3.10.2 ASCII Residential On-Line Services

Services originating in the U.S. such as the Source, CompuServe and Dow Jones are also available to Canadian subscribers. These ASCII based services account for the largest share of on-line information subscribers and probably represent at least 30,000 users in the Canadian residential market. Services are available to personal computer owners, and those having access to terminals equipped with modems. These services are available for fees ranging between $25 per hour for CompuServe, $10 per minute for the Source plus a $49.95 set up fee, and 40¢ per minute to $1.20 per minute for Dow Jones.

3.10.3 On-Line Business Services

On-line business services directly accessible by Canadian subscribers include: INET, Infoglobe, Marketfax, Dow Jones, Telechart and the Official Airline Guide. The NAPLPS based services are limited to the Marketfax, INET and Telechart services. These services represent a cross-section of applications including specialized stock market data (Marketfax), general social and economic data (Telechart), broad based business data bases and electronic mail (INET, Infoglobe).

Specification of the number of subscribers for these business services is not available since the information is considered proprietary by system operators. It is estimated, however, that there are approximately 150-200 INET subscribers and a similar number for Infoglobe. INET provides the means for information providers to display their data bases as well as providing direct access for the end user to numerous on-line data bases. Usage charges include a fixed monthly fee and additional charges dependent on the time spent on-line. Individual user rates include a $25 one time charge, a $5 per month charge and time charges of between $3.60 and $2.70 per hour. Additional fees are based on rates of $.30 per kilo character to $.27 kilo character.

3.10.4 Public Access: Canada

At the present time, the most promising developments in Canada are occurring in the area of public access terminals. There are a number of reasons which explain the growth in this sector. First, the services are offered free to the user. Secondly, the types of information or services offered on these terminals are usually very specific and appropriate to the location or site, e.g. transit information in transit stations, shopping information in stores and malls, and travel/tourism information in airports and hotels. This feature is very effective in encouraging users to access these data bases. This in turn makes it easier for the system operator to sell "space" to advertisers and information providers, an advantage that operators of broad based services do not have.

Our review of this market sector indicated eight major public access systems currently in operation or planned within Canada. These included:

- Teleguide
- CART-AIDE
- Videopress
- Ontario - North
- 560

- Palais du Congress
- Dominion Directories
- New Media Technologies

Of these various services, the largest is Teleguide operated by Infomart. The system currently operates on five hundred terminals located throughout Toronto providing an average audience of 850,000 viewers a month access to 16,000 pages of information. Advertisers pay between $235.00 and $285.00 per page per year for placement on the Informart data base. In comparison, the other services are much smaller with a more limited audience. Videopress, for example, provides a mall directory and merchandising system in public access kiosks for shoppers in the Eatons Center. These systems utilize a touch screen format and can be combined with personal computers and videodisc systems. The Videopress system in the Toronto Eatons Center has experienced significant levels of use with as many as 300,000 accesses per week during its operation. In addition to the Eatons Center, Cableshare has been successful in selling these systems to the U.S. Systems have recently been implemented in the U.S. cities of Davenport Iowa, San Antonio, Texas, Minneapolis and Detroit. In June of 1984, 16 Touch'n'Shop systems were sold to the Compu-U-Card International. New public access services being implemented include the revived B.C. Tel service in Vancouver by Dominion Information Services (Dominion Directories). They are planning an operation using 96 public access terminals and an initial data base of 500 pages. A smaller scale service is also being planned for Vancouver by New Media Technologies.

The remaining services identified in Exhibit 3.1 are quite small in scope typically providing access to a standalone data base in a relatively restricted public environment. The Ontario North system, for example, is based on five terminals located on the grounds of Ontario Place (amusement park) which provide travel planning and industry development information.

Applications being provided on the various systems range from the most general classes such as news, weather and public announcements to more specialized and site specific information such as transit guides, shopping information, entertainment and restaurant guides. The most common applications and the ones having the greatest number of pages are those oriented to tourism and entertainment. The second most popular information category for public access systems are shopping and retail information. Mall located public access services are increasingly being used to promote in-store specials, explain store policies and procedures and provide detailed product information to consumers.

The dominant trend for this market sector is toward increasingly specialized data bases on a location and applications specific basis. This has led to the development of public access systems in airports, railway stations, sports complexes, amusement parks and convention centers. In these locations, the data bases are targeted to those functions conducted at the particular site.

3.10.5 Business Closed User Group Services

The development of business closed user group (CUG's) systems in Canada is much more limited than is the case for the U.S.. The largest known system is operated by McLeod Young and Weir, a major Canadian brokerage house. Their system has been developed for internal use and provides staff with access to stock equity and bond information. The system uses NAPLPS protocal and allows access to over 5,000 publically traded securities on stock exchanges in the United States and Canada.

The Canadian Hospital Association provides hospital management information on terminals located in provincial health care offices across Canada. The service provides information on poison control and training to hospital administration and provincial health care associations across Canada. The name of the system, which is accessible through NAPLPS and ASCII devices, is the Canadian Hospital Association Information Network (CHAIN). It is designed in an interactive

format so users can comment on content, add their own views and exchange information with other associations.

The applications being examined in the business closed user context span a wide range of areas including inventory control, business graphics, information retrieval, financial planning, budgeting, accounting and electronic messaging.

The costs of private closed user systems will vary enormously depending on the scope and extent of coverage for the application in question. In some situations, videotex is being developed as a component of an office automation system on microcomputers and integrated into a distributed service. One project currently underway utilizes the concept of bundling videotex into a based office automation package to supply business graphics.

3.10.6 Educational Market in Canada

The development of the educational market for videotex and teletext focussed on four main sectors: formal and non-formal education, continuing education and industrial training. Specific programs for the use of videotex in education have emerged in Manitoba, where videotex systems have been placed in nine school sites with access provided to the Grassroots data base. However, TV Ontario has been the most active in this sector operating a variety of services as well as developing course content, in TV Ontario's educational service, terminals are distributed throughout the Province of Ontario to participating organizations such as:

a. elementary and secondary schools
b. colleges of applied arts and technology
c. universities
d. public libraries
e. special institutions (schools for the deaf).

The most recent developments in this sector have focussed on videotex/teletext courses, videotex software improvements, computer assisted instruction, special needs group applications, closed user groups and local area networks. Other related services have also begun to emerge for special markets such as medical and health education or community information.

It is generally considered that the development of educational, medical and community information applications reflect one of the most distinctive trends for the videotex/teletext industry. That is, they represent a distinct shift from the conventional mass market service orientation to a more closed and specialized interest group service.

At the present time there are two major on-going operational educational networks on a provincial wide basis, one in Ontario and one in Quebec. TV Ontario is operating a videotex network providing broadcast (teletext) and on-line videotex. The system uses a multi-mode terminal capable of receiving NAPLPS teletext and videotex as well as ASCII data for storing pages in a standalone mode. This service has been placed in 75 secondary schools, 15 youth centers and 10 public libraries. A data base has been developed which includes educational learning materials and the Ministry of Education's, Student Guidance Information Service (SGIS).

In Quebec, a distance education project has been started by the Tele Universiti du Quebec a Quebec. The service is designed for self paced learning using a network of terminals linked to a central host at the main university campus. Currently, 350 user terminals are in operation at five remote locations throughout the province.

In additional to these two on-going services, fifteen other educational experiments and services using videotex are currently operating in Canada. These are as well numerous software and courseware products are available for use in the education market. In the past two years about seventy different software

products have been developed and are being used for educational applications of videotex in Canada and the U.S.

3.10.7 Transactional Services - Banking and Shopping Canada:

The importance of transactional services as a component of the emergent videotex market in North America is becoming increasingly evident. However, in Canada these services have not progressed at as fast a rate as elsewhere, most particularly in relation to the U.S. Neither banking nor on-line shopping services have experienced the rapid proliferation of their southern neighbors. Nevertheless, plans for the development of this market are progressing in Canada which indicate that the near future may present significant opportunities for the industry.

A review of Exhibit 3.1 indicates there is at present only one major on-line banking service in Canada, and one direct to home shopping service both operated as part of Grassroots shopping. Nonetheless, other activities and plans are under discussion which reveal the extent of potential market development and activity in Canada. The majority of current attention is, at the present time, focussed on home banking rather than home shopping. Shopping services are being addressed mainly in relation to public access as opposed to on-line systems.

The impetus toward North American home banking is now considered to be dependent on how rapidly perscoms diffuse into the home in North America, and it is no longer thought that banks, as systems operators, will seed the North American market with dedicated banking terminals. Nevertheless, there is little doubt that banks are one of the main driving forces today behind home information services. Banks are involved in both ASCII and NAPLPS based services and many are experimenting in both types simultaneously. It is quite natural that the banks and the financial community in general were among the first to enter the electronic marketplace. In this context, information is

literally money, and major productivity and cost savings may be achieved in this industry by a wide range of electronic means and effects, i.e. the reduction of transit time for money and the accompanying interest savings. It is not surprising, therefore, that there are, according to a recent International Resource Development Inc. study, between 200,000 and 300,000 microcomputers in use in the U.S. financial industry.[13]

Despite this high penetration of electronic media in the industry, major questions still remain in this market concerning exactly what role banks are going to play in the provision of home banking. Their role could be to function as system operators offering banking services directly to customers along with other non-competing information services. Alternatively they could assume the role of service providers on an external party's system. Both scenarios are currently being adopted and industry observers are divided as to what configuration will likely emerge in the longer term. Tied into the whole question is the trend of banks, particularly those in the U.S., towards other areas of finance such as brokerage services.

In Canada, the Bank of Montreal is following the same strategy as many of the U.S. banks, gaining experience in operating its own home banking service and simultaneously acting as a service provider on Infomart's Grassroots service. The Bank of Montreal recently embarked on a one year research pilot as part of ADP Telephone Computer Service's Home Banking Interchange. As of February 1985, 90 homes were taking part in the pilot, although more were expected to be added during the course of the trial. Users are provided with access to the following banking services:

- funds transfer
- balance inquiry
- statement
- bill paying

In addition, users can leave messages for bank staff. The service is accessed through AT & T Sceptre terminals and a variable pricing strategy is to be employed throughout the trial, i.e. there will be different charges levied for different phases of the pilot.

The Bank of Montreal Services can also be accessed by subscribers to Grassroots. The services include transfers from one account to another, review of account statements and the ability to balance accounts. Additional future services include bill paying, Master Card activities, and some limited loans. Subscribers can also access the Greenshields stock exchange service and statistics, the Winnipeg Commodity Exchange, the Chicago Mercantile Exchange, the Mid-America Exchange and the Chicago Board of Trade.

One of the main ways impetuses stimulating the establishment of banking networks in North America involves the evolution of the shared automated teller machines (ATM). These ATM's allow a banking or retail user in one part of the country to use an ATM of a participating bank in a regional network to perform operations on his account from other regions. Switching customers from bank to bank on the network is sometimes performed by financial service bureau firms (i.e. as in the ADP trial) or by bank processing companies (frequently subsidiaries of banks). Such shared networks can also connect home banking users to home shopping facilities, and electronic banking and shopping systems are now merging as a result of these ATM developments.

In Canada, the ATM networks are presently operated by the major banks who have not generally been interested in providing access to outsiders. There has, however, been increasing pressure to gain access by retailers, independents and financial institutions other than banks that want to offer the same types of services. The intent of these groups is to develop a shared network which offers customers a multitude of on-line transaction services such as on-line shopping. The current trend is toward a shared national network. It is quite likely that the next few years will see a gradual movement from these ATM services toward direct in-home services combining banking, funds transfer and shopping.

The Access Banking Network operated a Toronto company started as a small, six machine network in August 1984, but currently Guarantee Trust Company and retailers such as The Bay are being linked into the network. Retailers feel ATM machines not only provide convenience to customers, but also increase traffic in stores and provide the customers with a ready source of cash. Ideally in such a network, a company will have computer links with financial institutions, giving customers direct access to accounts when they make a transaction on the machine.

Another company, called the Express Network of Toronto, recently announced a deal to place ATM machines in 7-Eleven convenience stores. There are at the present time approximately 360 of these in the country. The fee for using the machine ranges between 35¢ and 75¢, depending on the volume of transactions.

This movement toward ATM networks and the sharing of systems is also illustrated by the recent announcement of the Bank of Montreal to move into a shared ATM network with Cirrus Systems Inc. in the United States. This will benefit bank customers travelling to the U.S. and could conceivably provide the basis for a national system in Canada. As well, the Bank of Nova Scotia and the National Bank of Canada have announced plans to share respective networks, a move which is designed to overcome existing deficiencies that each feels exists in their present network.

In a recent speech by a senior Vice President of the Bank Montreal[14] it was noted that at the present time, about half their customers are equipped with their own coded banking cards which allow access to a variety of personal banking services seven days a week 15 hours a day. It was further noted that banking machines handle over 2 million transactions per month, with 35%, of all personal transactions being handled by the ATM's. The Bank of Montreals project with Cirrus systems will provide them with upwards of 7,500 automated banking machines linked across North America by the end of 1985. Future developments include the capability to provide customers with personal financial

profiles. This capability will allow subscribers to integrate all financial information concerning their transactions with the bank, consolidate information on a full range of balances, chequing accounts, savings, loans, mortgages, credit cards, information about RRSPs, GICs and Home Ownership Savings plans. Ultimately these services will be joined to the in-home services now in operation.

In Western Canada, an ATM system has been set up by Pacific Network Services (PNS) of Vancouver which operates 44 machines in credit unions. This network is linked to the Exchange, a U.S. service developed by Exchange Systems Inc. of Bellevue, Washington. The immediate intent is to make PNS the regional ATM network in Alberta and British Columbia, with a plan of placing ATM's in stores, trust companies and credit unions.

The movement towards the sharing of networks and sharing system services represents a positive move in Canada towards fully interactive banking, either in-home or through remote terminals located in specific locations such as convenience stores. In many cases, these developments offer opportunities for the provision of NAPLPS-based services, although at the present time most are operating on ASCII protocol.

3.10.8 Specialized Services: Canada

The specialized services sector is one of the most active within the Canadian market. These services all make very specific use of the videotex technology with applications ranging from weather maps in airports (TABS) to health care information (Tele Sante). The services identified in Exhibit 3.1 all are based on the NAPLPS protocol, utilize a combination of videotex software and required a display mechanism such as personal computers. The most distinctive feature of these services is that they represent new and innovative ways of using the NAPLPS videotex protocol. For example, interactive videotex is provided by both ATN, a driver licensing and testing service and OC Transpo, a transit information service. Office automation applications are provided by OASIS

while RIDS offers a military information service in use at the NORAD facility in North Bay. In total, approximately one half of the services classified as specialized within North America are in the Canadian market. In most instances, these special applications are combined with public access networks or closed user services. There are usually no fees charged to users for these services but advertisers and corporate sponsors often subsidize their production. Fees range anywhere from $30 to $200 per page depending on the services and system operator.

3.11 U.S. Market Situation Analysis

3.11.1 Residential Services

The examination of the U.S. market for this sector reveals a total of twenty different services currently in operation. Included in this group are ASCII and NAPLPS protocol based services such as CompuServe and The Source. Overall, ASCII services dominate constituting 70-80% of all subscribers. The more recent entrants in providing on-line information to the home market are those offering an NAPLPS capability such as Viewtron, Keycom and Gateway. The pattern of service is similar for all, with several applications being combined for the user - general information, news and weather, shopping guides, transaction services (in some cases), electronic mail and general announcements. Pricing strategies vary depending on whether a dedicated terminal must be purchased or leased or if a personal computer is used (the cost already being incurred by the user). The majority of services make use of the existing and well established personal computer base since PC's provide access to ASCII services when combined with a modem. When a graphics board is added or NAPLPS decoder software is available the NAPLPS protocol services can easily be accessed. Thus, the perscom provides a very versatile, readily available and sensible entry point for these types of on-line services.

Viewtron, Gateway and Keycom's KISS service are the three major videotex services currently operating in the U.S. directed to a mass residential market. All three are run by media conglomerates offering a broad base of information and services to their subscribers. (Detailed descriptions of the services are included in the Appendix A).

These services were all conceived as pilot operations serving as tests prior to their franchising on a regional level. In all cases the startup of new services has been hampered by the failure of system operators to attract the critical number of subscribers. Viewtron is a typical example as it was not only delayed coming into the market and exceeded its estimated operating costs, but also has far fewer subscribers than originally projected (2,800). A major obstacle identified for the Viewtron trial, and typical of many of these services, is the need for subscribers to purchase a $600 AT & T Scèptre videotex terminal in addition to the monthly subscription charge. (Exhibit 3.2 provides a sample of price ranges for residential services in the U.S.).

Although home banking, as discussed previously in the Canadian context, has proved to be a service that can attract subscribers on its own merits, its availability as an add on feature to Viewtron has failed to attract large numbers of subscribers. This may be due to the high cost of the service since home banking on its own usually cost $8 to $12 per month, while through operators like Viewtron subscribers were required to pay an additional $28 to $32 per month.

Gateway subscribers are also using AT & T Sceptre terminals with the rental of the equipment bundled into the $29.95 monthly subscription charge. In this case, $10 is allocated for the equipment and $19.95 for the service. The $19.95 charge includes usage for up to 20 hours, and $3 an hour is levied thereafter. The service is currently available to consumers in Orange County, California and offers subscribers the opportunity to utilize the banking services of Security Pacific.

Several companies originally involved in residential videotex trials using ASCII and NAPLPS have, in the past year, either discontinued their services, put their plans on hold or entered into other related projects. For example, Indax/Cox was involved in a joint field trial venture with Chase Manhattan and Jerrold (General Instruments). The trial ran for 9 months in 1983, but for a variety of reasons the project has now been discontinued.

EXHIBIT 3.2

SELECTED PRICE RANGE EXAMPLES
U.S. Services

Residential	Viewtron	$12.00 per month, subscription plus lease term - $39.95
	Keycom	$9.95-$24.95 per month
	CompuServe	Access Charges - $12.50 per hour Mon.-Fri. (prime time), $6.00 other times
	A-T Videotext	$8.00 per month
	Control Video	1 time registration fee - $25.00 plus $14.95 per month
	Delphi	Connect charges 300-1200 baud (prime time) - $9.00, 6.00 (non-prime time)
	Gimcrax, Inc.	One time membership fee - $50.00
	The Source	Set up free - $49.95, plus $20.75 per hour (prime time) and $7.75 (non-prime time)
	Electronic Editions	$9.95 per month
	The Shuttle Corporation	One time sign up fee - $25.00 plus $5.00 per month, $3.00 per year.
	Menutronics	One time sign up installation fee - $50.00 plus $2.50 a month.

3.11.2 Residential ASCII Based Services U.S.

A number of broad based information retrieval services in the U.S. are operating on the ASCII standard rather than full NAPLPS. These services range from small regional services to national operations such as CompuServe and The Source. The Shuttle Corporation, representing a regional service is a Seattle based company that sells videotex systems, in addition to host and subscriber equipment. Its service is mainly information retrieval, although there are plans to offer an on-line grocery shopping service and eventually home banking. Its services can be accessed by any personal computer or ASCII terminal with a 300 baud modem or by the 1200 baud Shuttle Information Terminal, available for $250 U.S. Its subscriber prices are moderate:

- a $25 initial fee
- a $5 monthly fee
- and $3/hour connect charge

Shuttle Corporation plans to operate a national network of locally operated systems linked by Satellite.

CompuServe's large subscriber base of over 100,000 is continuously being offered new services beyond the information retrieval and messaging that were the mainstay of the service in its original form. Besides having access to home banking, subscribers were recently introduced to a new service called "The Electronic Mall". This service was developed by CompuServe Incorporated and I.M Berry & Co. and has the following characteristics:

- over 80 national merchants
- on-line 24 hours a day, seven days a week
- complete description of all products
- a feedback capability
- electronic mail

- automatic order forms
- credit card and shopping information

One of the key market advantages of the much larger base of ASCII subscribers is that information and service providers have access to a qualitatively and quantitatively different type of user than those using NAPLPS only services. Two factors are mentioned most frequently:

1. ASCII users are technically adept
2. They are already owners of personal computers and are part of an "upscale" market

Both of these characteristics have allowed information providers and advertisers to target their products and services more carefully and at lower prices, a very appealing factor often missing in the NAPLPS based services.

3.11.3 Business On-Line Services U.S.

The majority of videotex on-line services directed to the business market are operating in the U.S. These services represent the forerunner to the limited, but growing number of services available in Canada. The most well established services and the ones with the highest penetration are ASCII based which aim at the large and growing market of personal computer owners in businesses and specialized home users requiring business information.

There are, at present, at least 300,000 subscribers to these types of services and of these Dow Jones and The Source account for about 60%. The remainder are spread between the various services such as AGNET (directed to the farm and rural based user), MARDATA, directed to the real estate market or GIMCRAX directed to the investment industry. One other service which has an extensive user base in the Official Airliner Guide. This service allows business and individual users access to all major airline schedules globally. It is offered either

directly to users on-line or through gateway services by most large scale videotex system operators.

The overall trend of this market sector is one of expansion with new services continually being introduced. The types of services which are emerging tend to be more specialized, directed to a core group of businesses or in-home users initially and then provided as part of a larger system operation. However, there has not emerged, in the past two years, any services which replicate the scale and diversity of Dow Jones or The Source.

ASCII services represent the dominant protocol in this sector and are most likely to continue to in the future. This fact is reinforced by the tendancy of service providers to direct their products to established computer users rather than to attempt to sell hardware in the form of decoders or standalone videotex units as a means of accessing a data base.

Pricing for these services varies widely depending to a large extent on the specialized nature of the data base, the brokerage fees and whether terminal costs are involved. The base of charges also varies with some calculated per minute (Dow Jones) and others on a flat fee plus usage (The Source). A selected sample of prices for U.S. services is presented in Exhibit 3.3. These services are also available to Canadian customers at comparable rates.

EXHIBIT 3.3

SELECTED PRICE RANGE EXAMPLES
U.S. Services

Business Service On-line	Business Computer Network	$5 month, 25¢ each access and normal on-line fee
	Agnet	Annual $50 plus $20-30 hourly
	Agridata	$25 hour - 300 baud $30 hour - 1200 baud
	Marketfax (C)	$325.00 month for 10 hours use
	Inner-Line	Minimum monthly fee $30.00 which includes 20 minute connection time and 60¢ minute.
	Dow Jones	Connection 40¢-$1.20 per minute (300 baud prime time), 13¢-90¢ non-prime time) double price for 1200 baud).
	Vu/Text	$60.00-$90.00 prime hour
	Startext	$7.95 month
	Mardata	Access $45.00 year
	The Source	Set up fee - $49.95 and $20.75 hour prime time, $7.75 non-prime time.
	Electronic Editions	$19.95 month

3.11.4 Business Closed User Group Services

In the U.S. as in Canada, the use of in-house videotex is growing, its development fostered (particularly in large corporations), by the need for a rapid dissemination of information, the desire for colour and graphics capabilities among middle managers, and the necessity to upgrade the level of computer literary and keyboard skills among middle and upper management personnel. Videotex systems offer the end user relative ease of access to into the network as well as simple operational procedures for accessing data. In many instances, these in-house systems also have a gateway facility allowing access to the expanding number of private and public data bases.

The diversity and specialized nature of these types of applications make it impossible to review all such installations. However, the U.S. based services listed in Exhibit 3.1 represent a good cross-section of the types of applications common to this market sector. Electronic mail, financial services, inventory control, stock ordering, accounting and money management have all been implemented. One of the most extensive of these is provided in the Buick Motor Division which provides on-line service to a selected number of dealers and sales outlets.

Information retrieval is a leading application for private videotex use. For example, in Pittsfield Mass., the Plastic Group of GE has set up an in-house videotex system for use by its field sales staff and marketing reps. The system, called ERIS (Engineering Resins Information System), allows people in the field to access a central data base of plastics data. Users access the system through portable computers using the GE Information Services Communications Network which is available in 750 cities around the world. In keeping with most company's strategies, ERIS has been designed to work with the videoconferencing facilities that GE has been establishing at its Plastic Group's offices.[15]

Closed user group applications are more likely to utilize the NAPLPS protocol in contrast to the on-line services which tend to be based on the ASCII protocol. In-house systems have also tended to emerge in large size businesses typified by the so-called Fortune 1000 companies as opposed to small and medium size companies which make up a significant share of the on-line market.

At a recent conference in New York, William Seelinger, IBM Corp.'s manager of videotex market development suggested that:

> "businesses create their own corporate systems to anticipate consumer acceptance" (of videotex)[16]

Further, he predicted that most Fortune 1000 Companies will eventually be using videotex in-house. Mr. Seelinger was reflecting on IBM's own strategy of using videotex in-house while in the process of planning its involvement in the Trintex consumer service.

> "IBM has taken a strategic decision to incorporate videotex (using the NAPLPS protocol) as a fundamental element in its service bureau/networking/distributed processing products for the 80's and 90's. IBM has used its SVS videotex product in-house for more than a year, and its experience with its own employees usage of that in-house system has led the company to decide that videotex is a key component of its future strategy".[17]

The movement towards increasing the use and development of private videotex systems has been encouraged by reports that hardware manufacturers including IBM, Honeywell, DEC and Sperry all have, or plan to incorporate videotex into their systems.

3.11.5 Transactional Services - Banking and Shopping U.S.

More than any other videotex/teletext market sector, banking and transactional services have grown the most rapidly and provide some of the most varied applications to subscribers in the U.S. Exhibit 3.1 lists eighteen commercially operated services across the U.S. In addition to these dedicated operations are a

number of other financial services which are offered through one or another of the on-line residential or business services such as Viewtron, Gateway or Keycom. Linked to these are the 16 telebrokerage operations which offer financial services ranging from stock portfolio and money management to account inquiring and funds transfer. The growth of these telebrokerage services parallels that of the dedicated telebanking services. The providers of such services include insurance companies such as AETNA, John Hancock and Allstate all of whom are actively pursuing these activities. Another group providing services are credit card firms such as Mastercard and American Express.

EXHIBIT 3.4

Selected Software Applications

For Transactional Services

Banking and Shopping

Software Application*	Operator
Balance inquiry, bill paying, consumer services, electronic transfer of funds, financial services, games, information retrieval and teleshopping	ADP
Balance inquiry, bill paying, consumer services, electronic statements, financial services, funds transfer, games, information retrieval and teleshopping	CBS Venture I
Calculator services, electronic balance inquiry, bill paying, electronic statements, electronic mail, financial service information, funds transfer, information retrieval and games	Keycom
Balance inquiry, bill paying, calculator services, electronic statements, electronic mail, financial services, funds transfer, information retrieval and teleshopping	Treasurer Inc.
Balance inquiry, bill paying, calculator services, electronic statements, financial services inquiry information, funds transfer, information retrieval and teleshopping	Videofinancial
Balance inquiry, bill paying, consumer services, electronic statements, electronic mail, financial services information, funds transfer, information retrieval and teleshopping	Viewdata Corp.

* All are NAPLPS protocol based.

The protocol of choice for 90% of these services is ASCII which is also an indication of the predominance of the personal computer in the market of on-line financial transaction services.

Two major trends can be specified in this market sector: one is the evolution of on-line services operated by individual banks of which there are hundreds in the U.S. (as opposed to a handful in Canada); and another is the growth of banking networks or shared facilities. Such networks switch customers from bank to bank and to other services such as home shopping. These shared networks have evolved from the shared ATN networks which are increasingly common in the U.S. and Canada.

In January 1983, Automatic Data Processing Inc. of New Jersey, utilizing its Seattle subsidiary ADP Telephone Computing Services Inc., began its home banking interchange project in Princeton, New Jersey (ADP Telephone Computing Services Inc. is an early pioneer of telephone bill paying technology for banks and currently is providing banks with voice/touch-tone telephone-based services nation-wide). Although ADP retained "all ownership and other rights to any and all software and hardware" emerging from the project, it has allowed, for a price of approximately $100,000, all participating banks to licence software resulting from this project. Services include:

1. bill paying
2. funds transfer between various bank accounts
3. account balance information
4. statement services including information on cleared cheques and chequing and savings accounts transaction history
5. interest accrual information
6. stock payment capabilities
7. interest rate information
8. other non-financial Videotex services provided by Videotex America and other third parties.[18]

Videofinancial Services (VFS) is an example of a consortium owned by seven U.S. banks. VFS was established to offer banking services as part of a commercial videotex system. Its own product is called Applause, and its mandate is to actively market its products nationwide and to licence its system overseas. It is currently offering home banking through eleven Florida banks as part of the Viewtron service. In California, Security Pacific is scheduled to offer the Applause banking service to Gateway subscribers.

Subscriber fees for transactional services, like most others in this market are varied. Applause, for example, is structured in the following way:

> "a one-off $50,000 fee to the bank plus a transaction fee of $5 per month per customer, for up to 25 transactions then $1.00 for 1-10 additional transactions. In addition the bank has to pay a 'connect' fee charged by the videotex system operator (about 75¢ per customer per month)".[19]

The customer must initially subscribe to the videotex service at $30 to $40 per month and then pay approximately $10 a month for the home banking service. Other home banking services such as Chemical Banks Pronto service are much cheaper for consumers to join because they can be accessed by home computers rather than costly videotex terminals. The basic fee to subscribers is $12.00 per month.

The National Bank of Detroit has taken yet another approach using a low cost videotex terminal called Tex. The Tex terminal, manufactured by Cambridge, Mass. based Telelogic Inc., is priced at about $100 each to the system operator. The terminal is available to subscribers for $200 and usage fees average $5-$10 per month. The terminal requires only a telephone and a TV set, and its low cost is due to:

> ... its reliance on the British Prestel videotex protocol and a system design that transfers much of the component and manufacturing cost from the terminal to the host computer portion of the system. Although it produces cruder graphics than the more elaborate North American Presentation Level Protocol Syntax (NAPLPS) standard, Prestel is easer and cheaper to implement.[20]

Customers are able to transfer funds from one account to another, check balances and statements, and obtain information on stocks, interest rates, etc. The bank also maintained a small data base of about 250 pages that included general information such as sports scores and movie listings.

In a recent interview (February 1985) with a National Bank of Detroit spokesperson, it was learned that the bank plans to offer a full commercial service by the end of 1985 which will include banking transactions such as funds transfer, balance inquiry, statements, bill paying, checkbook balancing, and loan amortization. It has not yet been decided whether other services such as teleshopping will be offered. The service will continue to utilize the Tex terminal, although it has not yet been determined whether the bank will assume the costs of providing the units to its customers or bundle the costs into the transaction charges. Like other banks involved in home banking, it has tentative plans to sell its service to other financial institutions.

Chemical Bank and Bank of America both deliver their home banking services to owners of personal computers. Bank of America's service is compatible with virtually any personal computer and as of September 1984, Chemical Bank was working towards increasing its user base beyond Apple, Commodore, Compaq and the IBM PC. As of November 1984, 14,000 customers were using Chemical's Pronto service for a fee of $12 per month and 2,000 more were expected to sign up by early 1985. At the same time, 15,000 Californians were paying $8.00 per month to use Bank of America's Home Banking Service.[21]

In addition to the 34 services in Exhibit 3.1, a further 35 are known to be planned for operation in the very near future. Most are based on the use of a personal computer in the home which can easily be configured to access a bank computer data base for data entry or retrieval. With the inclusion of these services and the exchange services such as those offered by Home Banking Interchange, there are 75 financial institutions involved in some form of transactional service at the present time in the U.S.

As the following exhibit reveals, the pricing strategy for interactive banking services varying quite substantially, ranging from a few dollars per month ($7-8) to upwards of $25 per month.

EXHIBIT 3.5

Sample In-Home Bank User Fees

Bank of America	$ 8.00	per month
Central Trade Bank	$ 7.50	per month, 20¢ bill payment
Chemical Bank	$12.00	per month
CompuServe	$22.50	per hour prime time; $5.00 per hour non-prime time
Dow Jones	$50.00	$75.00 annual fees, $50.00 per month plus $6.00 - $54.00 per hour non-prime time, $24.00 - $72.00 per hour prime time
Huntington Bancshares	$ 4.00	per month and CompuServe fees
KeyCom	$25.00	set up (one time only); $9.95 per month core database service up to 5 hours, $24.95 per month core database up to 15 hours, $5.00 per hour overtime charge
Shuttle Corporation	$ 5.00	per month plus $3.00 per hour for basic service
Source	$20.75	per hour prime time, $7.75 per hour non-prime time and a $100 one-time hook-up fee
Southeast Bank	$ 3.00	for 25 bill payments, 20¢ for each payment exceeding 25
Times-Mirror	$30.00	per month
Viewtron	$12.00	per month, $1.00 per hour of phone usage, or $39.95 per month (Sceptre terminal 10 hours of usage).
E.F. Hutton	$17.00	for the first 2 hours of use each month, 12½¢ per minute thereafter.

Source: Data Plus Research, Home Banking Review 1983, November 1984.

These fees can be configured in a variety of ways including per month, per minute, per minute of prime time blocks of time and per transaction. No distinct pattern or indication of market preference for one configuration or another appears to have emerged at the present time.

3.11.6 Advantages Offered by Transactional Services

In a recent address, C.S. Forbes[22] reviewed a number of the advantages which in-home Videotex-based banking services offer to the consumer market. The review centered on the Chemical Bank's Pronto service and indicated that items which were preferred and rated highly by consumers were the convenience of 24-hour banking, the instant access to information about accounts, and the ability to save time and money by paying bills and conducting banking business without leaving the home. Also, consumers felt that one of the most important aspects was their ability to be closer and more in touch with their finances, and have closer ties with the banks. Users, according to Forbes, found that such services simplified the transaction and gave them better control over how they were using their money.

In-depth user research has also indicated that as the individual becomes more familiar and at ease with such systems, the services increase in versatility. Uses and applications become more innovative as users develop skills which enable them to accomplish more complex tasks. One of the most important features is that consumers feel they have more direct control over their finances than was previously possible. Another important feature of such systems is the ability to integrate a multitude of transactions ranging from managing investments to buying theatre tickets. This represents a new element of management and control on the conduct of financial transactions.

3.11.7 Transactional Services Shopping U.S.

Teleshopping services using videotex and teletext, as outlined in Exhibit 3.1, represent an outgrowth from the more traditional telephone shopping services which have had significant success in the U.S. for some time. These new services operate in a similar fashion to the telebanking services being provided on an independent as well as shared basis. Presently, the majority of these services are shared which allows them to take advantage of the large number of subscribers already serviced by system operators. Montgomery Ward's service, for example, is provided through Keycom and thus is available to the 2,800 subscribers on that service. The majority of the eight major services listed in Exhibit 3.1 operate in the ASCII format, a feature which is accentuated when CompuServe and Comp-U-Card are included since they provide a base of 200,000 subscribers.

Dow Jones' News Service also operates an on-line transactional service called CompuStore which utilizes the personal computer service of Comp-U-Card. The service offers over 50,000 items and is available for a fee of $25 per year. Applications allow the consumer to review items, daily specials and compare product types. Purchasing is also possible through the use of an approved credit card.

One of the largest ASCII based shopping services is The Electronic Mall, operated jointly by CompuServe and L.M. Berry. The 100,000 plus subscribers to CompuServe are provided access to merchandise in 11 categories, including "Book Bazaar" and "The General Store" which feature computer related products. J.C. Penney, the U.S.'s third largest retailer, recently purchased the First hand videotex system of the First Bank of Minneapolis. This gave Penney its own national videotex system which they will use to provide services for home shopping and banking in the ASCII protocol.

Electronic shopping, or teleshopping, is available in the U.S. from a variety of service providers and through the use of a wide range of technologies including videotex, videodiscs, personal computers and cable TV. These services fall into basically two distinct areas:

1. non-store selling, and
2. electronic merchandising[23]

Non-store selling includes transactional services that can be accessed through home computers or on public access terminals in malls. Users can browse, compare prices and order goods. Goods displayed through these kinds of systems tend to be durables and brand name products. The main advantages to consumers in using transactional shopping services are usually identified as price and convenience.

Electronic merchandising is used for product demonstrations and such things as infomercials. Again, these types of services can be accessed through a variety of sources including cable television and vendor-sponsored video display/videodisc systems located in stores and malls. These types of systems are used to provide information that aids in the selling of such demonstratable products as appliances, makeup and fashions. The demonstrations do not emphasize price; they are generally utilized in a "how to" oriented manner.

In the U.S., Sears represents one the most active in the various areas of electronic merchandising. It has developed its own technology called Stage 1, which is a telephone bill paying service. In its test form in Southern California last year, subscribers paid a $3.95 monthly fee to pay any number of bills through the system with funds drawn on any bank to any merchant. Users with touch-tone telephones obtain universal access directly to an ATM, and rotary phone callers reach the system via an operator. This feature assures universal access to the system regardless of whether the user has a digital or analog telephone. This service is now being used by some U.S. banks, and Sears plans to offer the service nationally to its own customers this year.

Sears is also a partner with IBM and CBS in Trintex, a two-way shopping service for the residential market utilizing home computers. Other experiments being conducted by Sears include:

- placing its catalog on videodisc
- providing infomercials on cable television
- acting as an information/service provider on the Electronic Mall, Viewtron, Times Mirror and Venture One.

Hybrid videotex/videodisc systems are appearing most frequently in malls to either sell or demonstrate products. A California based company, By-Video, is manufacturing kiosk style electronic shopping terminals called Uniports which are based on a videodisc format, with users accessing the terminals with a credit card. The suppliers who are participating in the test include mail-order companies who fill orders the same as they would for phone or mail transactions.

Another system used more for the advertising of sales and specials than actual selling is being tested in San Antonio, Texas. The electronic shopping systems are called "selling outposts", consisting of video boards which are 40 inch screens displaying colour computer graphic messages lasting 10 seconds and touchscreen information systems. Promoters of the service have drawn the following conclusions:

- consumers are more interested in the information services than in using the equipment to buy merchandise
- the video boards attract attention and the touchscreens get shoppers involved
- customer service attendants located at the booth help make people feel more comfortable with the system
- location of the systems help increase cross selling for the mall.[24]

The sponsor of the test, a shopping centre developer, plans to test voice response units and videodisc during 1985.

Videotex type shopping services represent only one form of a rapidly expanding range of options for providing these services. In some cases, these are being combined with videotex and incorporated in public access kiosks at a large mall or retail outlet. Some of the more well known formats include:

Demand Video and Videodisc
Cable TV, Force Tuning
Speech Synthesis
Teleshopping

Regardless of the format, all indicators demonstrate that these services, like on-line banking, are proliferating within the U.S. market with the majority in ASCII rather than NAPLPS. Most also utilize shared networks and are increasingly being included as a complement to banking or brokerage services.

There are no user fees levied for the actual shopping transaction in these services although users must, in most cases, be linked to an established on-line services such as The Source or Viewtron. In those situations, the unit and usage charges represent charges to the end-user for on-line shopping.

3.12 Public Access: U.S.

Assessing the market situation for the public access services in the U.S. is complicated by the high degree of overlap with transactional shopping services. Most of the activities in this market which have been made public are directed to in-store and shopping mall activities. The sizes of these systems vary from small standalone kiosks containing three or four terminals to larger networked systems of 100 - 200 terminals in multiple locations within a city. Costs for implementation vary but are known to range from $50,000 to $10 million for the

larger installations. As in Canada, there is increasing use being made of hybrid videotex/videodisc systems providing features such as touch screens, audio and printouts. As such, they represent additional services to those discussed in the transactional services sector.

U.S. based public access services are being directed, to a greater extent than in Canada, to retail market activities. These include Fantasy Plaza, for example, a totally computerized shopping service providing access and direction to retail merchants. The U.S. services make up about one-half of all those listed in Exhibit 3.1 and they range in size from very limited operations such as A-T videotex in Ohio providing free standing kiosks for news and movie guides to Phoenix Teleguide. This system provides restaurant guides, movie reviews, sports stories, and entertainment along with government and community information services to the residents of Phoenix from approximately 50 public terminals. The Tribune service operating in Orlando is similar, using the NAPLPS protocol it provides textual and graphic information for television listings, movies, and other entertainment applications.

The majority of the services listed in Exhibit 2.1 provide services in the NAPLPS format and a number of them use Canadian components in the service offering. Cableshare and Infomart are two of the most notable suppliers of systems in the U.S. public access market. Videopress (Cableshare) is operating in four American mall locations, Davenport Iowa, San Antonio, Texas, Minneapolis and Detroit Metropolitan airport. The cableshare system is scheduled for installation in at least ten U.S. locations over the next year.[25] The main applications currently addressed by the cableshare systems include:

Stores - Location
Entertainment
Stores by Category
Shopping Specials

Future planned activity includes:

Gift Registeries
Video production demonstrations
Catalog ordering centers
Shared automatic teller machines

The market for these services is also supporting the development of clustered public access configurations. These emerge when malls, apartment buildings and hotels cluster together to develop one integrated public access service. In such cases, the data base is available via in-home terminals and hotel lobby kiosks. These systems are being provided by Melvin Simon and Associates in Houston Texas.

Telephone companies in the U.S. are also pursuing the public access market as typified by the New England Telephone Company's pay phone computer/videotex terminal for use in airports. This is the first of its type and is designed to provide access to financial information or electronic messaging systems. Video cataloguing has emerged as another key sector of the broader public access market.

Sears have an interactive merchandising service which they have planned to develop into a "store of the future" using transactional kiosks in non-store locations. A related development is that of Catalogia, a New York based company whose systems allow consumers to select and order merchandise from hundreds of printed catalogues, followed with home delivery. This system is being operated in conjunction with the Dow Jones News Retrieval Agency.

Public access videotex based systems have enjoyed considerable success in the U.S. market and represent one of the main growth areas for this industry. As a part of the broader video interactive merchandising (VIM) systems, these units

will most likely be a major force in altering the methods of retailing in North America. The majority of systems in the U.S. are oriented to retailing and providing services in malls, hotel lobbies and large department stores. These consumer oriented services are designed to promote products, encourage sales and take advantage of existing mall traffic. The technical configurations vary from two or three standalone kiosks to systems utilizing networked PC's and video discs. In most of the systems now in place, NAPLPS is the protocol of choice although ASCII services are also quite common represent about 30% of the services reviewed in Exhibit 3.1.

Exhibit 3.6 indicates the type and nature of charges which are levied for these services. These are all advertiser fees based on a per page basis since subscribers or users are not expected to pay for the privilege of using public access services.

EXHIBIT 3.6

SELECTED PRICE RANGE EXAMPLES
U.S. Public Access Services

Public Access Services	Yellowdata	$150 per screen, 254 lines.
	Infoview	Advertising pages $630.00 per page per year
	VideoTimes	Advertising rates for touch screen directory 10-35 per frame per year.
	A-T Videotext	$8.00 basic service monthly.

3.13 Educational Applications: U.S.

The education market for videotex services in the U.S. is somewhat less active than in Canada. The overiding emphasis in the U.S. has been on commercial applications which has meant the education sector has received less attention. This market is composed of three sectors. The first consists of institutions providing instruction in videotexs. Ohio State University, the Alternate Media Center in New York, San Diego State and the University of Florida all provide instruction and training in videotex. A second area of activity is in the provision of content and educational courseware. This is provided by the Electronic Text Consortium, the Learn Alaska Network and the University of Nebraska. Each of the organizations develop educational information, instructional programs and courses in videotex or teletext format. The third and largest of these is the Learn Alaska system for distance education which is a state wide instructional system using videotex and teletext to link up 250 sites by satellite. The service is focused on direct and supplementary instruction for public school students, college students and professionals.

San Francisco State University and University of Wisconsin operate networks providing education related material to subscribers. The San Francisco service is cable television delivered, serving 90,000 households. Information is available to subscribers though the use of touch tone telephone with data bases established for library information and student guidance. The University of Wisconsin provides a state wide audio triconference service and an on-line ASCII based information system that allows viewers of public TV to interact with the shows production center. The service is available to subscribers of the Source and CompuServe and an electronic ASCII based instructional text service is also accessible.

The activities in the U.S. market for educational videotex have focused much less on the development of formal courseware and instructional programming than is the case for Canada. At the same time, most of the on-line residential

services such as Viewtron, Keycom and Gateway offer informal educational content to their subscribers as well as access to services such as the Grolier Academic American Encyclopedia.

The three largest systems in operation are those operated by the Learn Alaska Network, San Francisco State and the University of Wisconsin. (A detailed description of each is in the attached appendix).

3.14 Specialized Applications: U.S.

The market for specialized videotex/teletext products, like most sectors in the U.S., is a growing one with a wide variety of software and hardware products available or being developed. However, this sector is evolving somewhat differently in the U.S. than has been typical in Canada. There are, for example, far less specialized content applications developed than software or hardware products. Conversely, in Canada, most of what are considered specialized applications involve the use of a particular hardware and software product to produce specialized content which is subsequently made available to either a select group on-line or through interactive videotex systems.

In the U.S. then, the emphasis has been placed to a greater extent on hardware and software products rather than an very specialized and unique content developments. There is also a much greater diversity of companies involved in the U.S. than in Canada's market and as a result a wider variety of products are being investigated.

While on-line specialized services are more limited in scope, a number do exist which are being provided by large and small system operators. ATT, for example, provides a real estate information service to brokers in New Jersey using an ASCII based data base operating over telephone lines. Infotel, a company in Oregon has developed an information display system for hotels and motels using an internal television system. Digital Equipment has a private

videotex system that operates commercially in several offices in the U.S., Switzerland, England and Australia. This service supports ASCII and NAPLPS and is delivered over telephone lines or satellite to 4,500 business users.

Specialized hardware and software products are proliferating in the U.S. where currently over 50 companies are directly involved in the production of system components, networking of software or interactive videodisc and integrated computer videotex configurations or applications software.

EXHIBIT 3.7

Specialized Hardware Software Suppliers in the U.S.

Hardware Products Vendors (only)	12
Software Products Vendors (only)	12
Hardware and Software Producers and Vendors	31
Total	55

Major computer, communications and media companies are all producing products for the specialized videotex/teletext markets. IBM, Digital Equipment, Honeywell, ATT, Commodore, Wang, Sony, RCA and CBS all have software and hardware products designed to meet the needs of the specialized market sector as well as the broader residential and business sectors.

IBM and ATT are producing system software for mini as well as micro computers. Digital Equipment is promoting specialized in-house systems and business services while Sony is producing hardware for all applications including point of sale, institutional closed user groups, private in-house videotex and public access information. Honeywell is producing a videotex system designed for the intra-business environment in large corporations which enables information dissemination, graphics display and information retrieval. The system supports ASCII, Antiope, and NAPLPS protocols. This support of multiple

protocols is typical of the U.S. market where, attention has generally been directed to ASCII protocol rather than NAPLPS. The specialized services and products being pursued and implemented are presently more likely to be ASCII based than NAPLPS based. Also, many more of the products and services, particularly the shopping business and financial ones are oriented towards the commercial market than is the case for Canada.

Interactive videodisc and videotex systems are being produced by several companies such as CAT Interactive, By Video, Atarie, Comp-U-Card and Compuvision. Most of these suppliers have focussed their attention on the video merchandising market, although CAT have produced systems for tourism, training and driver education.

The New York State Urban Development Corporation represents a prime example of a specialized content oriented service. This corporation is developing a state wide videotex system to provide information on industrial, commercial and civic development to interested parties. It offers low and moderate-income housing information as well as data on renovation of industrial and commercial facilities.

3.15 Teletext Services

3.15.1 Canada - Teletext Activity and Market Situation Analysis

Teletext services have received somewhat less attention in Canada than videotex services and, at the present time, there are no commercial markets providing teletext services. Several experiments have been conducted and a number of services proposed although none have as yet been implemented. However, Norpak and Electrohome both produce teletext equipment, such as decoders and head-end systems.

Delivery of teletext service in Canada is executed either using vbi in broadcast television or through full channel cable. The most commonly used of these is the Broadcast vbi, but the method likely to grow significantly in the future is the full channel cable delivery.

Teletext services which have been offered or which are currently planned include:

- CBC Project IRIS
- Canadian Captioning Development Agency
- Genesis Research Corporation
- l e Groupe Videoway
- TV Ontario

The CBC IRIS project was initiated in April 1982, as an experiment to test the delivery of English and French teletext services to 100 households in Montreal and Toronto.[26] The service was provided in the NAPLPS/NABTS protocol. Households in each city were provided with decoders for their television sets to facilitate receipt of teletext over the vbi. All households in trial had access to between 150 and 250 screens of text and graphics through their local CBC/Radio Canada Television station every day of the week. Content was broadcast in the form of a magazine divided into a number of topic sections. The topics included news, weather, sports and finance as well as softer information such as entertainment, news and community events. Users could access specific pages of the teletext magazine through a decoder.

The CBC trial has recently been terminated following almost eighteen months of activity. A research report has been produced providing details of the way the test households responded to the content, their patterns of viewing, method of viewing, impact on television viewing behaviour, and overall impressions of the service. The technical aspects of the service and its design features were also appraised.

EXHIBIT 3.8
Teletext Services

Service	Delivery Means	Protocol	Number of Subscribers	Status	Applications General
CANADA					
- Canadian Broadcast Corp./Project IRIS	- Broadcast	- NAPLPS/NABTS	- General Public	- Test/Implementation Stage	Information Retrieval News
- Canadian Captioning Development Agency	- Broadcast	- Line 21/NABTS	- General Public	- Operating	Programming Education
- Le Groupe Videoway	- Cable	- ASCII NAPLPS	- 600,000 Residential Users (Quebec)	- 1 way system in operation. Interactive planned for 1986	Entertainment Sports Weather Stock Market
- Genesis Research Corp.	- Cable/Satellite	- NAPLPS, Telidon	- 350,000 Residential Users	- Operating	Electronic Magazine
UNITED STATES					
- CBS Extra Vision	- Broadcast	- NABTS	- General Public	- Operating	Electronic Messaging
- NBC Teletext	- Cable/Broadcast	- NABTS	- General Public	- Operating	Advertising
- Satellite Network Delivery Corporation	- Broadcast Satellite	- NAPLPS/NABTS	- Business Community Nationwide	- Under development scheduled to begin operation in Sept. 1985	Community Bulletin
- TAFT Broadcast Corp.	- Broadcast		- 200 Residential Users (Cincinnati)	- Operating	Electronic Job Listing
- KSL TeleText-5	- Cable/Broadcast	- NABTS	- General Public	- Operating	Captioning Services
- Keyfax Teletext	- Cable/Satellite	- World System Teletext Format	- General Public	- Operating	Tourist Arts & Culture
- KTTV Metrotext	- Cable	- World System Teletext Format	- 600,000 Cable Households and free access to the General Public	- Operating	Farming
- WGBH Caption Center	- Broadcast	- Line 21/NABTS	- General Public	- Test/Implementation Stage	
- National Captioning Institute Inc.	- Broadcast/Cable	- Line 21	- General Public	- Operating	
- Colony Electronic Information Services	- Cable/One-Way		- General Public	- Operating	
- Group W Cable Inc.	- Cable/One-Way		- General Public	- Test/Implementation Stage	
- Courier Journal Louisville Times Co.	- Cable/One-Way	- NAPLPS	- 135,000 Residential Users (Louisville)	- Test/Implementation Stage	
- Newsday Videotex Services Dept.	- Cable/One-Way	- NAPLPS	- 226,000 Residential Users (Long Island)	- Operating	

Following the initial field trial phase, plans were announced in April 1984 to offer information to the general public in Toronto and Montreal on a three year development basis. The purpose being to support the manufacture and marketing of decoders. Now regional and local services are also being planned at each of CBC's television stations across the country. Data bridges will be installed at each station to ensure continuity in a national service and to provide appropriate manipulation of closed captioning signals. Delivery will be free to decoder equipped homes.

Another Canadian teletext service that offered by the Canadian Captioning Development Agency utilizes the vbi to provide captioning for Canadian television programming free to residential subscribers. To date, 25,000 decoders have been sold. Seven hours of captioned programming are broadcast weekly in English and five hours in French. In the U.S., CBS and PBS use this NABTS protocol based captioning service on a regular basis.

The activities of TV Ontario have been outlined in detail in the educational videotex section. However, their system uses the vbi to provide between 100 and 130 pages of teletext, in NAPLPS protocol, on career job information to several educational institutions. A local mode of teletext transmission has also been developed which allows information to be loaded and saved in the memory of a receiving terminal for viewing at a more convenient time.

3.15.2 Cable Services

The cable industry has expressed a great deal of interest in the provision of teletext based services in the last few years. The primary interest lies in diversifying program content to include a host of transactional and two way services which are now technically feasible and economically justifiable. This stems essentially from the desire by cable companies to increase their service offering and to gain a share of the growing market for non-programming services such as in-home banking, shopping, games, down loaded computer software,

business graphics, financial and brokerage services and commodities exchanges. Business networks for information retrieval and transactional services are now recognized as the dominant market growth areas. Broad band transactional services to the residential market are also expected to represent a signifcant growth opportunity over the next five years. A study recently conducted by Nordicity of Ottawa[27] estimated that 20% of cable industry revenues will arise from the sale of non-video services by 1990, generating close to $500 million.

One of the most interesting cable based teletext services is provided by Winnipeg based Genesis Research Corporation which provides educational information and children's entertainment to 350,000 residential subscribers in New York City, Austin, Texas, Miami, Florida and Long Beach, California. The system uses cable TV and satellite transmission to deliver pages in NAPLPS/NABTS format.

Le Groupe Videoway of Montreal provides an ASCII and NAPLPS service via cable (one way) to 600,000 residential cable subscribers in Quebec City. News, sports, timetables and bulletins are provided as part of the full cable service offering.

A study recently conducted by Norpak,[28] a major supplier of teletext equipment, outlined some of the new services for which a significant market may exist in the near future. These included:

- Business information services, data delivery, consumer catalogue shopping, electronic publishing and enhancement of TV services.

3.15.3 U.S. Teletext Activity and Market Situation Analysis

Teletext services have had more rapid and extensive development in the U.S. than in Canada. Most existing services use NABTS provided via broadcast and cable using the vbi and/or full channel services. The greatest number of subscribers are being serviced over cable, with penetration expected to reach

50% of U.S. homes in the next few years. Large network services are planned or already in operation by CBS, NBC and TAFT Broadcasting. Each uses the broadcast mode although NBC also utilizes cable. Services consist mainly of news and information retrieval.

Specialized broadcast teletext services have also emerged in the U.S. One such service is operated by the Satellite Network Delivery Corporation which broadcasts NAPLPS and NABTS protocol based business information to decoder equipped TV's and microcomputers to deliver business information to owners via satellite.

World Standard Teletext Service is also available in the U.S. on two services. One is provided by Keyfax teletext in Tulsa and the other be KTTV metrotext in Hollywood. The Keyfax service is free to cable subscribers and supplies advertisement. The KTTV services is available to 600,000 households, free of charge, supplying community information, entertainment reviews, contests and quizzes.

Captioning services, using NABTS, are also in operation in addition to the broader consumer teletext services. Two of the largest are the National Captioning Institute in Virginia (NCI) and the WGBH Caption Center in Boston. NCI provides basic services to networks such as video and local TV productions, while WGBH is more specific, servicing local areas as a public television station.

One way cable services consisting of pages cycled to subscribers constitute perhaps the most well developed sector in the U.S. One of the largest, although partially interactive is the QUBE service in Ohio with 55,000 subscribers. Others include the Group W Service in New York which is linked with Comp-U-Card, Electronic Media Services and TV Data for the delivery of one way services. In Louisville Kentucy, 135,000 residential subscribers are provided news, classified advertisements and tourist information by the Louisville Times. Another 226,000 subscribers in Long Island, New York receive news, sports, reviews and classified ads via the Newsday services.

Cable, teletext shopping and transactional services are also available through Comp-U-Star (25,000 subscribers), Bison (200 subscribers), Video Shopping Services and Comp-U-Serve. In the Video Shopping Services, two hours of daily shopping by satellite is provided. Subscribers can subsequently make purchases through connections to Comp-U-Card.

In the U.S., teletext activity is more diversified and extensive than observed for Canada. Broadcast networks, public TV stations, captioning services, cable operators and media companies are all offering teletext in one form or another. Most services are vbi based and use NABTS as the protocol. Cable teletext is expected to grow quite substantially in concert with the increased penetration of cable services throughout the U.S. This is likely occur initially within the residential services sector extending eventually to the business market sector. Applications currently include general news and information but there is a definite trend towards more specialized transactional and business related services. The growth in these services is dependent on forces similar to those in Canada, such as the availability of improved technology for two way services and the projected declining base of revenues from traditional programming offerings among cable operators.

3.16 Summary

This chapter has provided a review of the current situation for the North American market for videotex, teletext and related services. The analysis was based on the classification of services into seven different generic categories of:

- residential services
- business services on-line
- public access services
- transactional services, banking, brokerage and shopping
- business closed user group services
- educational services
- specialized applications

It is generally acknowledged there has been a much slower development of videotex and teletext services in North America and that there are presently only a handful of videotex services operating in North America which conform to the original view of a mass residential/consumer service. Most of the services now in operation are based on the more widely accepted ASCII protocol than the more specialized NAPLPS protocol. Also services have become more diversified with some of the most popular new developments including public access systems, integrated videodisc systems, transactional services and business closed user group services.

The following presents a summary of the extent of development for each of these service classes for the North American Market.*

EXHIBIT 3.9

Summary of Videotex Services

	Type of Service	No. of Services	No.of Subscribes
I	Residential/Consumer Services		
	NAPLPS	6	8,000 - 10,000
	ASCII	12	250,000 - 300,000
II	Business On-line Services		
	NAPLPS	5	2,000 - 3,000
	ASCII	16	225,000 - 250,000
III	Public Access		
	NAPLPS	10	
	ASCII	3	
IV	Transactional Services Banking		
	NAPLPS	10	1,200 - 1,500
	ASCII	8	50,000 - 60,000
V	Shopping Services		
	NAPLPS	3	2,000 - 4,000
	ASCII	6	100,000 - 200,000
VI	Business Closed User Groups		
	NAPLPS	6	
	ASCII	8	
VII	Education		
	NAPLPS	4	
	ASCII	12	
VIII	Specialized Services		
	NAPLPS	13	
	ASCII	13	
	Total No. of Services		Known Subscribers**
	NAPLPS	57	10,000 - 20,000
	ASCII	118	500,000 - 800,000

* These data are derived from a review of existing commercial services and our industry survey conducted as part of this study. They represent those services for which data could be verified.

** This would include multiple uses i.e.; those subscribing to in-home on-line information, banking and shopping services which could be verified through direct contacts with system operators. These also represent commercial and operational services rather than trial or test services.

This appraisal emphasises the overwhelming dominance of ASCII based services which currently exceed NAPLPS services on a 2 to 1 basis. This situation is emphasized further where ASCII accounts for 95% of the subscribers base with NAPLPS no more than 5%. The majority of services and consequently subscribers are found in the U.S. Teletext services have emerged in North America, but while there is a significant amount of discussion about these services by broadcasters such as CBC or NBC etc. there are as yet no large scale commercially operated services in North America. Services providing text over the VBI or on cable are in place in the U.S. and Canada but these do not generally make use of the sophisticated graphics of full NAPLPS teletext. These were not considered as a central part of the teletext services although they have been included in our market situation analysis.

CHAPTER IV - INTERNATIONAL MARKET ACTIVITY

4.0 Introduction

This chapter provides a review of the international market developments for videotex and teletext. It focuses mainly on Europe and Japan since these represent the most active areas outside of North America. Japan is particularly interesting because CAPTAINS and NAPLPS protocals are both being implemented offering Canadian suppliers significant export opportunities for the sale of hardware and software as well as applications development. Other Asian countries as well as New Zealand are known to be implementing NAPLPS or NABTS videotex/teletext and these are reviewed in the final sections of this chapter.

4.1 Market Overview

In 1984, the worldwide installed base of videotex terminals was estimated to be close to 60,000, with a growth rate of approximately 50% expected in the 1984-1986 period[29]. These estimates were exclusive of the highly subsidized French PTT services where at the present time up to 500,000 specialized Minitel terminals provide information retrieval.[30]

Teletext services are even more prevalent on a worldwide scale than videotex, with an estimated two million sets now installed predominantly in Europe. The greatest number of these exist in the UK where there are 1.1 million users. Significant numbers of subscribers also exist in the following European markets.[31]

Exhibit 4.1
European Teletext Penetration

Country	Subscribers
Germany	300,000
Austria	300,000
Netherlands	250,000
Sweden	250,000
France	100,000
Belgium	30,000
Finland	25,000
Switzerland	10,000

Japan's teletext services have only recently been implemented and there are at the present time no estimates of the number of users. However, the implementation of a national fibre optics network over the next ten years will undoubtably stimulate development of new teletext services being provided using CATV.

Within the European market areas, most teletext system operators use the British World Standard, with the exception of France which uses NABTS. Videotex is provided using the CEPT protocol in most European nations with the exception again of France where Antiope is used and Britain where Prestel is the preferred protocol. In Japan, CAPTAINS is used for the residential on-line services while NAPLPS is most commonly employed for public access and business services.

Comparatively, videotex developments in Europe and Japan are evolving quite differently to those in North America. National telecommunications carrier configurations are dominant, providing centralized and tightly controlled videotex networks with CATV implementation much more constrained than in North America. In almost all cases, standalone videotex terminals are the prevalent display mechanism. This is the case in Europe because the penetration of PCs is much lower than in North America, particularly in the home market, making them less appealing as a display technology. However, in Japan, personal computers are now enjoying a surge in popularity which will encourage their application as videotex terminals in the home and business environment. Also,

most Japanese computer manufacturers are now building videotex decoders into their PC's as part of the overall push to promote videotex developments.

4.2 European Market Situation

European videotex services are characteristically highly politicized as reflected in the rivalry between the French Antiope and the German Bildschirmtext services. The lines of competition originate with language differences, historical traditions and the desire to service other European countries. Switzerland, despite its significant French population, has recently become closely aligned with the German Bundespost services. This reflects the close historical ties between the two countries in the development of telephone network services and the acceptance by the Swiss of German assistance in the setting up of their videotex network.

Overall, growth in videotex services have been quite steady in Europe although, as in North America, service provides expectations have not been by matched market realities. In Germany, for example, a total of $233 million (US)[32] has been invested in the Bildschirmtext project, yet presently there are only about 18,000 subscribers. In Britain there are currently 50,000 terminals linked to the Prestel services after nearly five years of commercial operation.

Technology trends and service models emulate, for the most part, many of the activities identified in North America as the Europeans have tended to look to Canada and the US for leadership. There are several companies in Europe pursuing the development of videotex software for PCs and already IBM has introduced a CEPT standard decoder and encoder package.

The pursuit and development of the in-home transactional service sector in Europe is currently lagging behind its U.S. counterpart, although it has been targeted as a primary market opportunity for the near future. In Switzerland, Germany and France, large banking concerns are actively pursuing the home banking market, modelling these services on those being provided in the US.

Public access videotex is gaining in popularity in Europe with systems already being offered in Switzerland, Germany, France and Britain. These services are used primarily to provide travel and tourist information, shopping guides, restaurant guides and transit schedules.

One of the most active areas of development is in the specialized new media sector where video disc and videotex are being combined to create innovative uses of the technology. Several companies in Switzerland are either offering or planning to offer tour operator and travel agent integrated systems which incorporate moving pictures, full frame photography and videotex. It should be remembered, however, that these systems operate on the PAL standard and are thus not directly compatible with the NTSC standard common to North America and Japan.

4.3 Britain - Prestel

Britain was the first market to actively receive commercial videotex services. The experience gained from this market has proven useful not only in terms of specific opportunities for Canada, but more importantly because of the insight acquired concerning system operations, market behaviour and consumer response to commercial services.

The most important development to occur in Britain over the last two years involves British Telecom's shift in status from a from common carrier to a modified carrier. This change in role means that British Telecom has chosen to accelerate Prestel's move towards offering targeted specialized interest databases by entering into joint venture arrangements with single information providers for each database. This has been termed database franchising, meaning that the Prestel IPs will have to negotiate with each other for space and prominance on a Prestel database.

Mercury Communications has recently emerged as a network provider in Britain and plans to incorporate digital trunk optic fibres through all of the major cities in Britain, utilizing the existing rail lines as conduits for their cabling. An important part of their strategy involves the development of interactive services which will most likely compete with, or in some cases complement, existing Prestel services. Their stated approach, however, is to focus on the cable industry as a partner, establishing joint ventures for the provision of a variety of non-programming services. As well, the planned use of optic fibre illustrates that the focus of interest will initially lie in serving high density urban areas primarily for business services.

In general, consumer response to the Prestel services has been anything but spectacular, with approximately 12,000 customers actively using its database out of a total user population of 50,000. The most recent market appraisals have indicated that the growth rate has been much slower than originally forecast, although presently it is known that 2,000 subscribers per month are being added to the service. At the same time, upwards of 1,000 users are cutting services thus reducing the actual overall growth in subscribers.[33]

The majority of videotex subscribers on Prestel are business users (70%)[34], with the remainder classified as domestic users. A study conducted by Witcher (1982)[35] indicates the extent to which these specialized markets were addressed in the U.K.

EXHIBIT 4.2

U.K. Target Segments and Actual Penetration

	Size	Prestel Share %
Travel	5,000	18
Financial	30,000	5
Commercial	2,000	-
Agriculture	10,000	1
Construction	15,000	1
Hotels	34,000	.5
Lawyers	7,500	.3

The percent share indicates that of all business users, originate with the tourism and travel industries, 1% percent from agriculture and only .5% percent from the hotel industry. Another Prestel development which parallels the North American market scenario is the growth of gateways which allow compatible computers with interactive video standards to communicate with each other in a network manner.

Some of the most interesting facts emerging from the experiences of the well established videotex services pertain to questions concerning consumer response and market feasibility. Discussions[36] with Prestel system operators reveal the following facts:

1. Most of Prestel's residential customers and a growing number of business customers access Prestel through a personal computer rather than standalone units or adapted TV.

2. Consumers are not interested in sophisticated graphics for their own sake. Interest in such services derives from a user need, not from the elegance of the technology.

3. The mass market for information retrieval is very small and will be more effectively provided on Teletext. Retrieval services must be provided in tandem with transactional services, teleshopping and banking.

4. Consumers do not want services at any price if they do not meet their needs. The principal issues for consumers concern price, product value, as well as the provision of practical and diverse content options.

Recent developments parallel those in North America where interactive services, banking and very specialized applications for the business market are

beginning to emerge. One of the first interactive services is Home Link, a home banking application offered by British Telecom along with the Nottingham Building Society. It allows customers of the Nottingham Building Society to do account queries, transfer funds between their bank and the building society and pay household bills. Other services include Micronet, a database aimed at the personal computer user which allows access to Prestel through a special $65 modem adapter. This has been developed in association with Telemap, a videotex subsidiary of the East Midland Allied Press.

4.4 France

France recently opened the first operational electronic directory service in the world using the small, domestically produced Minitel terminal provided free to telephone subscribers. The response to the terminals has been relatively successful, with 45% of those eligible for receiving terminals reportedly doing so. By the end of 1984, there were 400,000 terminals installed and by 1985, 500,000 were in place. The 1986 penetration has been set optimistically at 3 million. Of the approximate 500,000 installed terminals, the dominant percentage are distributed in homes (70%), with an estimated 110,000 being used in a variety of professional services.[37]

EXHIBIT 4.3

Installations of French Minitels

Year	No. of Terminals
1983	344,948
1984	91,140
1985	52,263
Total	488,351

Minitel terminals are used primarily for information retrieval, electronic messaging and mail along with basic voice telephone services. As the following

exhibits illustrate, large numbers of different types of terminals exist which compatible with the Minitel network. As in North America, a host of microcomputers, ranging from "low end" models such as Atari to "high end" models such as IBM PC's can be used on the videotex network. At the same time there are various configurations of the dedicated Minitel in prices ranging from just under $700 to just over $2,000.

The most recent technical developments in France are focussed on the production of dual standard terminals which allow increased memory capacity in the ASCII and Antiope protocols. This has been encouraged by the increasing demand for additional functionality and services such as on-line banking, shopping, stock market transactions and business graphics. Now, business computers and office work stations too are being manufactured with videotex capabilities. Exhibits 4.4. and 4.5 lists a number of these multifunctional, dual protocol terminals in existance along with their current prices.

EXHIBIT 4.4

Terminal Equipment French Used on the Minitel Network

Terminal Type	Price		CAN $'s
FIET - Valise	16,000	FF	$2,240
DESTEL - MC 2900	5,900		826
MATRA TTE A315	4,900		686
MATRA TTE A620 (ASCII)	7,700		1,078
MATRA TTE A820, Teletel, ASCII	12,900		1,806
TELIC ALCATEL, Teletel, ASCII	11,300		1,580
THOMSON, Teletel, ASCII	12,000		1,680
TRT, Radio Technique, Teletel, Prestel	6,500		910
TRT, Radio Technique, Teletel, ASCII	5,000		700

EXHIBIT 4.5

Minitel Compatible Micros

Micro	Features	Price FF	CAN $
FIET	64k, 280 CPM	13,000	1,800
SMT GOUPIL	64k, 6809	7,500	1,091
SOBRELEC	64k	14,000	2,000
TELMI	64k	16,400	2,342

EXHIBIT 4.6

Micro's Adaptable to Minitel

Micro	Price FF	CAN $
Atari	3,500	500
Epson	6,500	920
Canon	3,000	428
Exelvision	1,100	157
Meta	4,800	685
Hewlett	3,500	500
Olivetti	1,250	178
Sharp	-	
Thomson	1,750	250
Wang	6,000	857
IBM	3,200	457

Host computers which can operate in the French Videotex environment include:

IBM 51	Datapoint 800
IBM 4341	Data General
Bull (Honeywell)	Dec Vax 750
Prime	PDP
ITT 3809	Perkin Elmer
ICL	CDC
PLEXIS	Texas 970

As previously stated, there are at the present time approximately 500,000 users of the French minitel service who have access to the on-line electronic directory. There are also an estimated 500 different services available on the videotex portion of the network. This is composed of pages supplying:

1. Games
2. On-line News and Entertainment Magazines
3. Shopping Services
4. Banking On-line
5. Transit and Travel Information
6. Public Announcements
7. Telemarketing Services

On-line banking services are also available to the customers of seven major banks:

1. CCF
2. Credit Lyonnais
3. Credit du Nord
4. Societe General
5. BNP
6. CIC
7. Chase Manhattan

This sector, along with the related application of on-line shopping, is experiencing significant growth and is expected to continue to expand as banks and retail institutions initiate services in those regions throughout France currently being added to the Minitel network.

In February 1984, Credit Commercial France announced the launching of a national home banking service using Minitel terminals. This service has provided in conjunction with the same network that is used for the French electronic

directory inquiry service. The network covers three regions in France: Brittany, Bacardi and Paris. The service allows account holders to check bank statements, call up financial information and carry out funds transfer transactions.

The banking sector in France has been one of the most active business sectors in developing services for the professional class, with 56 banking services representing 30,000 subscribers operating since 1984. These services are also linked to the well known Smart Card, which serves as a means of identification and payment of videotex services and bill telepayment. Currently, 50,000 Smart Cards are in use on videotex terminals. Smart Cards can also be used for payments in supermarkets, retail stores as well as public payphones.

Another major development stems from the experimentation with video disc applications, where the feasibility of combining these with videotex has been demonstrated. One particular test in Velizy utilizes a picture phone as a tourist information centre enabling visitors to visualize various areas of the city. This system, which offers full frame pictures accessed from an optic video disc , is now considered one of the most advanced applications of the combination of networking, videotex and optic laser discs capabilities currently available.

France represents one of Canada's foremost competitors in the selling of videotex and teletext equipment and services internationally. The high degree of subsidization prevalent in their domestic industry, has fostered a number of technology innovations which have enhanced France's advantage of the the international marketing of its videotex and teletext products worldwide.

In the past few years, the French videotex industry has been quite active in marketing their software and hardware producers. Sales of systems have been made in the US, Kuwait, Brazil, Italy, Greece, Australia and Norway. Of more significance, given the proliferation of banking services and the movement to in-home transaction capabilities, are the sales of Smart Cards. Major deals have recently been established in the US, with the First Bank System of Minneapolis,

and American Express. European deals have also been secured with Norwegian Telebank and in Germany, the Deutsche Bundespost is examining improvements that the Smart Card could bring to their videotex and public telephone service. During 1985, experiments are planned in Bonn and Aachen, to evaluate the feasibility of combining Smart Cards with videotex.

4.5 Switzerland

The Swiss PTT is officially following a role parallel to Germany and is basing its services on the CEPT standard. At the present time, there are approximately 1,000 on-line users in Switzerland accessing a central database in Zurich over the telephone lines. The Swiss videotex system, which has a multilingual requirement, is being built with DEC technology and it is interesting that the alphageometrics are being provided via NAPLPS rather than the CEPT protocol. The Swiss, while currently favouring the CEPT standard, are known to be looking at NAPLPS with increasing interest. It is likely that within the next two years, particularly in the private user group area, NAPLPS will be the dominant technology. As well, the Swiss are examining a number of innovative applications for the technology, particularly in the private sector. Large drug companies such as Hoffman La Roche and Sandoz are currently pursuing activities which could utilize large integrated databases jointly and as part of a closed user group application.

The focus in Switzerland is tending towards unique specialized application areas rather than a mass market approach to videotex implementation. Phillips Business System's Viewdata, for example, recently announced a 300 videotex terminal sale to Esco Reiscen, a tour operator based in Basel, Switzerland. The system to be installed in 320 offices of the tour company, connects videotex terminals directly to Phillips laser video disc machines. Customers are able to choose, via videotex, countries, resorts and hotels of interest and are then able to view films of those countries, resorts and hotels on request via video disc. The Swiss are also currently developing a cable network which will carry interactive services into selected home test regions over the next two to five years.

The Swiss have been somewhat slower than their European neighbours in developing the videotex market but they have also been taking a more strategic approach, first by dealing very closely with the Germans and now by examining developments in France and North America. Their tendancy has been to proceed cautiously with the development of closed user and private applications. (It is quite likely that in the next two years a number of very significant developments will emerge from the Swiss experience). This is due in part, to the relatively low amount of government support provided to the Swiss industry. Most of the impetus to date has come from the industrial sector. In particular, large drug producing companies, banking and financial institutions have shown considerable interest.

As a further indication of the Swiss interest, the second Swiss Videotex Congress was held in September 1984. This was organized by the Basel Chamber of Commerce and attracted over 1,500 participants. Speakers were in attendance from around the world to present and discuss developments in videotex. While the majority were focusing on European applications, interest was high with respect to the North American developments.

4.6 The Netherlands

In the Netherlands, the videotex service is provided by the PTT which now has approximately 7,500 subscribers compared to about 4,000 a year ago. It is expected to approach 10,000 in the next two years. As well, the government will test interactive cable services involving 100,000 homes throughout 1984/85. About 54 IPs are committed to this test which the government will be instituting at a cost of approximately $20 million over a ten year period. Non-programming services will be provided in tiers with a free tier offering news, weather, sports, fashion and tourist information. Other tiers include stock exchange prices and computer education. Plans have also been announced to introduce a telephone directory similar to that being produced in France.

4.7 Japan

Japan represents one of the most active markets for videotex services anywhere in the world. Fortunately for the Canadian videotex industry, interest in this market focuses on the NAPLPS protocol. Already business services using NAPLPS are being provided by major corporations such as Mitsui, Neechiman, Mitsubishi and the Nippon Telephone & Telegraph Co.

In Japan, the official standard for videotex is CAPTAINS (Character and Pattern Telephone Access Information Network System), but numerous business services and public access systems are utilizing the NAPLPS protocol. As a commercial service, CAPTAINS was launched in February 1984 as a joint venture between several information providers, including NTT, banks, terminal manufacturers and KDD.[38] An investment of $2 million CAN was used as the initial start-up capital for the service. The details of the CAPTAIN service are outlined in Exhibit 4.7.

EXHIBIT 4.7

Trial Service Configuration - Japan

CAPTAINS

Item	Step 1	Step 2
Trial Period	Dec. 1979 – Mar. 1981	Aug. 1981 to Mar. 1983
Service Area	Tokyo Metropolitan Area	Tokyo Metropolitan Area
Number of Monitors	1,000	2,000
Capacity of Stored Information Frames	100,000	200,000
Number of Information Providers	199	278
Variety of Provided Services	Information Retrieval	Information Retrieval Order Entry Service (Note 1) Closed User Group Service (Note 2)
Input of Information	Input from Center o Table-type Input Equipment o Facsimile-type Input Equipment	(1) Input from Center In addition to the equipment shown on the left: o Camera Input-type Input Equipment o Keyboard-type Input Equipment (2) Input by Outside Computer (Note 3) (3) Input from Information Providers' Premises o User Terminal with Keyboard
User Terminal	Input of Numerals from Keypad	o In addition to numerals, input of English letters and kana characters is possible. o Hardcopy
Information Retrieval	o Retrieval from Contents o Direct Retrieval by Index Number of Frame	In addition to the retrievals shown left: o Abbreviated Number Retrieval o Increase in the number of backup frames o Temporary Memory of Frame Number o Retrieval by Kana and English letter

Note 1: The service for inputting of orders for goods, replies to inquiries, etc., from users to information providers.
Note 2: Closed User Group service to provide specific information to specific users specified in advance.
Note 3: Automatic renewal of information (stock quotation, vacant seat, etc.) by on-line connection of the CAPTAIN center with outside computers.

EXHIBIT 4.8

System Configuration

CAPTAINS

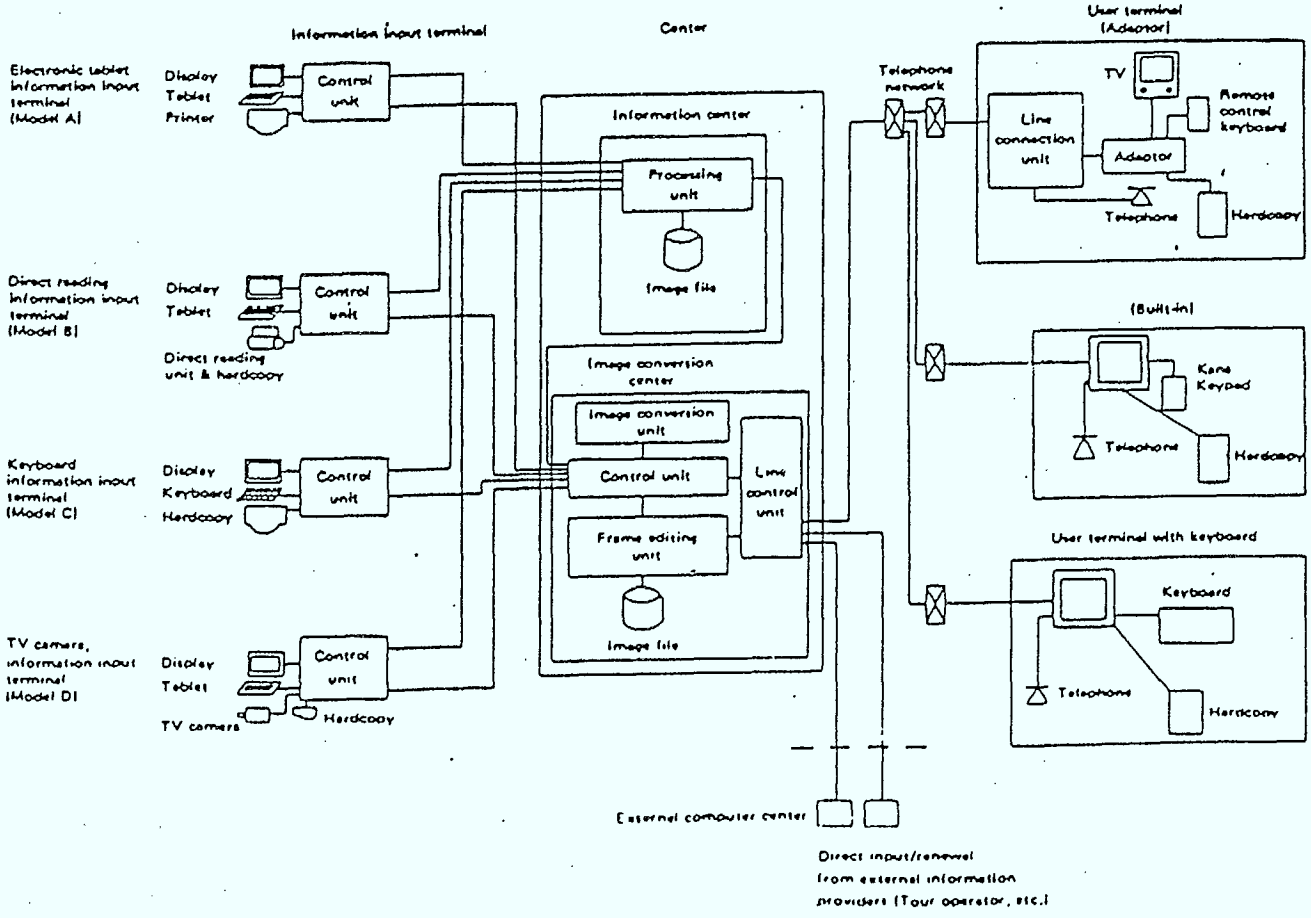


EXHIBIT 4.9

Frames and Accessess on CAPTAINS Trial Service

Information Category / Contents	Topics	Step 1		Step 2	
		No. of Frames	No. of Accesses	No. of Frames	No. of Accesses
		1,749	–	4,871	–
News and Weather Forecast	General, Sports News, Weekly Digest, Past Events, Weather Forecast and Racing Results	5,112	327,376	14,252	658,486
Public Information and Town Guides	Town Guides and Public Information provided by Tokyo Metropolitan Government and Ward Offices	6,684	40,381	17,579	10,225
Health, Beauty and Childcare	Health Care, Guide to Hospitals, Beauty Memo and Childcare	1,692	21,072	1,916	54,302
Shopping	Guide to Department Stores, Guide to Commodities, Guide to Speciality Stores and TV Shopping	4,211	154,099	5,927	284,884
Cooking and Guide to Restaurants	How to Cook and Guide to Restaurants	5,047	68,639	7,213	128,020
Housing	Consultation on House and Lot and Construction	1,740	45,050	4,209	72,327
Home Economics and Laws	Moneymaking, Loan, Insurance, Pension, Tax and Legal Advice	1,850	18,657	3,547	74,519
General Knowledge for Living	Various Knowledge, Ceremonial Occasions, Public Lottery, Circle Activities, and Service Information	9,089	55,101	10,669	176,218
Education, Study and Culture	Learning Programs, Entrance into a School of Higher Grade and Entrance Examination, Guide to Exhibitions, and Books	14,081	321,974	23,372	679,330
Sports	Baseball, Sumo Wrestling, Golf, Fishing and Various Sports – General Knowledge, Records and Racing Results –	10,488	305,754	10,673	592,643
Entertainments and Hobbies	Movie, Music, Drama, Art Museum, Art Exhibition, Quiz, Fortune Telling, Radio and TV Programs	17,600	1,455,536	44,169	552,944
Travel and Sight-seeing	Guide to Domestic and Overseas Trips, Guide to Pleasure Resorts, Guide to Hotels, Railway Schedule, Railway Station Lunch and Souvenirs	7,619	125,971	9,488	276,007
Business Information	"Help Wanted" Information, Various Statistical Information, Economic Movement, Technical Information and Guide to Gatherings and Exhibitions	8,210	109,820	12,470	365,310
Information in English	News & Weather, Entertainment, Public Information	436	44,543	1,194	39,913
Town Guides	Various Playspots and Sports Facilities by Districts	316	13,381	732	5,010
Samples	Samples	3,020	–	24,272	160,683
	Total	98,944	3,107,851	196,553	9,199,121

Exhibit 4.8 illustrates the technical details of the Japanese CAPTAINS service as it was designed for their initial trial service. This service is now operating in a commercial mode.

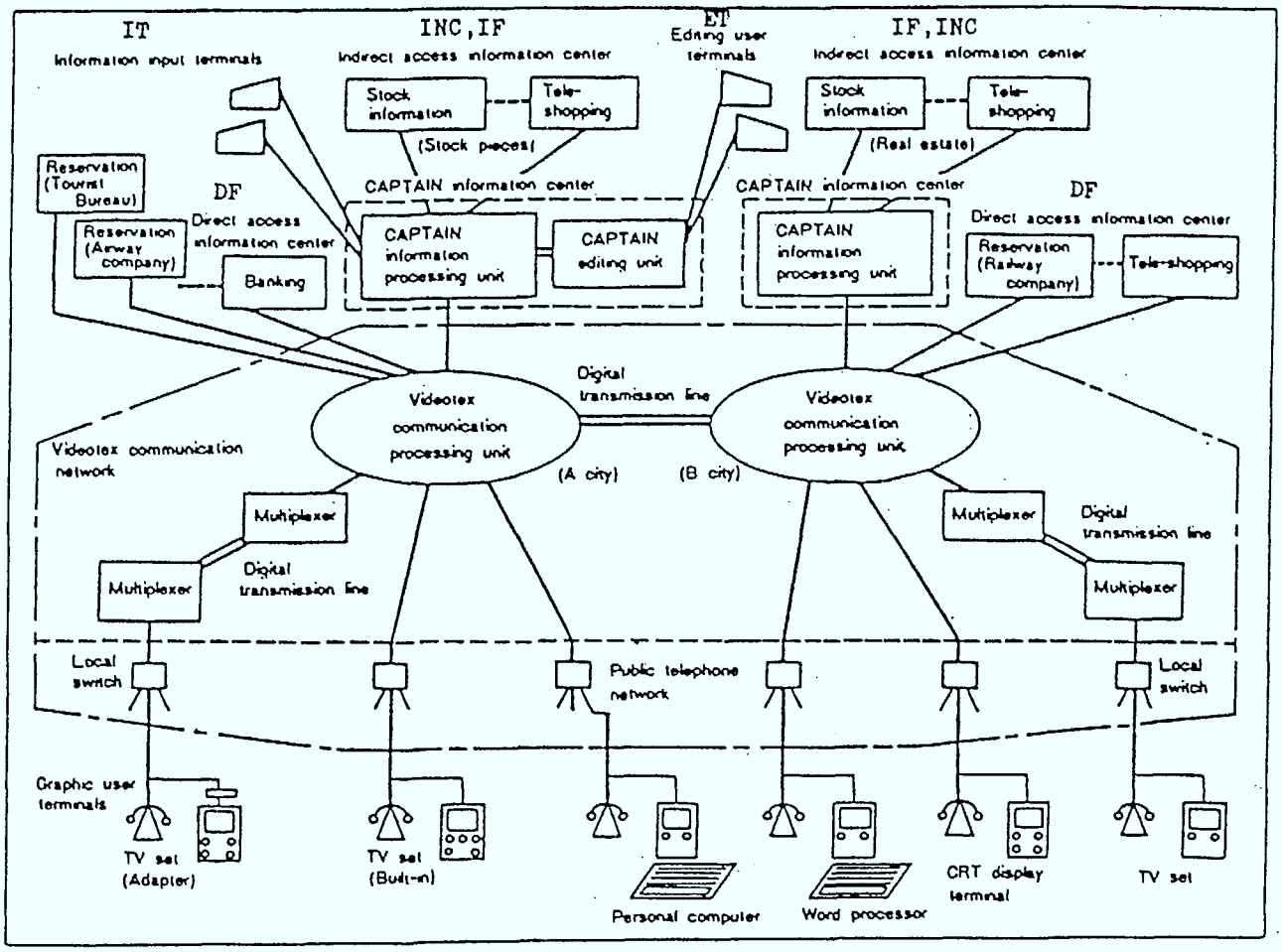
The trial services were provided to users free of charge, although a standard 10 yen fee (13¢) for a three minute telephone access charge was levied. By the end of the trial period in August 1983, 345 IPs were participating and all planned to continue operations into the commercial service phase.

Exhibit 4.9 reveals users response to the various types of pages provided in the trial period. Information rated as very useful to home users were: movie guides, news, weather forecasts, quizzes, stock quotations and reservations. For the commercial services, the pages most frequently called up included movie and exhibition information, guides to art museums and sport facilities, air and rail travel reservations, tourist information and shopping guides.

In November 1984, the commercial CAPTAINS service was inaugurated within the 23 wards of Tokyo as well as in the major cities within a 30 km radius of the metropolis. The service has been designed to allow a number of computer centres to be interconnected with the public network provided by NTT. This is envisioned as a general purpose video communication service, allowing anyone to connect a user terminal or computer centre to the network as long as the technical standards are satisfied. The network configuration is outlined in Exhibit 4.10.

EXHIBIT 4.10

Commercial Videotex Communication System Configuration



The network has the following functions:

1. To connect a user's terminal with the computer centre through a call from the user's terminal.

2. To convert the transmission speed of high-speed data sent from a computer centre into the standard speed during transmission to a user terminal (3,200 bits/sec).

3. To automatically detect the telephone number of the user who calls a computer centre, enabling the collection of usage rates and the provision of order entry services and closed user group services.

4. To control traffic.

5. To process the rates and charges for calls and information.

Provision of information, etc., can be done either by connecting the information providers' computer centre with the network or by using the shared-use-type CAPTAINS Information Centre. The shared-use-type CAPTAINS Information Centre uses the facilities provided by NTT. Information providers who do not have their own computer centre can, in this way, provide on a cost effective basis a variety of videotex services. Users in Japan are encouraged to purchase terminals directly from electric appliance stores or suppliers in order to promote a variety of terminals in the marketplace. These may include dedicated standalone units decoder equipped television sets, personal computers or TV's with built in decoders.

The Japanese have encouraged the use of a variety of terminals on their network resulting in the production of videotex products by most major communications companies. Included are NEC, Mitsui, Toshiba, Hitachi, Fujitsu, IBM, Sanyo and Sony. Toshiba, like most other suppliers, also produce a basic CAPTAIN set-top decoder and thermal colour printer.

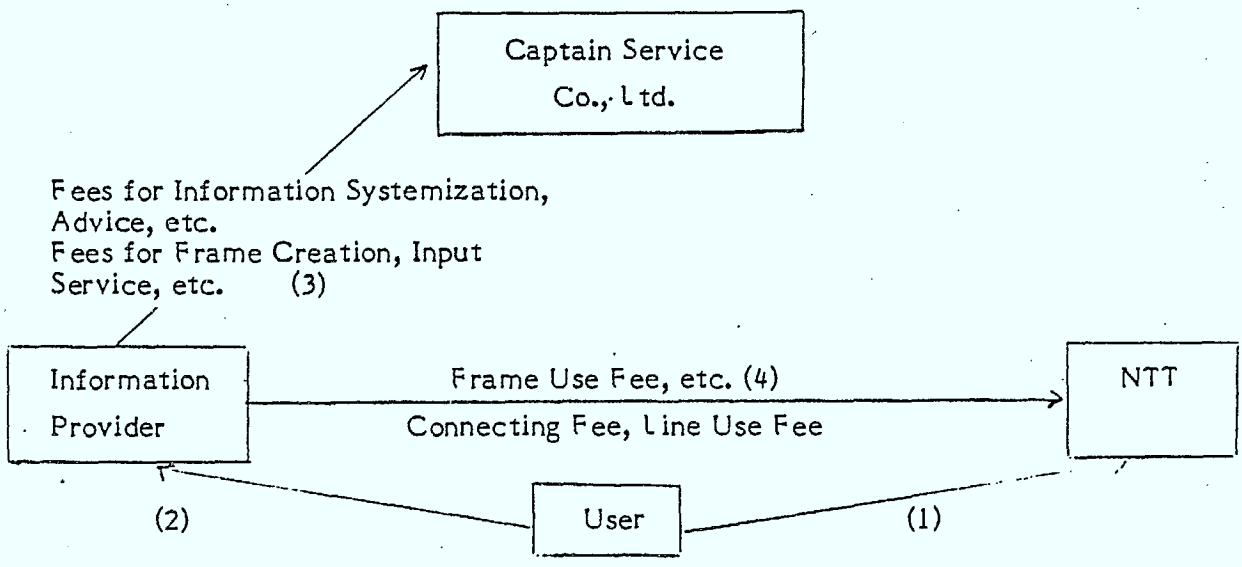
A comparison of the various terminals used in Japan for videotex services indicate prices ranging from $1,000 to $1,500 CAN for low-end standalone units to $3,000 to $3,500 CAN for videotex equipped micros with high resolution screens.

A typical configuration and associated pricing structure is presented by Toshiba:

a.	Toshiba Core 2000, 21k 692 lines (High Resolution) Terminal	$1,500
b.	CAT-2000 Decoder and Keypad (wireless)	1,500
c.	Printer	442
d.	Digital Telephone	180

EXHIBIT 4.11

Videotex Communications Service Fee Structure



1.	Contract fee	$'s = $6
	Communication fee	20¢
2.	Page charge which can be determined separately by IP.	
3.	IP registration fee	$3,500
	Input service fee	
	- per graphic frame	$ 18
	- per character frame	$ 5
4.	Establishment fee	$ 8
	Basic line fee	$ 400
	Line connection fee	$ 350
	Line terminal use fee	$ 110
	Frame use fee	$ 150

NB These calculated figures are for an IP in Yokohama, 30 kms from Tokyo where 200 frames were generated.

The commercial CAPTAIN services now in place are all viewed within the context of an overall Integrated Network Services development strategy. Japan's plan over the next 10 to 15 year is to have a fully digital national telecommunications network including videotex in the cities of Tokyo, Osaka and Nagoya during the 1984-1987 period.

Results from the early stages of the commercial CAPTAINS service indicate a somewhat slower growth than was initially anticipated. There are now approximately 5,000 users accessing more than 450 different services.[39] About 60% of the user population is business, with the remaining 40% residential users. The bulk of business use is in Tokyo, with the residential population divided between Tokyo (30%) and Osaka (30%). Approximately 100,000 pages are available to all users. Revenues derived from the current user population have not been released by the service providers.

Applications which are being implemented on the residential services using CAPTAIN include:

a. General Information Retrieval
b. Shopping Information
c. Tourism and Travel
d. Health Information
e. Electronic Messaging
f. On-line Shopping

Additional applications are available to CAPTAIN subscribers through interconnection to many of the private business group networks now being developed. Since many of the business services are NAPLPS based, it is necessary to link these two protocols. This is accomplished through dual protocol decoders which can convert CAPTAIN to NAPLPS protocol. One such product is produced by Toyovideo at a cost of $15,000. This is clearly not a mass market product but rather one which could be used to convert pages at a central point for distribution over a network using the appropriate alternate protocol.

Discussion with most of the major videotex service operators in Japan revealed that the most intensive developments in this market are being directed to business and public access services. Most of these will be based on NAPLPS protocol, with personal computers and videodiscs the dominant display technology. Teletext has not developed to any significant level at the present time although NHK, the leading broadcaster in Japan is planning to introduce such a service in the next year. Unlike North America, the CATV market for videotex or teletext is not significant since there is very limited cabling of the home or business market. However, the planned fiber optic networks may offer opportunities for providing videotex and teletext services in the future.

Business oriented services in Japan are being offered by several companies and most are providing both NAPLPS and CAPTAINS protocols. Standalone public access systems modelled on the Teleguide service of Infomart are being promoted actively by Mitsui, Neechimen and Toshiba, as is videotex software compatible with IBM PCs and Toshiba's own microterminal.

Neechiman corporation, Mitsui and Toshiba are each marketing videotex hardware, software, and closed user group systems for business services. Neechiman, for example, has focussed on closed user group applications using the NAPLPS protocol. Their systems utilize the DEC VAX minicomputer and linked IBM 5550 computers as well as NEC 9801 terminals. Applications include a relational data base management system and an office automation graphics system. Currently, testing is being carried out on the videodisc applications combining NAPLPS graphics and text with moving images and pictures. Neechiman is also producing public videotex systems using By-Video's software for placement in shopping centers and supermarkets. Software for NAPLPS videotex has also been purchased from Microtel and B.C. Tel and is now being used by Neechiman.

Mitsui corporation is also developing business videotex systems and has already made agreements with Infomart, Genysis, Cable Share, and Norpak for software and hardware products to serve the business and public access markets. Mitsui

also has the rights to Dow Jones and NewsNet, two on-line business services already available in the U.S. The focus of Mitsui's closed user group work applications include:

a. information retrieval
b. real-time data access
c. stock exchange information
d. data base management
e. scheduling
f. electronic messaging

Software for these types of videotex applications has been developed to operate on Toshiba, NEC, CASIO and IBM business and personal computers.

Mitsui is also selling a combined videodisc and Videotex product -- NAVIC. This system is targeted to travel agents, banks, and shopping centers. To date they have been sold only in Japan, although marketing has been active in Korea. Software development is also currently proceeding on an integrated text and office automation system for large business environments.

Public access services are a second major area of Mitsui activities, with systems now being placed in malls and railway stations around Tokyo. Their system is based on Infomart's Teleguide services, with licensing costs for the software set at $400,000 (Cdn). Their network uses a VAX computer and links 10 terminals containing 20,000 pages of information supplied by between 80 and 100 information providers. Costs for page creation services are $3,000 CAN to $3,500 CAN, while file storage charges range anywhere from $30 CAN to as high as $200 CAN per month. The services include tourist information, shopping and restaurant guides.

Revenues from the sale of Mitsui Videotex services are projected to grow from $1 million CAN in 1986, to $14 million CAN by the 1990s.

4.8 Summary of Japanese Market Situation

As in most other countries, one of the motivating forces for the development of videotex is the desire to boost telephone revenues. In 1982, telephone revenues accounted for 95% of NTT's total sales.[40] Approximately 90% of this total was derived from home customers estimated to use their telephone 10 minutes daily. NTT spokesmen have indicated that revenues could grow by 50% if home usage rose by as little as five minutes through the use of interactive services.

The Japanese videotex market is perhaps the second most important for Canadian videotex/teletext suppliers outside the U.S. While the residential services are based on CAPTAINS, most of the business services and public access systems based on the North American NAPLPS protocol. With the development of cost effective conversion software and the interfacing of the two standards, the opportunities for NAPLPS services will undoubtably be enhanced even further. The Japanese market presents opportunities to Canadian suppliers of public access systems, applications software of all types, encoding and decoding software as well as set-top decoders.

The activity the Japanese market by public and private enterprises ensures its growth and continued development in both the residential and business sectors. The need for content and innovative applications will provide opportunities for companies familiar with the use of NAPLPS, closed user group business applications and specialized public access services.

The Japanese interest in videotex also presents a competitive threat to Canadian suppliers attempting to address foreign markets where NAPLPS is the accepted protocol. Toshiba, for example, is working on an NAPLPS decoder which could sell in the North American market for between $300 and $500. Sales of Japanese equipment for videotex systems have also been made to a number of Asian countries including Singapore and Korea. Thus, while the use of NAPLPS can be viewed as an opportunity for Canadian suppliers Japan's aggressive compaigning

of the export markets for videotex hardware, software and systems also poses a potential threat.

4.9 Developments in New Zealand

Videotex was formally launched in New Zealand on 28 May, 1984, with the commissioning of Post Office Videotex access switches in Wellington and Auckland. These switches enable users to access Videotex services from any of the 2 million telephones in the country. In July of 1982, the Government allowed the establishment of small scale videotex services, based on a "gateway" concept. The Post Office would provide the access network to anyone wishing to set up and operate a videotex database.

Following the July 1982 announcement, the Post Office convened a series of public meetings to discuss the question of standards and in May of 1983, a joint industry agreement was reached to embark on a two-year development period using systems based on either British Prestel or French Teletel.

In November 1984, seven systems using Prestel and one using the French Teletel were established either as trials or full commercial services. However, all but a few of the 600 terminals in use at this time used the Prestel protocol.

The existing videotex access service is provided via specially developed access units and the public switched telephone network (PSTN). A six digit local number is used in Wellington and Auckland where the initial access units are located; access from all other centres is obtained by dialing a Freefone number or in non-STD areas, by asking the operator for a videotex call.

The videotex access unit comprises a number of auto answer modems (each providing a single terminal port) linked to a local microprocessor which controls the various functions of the access unit, e.g. terminal identification, presentation of database menu. When a user selects a particular service from the access

unit menu, a connection is automatically set up to the required host computer. This link is initially being provided using the PSTN, but later this year will be replaced by the packet switching network.

All but one of the eight videotex services currently available use the British Prestel standard. With more than 10 years of videotex experience in the United Kingdom, pioneers like GEC Computers and ICL have been quick to secure a share of the New Zealand market. Support for the North American standard has grown significantly however during the last 12 months, to the extent that the Post Office is now planning to support NAPLPS terminals on its Videotex Access Service later this year. Support is also rising for the ASCII protocol as evidence gained from experience in other countries indicates that at least some of the videotex can best be served by the standard text-only ASCII terminals. The Post Office is committed to support Prestel and Teletel systems for the duration of the 2 year development period. Beyond that, it is likely that this support will extend to both NAPLPS and ASCII systems.

With the growth in electronic information services, a corresponding growth has emerged in the range and variety of terminal devices available to deliver the services. For videotex alone, there are four types of terminal product emerging in New Zealand: television set adaptors, dedicated business terminals, microcomputers with a videotex option and integrated business workstations.

Microcomputers and integrated business workstations are likely to eventually dominate the videotex terminal market in New Zealand. Already plug-in or add-on cards are becoming available for many of the popular microcomputers available in New Zealand (e.g., Sinclair Spectrum, Commodore 64, IBM PC, Apple IIE, BBC). Business workstations which combine the functions of a telephone and a computer terminal are also emerging with built-in videotex facilities. In these configurations, the terminal is a multi-function unit, with videotex just one of the services available.

4.10 Singapore

The most recent developments for videotex in Asia include the decision by the Singapore PTT and Straights Times Newspaper to form a joint venture for the provision of a full broadcast videotex/teletext service over the next four years. It is quite likely that NAPLPS and NABTS will be the protocol selected for the services to be built by an undisclosed supplier. This system will use full channel broadcast of videotex into 2,000 test homes throughout Singapore and will be operated by the Singapore Telephone Co. Interactive capabilities will be provided through the use of the telephone for response to specific pages of information. Future plans include a fibre optic network when full service begins. Consumer residential services are likely to have a wide range of information made available which will be coordinated by one umbrella IP, the Straights Times.

4.11 Summary International Developments

Videotex and teletext services have become a significant part of the information technology base of most of Western Europe, Japan, S. Korea, Singapore, and New Zealand. The level of development in each varies depending on the length of time services have been available, the extent of government involvement and the extent to which the required telecommunications infrastructure is in place.

Teletext services are considerably more developed on a total world wide scale than are videotex. However, these are largely restricted to Europe where there are an estimated two million teletext terminals in place. The single largest market sector is in the U.K., where there are 1.1 million users at the present time. The second largest markets are in Germany and Austria where each has 300,000 users. Most of the teletext services operate on British World Standard with the exception of France which uses NABTS. The predominant method of transmission is through the use of the broadcast vbi.

Although Canadian hardware and software suppliers are not likely to penetrate the European market to any great extent in the near term, two developments present opportunities for the future. One is the increasing use of CATV and the other is the interest in enhanced business services such as on-line banking, shopping and brokerage activities. These services represent important elements in the service offerings of cable TV suppliers now beginning to emerge in Europe. Canadian companies such as Videotron, Cableshare and Norpak would be ideal suppliers to this industry sector since they already have experience and expertise in serving the North American market. The issue of standards must be considered a constraint, but there is the possibility that NABTS could yet emerge in Europe as the protocol for teletext services. South Korea and Singapore are now testing teletext, using the NABTS protocol. Japan does not presently offer immediate possibilities for teletext suppliers due to the very limited development and minor penetration of CATV.

Videotex has been introduced to most of western Europe, Japan and parts of SE Asia. Europe is still very much tied to the basic Prestel standard which is used most prevalently in Britain and Germany. However, the new CEPT standard, more closely aligned with the NAPLPS protocol, is being adopted by many of the recently established European videotex operators. Both the Swiss and Austrian videotex services are CEPT compatible. In Japan, activity is greatest in the on-line business, specialized business and public access sectors. These services are NAPLPS based and therefore present opportunities for Canadian software and hardware suppliers. Already Cableshare, Infomart, Genysis and Microtel have made sales to Japanese companies.

Presently, most of the sales in Japan have been made to large trading houses such as Mitsui, Neechiman and Mitsubishi. Activity has been concentrated in the licencing of software for use within the Japanese market. It is likely that more of this type of activity will take place as the market sector develops further. Business applications software using the NAPLPS protocol will constitute the focus or activity within the Japanese videotex market since these services are

expected to expand most rapidly in the near future. As in North America, on-line banking and transaction services will represent a prime growth area for videotex. These developments offer Canadian firms with expertise in on-line services, networking and interactive software significant export opportunities.

Public access videotex, either as standalone units, networked terminals or as laser disc systems will also continue to grow in Japan. Since many of these are already based on the use of Canadian produced software, this also represents an opportunity for further sales as the demand for public access videotex grows. Mitsui have projected a 300% growth in public access systems over the next five years. As these become an integrated part of the Japanese videotex services, new and more advanced systems will be required. Canadian expertise in the area of interactive videodisc systems enhances the possibility of having a share of this growing market.

The review of other countries indicated that significant interest still exists in the development of videotex services for the home and business markets. Immediate opportunities are constrained somewhat by the adherence to protocols not compatible with NAPLPS. This has been the case, for example, in Europe and New Zealand. However, this does not rule out the closed user and special applications sectors. As well, there is a general trend toward the acceptance of NAPLPS on a world wide scale which will further enhance the possibilities for export sales of videotex software and hardware.

EXHIBIT 4.12
International Developments in Videotex and Teletext

Country	Protocol	Subscribers	Services
Argentina	ASCII, Prestel NAPLPS	Residential Subscribers in the Buenos Aires Area	travel, real estate, pharmaceutical, financial services, building construction, legal services
Australia	Videotex-Prestel	Business farmers graziers and residential users	agribusiness, business and telebanking services, national public access service
	Teletext World System	5,500 users in Sidney, Melbourne and Brisbane areas	news, weather, sports results, financial information, consumer information, entertainment guides, traffic reports, travel information and children's pages, electronic publishing
Austria	Videotex Prestel	750 users	electronic newspaper, general information, sales, catalogs, travel information, government data, electronic directory, computer assisted instructions, games electronic mail, teleconferencing, home computing services, and telesoftware delivery
	Teletext World System	200,000 residential users	news, weather, airport information, travel, data
Belgium	Videotex		indexing, identification, automatic routing, and billing electronic mailbox, tourism, real estate, transportation
	Teletext	Residential users in Brussels	news, sports, weather, entertainment, financial information
	Radio and Television Program		
Brazil	Videotex	Businesses: residence of the Sao Paulo State Area	news and financial information
	Teletext		programming information

EXHIBIT 4.12 (Continued)
International Developments in Videotex and Teletext

Country	Protocol	Subscribers	Services
Canada	NAPLPS	Residential and subscribers in most major metropolitan areas	
Denmark	Teletext World System	100,000 viewers in Denmark	weather, news, sports, stock information
Ecuador	Videotex Antiope	Users in Quito Guayaquil	financial information, news, travel, airline, shopping
Finland	Videotex	1,000 business users	business services
	Teletext World System	20,000 residences	
France	Videotex Antiope	400,000 residential 100,000 business subscribers	electronic directory
	Teletext Antiope/ NABTS		stock market, weather, eletronic mail, etc.
Hong Kong	Videotex Prestel	Residential subscribers in Hong Kong	news, stock information, horse race oods, business, news, educational information, sports, leisure, travel guides, telesoftware delivery, eletronic mail, telephone directory inquiries
Ireland	Videotex	Implementation Stage	business and financial videotex services
	Teletext Antiope	Trial Stage	Closed user group services
Israel	Videotex ASCII, Prestel	Residential and business users	home banking - customer account information, banking queries, financial information, non-banking services are being planned, information retrieval electronic mail/messaging
	Teletext World System Note: Systems under development for the use of NAPLPS, Prestel and Teletet formats		Business and residential services

EXHIBIT 4.12 (Continued)
International Developments in Videotex and Teletext

Country	Protocol	Subscribers	Services
Italy	Videotex Prestel	Development Stage (expected to be offering service in 1986 to 100 residential and 1,200 business subscribers	Information retrieval, telebanking, access to educational resources, and mail/messaging
Japan	Teletext Presentation level protocol		
Jordan	Teletext Antiope	Trial Stage 1984	
Korea	NAPLPS	System under development	
Kuwait		Trial Stage	
Malaysia	Prestel	System under development	
Netherlands	Videotex Prestel	4,000 residential and 8,000 business subscribers	information retrieval, telesoftware delivery, teleshopping, mail/messaging
New Zealand	Videotex Prestel and Teletel	Trial Stage	
	Teletext World System	2,000 users	news, weather, sports, finance, farming, consumers, travel, entertainment, children's programs, information for the disabled
	ASCII, Prestel based systems	Agribusiness commercial and professional communities	agribusiness, finance, investment, news, weather, sports
	Prestel and NAPLPS based systems		information retrieval, banking and shopping

EXHIBIT 4.12 (Continued)
International Developments in Videotex and Teletext

Country	Protocol	Subscribers	Services
Norway	Videotex CEPT Note: Prestel format used during trial	Business users, residential applications forthcoming	
	Teletext	Received by 80,000 television sets Trial Stage	
Singapore	Videotex Prestel	System under development	
South Africa	Videotex Prestel and CEPT	1,200 in a number of large metropolitan cities	news, weather, home banking, teleshopping, legal data, display and classified advertising, company information, travel, insurance, telesoftware delivery, games and mail/messaging
Spain	Antiope during trial CEPT for commercial operation	Initially for professional users and eventually extended to the general public	shopping, finance, travel, education media, business, public institutions, publishing trade
	Teletext Antiope	General Public	
Sweden	Videotex Prestel	700 closed user group subscribers	business services
	Videotex ASCII based service	500 business users in Stockholm and Goteborg	information retrieval, teleshopping, telebanking, education, games, electronic messaging
	Prestel based services	50 commercial subscribers	balance inquiry, electronic statements, cash flow data, spreadsheet analyst, electronic mail, financial information
	Teletext World System	General Public	subtitling and captioning services

EXHIBIT 4.12 (Continued)
International Developments in Videotex and Teletext

Country	Protocol	Subscribers	Services
Switzerland	Videotex Prestel	3,000 residential subscribers throughout the country Trial Stage 500 commerical users	travel and financial services
	Teletext World System	General public	
Taiwan	Videotex NAPLPS	Residential business users system under development	information retrieval, telesoftware delivery, shopping, mail/ messaging
United Kingdom	Videotex Prestel	48,000 69% business users and 31% residential users	messaging, finance, travel, auto, etc.
	Teletext	1.5 million homes	news, general information, captioning, telesoftware
West Germany	Videotex CEPT	8,000 residential subscribers and 4,000 business subscribers	news, public service information, electronic shopping and banking, mailbox, games, travel, tourism
	Teletext Antiope and World System	available to 200,000 television receivers	

Chapter V - Software, Hardware and Service Trends

5.0 Introduction

The purpose of this chapter is to illustrate the dominant trends in software, hardware and services used for the provision of videotex/teletext and related services. In the previous chapter, the basic categories of services were identified along with an analysis of the current market situation. For this assessment of hardware and software trends it is appropriate to consider the following sectors:

a. on-line residential and business services
b. closed user group business services
c. transactional services/on-line banking and shopping
d. public access
e. education
f. specialized services

There are numerous developments taking place in the technology for the provision of videotex/teletext and related services. However, the dominant ones focus on: terminals, decoder software, page creation hardware, page encoding software, data base software, video discs and public access terminals. These components are reviewed in detail in order to illustrate the trends and implications for the videotex and teletext industry.

In general, the hardware and software available to provide videotex services on-line to the residential and business markets is likely to be quite similar. However, for the other sectors there are a number of technological trends which are unique and which deserve special attention. Video discs and public access systems have a variety of unique characteristics which are illustrated in this chapter.

A number of the more important technology developments are specifically related to transactional services, including in-home banking and shopping. These include such things as cable TV, smart cards and video discs.

Hardware and software components for videotex/teletext services can be considered for each level of the system. The principal components are:

1. Page creation terminals and software
2. Display systems
3. set-top decoders for videotex and teletext
4. central processing units and storage devices
5. transmission systems, telephone lines, cable, fibre optics
6. personal computers, VLSI chips and decoder software
7. specialized storage systems and display mechanisms
8. photographic display technology utilizing and linking videodiscs with transmission technology, audio and visual display systems.

Exhibit 5.1 presents a model integrated videotex system displaying each of the various components and their interrelationship in an operational service. This model is taken from the Japanese CAPTAINS service, but is nevertheless relevant to North America's situation. The components include:

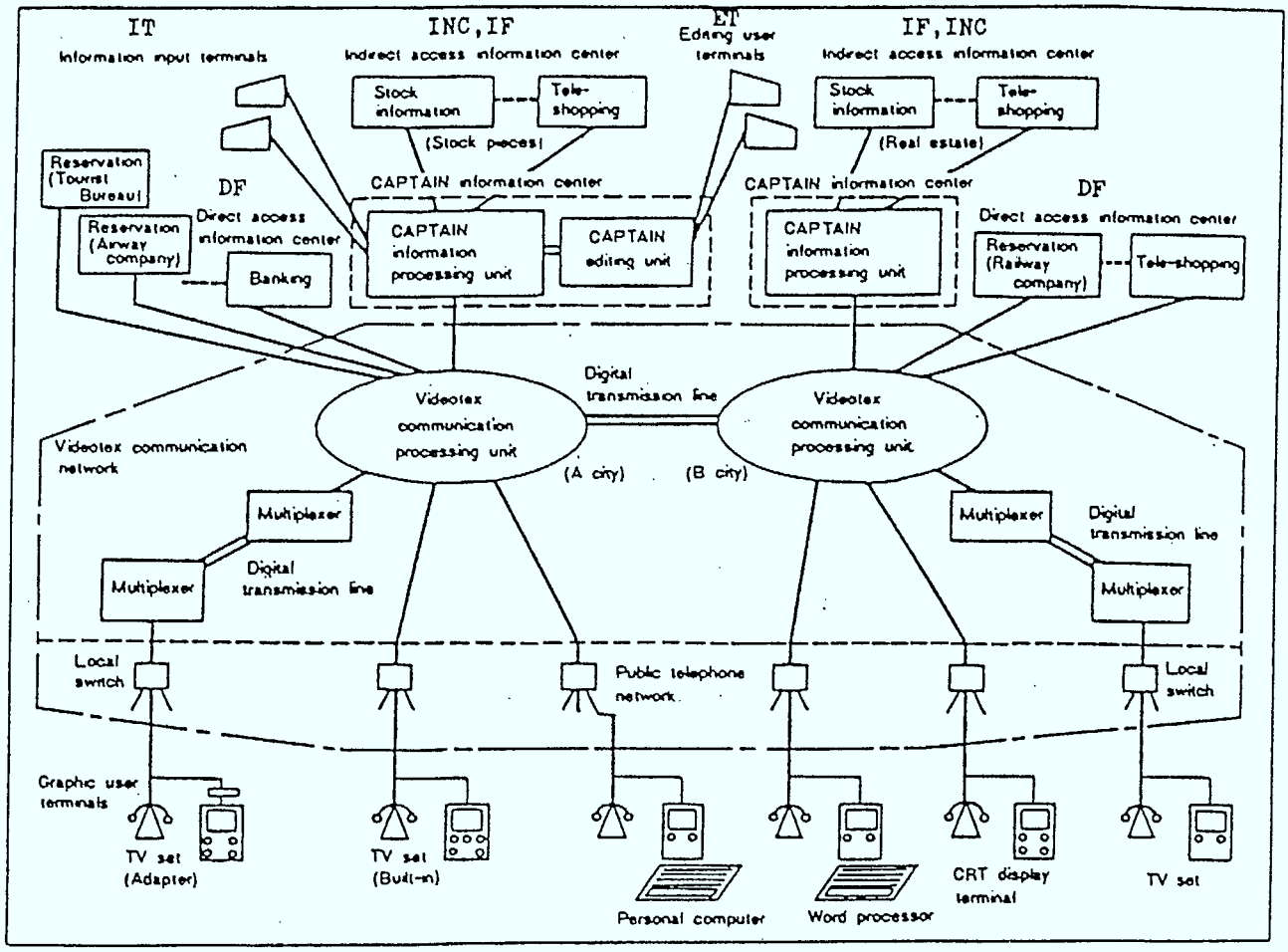
a. TV set adapters
b. TV's with built-in videotex decoders
c. personal computers with videotex software and VLSI chips
d. word processors with videotex
e. CRTC display terminals capable of assessing videotex
f. management work stations

The various approaches to page creation are also illustrated with the options including:

a. Dedicated standalone page creation terminals using graphics tablets and character generators.

EXHIBIT 5.1

Basic Composition of the Videotex Communications System



b. Text only editing terminals operating in ASCII, NAPLPS, or CAPTAINS.

c. Personal computers with graphics tablets, colour screens, and encoder software.

d. Optical page creation systems comprised of a colour camera, video monitor, micro computer and text generator (keyboard).

e. The various communication options are also displayed and include; telephone lines, digital transmission lines and local area networks.

5.1 Terminals

Terminals used for the display of videotex services are much more likely today to be adapted personal computers using VLSI chips or decoder software than standalone dedicated videotex terminals. The most recent estimates indicate that approximately 85% of all videotex services to residences and business are displayed on an adapted personal computer rather than a dedicated terminal or decoder. In the business market, where a significant number of dumb ASCII terminals are already in place, text only services could be displayed. However, many of these, particularly older models, would not be suitable for displaying full NAPLPS videotex services.

A 1985 Wescom survey of fifty services now in operation in North America revealed the majority (34), make use of personal computers as the display medium. The most common ones identified were, IBM, KAPRO, Compaq, Apple, Radio Shack, and Commodore. Dedicated terminals, capable of displaying NAPLPS protocol were used in fourteen services with videotex decoders attached to televisions or RGB monitors employed by eleven operators. Our survey of twenty four financial institutions paralled the previous findings and revealed seventeen using personal computers, nine using display decoders and six using dumb ASCII terminals. The dominant home computer products were IBM, Apple, ATARI and Commodore while dedicated terminals included ATT Sceptre and a product supplied by Telelogic.

EXHIBIT 5.2

Videotex Terminal Types

(1) Business Videotex Terminals

- Standalone unit - usually auto dialer
- Keypad or keyboard - ASCII
- 256 x 200 resolution
- 6 colours

(2) "R.F." Videotex/Teletext Adaptor

- Connection to a television receiver enabling it to operate as a videotex terminal.

(3) "RGB" Videotex/Teletext Adaptor

- Connects directly to the red, green and blue "guns" of a television receiver, thereby enabling it to operate as a videotex terminal.

(4) Cable Television Converter/Adaptors

- Set top frequency converters already used in cable television to enable the user to select from the full range of television channels.

(5) Television Receiver

- Linked to shared decoder.

(6) Personal Computers

- Parallel to serial interface
- Modem
- Videotex decoder/character generator card
- Graphics display

EXHIBIT 5.3

Videotex Terminals Used In North America

Vendor	Product	Protocol	Comments
ATT	Sceptre Terminal	NAPLPS	
Norpak	GC 1000 Series 200	NAPLPS	Integrated station
Norpak	Mark V GC 1000	NAPLPS/ACSII NAPLPS/ASCII	$1,400
Electrohome	EGT 100 EGT 1000	NAPLPS/ NAPLPS/ASCII	High Resolution Vast Colour Arrays
CEMCORP	ICON	NAPLPS	$2,770
New Media Technologies	VTX 208	NAPLPS/ASCII	
Philips NA	VTX	Antiope/Prestel/ NAPLPS	
Panasonic	VTI	NAPLPS/ASCII	$450-$550
Shuttle Corporation	Shuttle Information Terminal	ASCII/NAPLPS	
Sony	KTX 8300/VDX 100	Prestel/NAPLPS	
Verticom	PLP 100, PLP 200	NAPLPS	Medium Resolution

EXHIBIT 5.4
Product Type: Videotex Decoders - Hardware

Company	Product/Name	Description	Cost
Electrohome	EGT 100 Set Top Terminal	- consists of separate decoder and remote keyboard unit; needs monitor (can be standard home TV set) - displays NAPLPS encoded videotex information received over normal telephone lines	$1,400 Cdn. (volume discounts available)
Electrohome	EGT 100 Rackmount Terminal	- consists of separate decoder and remote keyboard unit; needs monitor (can be standard home TV set) - displays NAPLPS encoded videotex information received over normal telephone lines - built for commercial use	$1,400 Cdn. (volume discounts available)
AT & T	Sceptre	- unifunctional videotex terminal - full NAPLPS standard	$600 U.S. $849 Cdn.
Norpak	VTX-4	- standard videotex decoder - sub-NAPLPS - available without a modem (VTX-4A) or with a 1200 - 150 modem (VTX-4B)	VTX-4A - $1,225 Cdn. VTX-4B - $1,300 Cdn.
Norpak	VTX-5	- available in 2 versions 1 1200 oblique 150 (VTX-5B) 2 1200 oblique 1200 (VTX-5C) - has full travel IBM type keyboard - full NAPLPS	price at time of order

EXHIBIT 5.4 (Continued)
Product Type: Videotex Decoders - Hardware

Company	Product/Name	Description	Cost
Norpak	VTX-6	- serial interface - VLSI based decoder (V-6A) - (V6C) - VLSI based videotex terminal with an integral 1200/1200 modem - full NAPLPS, non-volatile RAM - V6C - entire terminal is contained within the keyboard enclosure	price depends on volumes
CEMCORP	ICON	- Table top unit with full size keyboard and video display - 384 k bytes RAM, expandable to 512 K - QNX operating system, NAPLPS	$2,700

Presently, the three major suppliers of standalone videotex decoders are: Norpak and Electrohome in Canada and ATT in the U.S.

5.2 Electrohome

Two terminal products are produced by Electrohome and include the EGT 100 and 1000. The EGT 100 displays NAPLPS encoded videotex information received over normal telephone lines. It includes features such as an RGB output and the ability to execute downloaded programs. The Electrohome terminal is compatible with a variety of host computers and offers 16k bytes of RAM for host downloadable data and programs (telesoft) and is expandable to 32k bytes. The terminal can be expandable up to 512k bytes of memory for storage of telephone numbers, serial numbers, user ID and login commands. The EGT 1000 terminal is suitable for high level graphics creation engineering design, process control and computer aided learning. It is also ASCII compatible and therefore can function as a microcomputer. The EGT is an SRM level NAPLPS terminal complete with keyboard, split screen (1200/75) model and 16 k of RAM for downloading the software.

5.3 Norpak

Norpak produces the GC 1000 series 200 Graphics Computer which is a desk top microcomputer and ASCII terminal with keyboard and display screen. The unit has 128 k bytes of program RAM and includes dual 5¼ inch floppy disk drives. The terminal combines graphics videotex and computational systems into one integrated desk top work station. The system is designed as a frame creation work station, useful for the production of images, charts and graphs. The terminal is also capable of performing word processing as well as graphics display.

Norpak also produces the VTX5, a fifth generation terminal which has an internal modem, ASCII keyboard, NAPLPS compatibility and dual video outputs. The

terminal is capable of handling all NAPLPS features including text underlining, reflection, inversion and mosaics, variable size DRCS characters, X scroll and blink. Two versions of the terminal are available; the MK5 - 16B with an internal 1200/150 baud asynchronous modem and the MK5 - 16C - terminal with an internal asynchronous Bell 212 high speed modem.

5.4 ATT Sceptre

The ATT terminal features a hand held 60 character keypad, with an inframed beam linking it to the decoder which resembles a cable converter in size and design. The decoder supports NAPLPS and ASCII protocols and connects via a RF outlet. It contains further outlets for a telephone extension and a 422 peripheral interface. The terminal contains a proprietary encryption feature to allow secure funds transfer, a call waiting alert to minimize videotex/telephone call conflicts and a built in 212 (1200/1200) modem. There is provision in the terminal for the storage of telephone numbers, up to 5 databases and for the host down loading of 10 other numbers to facilitate automatic dialing for telephone applications.

5.5 Terminal Trends

Norpak, Electrohome and ATT have the greatest share of the market for dedicated videotex terminals. Norpak originally produced the VTX 4 and VTX 5 which are the versions being used in the Grassroots services. More recent editions are the VTX 6 series which are VLSI based and offer the full NAPLPS SRM with a built in 1200 baud modem. The actual number of installed Norpak terminals is unknown but is not likely to exceed 1000. Electrohome, a pioneer in videotex in Canada, still produces its dedicated terminal, the EGT 100, but is now placing more emphasis on the EGT 1000.

The EGT 1000 terminal is expensive, retailing for $10,000 and is clearly aimed at the specialized business market. No details of the extent of penetration into the

North American market have been made available by the company. ATT's Sceptre terminal is the most successful in terms of market penetration and is now being used in most of the U.S. residential and home banking trials where the required protocol is NAPLPS. Sceptre is also sold along with the Norpak terminals by Infomart to Grassroots subscribers. Its appeal rests mainly on its price, which at $600 U.S., is very competitive with Norpak's products priced at $1200 - $1400.

Recently, new versions of dedicated videotex terminals have been introduced which are priced significantly lower than ATT, Norpak or Electrohome. Sony and Panasonic have announced terminals supporting NAPLPS and ASCII which are designed to sell for under $500. Synertek, a division of Honeywell will apparently be providing as many as 30,000 terminals at $700 each to the Keycom service in Chicago. Their terminal has SRM level NAPLPS and includes DES - encryption firmware.

5.6 Low Cost Decoders

In general, dedicated videotex terminals comprised of a monitor, keyboard and communications port have not penetrated the videotex market to any significant degree. Cost of $600 to $1,400 are still simply to high for most consumers especially given their functional limitations. As a result, manufacturers are now focusing on other hardware solutions using VLSI technology to provide either multifunctional terminals or decoders which are built into or attached to television sets.

The most immediate possibilities for low cost terminals lies in decoders since these can be produced quite economically using VLSI chips. This solution also takes advantage of the high penetration of colour TV's and touch tone phone lines in the North American market.

One of the least expensive of these new decoder products is the proposed Transtext system being developed by a consortium of companies including Sony[41]. This system will sell for under $300 and will supply videotex in ASCII format through touch telephones. The terminal is suitable for information retrieval, display, transactions, and shopping.

Another decoder product is being developed by the National Bank of Detroit which will sell for $100[42]. It is composed of a one piece decoder which translates information from the host computer. It contains a radio frequency modulator which connects to a television antenna for displaying information on a screen. The Tex terminal is a receive only ASCII device which operates at 1200 baud. The user can indicate a choice of items from a menu on the screen and make other simple communications through dual tone multifrequency tones generated by the telephone keypad.

The Shuttle corporations terminal product is based on a 32 x 16 format with eight colour RF output and an RS 232 interface. The terminal operates with either a 17 key numeric keypad or an optional 52 key alphanumeric keyboard. Of most interest is an optional AB Track II Credit Card reader which works in conjunction with a write/addressable Terminal ID feature. This is designed to sell at the low price of $150.00.

5.7 Integrated Video Processors (IVP)

Related to these developments are those involving very large scale integrated video processors. One such product is the advanced video display processor (AVDP) developed by Texas Instrument. These chips, combined with microprocessors, optimize the basic requirement in displaying graphics such as timing and memory refresh, video display refresh and conversion of digital signals to the analog form required by a TV receiver. This allows the use of a TV to display and utilize videotex and teletext services.

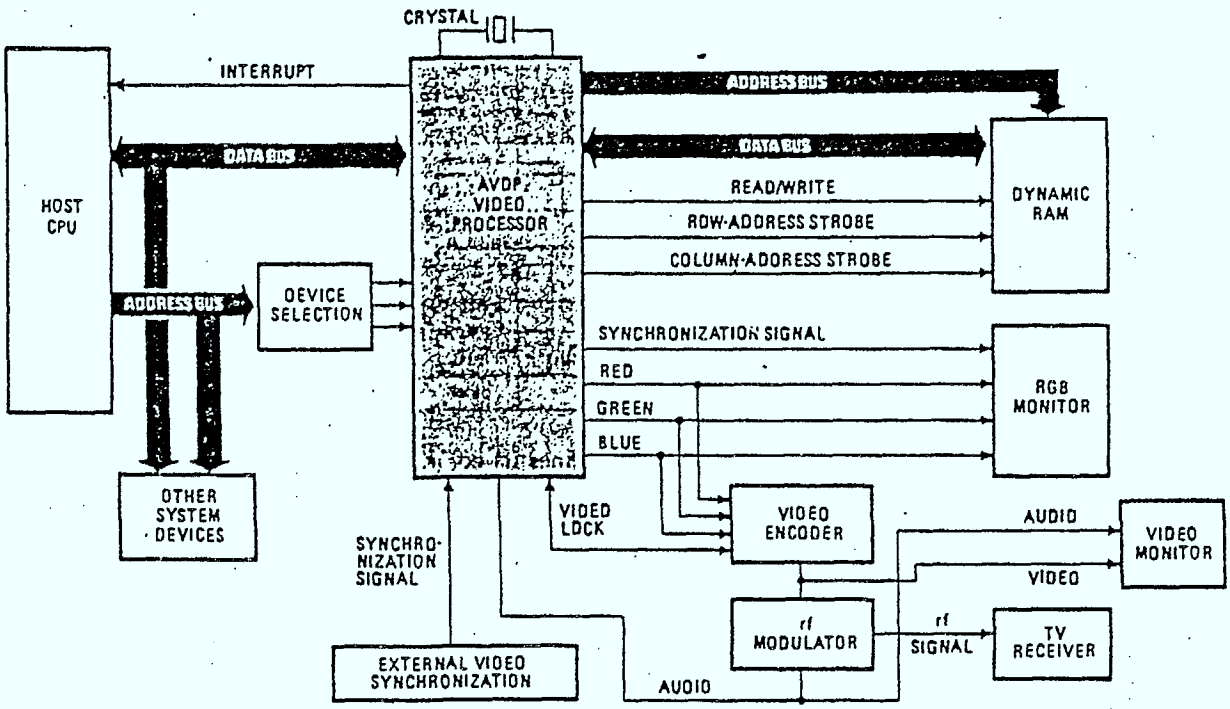
Upgrading present video systems for videotex requires the addition of a modem, memory, and video display processor. In order to effectively utilize a television set and accomplish the tasks of display, interaction and colour enhancement, the basic technical requirements are: 8 or 16 bit processors, 64 to 128 k of memory, communication on a bit plane map, 16 to 512 colours and pixel displays of 256 x 210.

The AVDP chip provides all of the requirements to allow a standard TV to act as an enhanced video graphics monitor and text display terminal. These chips also support interaction with an external video source and thereby offer a very low cost solution to the display of NAPLPS graphics and text.

Two additional trends can be identified with respect to the changes taking place in videotex terminals: the adaption of personal computers to videotex capability using VLSI chips and decoder software; and the building of integrated videotex terminals and micro computers.

EXHIBIT 5.5

AVDP Video Processor Chip



Advanced chip. Except for RAM, all the necessary functions have been integrated into the Advanced Video Display Processor chip. This single-chip controller operates with the system CPU and video memory to generate images for a raster-scan display.

5.8 PC's and Videotex

In a recent speech given by C.F. Touchton of the IBM Corp.,[43] the implications for personal computer developments and videotex were examined. In that discussion, it was noted that videotex facilities should enable virtually anyone, anywhere to have quick and easy access to a wide range of information and transaction services. In addition, he expressed that this should be achieved on a casual incidental basis simply as a by-product of their everyday activity, not just in consumer and residential environments but in business as well. It was also noted that a significant change has occurred in the publics perceptions of videotex, particularly with respect to videotex terminals. In the past this has always been identified as an appropriately modified or adapted television set. Today, it is increasingly apparent that in the business and consumer environments, the optimal terminal of choice will be an appropriately functioned personal computer.

Personal computers configured to function as videotex terminals require colour, graphics and communications capabilities to process the relevant videotex protocol. These multiple videotex protocols can now be accomplished through software, with the result that the end user has a single multi-protocol videotex terminal. Assuming that the personal computer is justified for applications beyond videotex, then it is clear that the incremental cost of the videotex capability can be equal to the cost of the software. It is suggested further that because of the multiple protocols that exist, it is going to be desirable to maintain as much data as possible in a protocol independent form.

Three distinct product types are needed for integrated videotex systems:

1. A videotex terminal emulation product which can be implemented on a personal computer. These, we know, can be incorporated as either software or VLSI chip sets.

2. A videotex processor product having multi-protocol capabilities and implemented on a process or product having strong communications capabilities. This will be required to handle the multiple protocols that exist, particularly with respect to financial transaction services on shared networks.

3. A videotex data processor product having an awareness of videotex but maintaining most of its data in a videotex protocol independent mode, and implemented on a database machine having strong database processing capabilities.

The implementation of these types of strategies enables the information and transactions presently available to a large number of people in conventional databases, to be available to a much broader base of users utilizing a more user friendly, cheap and uniform videotex system. The key ingredients include a general purpose product for the personal computer, the development of advanced software and the availability of VLSI chips for the necessary conversion.

Dean Simons, President of Digital Video Corporation of the USA,[44] has noted that the marriage of videotex and personal computing reflects the current realities that processing and memory must reside more and more with individual users, and that processing is cheaper than bandwidth or communications. This implies far more for videotex than simply using the personal computer as a terminal or telesoftware delivery mechanism. It means using the personal computer and videotex system in a fully integrated manner, allocating the capabilities and resources of each to suit individual applications. Thus, a person might want to use videotex for banking if it were available, or if not they could simply use an ASCII system. It is suggested that applications which require modest amounts of computation capability or which employ static information stored on a floppy disk, will tend to be done by a standalone personal computer. Applications, however, involving very large databases or simple retrieval of highly dynamic data, will tend to make use of a videotex protocol, though not necessarily NAPLPS.

5.9 Integrated Videotex and Personal Computers

5.9.1 Mindset

One of the dominant trends in the terminal developments is the melding of videotex and standard ASCII computers into a single unit.

Typical of the current technological developments in the area of integrated micro's, is a product developed by Mindset of the US. This is a personal computer that can also serve in a very high performance, cost effective manner as a frame creation station or smart NAPLPS and ASCII videotex terminal. It can also support telesoftware and permits the optimal integration of the complementary capabilities of personal computing and videotex. It uses an Intel 80/186 microprocessor with two custom co-processors -- a graphics processor and a video processor. The system is composed of two basic units, the unit attached to an 84 key keyboard containing all the CPU elements, a 32K frame buffer and 32K of system memory. It also has an expansion unit which contains disk drives as well as additional system memory. Three input-output module slots are contained at the rear of each unit to allow the addition of functions such as modems with RS232 interfaces. Resolution level of 320 by 200 pixels is possible, with 16 displayable colours out of a 512 colour palette. High resolution modes of 640 by 200 and 640 by 400 are also supported for applications such as computer-aided design, word processing and presentations.

The Mindset system is configured as an NAPLPS videotex terminal with the addition of a 1200 baud modem supporting bi-synchronous and a-synchronous communications, and Mindset's ROM cartridge NAPLPS interpreter program which implements the full NAPLPS SRM including DRCS and macros. The Mindset also provides DES encryption which has been endorsed by the financial industry for financial funds transfer. The machine has advanced sound synthesis and graphics animation capabilities. The terminals are being used by Viewtron in the US and have been demonstrated to provide one to two second presentations per page.

5.9.2 Rholm

Other important technical development in terminals are presented by the new Rholm Cedar and Cypress computers which link a personal computer and a voice telephone system. This allows the use of either voice or data systems on a dedicated digital line suitably linked to a PBX system. The system has 512K of memory and operates as a touch-tone phone or as a display terminal for graphics or text and is also a powerful microcomputer. Since the system is IBM compatible, many of the available NAPLPS software packages could be used to allow videotex applications.

5.9.3 ICON

In the educational sector, the CEM CORP has now begun production of the ICON educational computer. This will be sold to schools in Ontario through the Ministry of Education and the Ontario Institute for Studies in Education. The computer is NAPLPS compatible and will cost approximately $2,700 per unit. The unit has a full keyboard video display which operates off an IAPX 186 integrated computer and uses a 16 bit microprocessor which is upwardly compatible with all 8088 microprocessors. The computer has 384 k RAM expandable memory up to 512 k. It is compatible with a variety of software including PASCAL, C, FORTRAN, COBOL, APL, and LOGO. This system is expected to have a significant level of penetration in Ontario schools over the next few years and offers the capability for the use of a variety of videotex software since it is NAPLPS compatible. The ICON can function as a standalone diskette based system or participate in a local area network. It can be configured with access to a hard disk drive and other peripheral devices. Voice synthesis and music can be generated from each work station through a built-in speaker and head phone jack. Word processing, electronic mail and intregrated graphics are also available.

5.9.4 New Media Technologies

Another integrated terminal has been developed by New Media Technologies of Vancouver. This terminal provides 16 colours from a pallet of a possible 4,000 along with 16 grey levels. The terminal has a resolution of 256 x 240 pixels and 80 x 24 text display with a resolution of 160 x 240 pixels. Additional hardware includes RS 232 C cable for external connection, a printer and standard miniture telephone jack. The system is NAPLPS compatible. The terminal can be used as part of a videotex information system or as a standard computer terminal. It generates all ASCII codes and is compatible with a wide variety of host computers. A built-in modem permits direct telecommunications with a transmission rate of 150 baud and a reception rate of 1200 baud. Currently, about 100 of these VTX 208's are in use in North America.

5.9.5 Electrohome

Electrohome also produces an integrated videotex ASCII computer, the EG 1000 high performance colour graphics terminal. This system has a Qwerty keyboard and a 13 inch monitor which is compatible with any host computer. It provides 256 simultaneous colours from a pallet of 16.8 million with a resolution of 640 x 512 pixels. It is fully NAPLPS SRM compatible. With the appropriate application software, the terminal becomes a tool for high level graphic creation, engineering design, process control and computer aided learning. NAPLPS geometric coding facilitates the feeding of high resolution pictures to any number of Electrohome NAPLPS graphic terminals.

5.10 NAPLPS - Decoder Software

Chang[45] has pointed out since the NAPLPS standard essentially involves code interpretation and presentation which can be accomplished through machine level languages, the standard can be implemented on most general purpose microcomputers. This can be achieved through software or with a combination

of software and firmware. With respect to software decoding, most of the present day 8 bit and 16 bit microprocessors are considered adequate. For memory, however, it is necessary that the machine have at least 96 to 128 k bytes of RAM for storage and bit map buffer.

One of the major limitations with using microcomputers for the display of NAPLPS is with colour graphics processing and display. Most microcomputers can provide only a limited number of fixed colours and or gray levels when the display resolution is lower than the 256 x 200 pixels required by the NAPLPS SRM. In some cases, this limitation is machine dependent and cannot be readily overcome. The Commodore 64 is particularly vulnerable to this limitation.

The following computers have the capability for handling the NAPLPS protocol.

1. Commmodore 64 k memory
2. Apple IIe, 64 k
3. IBM PC, 256 k memory
4. NEC, 128 k memory
5. Sony, 64 k
6. Deck Rainbow, 64 k to 256 k memory
7. Tandy 2000, 128 k memory

The Commodore, Apple and Sony SMC 70 do not require boards to make them videotex compatible. The Deck Rainbow requires a graphics option and the Tandy 2000 also requires a graphics option. The IBM PC and its variations also require the addition of a plug-in colour board to enhance their graphics capabilities. An IBM colour graphics adaptor, for example, can provide four colours at 320 x 200 resolution. Graphics boards suitable for IBM PC and compatibles include:

1. IBM colour graphics adaptor
2. Hercules

3. Orchid
4. Tech Mar
5. Plantronics
6. Microdel
7. Number 9
8. Conographic
9. Skion
10. IDE

NAPLPS decoder software suitable for a variety of microcomputers is now available from a number of companies at cost ranging between $150 - $300 per package including a diskette manual, but not including the colour board. Decoder software transforms a microcomputer into a videotex terminal and usually contains the communications module which enables the user to automatically establish connection with databases.

EXHIBIT 5.6

Processing, Memory and Colour Graphics

Capabilities of Some Microcomputers

Computer Type	Micro-Processor	Main Memory (RAM)	Resolution	Colours	Boards Required*
Commodore 64	6510 (8-bit)	64K	320x200	2/8x8 cell	No
Apple IIe	6502 (8-bit)	64K to 128K	280x192	6	No
IBM PC	8088 (8/16-bit)	256K	320x200	4	Colour/ Graphics Adapter
NEC APC	8086 (16-bit)	128K to 640K	640x494	16	7220 GDC (included)
Sony SMC-70	Z-80A (8-bit)	64K	320x200	16	No
DEC Rainbow	Z-80A 8088 (8 & 8/16 bit)	64K to 256K	384x240	16 out of 1024	Graphics Option (PCIXX-BA)
Tandy 2000	80186 (16-bit)	128K	640x400	8	Graphics Option

* To obtain the display resolution and colours indicated.

The following table provides a list of the microcomputer based NAPLPS decoder software. It illustrates the product name, the base microcomputer on which it operates, the memory requirements, the operating system, language display resolution, colour, extra hardware requirements and additional remarks to help detail the capability of the particular software package. A more detailed description of some of the more popular software packages is provided in the following section.

1. FBN NAPLPS Decoder Software

   This package, developed by FBN Software of Ottawa retails for $200 Can. It operates on the IBM PC family of computers including PC, PCXT, PCjr, portable and PC standard compatibles such as Compaq. The memory required for operation is 128 k and the operating system is PC DOS 1.1 or 2.0. The decoder package is presently being marketed as a graphics device driver that is independent of any specific application or programming language. The device driver structure allows other programs to display graphics simply by passing NAPLPS data to the decoder. The decoder displays graphics images as decoded by the driving application in a stream of PDI's. There is no need to resort to an external hardware decoder or external software decoder on a micro. Both the driver program and the FBN decoder run on the same personal computer and the package allows programs to adhere to the NAPLPS standard while at the same time minimizes their overall investment in peripheral equipment.

2. PC Videotex

   This program was developed by IBM Canada and retails for $300 - $350. The base computers it is designed to run on are the IBM PC, XT, AT, and Jr. The memory requirements are 128 k bits of main storage memory and the operating system is MSDOS. This software

EXHIBIT 5.7

Microcomputer Based Telidon/NAPLPS Decoders

Company	Base Micro-Computer	Memory Required	Operating System	Language	Display Resolution	Simulta-neous Colors	Extra Hardware Required	Remarks
AVCOR	Commodore 64	64K	C64 Kernal	Assembly	320 x 200	2/ch.cell 16 palette	No	Cartridge based
ASHDUNE	Commodore 64	64K	C64 Kernal 3.2 or 3.3	C and Basic	320 x 200	8 colours or 8 grays	No	
	Apple II, II+, IIe	48K	Apple DOS	C and Basic	180 x 140	6 colours or 8 grays	No	
NORPAK/APPLX	Apple II, II+, IIe	48K	DOS 3.3	Pascal	128 x 96	15	Telidon inter-face card	
MICROTAURE	IBM PC,XT	128K	PC DOS	Machine	256 x 200	16/512	Real Colour colour card	Features inc. downloading, slide show printing
MICROSTAR	IBM PC,XT	192K	PC DOS	Basic & Assembly	320 x 200	16	Plantronics colour card	Also available for Hyperion, Compaq, Colum-bia, etc.
FBH	IBM PC,XT,PCjr	128K	PC DOS 1.1 or 2.1	Forth	320 x 200	16	Tecmar or Plantronics colour card	
MICROPIXEL	IBM PC,XT	NIL	PC DOS 2.0	Machine	256 x 200 x4 planes	16 out of 16 million	EGT 100-based Board	Full SRM 16K Telesoft-ware, 8K Macr Composite video output
MANITOBA TELEPHONE SYSTEM	Commodore 64	64K	C64 Kernal	Machine	160 x 200	13 + 3	No	3 out of 13 colours and 3 gray scales per ch. cell
FORMIC	Apple IIe	64K	DOS 3.3	Machine	256 x 190	16	Taxan card	Also requires a 64K, 80 col card
MICROTEL PACIFIC RESEARCH	IBM PC	128K	PC DOS	C and Assembly	320 x 200	16/512	Real Colour	Full SRM, color map defaults depend upon card, 64K max. shared memory for macro

program requires one double sided diskette drive with advanced colour graphics adapter, colour monitor or TV compatible with a colour graphics adapter, asycromous communications adapter and a 1200 bps modem such as the Hayes Smart Modem or some equivalent. IBM PC videotex allows an IBM PC to serve as an end user videotex terminal. Two session level protocols for videotex communication links are supported. Those currently implemented on the Norpak Mark IV terminals and the IBM Series 1VSV program product as well as the protocol presently used by Infomart.

3. Personality Plus Two

This product is marketed by MicroStar Software Limited and sells for around $200. It operates on several base computers including the IBM PC, XT, AT, Jr, Columbia, Compaq, Corona, Sperry PC, Televideo and Zenith 150. Memory requirements are a minimum of 128 k. The program operates under the operating system of PC Dos 1.2 or 2.1. This software package is unique in that it operates either on a NAPLPS terminal features or as an ASCII terminal displaying text in 80 x 24 format. Extra hardware required includes one 320 k disk drive and a IBM colour board or plantronics board with an asyncronous adapter and a colour monitor. Users can also add a dot matrix printer with graphics or an IBM prism colour printer. The software package effectively allows users to access any NAPLPS or ASCII information service and database systems such as The Source, Cantel CompuServe, Inet, Envoy 100 or Grassroots. It offers a number of versatile functions including user definable function keys, as well as download and upload facility for frames and slide show sequence etc.

4. Pro NAPLPS

This package is developed and marketed by Digital Equipment of Canada and sells for around $200. It runs on the DEC professional 300 personal work station. Extra hardware requirements are quite

substantial since the system must include a hard disk drive subsystem and an extended bit map option. Pro NAPLPS enables the 300 terminal to use the NAPLPS protocol to access videotex databases on remote host systems. Utilities are included to perform communications related functions like modem set up, auto dial storage of host information, file transfer and text only support. These utilities are accessed through easy to use menus and on-line help appears at the touch of a key.

5. Quick Pel

This product, marketed and developed by Micropixel Incorporated, sells for between $200 and $650. The software runs on the IBM PCXT portable, Corona, Eagle, Compaq, and Columbia computers. The extra hardware needed to run the software includes a base band video monitor which would drive a digital RGB monitor if equipped with a board, or a TV set if equipped with RF modulator. Quick Pel program enables the IBM PC to be used as a terminal can be linked into a videotex database. The package allows 16 k RAM for downloadable data and/or programming.

6. Videotex Decoder Software VI.0

This product is developed and marketed by Manitoba Telephone Systems and is compatible with the Commodore 64. It has six colours, black, white and 3 green shades. Extra hardware requirements include a Commodore disk drive, colour monitor, and a modem that is plug compatible with a RS 232 port. This package converts the Commodore 64 into a videotex terminal capable of displaying the text and graphics defined by the NAPLPS standard. Although major text functions are supported and PDI primatives have been implemented, special function keys found on the computer keyboard allow

a user to send commonly used commands to a videotex database with a single key stroke.

5.11 VLSI Vs PC Software

A major debate is now developing in North America concerning the relative merits of VLSI adapted PCs and multifunctioned videotex personal computers. Link,[46] when assessing the relative market opportunities for videotex assumed that the semi-conductor versions of videotex decoder circuits would be available in North America and Europe by mid to late 1985. These are now being implemented in dedicated videotex devices such as ATT's Sceptre terminal and some personal computers products.

Over the next few years, market development and expansion will be based primarily on personal computers using VLSI chip sets and decoder software. Other critical developments will be based on the extent to which new, more intelligent videotex terminals emulate a personal computer and whether they provide colour graphics presentation capability, as well as a communication linkage.

It is expected, however, that it will be 1985-87 before VLSI chips become readily available at low cost in North America. This will present significant competition to the market for videotex decoder software used on personal computers. Once these chips become standard features for off-the-shelf personal computers, decoder software sales will most likely stall as a growing percentage of new computers will include videotex decoding as a standard feature. This is also due to the extra hardware required to make a standard personal computer, videotex compatible. Basic requirements include, a bit plane map colour monitor, communications card and in many cases dual disk drives. These basic devices could add anywhere between $300 and $1,500 to the basic cost of a personal computer.

The review of terminal developments and trends leads us to conclude that the most likely way of displaying videotex in the near future will be on an adapted personal computer using either VLSI chips or decoder software. In the longer term specially designed video processor chips will emerge making it possible to utilize a standard television set in a far more diverse manner than is now possible. Within the medium term, major computer suppliers such as IBM, Apple and Commodore will incorporate VLSI chips into their products making them videotex compatible.

The availability of VLSI chips is still two or three years away and thus it will be the late 1980's before such products are widely available.

5.12 Page Creation Hardware

The early stages of videotex development were based on the use of large standalone page creation systems. These were composed of the page creation processor, editing screen, colour monitor, graphics tablet, joystick, drawing pen and disc storage devices. Leading suppliers of page creation units include Norpak and ATT.

Norpak currently manufactures a full NAPLPS standard, PDP II micro based page creation terminal, the IPS-3 V-2. This system utilizes ½ MB RAM memory and a 10 MB hard disc drive and retails for around $20,000. The IPS3 has a colour palette of 16 displayable colours from a total of 4,096, with optional background colours. The system complies fully with the NAPLPS Service Reference Model (SRM). It is geared toward advertisers, system operators, database information providers and graphic designers who are engaged in full-time high volume, videotex production and operation. The IPS3 provides full functionality (text/ picture creation, editing and NAPLPS file management).

EXHIBIT 5.8
Product Type: Page Creation - Hardware

Company	Product/Name	Description	Cost
Norpak	IPS-3 V.2 (to be followed by V.3 in early summer)	- full NAPLPS standard - PDP II microbased - ½ MB RAM, 10 MB Hard disk, 2 5¼" floppies - visual overlay system	$40,000 Cdn.
Barros & Associate	Videowrite	- high speed NAPLPS text production system - uses off-the-shelf text editors and page creation packages - comes up with layer on top for data bases with mostly textual information - requires external decoder or Quickpel card	
ATT	AT&T and Frame Creation Series 700	- converts photos and drawings into videotex frames in about 15 seconds - slide maker peripheral unit which can can transfer frames from a Frame Creation System, directly onto film	$60,000
Sony	FCX 1100	- A digitizing camera system to create NAPLPS frames.	$40,000
ToyoVideo	Decalon	- Digital camera, keyboard, PC and video monitor.	$30,000

Two major developments have occurred in the past few years which have prompted significant changes in the technology of page creation: the proliferation of software based page creation products; and the development of a photographic page creation method.

Photographic page creation systems are currently produced by three companies, ATT, Sony and Toyo Video. These products use optical techniques for digitizing frames of information. The digitization takes a photograph and turns it into a video image via a video camera. The image then turned into NAPLPS coding. A system developed by Sony sells for approximately $40,000, while the ATT system sells for $60,000. The Toyo Video system is the least expensive system selling for $30,000 CAN. Their system is called Decalon and is capable of providing pages in NAPLPS and CAPTAINS protocol.

These optic page creation systems link a colour video camera to a personal computer in such a way that any still video image can be converted digitally to NAPLPS programming and recreated as a videotex page. These systems allow the instantaneous display of background images with colour. Other structures are modified by an operator using a light pen or mouse. The systems feature a variety of error correction measures and the editing functions include provisions for changing picture description instructions. In the Toyovideo system, the images are displayed in high resolution, 512 x 400, with 4,913 colours available through a 16 piece pallet. The system operates either in NAPLPS or CAPTAIN format.

The advantage of these types of systems is the time savings which are possible in page production. This is particularly the case when complex graphics are being produced or when corporate logo's are required as overlays on existing NAPLPS pages.

5.13 Page Creation Software

The second major area of development in page creation is in encoding software. Encoding software has been developed which is suitable for a variety of personal computers. When suitably equipped with peripherals, they are capable of functioning as full page creation terminals.

The most active area of development in page creation is in software for use on microcomputers. The most well known of these are packages developed by Cableshare, Tayson, Limicon, Formic, Async, Microtaur and TV Ontario. Computers employed for these packages include IBM PC, Apple II, DecRainbow and the Sony SMC-70. Exhibit 5.9 provides a summary of the various products available and their associated memory requirements, operating system, language, display resolution and hardware requirements.

These software packages are flexible, relatively inexpensive and, in most cases, offer full NAPLPS SRM. They also require, however, a significant amount of additional hardware in order to utilize the full scope of their capabilities. Basic requirements are a colour monitor, graphics tablet, mouse, joystick, memory, dual disk drives and in some cases an extra display screen.

EXHIBIT 5.9

Microcomputer Based Page Creation Systems

Company	Base Micro-Computer	Memory Required	Operating System	Language	Display Resolution	Extra Hardware Required	Remarks
CABLESHARE Picture Painter	IBM PC, XT DEC Rainbow	128K 256K	PC-DOS CP/M 86/80	C C and Basic	256 x 200 256 x 200	NAPLPS Decoder, Graphics Tablet	16 text fonts; XFER software ava. for direct transfer to database
TAYSON Vast	IBM PC, XT	128K	CP/M MS-DOS	C and Basic	256 x 200	NAPLPS Decoder, Dual Drive or Hard Disk	
LIMICON Prodraw	Sony SMC-70	64K	CP/M	C	256 x 200	NAPLPS Decoder, Graphics Tablet	File transfer pkg and cycle software available as extra
FORMIC	Apple II	48K	DOS 3.3	Machine	256 x 200	NAPLPS Decoder Formic (ROM) Card	Communications pkg. available
ASTNC Videographic System	Apple II IBM PC,XT	64K 128K	P. System UCSD P. System UCSD	Pascal Pascal	256 x 200 256 x 200	NAPLPS Decoder NAPLPS Decoder, Quickpel card	NAPLPS to NTSC interface available Scrip for file management
TV ONTARIO Createx C	IBM PC,XT	128K	MS-DOS	C	256 x 200	NAPLPS Decoder, Quickpel card	Features inc. Page compression, Auto-shading, cont. scaling.
NORPAX/ APPLE Telidon Graphic System	Apple II	48K	DOS 3.3	Pascal	128 x 96	Telidon Interface card	Not yet NAPLPS compatible
MICROTAURE M.P.C.	IBM PC, XT	256K	PC-DOS	Assembly & C	256 x 200	1 extra screen	Built-in Software Decoder, SCRIBE ava. for DRCS creation.

EXHIBIT 5.9 (Continued)
Microprocessor Based Page Creation Systems

Company	Based Micro-Computer	Memory Required	Operating System	Language	Display Resolution	Extra Hardware Required	Remarks
Formic	Apple Computer	2 k		Machine	250 x 200	RS 232 Serial Communication Card	
Cariboo College DRAWTEL	IBM PC	128 k	MSDOS	Machine	256 x 200	2 drivers Microsoft Micro Decoder and Monitor	$394
Electrohome PLPLIB, Encoder UPOI (Software library)	Any		UNIX	C	256 x 200		
Softwords Graphics Power	IBM PC/XT PDP II/44		UNIX	C		Multi-user environment with a decoder pad, mouse	
Softwords NATAL	IBM/PC/XT ICON/Lexicon PDPII-44 VAX	512 k 10 MB hard disk	UNIX	C		Terminal telephone line modem	$750 count authority language

5.14 Data Base Systems

Data base systems are an important part of the provision of videotex services either for in-house applications, or public access services. There are a number of microcomputer based products which can serve as mini-data base systems and which open up the possibility for supplying medium or large scale videotex without the use of a mainframe data base. In most instances, the software packages, when supported by the appropriate hardware (i.e. micro computers and hard disk drives), can control upwards of 10 user terminals simultaneously. The data base size can vary from 100 to 20,000 pages using either the RAM memory or a hard disk. Exhibit 5.10 documents the data base software packages currently available in Canada and the U.S.

One of the more unique and innovative database packages has been developed by Media Videotex of Vancouver. This package can be used to drive up to eight terminals, an NAPLPS decoder and page generator. The base computer supported by the media node software is the IBM PC-XT. This package supports conventional ASCII and NAPLPS colour terminals or a more sophisticated Media Term I or Media Term II terminal. Of particular interest is the Media Term II terminal since this consists of a video disk unit, colour video monitor and NAPLPS decoder. The system can also support laser disks capable of storing 1.6 gigabytes of video and videotex information or 54,000 individual frames. Terminals, keyboards, keypads, and touch screens can all easily be added to this system which supports NAPLPS and CEPT standards.

EXHIBIT 5.10

Microcomputer Based Host Data Base Systems

Company (System)	Base Micro-Computer	Memory Required	Operating System	Language	I/O Ports Supported	Extra Hardware Required	Remarks
ALPHATEL Telidon Service Software	IBM PC,XT	256K	QNX	C	8	Hard Disk 8-port board	Action pages key feature
GENESYS GVS/PRO V1.0	DEC PRO-350	256K or 512K	P/DOS V1.7	Fortran/ Assembly	1 (local Database & Terminal)	Hard Disk Ext-Bit-Map Board	Has built-in software decoder
FDI	Spectrix NCR Tower 1632	256K to 750K	UNIX	C	24-Spectrix 16-NCR	No	Runs on any UNIX machine; protocol independent; handle both session layer prot.
TAYSON VAST	IBM PC,XT	128K	MS-DOS	Basic and C	8 (local Database & Terminal)	Decoder	Can be served by a central database with a super micro
FORMIC	APPLE II	48K	DOS 3.3	Machine	10	Formic ROM Card Floppy or Hard Disk	
CABLESHARE MICROTEX	IBM PC,XT	128K	CP/M (8085 A)	C	2	Floppy or Hard Disk	Interactive Touch Sensitive-screen sys.
MEDIA VIDEOTEX Media node - 8	IBM XT	256K	UNIX	C	8	10 MB Hard Disk 3 boards	Can use videodisc for mass storage & video overlay; also frame creation cap
INFO AGE Infograph	ALPHA MICRO SYSTEM	128K	AMOS	Basic Compiler and Assembler	66	10 MB Hard Disk Decoder	Also have page creation capability

One of the most interesting aspects of Media Node 8 is that any combination of different elements including sound, graphics, moving images and text can be utilized. Communication between these systems or with different computers is possible via telephone, cable or computer networks. The product is also capable of frame creation, down-line loading from remote data bases, bulk updating and data base management. An additional software option is designated for local area net works provided by Media Net which allows information to be accessed by up to 80 screens simultaneously.

The main focus of the Media Node approach is to combine of personal computers with laser disks. This introduces a very rapid retrieval method for video sequences, frames and data. It also represents a vast improvement on poorer resolution, slower videotape. By using these systems, it is possible to access a mixture of still and motion pictures, sound, text, pie charts and cartoon graphics. These elements, when combined make the Media Node data base product suitable for a variety of locations and applications.

5.15 Central Storage Devices/Mini Computers

The heart of any integrated on-line videotex service is the host computer and associated devices which drive the system. The minicomputers used most frequently for such services are the PDPII, Dec VAX 11/70 and Spectrix. With the development of new encoding software, micro computers are now more likely to be used to run videotex services and to facilitate data base system developments the most common being the IBM PC XT. With respect to on-line systems, there have not been any major new trends arising in the past few years other than those involving the increased use of micro's and gateway software for linking sets of micro computers together. The objective of this transformation has enabled them to share a database.

EXHIBIT 5.11

Central Storage Hardware

Service	Computer
Grassroots	DEC/VAX
InfoNorth	PDP 11/23
Keycom	DEC/VAX
Gateway	DEC/VAX, 11/780
Compuserve	DEC/PDP 10
Source	Prime 750
Dow Jones	IBM 4341

5.16 Optic Laser Discs

The use of optic laser discs as the main storage mechanism for videotex or teletext pages has become increasingly popular along with the evolution of public systems and interactive videotex. Video discs are attractive because of their ability to handle the graphics and text produced in NAPLPS or ASCII, full photographic images, full video and sound. The available capacity allows for storage of up to as many as 108,000 35 mm slide frames or photographic images on a single disc.

Videotex and teletext are still not capable of rapidly incorporating still and moving pictures, but optical video discs with perscoms provide such capabilities. When used on a two-way cable system, these can provide a near instantaneous milage of video and graphic images.

Microprocessor driven video disc players can present a mixture of still frame pictures, computer graphics, continuous motion video and text, including split screen text and video. Software advances using random access procedures and artificial intelligence (AI) are making these devices more attractive for use in public access locations such as airports, shopping malls and hotel lobbies.

Videodiscs are also the basis of consumer activated sales aids which are usually located at the point of purchase for selling such items as tickets, financial services and computer hardware and software. The two main suppliers of read and write videodiscs players are Sony and Philips. Most North American services, of which there are about 1,500 at the present time, use Sony devices.

A functional definition for a read/write optical storage disc is:

> A high density memory base in which data and images are stored by a high energy laser beam that induces changes in a medium which can be read by a low-power laser.

A number of features of laser optical discs make them very attractive for interactive videotex and on-line services. The read/write laser head of an optical disc can be farther away from the disc than a magnetic head of similar capactiy thereby allowing "removable media". With removable media, the user is able to store vast amounts of information off-line. Other advantages of optical video discs include:

- portability
- fast access rates
- high density/capacity

It is generally acknowledged that optical discs will have the greatest impact in applications that require repeated usage and fast retrieval. This factor is evident in the areas of public access systems and interactive computer based training systems. Their use in the public access sector has mainly been for point of sale displays, in-store selling, advertising and public announcements.

Some of the advantages noted for video disks include:

a. local storage of frames and images in conjunction with remote access for updating information and transactions.

b. direct read after write (draw) discs which offer a cost effective and portable medium for distribution to, and dissemination from videotex databases.

c. The ability to utilize the NAPLPS protocol for the writing and display of graphics and data bases combined on one storage device.

The public access videotex field has already seen systems developed by such groups as Byvideo, CompuCard, Video Press, Sears and Media Videotex.

5.17 Public Access

In conjunction with developments in the area of video discs, trends for public access videotex systems focus on:

a. networking for larger scale public videotex services
b. keypad design and screen enclosures
c. terminal displays using Touch Screens, and voice activated systems
d. Peripheral hardware including:
   - colour printers
   - coupon dispenses
   - coin terminals

One of the more well known public information retrieval systems (PIRT) has been developed by New Media Technologies of Vancouver. This system is typical of most products which are designed for videotex display in unsupervised public environments in multi-terminal mode or as a standalone services. The PIRT terminal interprets NAPLPS encoded information and processes it to display graphics and alphanumeric images. The terminal has a sixteen position keypad mounted below the display screen and will display 16 colours from a palette of 4,096 different shades including 16 grey levels. The colour monitor has a resolution of 256 x 200 pixels.

EXHIBIT 5.12
Product Type: Public Access Terminals

Company	Product/Name	Description	Cost
Electrohome	T-12	- EGT 100 based, consists of large cabinet and display terminal	quotations vary according to specifications
AT & T	AT & T Public Access Terminals	- available in three models: 1 SK - has a 13" colour monitor housed in a 6' high standalone kiosk with an optional video printer 2 TK - has a compact modular design with a 9" colour monitor and fits in a variety of public telephone enclosures 3 XE - designed to fit into special enclosures for custom applications	
New Media Technologies	PIRT (Public Information Retrieval Terminal)	- can be used as a standalone data base unit or as part of a larger network of terminals	depends on volume of purchase
Cableshare	Touch n' Shop	- videotex/videodisc combination with touch screen - uses the IBM PC or DEC rainbow computer in standalone installations and can grow to a network of 16 terminals on larger microcomputers - page creation and update can occur locally or remotely - supports various videodisc players including Pioneer, Sony and Hitachi - specialized peripherals supported through system calls e.g. Mag stripe card reader, receipt printer with auto slip cutter	$6,000 U.S. for a basic one terminal graphics only Touch n' Shop Other configurations by quotation
Norpak	PAT	- available with or without enclosure	$3,500 without enclosure $5,000 with enclosure

Other public access terminal products are being provided by ATT, Electrohome and Cableshare. Each has a slightly different terminal support capability but most are multisite compatible.

Cableshares system has some interesting characteristics which are related to its use of touch screens. These have become increasingly popular in shopping centers or where special needs exist, as is the case with the handicapped. Cableshares system also makes use of a video disc as the storage device and can be readily configured to a multi-terminal network of up to 16 units. Various video disk players are supported by the Cableshare system including Pioneer, Sony and Hitachi.

ATT has a variety of Public Access terminals designed for various customized applications. These are oriented to standalone systems, public telephone services and custom applications. Each system has the capability to be configured as a standalone unit or to operate in a multi-terminal linked mode.

5.18 Teletext Hardware

The most well known produces of Teletext equipment in North American are Norpak and Electrohome. These companies produce decoders as well as head end system and character generators. It is Norpak however who manufacture the most diverse set of decoder and host captioning products. Exhibit 5.13A provides a summary of teletext decoders and Exhibit 5.13B describes the captioning host equipment supplied by Norpak for most of the currently operational teletext services.

5.19 Summary

This chapter has reviewed the dominant trends in hardware and software for videotex and teletext services. The focus has been placed on terminals, decoder software, page creation hardware, photographic page creation, page creation software, database software, video discs and public access terminals.

EXHIBIT 5.13A
Product Type: Teletext Decoders

Company	Product/Name	Description	Cost
Norpak	TTX-5	- broadcast quality reference decoder - full channel & VBI teletext reception - will act as a videotex terminal as well	$3,235
Norpak	TTX-6	- offered in conjunction with TV manufacturers - can be used as a module for TV manufacturers to incorporate into TV sets - can be used as a standalone box with new component TV sets	

EXHIBIT 5.13B
Product Type: Teletext/Captioning Host Systems

Company	Product/Name	Description	Cost
Norpak	CCS-1 (Caption Creation System)	- full NABTS and Line Z1 captions - includes full colour animation - standalone system	$39,500 Cdn.
Norpak	TES-2 (Teletext Encoder System)	- full NABTS system - standalone - 68,000 based, 6809 inserter, up to 10 MB of memory - 33 or 66 MB hard disk - 2 8" floppy disks - broadcast equipment end	$55,000
Norpak	CES-1 (Caption Encoding System)	- for simulataneous broadcast of NABTS and line Z1 - multi-language capabilities - suitable for subtitling	
Norpak	TDS-3 (Teletext Delivery System)	- used by broadcasters - for VBI or full channel - national and local content can be combined - can provide data services, software, stock quotes, transmission of captioning - can bridge off services for new combinations	
Norpak	TMS-1 (Teletext Management System)	- allows major broadcasters to manage a number of teletext services including national level teletext magazines	

The most important trend in these areas are related to software rather than hardware developments. The software developments are most pronounced in decoding and encoding systems where adapted personal computers such as IBM, Apple and Commodore 64 can be utilized. These trends create a high degree of uncertainty for the future of hardware based page creation systems and dedicated videotex decoders. This concern is accentuated by the realization that within a very short time, computer manufacturers will have access to low cost VLSI chips which can be incorporated into personal computers to provide videotex capabilities.

Teletext developments will be influenced most by the incorporation of video display chips into television sets. This will allow access to videotex or teletext services directly via any equipped television set.

Video discs represent one of the newest additions to the field of videotex. These are being used most prevalently in public access locations for shopping guides and point of sale material. As read and write video discs become more readily available, use of video discs as storage mediums will be enhanced. This will in turn reduce the requirement for mainframe or even minicomputers which today function as page storage and file managements processors.

In the immediate future, most videotex services will be configured to take advantage of the high penetration level of microcomputers and the increasing body of software used for page encoding and decoding. These developments will be affected, however, when manufacturers actively begin the production of computers with VLSI chip sets which enable the use of videotex in NAPLPS protocol. At that time, the requirement for decoder software and the associated peripherals will diminish as new users opt for suitably equipped micros and television sets.

CHAPTER VI - Market Forecasting Methods Review and Proposed Procedures

6.0 Overview

This chapter provides a brief review of some of the approaches which have been used to forecast the market for videotex and teletext services. The review highlights the most important features of the particular techniques and indicates both the strengths and weaknesses of a given approach.

The final part of this chapter presents the details of the proposed approach and procedure for forecasting the market demand for each of the basic market sectors identified previously. The proposed methods, by necessity, are generally defined since each market sector requires a somewhat different forecasting approach. This is due to the variation in available information on which a forecast could be based. In some cases, data is available which allows a quantitative appraisal to be made using primary data. In other cases reliance on secondary sources and expert opinion is necessary in order to assess market size and future trends.

Lane (1984), in reviewing the achievements of the videotex industry, has quite adequately described the process of forecasting that has taken place over the last few years.

> "This inbred process of self confirmation and self reinforcement happens at an industry wide, not just company wide level in the videotex community. Videotex is based on unverified hypotheses and unproven theorems and is sustained for the time being at least by the momentum of the industry players acting upon those assumptions without pausing to examine them".[47]

He states further that forecasting future developments in the videotex world is a little like attempting to forecast the development of the personal computer market in 1976, three years before Apple was introduced. If one had gone by the past or present developments in computing, one would have estimated that it would take ten years before there would be sufficient demand to justify the

production of computers for individual use, and that the primary market for such machines would be in the computing industry.

6.1 Methods and Approaches to Forecasting Videotex

Previous studies conducted by Wescom (DOC, Telidon Evaluation - Marketing and Economic Evaluation of Telidon), indicated that "It was extremely difficult to know what the future videotex/teletext products would actually comprise." Furthermore, the various market projections made between 1980 and 1983, for both hardware and software have been shown to be inaccurate. These projections suggested anywhere between 40,000 and 500,000 terminal installations in homes by 1984.

Wescom's previous studies and reviews of the industry suggested very strongly that a reassessment of the demand forecasting methodology was required in order to realistically assess the potential for videotex, teletext and related products. Such a reassessment, it was argued, should be based on a restructured demand estimation procedure which takes into account more of the factors of the marketplace than has been done to date.

Furthermore, it was illustrated that the viability of videotex products and market opportunities could not be assessed directly from the results achieved in the field trials of services. Field trials have been unable to provide the type of information or the appropriate framework within which market opportunities can be adequately forecast.

The past two years, however, have seen some movement towards market trials, whereby a specific set of product attributes (price and service configurations) have been presented to a specified target group. Telecom Canada's INET service, for example, is currently in such a phase. Infomart's Grassroots and Teleguide services in Canada and the Keycom and Viewtron services in the US have also experiences with conducting market trials. The results of these

activities have, where possible, been incorporated into the forecasts and projects contained in the following chapter.

The previous market situation analysis and technology reviews made for videotex and teletext highlight the need to approach any market forecast as disaggregated and segmented with the emphasis being placed on new applications rather than simply the hardware or software. Furthermore, it is recognized that there are a number of primary videotex and teletext markets, and a large and growing number of very specialized ones in the domestic and North American markets.

6.2 Modelling Approaches

The basic approaches to assessing the market include variants on each of the following:

a. Desk top research which includes historical analogy, analysis of diffusion of innovations, retrospective surveys, household expenditure approaches.

b. Field research and experiments which include delphi techniques, market forecasting from supplier data and market research.

c. Analysis of historical and experimental data which include disaggregate activity models, elimination by aspects models, complementary and competitive analysis and aggregate transaction models.

6.3 Historical Analogy

Hough (1980),[48] in forecasting the likely penetration of videotex, used an historical analogy model. These use the diffusion path for a set of business and household innovations to forecast the diffusion path for videotex. Examination

of Hough's forecast revealed a significant range between the upper and lower bound estimates for the same year which underscored a fundamental weakness of the method. Widely different forecasts for videotex set adoption were achieved depending on whether or not the set of analogous innovations included television. Without a careful comparison of the conditions surrounding the adoption of television and the potential adoption of videotex, there is no firm basis for classifying television as a relevant analogy to videotex. Indeed, as has happened over the last few years, the market for videotex, and for using the television as a display mechanism for videotex has been extremely limited due mainly to the lack of cost competitive decoders and perhaps more importantly, the lack of comprehensive and well designed content.

An assessment of the historical analogy approach reveals that the uncertainty regarding the appropriateness of the particular analogy chosen, along with a wide variation in historical growth rates for different innovations, presents a major limitation to its use as a method for providing reliable demand assessments. However, the approach is useful for providing benchmarks and guidelines within which a forecast under certain conditions can be made. Presently the patterns of actual videotex usage are now more established than when Hough made his initial forecasts and it is now widely accepted that the personal computer is the appropriate technology to forecast videotex in the home or business sector.

6.4 Diffusion of Innovations

Diffusion analysis attempts to extract some generalizations about the diffusion processes of an innovation and is useful in some cases for forecasting the adoption path of a specific innovation. This approach is similar to the historical analogy approach with the exception that it attempts to explain the pattern of a particular process of diffusion rather than simply tracking the trends of an innovation. Using this approach, however, one suffers from the same weaknesses as the historical analogy method. Specifically, the average diffusion pattern for a class of technologies will not necessarily be a reliable guide to the anticipated

diffusion pattern for any particular innovation, nor does it provide a reliable insight into the quantitative impacts that external factors can be expected to have on the acceptance of services such as videotex or teletext. The concepts of diffusion analysis however provide a possible guide when interpreting the growth of particular innovations and can serve as a part of a demand forecast.

6.5 Household Expenditure Approach

The household expenditure approach is usually composed of six steps:

a. determining components of a base year household expenditure vulnerable to diversion to a videotex/teletext services

b. project the growth of (a) to the forecast year

c. determine the maximum plausible part of (a) that may be taken by the videotex service in competition with other new or growing expenditure items serving similar purposes

d. identify this value (c) and consider its variation across household groups segmented, for example, by income

e. determine the threshold videotex expenditure, i.e. the cost per month, for the lease rental or purchase, of services

f. use the distribution of household income or other relevant characteristics to estimate the number of households that could afford videotex and judge what portion of penetration will actually be achieved.

In 1980, Hough attempted to use the household expenditure approach to forecast the likely penetration and subscriber rates for videotex. This considered various

pricing functions ranging from $6 to $25, the number of households that would actually be able to afford videotex and the actual number of subscribers. Using a 1976 consumer expenditure survey, Hough estimated that the average dollars available for videotex could be calculated by the average amount spent per household on items relevant to information retrieval, games, reading, recreation, education and items relevant to message services: post, telephone and telegraph. This method produced, for example, an estimate that a typical North American household would need an income of $70,000 to support a $25 per month cost for Telidon. Forecasted households for 1985, based on this approach, were 26,000. Reducing the cost estimate to $13 produced an increase to 650,000. In sum, the model inputs led to overly optimistic forecasts relative to what actually has happened in the market.

Another study produced by Hickling and Johnston (1979)[49] provided an estimate of Telidon demand that also utilized the income expenditure approach. It was asserted that the services which Telidon is most capable of supporting would compete primarily for disposable income, with products and services which cater to the consumers' propensity for recreation, entertainment, education and culture. The estimates produced by Hickling and Johnston suggested approximately 114,000 subscribing Canadian households in 1983, which were projected to rise to 1.9 million by 1991.

The central fault of the Hickling and Johnston study rested on its discussion of serviceware and assumptions of Telidon's usefulness to firms and individuals. It was thought that Telidon would diffuse from the top downwards via high income groups who possess more disposable income for such purposes. However, it is quite possible that expenditures for such immediate consumption will not follow a top down model. More significantly, Telidon will not necessarily compete primarily in the cultural entertainment portions of individual budgets.

It is suggested that videotex is more attractive to persons for whom it offers some kind of economy of convenience, time or access, or alternatively allows

increased use of a service or product already purchased such as a personal computer. Other problems centred on the assumptions about price, and in fact there was no basis in the Hickling study to assume that a $30 figure was realistic for the purchase of videotex.

In general, most of the past forecasts have focused on the idea that information retrieval would be the prime application for videotex and that the home market would be the driving force. Clearly too much emphasis has been placed on this factor and not enough emphasis on the disaggregated approach to the features and services of videotex in its numerous formats within a highly segmented marketplace.

6.6 Market Research

Still another approach involves market research which relies upon survey methods of buyer preferences. In this approach respondents are asked to reveal their attitudes towards a product's attributes including potential prices and attractiveness vis a vis competitive products. The major shortcoming, however, is that expressions of preference are not necessarily equivalent with behaviour. This is particularly the case when new or innovative products are being considered and many individuals would not have had the experience or an understanding of what the system or product is capable of doing. In other words, its attributes may not even be known. Most of the research conducted on videotex has been based on individuals with very little experience with these products and little real understanding of their usefulness/operation or benefits.

6.7 Demographic Attributes Model

A demographic attributes model is based on forecasting using a set of demographic attributes in households that will actually subscribe to one or more videotex or videotex-like electronic publishing services. This involves disaggregating households into finer and finer categories based on their assumed receptivity to computerized transmission and display media.

Tyler (1980)[50], asserted that eligible videotex households are those whose members are under 35 and therefore presumably are more familiar with computers and willing to adopt computer-based innovations. He asserts that the potential adapters are not likely to be more than one-third of all eligible households. Based on an assumed penetration rate from personal computers with modems, Tyler projected the number of US households likely to subscribe to videotex publishing services (on-line information retrieval).

The most interesting point in this approach is the recognition there are other factors besides income that shape the attitudes of potential adopters towards videotex services. However, the actual method used to make the market assessment was somewhat informal and failed to incorporate analysis of competitive advantages and disadvantages of available videotex protocols relative to alternative technologies. It also is extremely generous in its assumptions about the type and quality of content and services to be provided.

Tyler's forecasts are reported in Exhibit 6.1.

EXHIBIT 6.1

Personal Computer Subscriptions to Videotex and Videotex-Like Electronic Publishing Services

	Net Additions		Total	
	Upper Projection	Lower Projection	Upper Projection	Lower Projection
1979	-	-	4,000	4,000
1980	6,000	6,000	10,000	10,000
1981	16,000	12,000	26,000	22,000
1982	41,000	24,000	67,000	46,000
1983	103,000	54,000	170,000	100,000
1984	220,000	110,000	390,000	210,000
1985	440,000	200,000	830,000	410,000

Source: Michael Tyler, "Market Projections for Personal Computers and Electronic Publishing", in Context, Report Six, London, December 1980, p. 93.

6.8 Competing and Complementary Analysis

A review of the various models and approaches revealed quite clearly that in most cases they are by necessity simplified, and that assumptions about the various diffusion rates can easily be questioned. One of the most important aspects that has been reinforced in this critique is the need to consider competitive and complementary analysis in the appraisal of opportunities and potential for videotex. The purpose of this form of analysis is to identify the anticipated net advantages of an innovation in comparison with alternative technologies in order to determine the expenditures that might be made for the innovation.

Market analysis must acknowledge the availability of complements which enhance the net advantage of the innovation under examination. A prime example of this is the trend toward equipping personal computers with videotex cards which will expand the means to access videotex protocols. These types of complementary technological changes should and must be incorporated and considered in any evaluation of videotex and teletext's potential. It is acknowledged however there are problems with this approach since one is dealing with a technology that can take many forms depending on whatever opportunity area one cares to examine. As a number of researchers have noted, it is quite difficult to implement such an approach in practice given, among other things, the broad number of potential substitutes. In fact, implementation of the technique, while not impossible, requires a substantial amount of information to be known about the attributes of a wide range of products and services, and about the tastes and preferences of potential users. In many cases the requisite data are not available from field trials or market assessment studies. As a result, this restriction limits the extent to which any forecast can be provided which can truly be considered to have taken full account of these aspects.

Some existing studies have employed aspects of the competitive and complementary analysis technique to forecast the future demand for videotex. Link

Resources (1983)[51] forecast the number of dial-up videotex terminals in households defined as videotex devices attached to the public-switched telephone network, exclusive of personal computers enhanced for videotex capabilities. Their forecasts were derived by assessing the ability of videotex to substitute for existing services. Their assessment incorporated a number of demand indicators generated from pilot offerings and market tests from the United Kingdom, along with the comments and views of individuals actually involved in providing videotex and teletext services.

6.9 Forecasting Procedure

Consideration of the limitations of other approaches and our assessment of the videotex and teletext market have resulted in the specification of the following approach to assessing the potential demand for videotex and teletext services in North America. Exhibit 6.2 provides an overview of our proposed approach.

When attempting to assess the likely penetration and demand for services, such as those provided by videotex and teletext, it is clear that what has to be considered are both the growth and development of competing media, substitute media as well as the pricing structures which are developed around these services.

Case study examples of pricing and the acceptance of videotex, its complements and substitutes are very scant, although a number of services are now in operation which provide opportunities to assess these issues. For example, none of the field trials conducted in Canada were designed to measure the way videotex/teletext was perceived by potential customers relative to existing media. Only very preliminary information about price and preference were gathered.

EXHIBIT 6.2

Market Demand Methodology

1. Market Segmentation

   6 basic segments

   a. Home Market
   b. Business On-Line Market
   c. Public Access
   d. Business Closed User Groups
   e. Specialty Applications
   f. Education and Training

2. Definition of Complementary or Linking Technologies

a.	Home Market	Personal Computer's Decoders Standalone Units
b.	Public Access Videotex	Linked Personal Computers Standalone Units Videodiscs and Personal Computers
c.	Business Services	Personal Computers Standalone Units Integrated Workstations
d.	Specialty Applications	Videodisc Networked Personal Computers Standalone Units
e.	Education and Training	Videodisc Personal Computers Standalone Units

3. Revenue and Pricing

   Generally accepted pricing for products and services where no detailed pricing information exists.

4. Market by Sector Estimation Procedure

   a. Sector Identification
   b. Complementary Technology Specification
   c. Forecast Market Penetration
   d. Expected Market Demand

In one study conducted by the authors for a major telephone company, participants were offered a number of options for payment of proposed videotex services. Preferences for particular payment methods were assessed and disaggregated according to whether users were in business, home, public or government agencies. Each had significantly different responses to the price configurations. Overall a $30 per month fee was considered an upper limit for in-house services with leasing and direct purchase of terminals and decoders considered equally appealling. This type of information is far too generalized to apply to a larger population and to be used for a detailed market forecast. However, combining these results with those obtained in other studies can provide a sensible reference point for specifying the likely expenditures and preferences for specific applications of videotex or teletext.

The proposed demand model is disaggregated and oriented around six basic segments of the market. While it is possible to subdivide these basic segments, that process would require far more detailed market analysis than is possible in this particular study. Thus a reliance is placed on the basic market sectors identified in the previous sections of this report. Within each segment videotex and teletext services in their different forms are analysed. No one form of videotex can be assumed, although we have focussed on those configurations which are more likely to come into the marketplace than others. While a variety of delivery mechanisms are possible, we have placed most emphasis on the use of personal computers as the primary technology for accessing videotex for the home and business market. In the other major market sectors different delivery mechanisms are assumed such as public access terminals, videodisc systems or standalone videotex terminals.

1. Market Segmentation:

The first stage of this assessment was the identification of market segments for the product or services in question. It is quite well known, for example, that we can now separate business and residence markets, and further segment each of these into specialized application areas.

For the initial market demand assessment we have identified six basic market sectors. These include:

1. Home Users
2. Business On-Line Users
3. Public Access Installations
4. Business - Closed User Groups
5. Specialty Applications - using merged technologies
6. Education and Training Markets

Associated with these sectors are a set of technologies which can be examined in terms of those relevant to the short term or the long term.

2. Complementary Technologies

The next stage in the process is to examine the growth, development and trends for a set of linking or complementary technologies that have been identified for each of the primary sectors. This stems from the realization that videotex and teletext services can be delivered by a variety of means. The following table provides an indication of the most popular technologies.

EXHIBIT 6.3

Popular Technologies

Market Sector	Technology	
1. Home Market	a. Home Computers - High end PC's Apple, IBM, Commodore,	
	b. Standalone Units -Sceptre AT&T	
	c. Decoders Telephone or Cable based systems	Electrohome Videoway Norpak
2. Public Access	a. Personal Computers Linked - IBM, Apple, Videodisc & Personal Computers	
	b. Standalone Videotex Units - Touch Screens	
3. Business Services	a. Personal Computer based	
	b. Standalone Terminals VTX 200, Micro's and Mini's Spectrix	
	c. Integrated Workstations with Videotex Software	
4. Speciality Applications	a. Videodisc/Personal Computers	
	b. Networked Personal Computers	
	c. Standalone Videotex Terminals	
5. Educational and Training	a. Videodisc/Personal Computers	
	b. Personal Computers/Specialty Computers (ICON)	
	c. Standalone Videotex Terminal	

3. Revenues and Pricing

With respect to the revenues and the costs that have been associated with videotex services, it should be noted that at the present time in North America and particularly in Canada, there are no well established criteria for determining what price subscribers are likely to pay for services in any of the defined sectors. Pricing strategies are complicated by the fact that the role advertisers will play in subsidizing the cost for the end user, and the role that banks will play in terms of seeding the market with terminals and not levying direct charges -- will have an effect in establishing what the pricing and therefore what the revenue generation from the end user might be.

In some cases it makes sense to levy direct user charges based on the estimated number of minutes of videotex usage. In other cases, flat fees per month with no usage-sensitive pricing, terminal purchasing or terminal leasing are also being proposed. Due to this uncertainty it is necessary to utilize existing estimates or generally accepted pricing levels as the basis for estimating the revenue implications of a given market forecast. Also in some cases there are no firm bases for assuming a given expenditure level and thus revenue implication cannot be directly assessed. In such cases only a very general estimate is feasible.

4. Market Sector Estimation

The fourth step in our demand estimation process is referred to as the market share analysis.

Each of the sectors identified in this study requires a different method for determining the gross potential opportunity and forecast penetration. In the home market, for example, there is enough evidence from past studies to indicate the delivery of videotex will, in the short-term, be provided over telephone lines and will be most appealing to those individuals owning some form of personal computer with a communications capacity. In addition the personal

computer must be capable of displaying the full SRM for NAPLPS videotex if text and graphics are desired. As previously indicated, videotex is considered to include NAPLPS and ASCII text only services. This condition considerably broadens the scope of defining the market for services since fewer additional peripheral devices are required to access a text only videotex service than text and graphics.

6.10 In-Home Users and On-line Business Sectors

In the home market the basic linking or conditional technology for videotex in the home is a suitably equipped personal computer. Home users also have the potential for linking to videotex and teletext via cable television or CATV. In such cases a decoder for reading the encoded signals is required along with a colour television. Implementation of a two-way capability in the CATV network is also required. To assess this sector of the market we must use current industry estimates of the expected penetration of low priced decoders as a base for our forecast and the existing number of subscribers using such technology. Presently however this is an extremely limited sector with very few large scale operation now in place.

Home users could also access videotex via standalone terminals. We believe this form of videotex access represents a very small segment of the future market for these services. Thus we will use the current estimates from services such as Keycom, Viewtron and Grassroots to provide base line indicators of the likelihood this form of videotex will continue to exist and the expected penetration of such services for text and graphics.

A final entry point into the home market for videotex is through suitably equipped television sets, although existing evidence suggests this form of delivery is not proving very successful in established markets.

There is also an important distinction between decoder equipped televisions and those having a built-in videotex chip to facilitate the access and display of a particular protocol. Prestel is accessed intermittently by as many as 290,000 users in Britain although the core number of users is estimated at approximately 60,000 subscribers.[52] The likelihood for this form of accessing videotex is considered extremely limited and is therefore not incorporated directly into our forecasts.

In the business on-line market the main method for accessing videotex is over the telephone lines with a suitably configured personal computer. In some cases standalone videotex terminals may be used but this represents an extremely limited market sector. In Canada business on-line videotex is provided through Inet as one of a number of data base services. The display terminal can be either a display phone, personal computers or dumb ASCII terminal.

6.11 Public Access Services

Public access services are currently being provided in large metropolitan areas by a several service providers in Canada, the U.S. and Japan. These services are usually one of two basic types: networked and standalone services. Network services can be further disaggregated in the following manner:

a. network services using standalone videotex decoders linked to a centralized data base
b. network services using videodisc, personal computers or touch screen displays.

Standalone services can be provided using videotex terminals with a fixed page set allowing sequential display, or through page access by the user via a menu or key word search procedure. These systems are used mainly in shopping malls for advertising and promotion of products or services.

Assessing this sector requires the consideration of two elements: The sale of systems and the expected number of terminals. The basis of our approach is to consider the terminals, the network services and central page storage computer as one system. Our approach will consider the number of such systems likely to emerge in large metropolitan areas across North America. Through the examination of existing services we can determine the average number of terminals per system, thus enabling us to provide a forecast of systems and terminals.

To appraise the potential of this sector we have examined the current pattern of system placements and identified the primary locations for their placement.

a. Shopping malls (large size)
b. Airports and government buildings
c. Large size office buildings
d. Convention centers and hotels
e. Museums and Galleries

Applications associated with these systems include:

a. Shopping and Product Information
b. Travel Information and Transit Service Guides
c. Tourist Information
d. Entertainment Guides

Appraising this sector required the use of existing market forecast information and the specification of additional gross opportunities offered in unserved markets. Assumptions about expected growth are based on primary data collected for this study, secondary research documenting existing systems and existing forecasts.

6.12 Business Closed User Group Sector

This sector is believed by many forecasters to represent the main entry point for videotex services in North America. As the expectations for the residence videotex market have deteriorated there has been growing optimism in the industry about the possibilities inherent in the business sector. There has however been some confusion in defining what constitute business users of videotex. This results from the fact that we can identify business "users" and business "uses". Business applications such as stock market quotations can, for example, be provided as part of an in-home service but can also be provided directly to business.

The focus of this sector analysis therefore is the extent of demand likely to derive from the use of videotex services in business. The main market for these services are the so-called Fortune 1000 companies.

A business closed user group is generally one which utilizes videotex services to facilitate some aspect of its internal operations and which uses internal computer resources for storage and retrieval rather than using a time sharing service.

These services could be used in business in a variety of ways including:

a. PC based networked services (SRM NAPLPS) i.e. linked PC's
b. PC based down loaded (SRM NAPLPS) software
c. PC based standalone via NAPLPS software
d. Dumb terminals via communication modems (text and limited graphics) (ASCII based)
e. Standalone videotex terminals via telephone lines
f. Standalone videotex terminals hardwired to a central database (internal)
g. Integrated videotex/micro terminals

h. Specialized terminals such as display phones

i. Integrated office automation systems.

The most readily available and most likely display technologies for videotex in business are micro computers such as IBM, Apple and Commodore 64. At the present time these systems dominate in the small and medium business environment, and are gaining an increasing share of new installations in the large Fortune 1,000 type of companies.

In the office automation sector there has traditionally been a significant level of interest in display graphics and recently, products developed under the Unix operating system incorporating videotex have also emerged. Thus another way videotex services may emerge is as an integrated office automation package operating on distributed terminals linked to a minicomputer such as a PDPII, Dec VAX or Spectrix. Thus OA software sales constitute a primary method of assessing related videotex opportunities.

In order to make an estimate of the proportion of business users likely to require videotex services, we must consider the requirement for information retrieval or business display graphics. In addition there is evidence to support the existence of a growing number of specialized videotex based information retrieval systems being installed in large (Fortune 1,000) type companies. These are typified by large retail organizations, car dealerships, automotive manufacturers, and utility companies.

One other business area requiring attention is for financial services and transaction applications. Using PC's, or other suitably equipped terminals, businesses are increasingly taking advantage of the growth of on-line banking, commodity and stock market transaction services. To evaluate this sector, reliance is placed on published reports, industry surveys and existing forecasts. This information is then used as a basis for making a more definitive forecast of the specific market for Canada and the U.S.

6.13 Education and Specialized Markets

The previous discussions have provided an indication of how we propose to evaluate each of the sectors of the market for videotex. Similar approaches will be followed in the remaining sectors for education and special uses. In these areas we cannot provide as detailed an evaluation as in the primary sectors and therefore we place more emphasis on using secondary research and available industry studies. This focuses on the three main education sectors of:

a. Formal in school training and computer aided instruction
b. Informal training in-home
c. Formal corporate training

In the specialized sector the main focus of attention is on the use of videodiscs and computers. Our analysis therefore is based on the expected growth in interactive videodisc technologies. A reliance is therefore placed on our own industry assessment of these opportunities and existing published statistics on their likely market penetration.

To substantiate some of the initial assumptions made for this market appraisal and forecast we have examined a number of industry reports documenting the current market situation. In most cases these have reinforced our belief that, in North America, videotex and related services are essentially peripheral to the personal computer industry. Thus the prime complementary technology we have selected in order to forecast videotex are personal computers in the home and business environment. In most cases our forecast penetration of videotex represents a subsector of the broader personal computer market with an adjustment made to account for the availability of modems, software, and colour display monitors. We have considered full videotex (text and graphics) as well text only graphics systems. The latter are most important in the expanding on-line banking and shopping sectors.

CHAPTER VII - MARKET FORECAST

This chapter provides an assessment of the expected demand for each of the defined sectors of the videotex market utilizing the approach outlined in the previous chapter. The forecasts are based in most instances on data derived either through interviews conducted by Wescom with industry spokesmen and representatives or secondary research studies and industry information. The market forecast is not an indepth detailed forecast since in most cases the required data for such an appraisal is not available. As a result reliance must be placed on forecasts of analogous and complementary technologies which are known to be critical to the likely penetration of videotex. These have been referred to as linking technologies and include such items as personal computers and integrated work stations for example.

7.0 Market Forecast - In-Home Services

1. NAPLPS In-Home Integrated Services

A number of fundamental trends have now begun to emerge in the market for in-home services which have lead to major revisions in the expectations for this sector in North America.

In general there has been a much slower than expected up take of NAPLPS based videotex services. This has meant that in all market areas significantly lower than expected numbers of subscribers are signing up for the services of companies such as Grassroots, Viewtron, Gateway and Keycom. In all of these services optimistic projections of upwards of 50,000 customers by 1986 have been drastically reduced and most of these services now have less than 5,000 subscribers. Thus the existing base of integrated in-home subscribers, full NAPLPS videotex services is at the present time approximately 10,000. The growth in this sector is likely to be quite limited due to the impact of a number of other competing services, the rather poor development of content on most of

the integrated databases, and the high cost of purchasing the necessary equipment to facilitate accessing selected services.

Currently there are therefore approximately 10,000 subscribers to NAPLPS -text and graphics videotex services in North America. These subscribers will usually be accessing one of the main services of Keycom, Viewtron, Gateway and Grassroots using a dedicated terminal or decoder.

Interviews conducted with the operators of each of these services revealed while there was still considerable optimism about the possibilities for these services there was also a realization that growth would be significantly slower than originally anticipated.

Industry analysts and operators of these services suggest that over the next five years this sector of the in-home market will grow at no more than 40% per year for all North America. Assuming a 40% growth rate the following yearly subscriber levels would be achieved. Exhibit 7.1 provides a comparison of the expected number of subscribers based on the Wescom survey and those derived from Link resources.

EXHIBIT 7.1

In-Home Integrated Videotex Service Forecast
North America

Year	Wescom Estimate	(Link 1984)
1985	10,000	20,000
1986	14,000	40,000
1987	19,600	55,000
1988	27,400	95,000
1989	38,400	210,000

2. Personal Computer Users and NAPLPS

The second major component of the in-home videotex market is composed of the much larger audience of personal computer users who are likely to utilize the services of a text and graphics data base in NAPLPS protocol.

Link Resources in their most recent 1984 videotex forecast specified personal computers as the key linking technology for the acquisition of videotex services. This recognizes that videotext is simply but one subset of a host of new media for information retrieval, data acquistion and transactional services. The personal computer market is quite substantial and growth has averaged well over 30% in the North American over the past few years. In some sectors such as business and professional services the growth in the U.S. and Canada has averaged 55%.[53]

The total installed based for personal computers in North America is currently estimated at 17 million units. About 15 million of these are in U.S. homes while 1.5 to 2 million are in Canada. According to Link (August 1984 p. 11) by 1987 the number of in-home personal computer owners in North America is expected to be approximately 37 million and by 1989 the number is expected to increase to about 65 million. These estimates however are based on a rather optimistic assessment of the likely trends in personal computer sales. More recent evidence suggests a slowing in personal computer sales activities particularly in the home market which means the future prospects for such products will be more limited than originally anticipated. We have estimated that personal computer sales will average about 30% compound growth between 1985 and 1989. Under that assumption the expected installed base for 1987 is 29 million and for 1989 48 million.

The appeal of using a personal computer to access videotex services lies mainly in the relative price advantage compared to purchasing a standalone videotex unit. There are however a number of technical issues which limit the ability of a computer owner to access NAPLPS text and graphics.

The central problem is one of incompatibility with the NAPLPS Service Reference Model (SRM). Also before a personal computer can be used to access a videotex service it must be equipped with a videotex decoder product (hardware or software) appropriate for the particular computer and a modem for communication with the videotex service. These could be either 300 baud or 1200 baud modems. The incremental cost for such add-on features ranges between $900 and $1,800 depending on the particular software, modem and graphics board being purchased.

It has been estimated by several sources; Link (1984), CSP (1984) Wescom interviews with industry experts, that of all personal computer owners in North America only about .1% will utilize the full NAPLPS videotex capabilities of their machines. In the North American home market this would lead to the following expected number of personal computer users accessing videotex in the next five years.

EXHIBIT 7.2

Estimated North American Personal Computer Based Videotex/NAPLPS Users

Year	Home P.C. Market (Wescom)	Home P.C. Market (Link)	P.C. Videotex/ NAPLPS
1985	17,000	17,000	17,000
1986	22,000	25,000	22,000
1987	29,000	37,000	29,000
1988	38,000	41,000	38,000
1989	48,000	60,000	48,000

Data Source - Link, Evans and CSP International.

The forecast suggests that by the end of the 1980's there are likely to be no more than approximately 48,000 personal computer owners in North America using NAPLPS videotex through their installed personal computers. Consideration of

the 1985 figure of 17,000, reveals this to be approximately equal to the most optimistic estimate of the number of actual NAPLPS videotex subscribers included in the residence, small business market and on-line transaction market.

This estimate is considerably more conservative than any previous estimate but reflects the realities of the problems associated with actually making a personal computer totally NAPLPS compatible. The solution to this problem of course lies in the development of VLSI chip boards with NAPLPS. Their production however is not likely to be underway on a large scale until the late 1980's.

Thus while the personal computer offers significant opportunity to act as a videotex decoder the reality for the market is that significant additional investment must be made to provide full compatibility. The main use of such a system enhancement would be to take advantage of the text and graphics aspects of videotex. However it is also widely acknowledged that the majority of services now being implemented are largely based on ASCII protocol rather than NAPLPS. Thus the need for a consumer to purchase add-ons to enable the utilization of the full NAPLPS protocol is being continuously undermined by the growth of competing services.

Link (1984 p. 9) have also acknowledged this slower than anticipated growth in the potential for personal computer based NAPLPS videotex. They state in their most recent report (Sept. 1984) the growth of NAPLPS - adapted personal computer terminals will be slowed substantially. They estimate that by 1986 the overwhelming majority of NAPLPS terminals will be adapted personal computers and the absolute number of these will be approximately 40,000 which is somewhat higher than our forecast of 22,000 potential users.

Thus the combined in-home NAPLPS market is quite small in comparison to other mass market communication services. It is expected to be composed of both dedicated service customers subscribing to Keycom, Gateway, Viewtron and Grassroots and a broader audience of personal computer owners who could access these services and others through a variety of suitably equiped personal computers.

Taken together the following yearly subscriber forecast is made for the in-home NAPLPS based videotex market for all North America. The majority of these subscribers will be in the U.S. with perhaps as many as 10% residing in Canada.

EXHIBIT 7.3

Total In-Home NAPLPS/Videotex Market

Year	Forecast
1985	27,000
1986	36,000
1987	48,600
1988	65,400
1989	86,400

7.1 ASCII Based Videotex/

The most rapidly growing sector of videotex services are those which utilize ASCII protocol rather than NAPLPS. These services offer a lower grade of graphics and text but have captured a much larger share of the market for information retrieval, transactions, banking, shopping and related services.

These type of services are typified by the Source, CompuServe and Dow Jones. However numerous other services also exist providing banking, shopping and information services to the home. In many instances the ASCII based services are supplied as a rather inexpensive add-on to the purchase of a personal computer and in 1984 "text only" services such as Dow Jones, CompuServe and the Source had a combined total of almost 500,000 users (185,000 for Dow Jones, 160,000 for CompuServe, and 60,000 for the Source).

The majority of subscribers to these services use personal computers to accomplish their retrieval functions. A much higher proportion of computer users are expected to use these ASCII based information services than are likely to use the NAPLPS protocol videotex services.

These types of ASCII text only videotex systems are expected to grow much more rapidly than NAPLPS services and are also likely to be used by a much higher proportion of computer owners than was the case for NAPLPS services. Presently for example there are about 500,000 subscribers to ASCII videotex services. This represents approximately 3% of all in-home personal computer owners. We forecast this to grow to about 1.4 million by 1989. If this proportion is accepted as an effective guideline, then the number of potential ASCII videotex subscribers can be defined directly from the growth of personal computer owners. In Exhibit 7.4, we have assumed an average annual growth rate of personal computers in North America of 29%. Although personal computer growth has slowed down in recent years and is now considerably under the widely predicted 50% annual growth rate, we assume that a further series of price cuts for personal computers over the next year will accelerate the personal computer annual growth rate to this level.

EXHIBIT 7.4

Total ASCII Based Videotex Users
North America

Year	Personal Computer Households	Subscribers to ASCII Videotex Services
1984	-	
1985	17,000,000	500,000
1986	22,000,000	647,000
1987	29,000,000	841,000
1988	38,000,000	1,102,000
1989	48,000,000	1,392,000

The approach we have taken in this section is to indicate the most likely pattern of developments for NAPLPS standalone subscribers, personal computer based videotex services and personal computer based ASCII services. The lowest growth is expected in the NAPLPS videotex services of the type provided by Keycom, Grassroots, Viewtron, and Times Mirror. Personal computer based NAPLPS videotex while having a significant appeal also has a number of associated factors inhibiting its long term development. Thus the growth forecast for that sector is somewhat more constrained than might be expected.

The largest and most rapidly growing market is for ASCII based videotex services. These services are already well established and also use ASCII for most of the new transactional services.

The primary technology base of the forecasts provided in this study are personal computers equiped with modems and colour display monitors. It is our assumption that future developments for videotex will be closely tied to the expansion of the personal computer market, particularly the mid price models such as Commodore, Apple and Tandy and to a lesser extent IBM.

7.2 Interactive Services

Interactive service are comprised of in-home banking services and in-home shopping services. The variety of delivery methods and the procedures for providing these services have been outlined in the previous chapters. Both services can be delivered using either NAPLPS or ASCII protocol. Almost all of the current operational services utilize the telephone lines for transmission and personal computers for access, storage and displays. The majority of new services are also based on ASCII protocol rather than NAPLPS.

Presently there are approximately 58,000 consumers and small businesses using computers and terminals to bank on-line. There are 25 banks, thrift institutions and credit unions in full commercial operation. A further 23 institutions are running pilot tests. The largest services are Chemical Bank with 23,000 individuals and 4,000 small businesses and Bank America which has 18,000 subscribers. Together these two operations dominate the home banking market with 45,000 of the current 58,000 subscribers. These two services are both ASCII based with the remaining 13,000 subscribers also using ASCII services rather than NAPLPS.

Perhaps the most fundamental factor influencing the growth of interactive services is the penetration of personal computer in the home or small business

market. The second major factor is the utilization of the telephone network for the use of electronic banking and home shopping services.

A recent In-Context (1983)[54] report reviewed various indicators of the potential success of in-home banking. It pointed out that consumer response to a number of other technological advances in banking have played in important role in enhancing the possibilities for in-home banking.

These include:

a. ATMS: The growth in ATMS has been quite substantial in both Canada and the U.S. markets. CSP has estimated there are about 35,000 such machines currently in place in North America and these are growing at about 3,000 per year.

b. Bank at Home Services: Telebanking services, the predecessor to on-line videotex services have enjoyed considerable success with an estimated 1 million users in North America.

c. Personal Computers: The penetration of personal computers is quite substantial with estimates for 1985 ranging between 10 million installed units and 17 million units. These are likely to service as the primary method for in-home services in North America.

d. Cable Text Services: In the U.S. over 150 cable systems provide alpha-numeric services on cable TV. Most of these are being used to provide some limited forms of electronic banking and shopping services.

The most likely users of bank at home services are generally thought to be similar to the type of users expected to utilize videotex services or to purchase personal computers. For videotex this constitutes upper and middle level income groups in the managerial or professional class in the 25 - 45 age group. (These findings are based on results obtained by Wescom in studies conducted on behalf of the Canadian Telecommunications industry).

CSP (1983 p. 33) report that there will be about 20 million individuals in North America falling within the prime target group for home banking services by 1990. This constitutes about 21% of the total number of eligible households for such services.

The expected growth rate in home banking users is expected to range between a low of 34% (1985) to a high of 132% (1986). These estimates are based on forecasts provided by Link (1983, p.27) and verified by Wescom in discussions with industry representatives.

A forecast for the growth of banking services has also been provided by Link and reveals the following:

EXHIBIT 7.5

Interactive Home Banking Services

North America

Year	No. of Subscribers (Link)	Actual
1984	43,000	44,000
1985	155,000	58,000
1986	560,000	
1987	785,000	
1988	1,505,000	
1989	2,105,000	

(Link 1984 p. 27)[55]

Examination of the estimates provided by Link shows them to be somewhat optimistic. This is especially the case for 1985 where there are a projected 155,000 subscribers. The authoritative American Banker (1985)[56] reported there were 44,000 customers using home banking in the beginning of 1985 and by July 1985 this had grown to 58,000 users, approximately 80% of which were ASCII based with the remaining 20% NAPLPS based (11,600).

Our forecast of home banking users is based on utilizing the known growth between 1984 and 1985 which is approximately 34%, the expected growth figures as devised by Link (1984) and an estimate of growth derived from our own industry interviews. Over the 1985 to 1989 period the average per year growth in subscribers is expected to be between 75% -100% per year. This approximates almost a doubling of the subscriber base each year for the next five years.

The forecast for interactive banking services therefore can be assumed to follow a rather steep increase with some leveling likely to occur in the 1989-1990's period. This is based on the assumption that home banking will follow a typical innovation diffusion process whereby the initial enthusiasm increases rapidly and then levels off as "backfilling" of the market takes place or more specialized sectors take up the services.

EXHIBIT 7.6

Forecast of North American
Users of Interactive Banking Services
(Wescom)

Year	
1985	58,000
1986	101,000
1987	177,000
1988	309,000
1989	540,000

Comparison of our forecast with that provided by Link shows a high variation particularly in the 1988 and 1989 period. This results essentially from the inflated 1985 user base of 155,000 subscribers specified by Link. Our forecast is based on a review of the existing banking services and the most recent industry survey reported by the American Banker.

The forecast number of in-home banking subscribers is a subset of the broader audience of ASCII and NAPLPS users. It is our belief however that the majority of new services of any size will most likely utilize ASCII rather than NAPLPS. It is therefore reasonable to assume that no more than the current 10% - 20% of in-home banking services will utilize NAPLPS rather than ASCII protocol. In fact this number is likely to reduce quite substantially as ASCII services increase at a faster rate than NAPLPS services.

Seventy five institutions currently operate some form of on-line banking or financial service in North America. This is expected to increase to about 165 institutions by 1989 (Link 1984, p. 27).

7.3 Interactive In-home Shopping

The market for interactive in-home shopping services is already well established in North America particularly in the U.S. Factors which have spurred the growth of the market sector are similar to those for the other services already reviewed. This includes:

a. The rapid penetration of personal computers.
b. The growth and popularity of telephone shopping services.
c. The ability to gateway from one videotex service to another and to develop shared services such that one shopping service will be available through several system providers.
d. The growth of cable based text services.

The most relevant form of interactive shopping assumed for this study are those provided over the telephone lines, two way cable TV and which utilize a home terminal or personal computer for making selections.

It is generally acknowledged that due to a number of technological and economic factors interactive teleshopping services and systems will have excellent market opportunities in the future. Already a significant number of on-line shopping services exist in North America and this sector is now experiencing similar levels of growth to that of banking services. In April 1983 24 of 31 videotex/teletext operations included some form of interactive shopping either as the primary service or as an add-on to a collection of other services.

The market situation analysis section illustrated the growth of these services and also revealed the shared nature of the majority of these services. For example a major department store might provide access to its services through one of the major videotex service providers. This gives access to an established user base and virtually assumes a market for the proposed services.

The practice of using an established service to carry interactive shopping makes it extremely difficult to extract the actual number of on-line shoppers from all users of a given services. Also the majority of services are available ASCII rather than NAPLPS protocol. For example CompuServe, Dow Jones and the Source all have different forms of on-line shopping and together these account for between 250,000 and 500,000 potential users. However, the actual number of users of these services is not actually known at the present time. In comparison to the large potential market of ASCII based services are those which have been set up using NAPLPS protocol. Currently there are about 5,000 - 10,000 users on these services, only a small proportion of which will be using on-line shopping. In Canada this proportion is extremely small since there is only one service currently provided through Grassroots.

It is reasonable to consider most interactive shopping on-line services to be primarily ASCII based and to be part of a shared services. Forecasting the growth of services on that basis involves examining the previously identified markets for ASCII videotex. These were expected to grow from a current base of 500,000 users to upwards of 1.5 million users by 1990. Using the on-line banking services as a guideline, it is likely that no more than 10% of the base of ASCII subscribers, each year, would be likely to use on-line shopping on a regular basis. Most NAPLPS services are likely to grow very slowly and its use will be mainly for interactive public access services rather than as an in-home option.

7.4 Public Access Videotex

The current market situation for public access videotex systems reveals approximately 30 systems in operation with an installed base of approximately 3,000 terminals. These systems are located in shopping centers, hotel lobbies, hotel rooms, airports and large department stores.

A second major segment of this market are what have become known as private in-house videotex systems. Our review of the videotex industry revealed this to be quite small in North America but to be likely to experience rapid growth over the next five years. There are at the present time about 150 private access videotex systems in operation in North America with about 6,000 associated terminals.[57] (The detailed discussion of these systems is made in the Business Closed User Group Section).

A recent Frost and Sullivan report (1984)[59] forecast that in-store/public access videotex is likely to be the fastest growing segment of the videotex market place in the next few years. They estimate revenues to the industry of approximately $50 million (1984 dollar) and these are projected to climb to $1.4 billion by 1986 and to $4.1 billion by 1988. These revenues are expected to be derived from the sale of equipment as well as services.

Within the public access market are three main sectors:

a. multisite systems (NAPLPS)
b. standalone systems (NAPLPS/ASCII)
c. interactive videotex systems

There were approximately thirty public access systems identified in the market analysis, ten were NAPLPS based with the remainder using ASCII protocol. Five of the systems are classified as multisite with a further five using interactive videodisc and the remainder standalone services (20). Unlike other areas of videotex, the use of NAPLPS protocol for this sector is quite well established and it is likely to remain a preferred choice of public access system operators for sometime.

Link Resources (1984 p.31) have provided some insight into the likely growth of the public access videotex market. Their forecast focuses on two sectors: Multisite and standalone systems. Their analysis provides the following yearly growth estimates for different system types and configurations.

EXHIBIT 7.7

Link Growth Estimates

Year	Multisite Systems	Standalone Systems	Videodisc Systems (Based on Terminals)
1984-1985	166%	200%	138%
1985-1986	87.5%	100%	121%
1986-1987	58%	66%	144%
1987-1988	45%	60%	125%
1988-1989	40%	50%	73%
Average	79.3%	95.2%	120%

Based on the Link forecast the most successful systems are expected to be those using videodisc technology, with the second most successful being those of the standalone variety. Multisite systems are expected to have the lowest overall growth averaging 79% over a five year period.

The industry survey conducted by Wescom substantiated the existance of approximately twenty standalone systems in 1984-1985, 5 multisite systems and 5 videodisc systems in North America. Discussions with industry operators revealed a significant degree of optimism in this market segment and confirmed the belief in the growth of videodisc based videotex using either ASCII or NAPLPS. In this sector growth rates of 100% per year were not considered unrealistic.

EXHIBIT 7.8

Forecast for Multisite Systems/ Standalone Systems Public Access Videotex

Year	Multisite Number of Systems	Standalone ASCII/NAPLPS Number of Systems
1984	5	20
1985	8	60
1986	15	120
1987	23	195
1988	32	300
1989	44	450

EXHIBIT 7.9

Forecast for Public Access
Videodisc Systems (NAPLPS/ASCII)

Year	Number of Systems
1984	5
1985	12
1986	26
1987	63
1988	141
1989	243

The forecast provided for each of the public access market sectors is based on the number of systems rather than terminals. The starting point for the forecast is based on the results of our market situation analysis with the growth rates specified through our industry surveys and the projections made by Link (1984). The forecast has not been disaggregated for Canada and the U.S. due mainly to the very limited number of systems in Canada. In the interactive videodisc systems forecast only the public access operations have been included. Another sector is composed of specialized services.

The Yankee Group (1983 p. 163)[59] undertook an in-depth look at the public access videodisc market and concluded that video catalogs (public access videodisc) will be only moderately successful in gaining full industry acceptance. They state (1983 p. 23) although self service terminals are beginning to make their presence felt in a variety of public and in-store locations, prospective customers including marketing firms, major retailers and manufacturers are likely to remain in a "look see mode".

The Yankee Group expects in-store installations of video catalogs with on-line ordering capabilities to take precedence over other forms of videodisc applications. The forecast provided for interactive videodisc systems includes only those which can be classified as videotex based and which facilitate some form

of built in transaction capability either NAPLPS or ASCII. The market for all types of video cataloging systems is expected to be somewhat larger than that defined as videotex. The Yankee Group (1983 p. 161) have forecast the growth of all video catalog systems for the U.S. and Canadian market. Their forecasts show that in 1985 there were 2,950 systems in place with the overall numbers expected to grow to 6,700 by 1986 and 10,000 by 1987. The total value estimated for these systems was $33.9 million for 1985, $60.3 million for 1986 and up to $80 million for 1987. The average value was $8,000 per system.

7.5 Business On-line Systems

The videotex market for business services has been identified as one of the most active in North America. This market sector is similar in many ways to the in-home on-line market since most of the services are ASCII rather than NAPLPS and most subscribers to these services are expected to use personal computers rather than standalone videotex units. The services identified in our market situation analysis are designed to serve a cross-section of business types and sizes. However, it is generally acknowledged that the main targets for these services are small and medium size businesses. The large business customer is more likely to have an in-house or closed videotex system rather than utilize on-line services.

The supply of business on-line videotex services is dominated by a few large scale operators most notably Dow Jones with almost 200,000 subscribers and the Source with approximately 60,000 users, 60% of whom are classified as business users.

Our market situation analysis for business on-line services revealed there were 22 commercial services operating in 1984/85. The majority of these were ASCII rather than NAPLPS based and most only required a personal computer or terminal to access and display information.

The NAPLPS on-line videotex market is extremely small at the present time particularly in comparison to the growing ASCII based services. Our situation analysis revealed only six of the twenty two operating services used NAPLPS rather than ASCII. No more than approximately 2,000 subscribers were using NAPLPS services compared to the almost 250,000 known users ASCII services.

The forecast of on-line business subscribers addresses the ASCII based services rather than the NAPLPS services. This is because there seems to be very limited likelihood that NAPLPS services will capture a significant market share for on-line business services within the next five years.

Since the main method of access for ASCII videotex is through personal computers we have examined their growth to forecast the potential for text only business on-line services.

The business/professional market for personal computers is still growing quite rapidly despite recent slowdowns in the industry. There is however expected to be a reduction in the rate of growth within this market over the next five to ten years. Growth in the business professional market is currently eximated at 55% but this is expected to be 52% between 85/86, 44% 86/87, 38% 87/88, and 34% between 88/89.

EXHIBIT 7.10
Forecast Personal Computers
Business Market North America

Year	Cumulation Units (OOOs)
1985	9,500
1986	14,500
1987	21,000
1988	29,000
1989	39,000

Source: Link 1984 p. 11 - Personal Computer Forecast by Application Segment

The current personal computer business market subscribers base has been estimated at approximately 9.5 million for all of North America. This population is expected to grow steadily between 1985 and 1989 to a total of about 39 million. The current subscription base for ASCII text only on-line business services is estimated at about 300,000 (based on Wescom Market Situation Analysis and related background studies). These are in addition to the residence on-line subscribers who could also access services.

The number of on-line videotex business subscribers in 1985 was estimated at 300,000 which represents approximately 3% of all personal computer owners for the same year. Assuming the proportion of on-line subscribers parallels the growth in personal computer sales the following estimates are derived for the business on-line services sector (Column A).

EXHIBIT 7.11

On-Line Business ASCII Videotex Subscribers

Year	No. of Subscribers	
	(A)	(B)
1985	300,000	570,000
1986	435,000	870,000
1987	630,000	1,260,000
1988	870,000	1,740,000
1989	1,170,000	2,340,000

A second approach to forecasting the potential subscribers base for on-line videotex is to consider that in a survey of Canadian companies owning personal computers with a communications capability (Wescom 1983) it was found that only about 6% subscribed to on-line business data bases on a regular basis. Using that estimate allows an upper limit forecast to be made of the on-line business database market. This is exhibited in column (B) of Exhibit 7.11.

There is a strong market for business oriented on-line services most of which are of the ASCII type. The NAPLPS services constitute only a very small percentage of services in this sector and they are not considered to grow substantially in the future.

7.6 Business Closed User Group Services

The market situation analysis section identified eleven business closed user group applications currently operating in North America. This sector has been designated as one of the most positive growth opportunities for NAPLPS text and graphics systems. These are expected to be oriented mainly to large corporate clients rather than the small and medium sized companies most likely to use on-line services.

The most likely target for these services are the so called Fortune 1000 companies. The popularity of corporate videotex is paralleled, as in other sectors of the market, by the growth of personal computers in business. Also user research conducted by companies such as IBM[60] has indicated that videotex use will be conditioned by the growth of external (on-line) databases as well as corporate applications.

A recent market analysis of these applications for videotex was undertaken in the U.S. and provided the following forecast.

In North America there are currently 100 million workers of which 49.5% or 50 million are classified as white collar. Presently about 10% of these workers are assumed to be owners or users of a personal computer. The actual number of personal computers with videotex expected to be used in business has been forecast to total about 3 million units by 1987 with up to 23 million in use by the early 1990's.[61] These estimates are inclusive of all business classes (small, medium and large) and therefore must be adjusted somewhat to reflect the primary user group of large businesses. Large businesses are assumed to

constitute about 15% of all business classes which would provide for a potential market for closed videotex systems (corporate videotex) of 60,000 units in 1985/86, 450,000 units by 1987 and 3.5 million units by the early 1990's. The forecast number of units represents mostly personal computers suitably equipped to access videotex either externally via a gateway or internally utilizing a corporate database. In most cases the personal computer would utilize one of the many available videotex software packages and therefore would be the primary method of displaying videotex.

7.7 Education Market

The educational market for videotex represents one of the more complex sectors to forecast due to its fragmented nature, limited current development and highly specialized character. In the market situation analysis a total of fifteen different education oriented services were identified for the U.S. and Canada. Most of these were in the formal education sector serving colleges, universities and specialized institutions. In addition to the existing services identified in the situation analysis there are as well in Canada a number of experiments being planned for the use of videotex in education. Likewise in the U.S. most of the on-going activity is in the formal education markets with a number of universities offering some form of videotex or teletext services either to the local community or as formal course instruction in the use of videotex. Informal education market uses of videotex have been provided in a number of the on-line residential services such as Grassroots, Keycom and Viewtron. However these applications are usually more oriented to entertainment functions than structured learning and are therefore not included in this analysis.

While there are a diversity of opinions regarding the future of videotex in education there are two recurrent themes which aid in defining the nature of this market. Elementary and secondary schools and some community colleges tend to use videotex for teacher support and computer assisted instruction, while universities use it for information searches, research and development.

Another consideration in the educational markets for videotex are the developments taking place in interactive videodiscs and computer aided learning. These systems may be geared, to formal as well as informal education activities.

Videotex applications in computer aided instruction are still quite uncertain with several experiments underway to evaluate its function. In the videodisc area market activity is quite brisk particular for non-formal and industrial training. In such systems a microcomputer is used to control a videodisc player which allows full scale computer programs to be written to control the presentation of material and to store and analyze student response data. It also allows for computer generated text overlays and graphics for full alphanumeric input.

Another market sector where opportunities exist for computer learning and possibly videotex is in the non-school training area. This has been identified as one of the most attractive areas for the use of computer aided instruction using computers, videodiscs and associated software. The actual extent to which videotex could be incorporated into these applications is still unclear but given the large amounts being spent it would seem to offer significant opportunities.

The Canadian federal government, spends annually upwards of $1 billion on technical and vocational training. In British Columbia $4.5 million was spent on industrial training programs in 1982 and private industry expenditures on training are estimated at about $2 billion per year.

In the U.S. the computer based training market is also quite active. In the early 1980's up to 21% of all large size companies were estimated to use some form of computer instruction and this was expected to grow quite significantly over the next few year particularly among large corporations.[62] Another study conducted in 1981 found that of 160 large firms surveyed 50% were using computers for training and 71% used microcomputers.

The educational market is currently undergoing major changes in the use and incorporation of computers for formal and informal training and learning. Microcomputers are appearing in increasing numbers in formal education environments as well as the home market and software for all types of instruction is proliferating. Government and industry are spending very large sums on training and making increased use of computers for instructional purposes.

In mid 1982 there were approximately 10,000 microcomputers in Canadian schools. The growth rate for these products in the formal education market has been estimated to be approximately 40% over the next few years.[63] In the U.S. recent surveys indicate a total of 100,000 micro's were being used in schools in 1981. This was expected to grow to 250,000 by 1985 with 1 million units expected to be in place by 1987.

The microcomputers in Canada were distributed among 15,000 elementary schools, 192 colleges and 65 universities. In the Canadian post secondary education sector there are a total of 252 institutions offering college and university training to over 600,000 full time and a further 250,000 part time students.

There are a total of thirty two colleges, universities and private companies currently involved in the development and use of NAPLPS based educational courseware.[64] This represents only a very small percentage, 14%, of the total number of colleges and universities in Canada and only .2% of all formal education institutes in Canada (elementary, college and universities). While it can be assumed that as the penetration level of educational micros increases in Canadian schools, which now total approximately 10,000 to 15,000 units, the possibilities for using NAPLPS videotex courseware will improve. It must be assumed, however that only a portion of all micros will be videotex compatible.

Our review of various experiments and tests currently being operated indicates only about 1 in 30 or about 3% of micros in participating institutions are videotex compatible and have communications capability. While this is a rather crude estimate it provides some indication of the possible user base for NAPLPS based courseware over the next five years. It is recognized however that the number of institutions participating in videotex will probably grow over the next five years to take in most post secondary institutions. The actual number of elementary schools using videotex is not likely to grow as rapidly due mainly to the moderate growth in installed micros and the preference for other forms of educational courseware and computer learning software.

One development likely to foster videotex growth in the Canadian and North American market place is the setting up of a videotex based network for the exchange of educational oriented content. This is a federal government sponsored program designed to foster the exchange of content and educational applications between academic institutions, researchers and companies involved in videotex courseware development.

In the formal educational market NAPLPS protocol based courseware is only one small part of the growing computer learning market. Discussions with individuals involved in the educational market for videotex suggest that within 5 years all universities and colleges will be linked via an NAPLPS protocol network, allowing the exchange of courseware, messaging and general information retrieval. There is less certainty at the present time about the involvement of secondary and elementary schools in such a network.

Sales of NAPLPS courseware will most likely parallel the growth of micro computer into Canadian schools. These are currently estimated at 15,000 units with growth expected at a constant 40% annually.

EXHIBIT 7.12

Educational Micros in Canadian Schools

Year	Micros	Videotex Compatible
1984	15,000	450
1985	21,000	630
1986	29,400	882
1987	41,160	1,200
1988	57,624	1,728
1989	80,600	2,418

It is unlikely that all of the micros in Canadian schools will be NAPLPS compatible and therefore capable of using the available software. It has been conservatively estimated, based on discussions with those involved in this market and in the assessment of existing hardware that about 3% of existing micros are NAPLPS compatible.

Exhibit 7.12 provides a indication of the number of micros expected in Canadian schools between 1985 and 1989. It also provides an indication of the number of videotex compatible micros assumed in the market if only 3% were capable of displaying the full NAPLPS protocol. One recent development however which should be considered is the selection by the Ontario Ministry of Education of the Icon as the educational micro for that province. The Icon while being a standard micro computer also is NAPLPS compatible. Ontario currently accounts for approximately 47% of all micro computers installed in schools in Canada[65] and thus can be expected to have a significant influence on the potential for NAPLPS videotex educational courseware. Between 1985 and 1989 the overall growth in micro computers is expected to total 60,000 units with approximately one half in Ontario (30,000 units). The majority of these are likely to be the Icon computers which are NAPLPS compatible. This will provide a sizeable market for those institutions, agencies and companies producing courseware and other videotex products. Thus we can assume a minimum market size in the sector of approximately 35,000 users by the late 1980's.

Exhibit 7.13 and Exhibit 7.14 detail the various projects, hardware and software products being produced for the educational market in Canada.

The assessment of the formal education market for videotex reveals a significant amount of interest exists within Canada and the U.S. There are trends in hardware and software which substantiate the growth of computer based instruction and computer learning at all levels of the formal education process. The extent to which NAPLPS based videotex will capture a portion of this market is however still very speculative. This is due to the limited experience with videotex courseware and the low penetration of NAPLPS compatible hardware.

EXHIBIT 7.13

Education Videotex Projects

Project Title	Sponsor	Specifications and Standards	No. of Pages
Agora	Universite du Quebec a Montreal	5 IPS-2 dont 4 en version 699	
Agrilab	Olds College		
Agritex Trial Project	University Extension, University of Regina	Host - VAX 11/750 User Terminals 9 - Apple IIe's with ASCII Express Pro software	400
Athabasca University Telidon Project	Athabasca University	Videotex Host - VAX 11/780 Videotex Page Creation Stations 4 stations, ASCII terminal with two-way printer port, Huston Instruments "Hipad" digitizer, Telidon decoder, and page creation software on the VAX 11/780 Standard 699 level protocol	1,925
Banque de Cours	Universite du Quebec a Montreal		
Cameleon	Commission scolaire LES ECORES		
CCOHS Videotex	Canadian Centre for Occupational Health and Safety	Videotex Host - IBM PC-XT Videotex Page Creation Stations - IBM PC-XT Terminals - EGT 100 Standard - NAPLPS	
Ecotoxicologie	Universite Concordia (MTL)		

EXHIBIT 7.13 (Continued)

Education Videotex Projects

Project Title	Sponsor	Specifications and Standards	No. of Pages
L'Education Continue a Distance a l'Aide de Telidon	Universite de Montreal	Videotex Host Videotex Page Creation Stations 2 postes de creation de pages (Apple, Microtel, Televideo)	500
Formatec	Universite du Quebec a Hull	2 systems IPS, 1 EPS, 6 Mark IV, 2 laboratories, 1 salle d'usagers de VAC, IBM-PC	
Gricotel	Cegep de Valleyfield	un micro-ordinateur Apple and un lecteur de disquette, un decodeur Telidon, logiciels micro-videotex	
iNet 2000	Telecom Canada	ASCII or Telidon Terminal	
Infagri	Cegep d'Alma	Videotex Host - Apple IIe Videotex Page Creation Stations IPS 2.3, Apple IIe, logiciel Norpak - Formic, tablettes graphiques Videotex User Terminal - EGT 100 Standard - NAPLPS	1,000
IRIS	Canadian Broadcasting Corporation	Videotex Host - DEC/10 host computer, Videotex Page Creation Stations, CBC/Norpak, Videotex User Terminals - Norpak MK-IV Standard - NAPLPS	250

EXHIBIT 7.13 (Continued)

Education Videotex Projects

Project Title	Sponsor	Specifications and Standards	No. of Pages
Logitel	Commission scolaire des Mille-Iles	Videotex Page Creation Stations 2 micro-ordinateurs Apple avec logiciel "Createur de page" Formic Videotex User Terminals - 3 decodeurs 2 Electrohome et 1 Microtel	
Maquette Didactique pour l'enseignement des Micro-Processeurs	Cegep de St-Jean	CPM 8080	
Open Learning Institute Telidon Project	Opening Learning Institute and B.C. Telephone Company	Videotex Host - PDP-11/70 Videotex Page Creation Stations Norpak IPS-1 page creation terminals provided by BC Tel Videotex User Terminals - 2 AEL Microtel	308
Profi	Cegep de St-Felicien	1 micro-ordinateur + 1 decodeur Telidon + 1 logiciel de cretion;	
Progiciel Educatif	Commission scolaire Jerome-Leroyer		
Programme de Developpement de Contenus	Tele-Universite	Videotex Page Creation Stations 2 IPS (Norpak) 1 IBM PC	
TEL-EP	Ministere de l'Education (Quebec)		7,500

EXHIBIT 7.13 (Continued)
Education Videotex Projects

Project Title	Sponsor	Specifications and Standards	No. of Pages
Tele-Sante	Institut de recherches cliniques de Montreal	Videotex Host - 1 VAC 750 Videotex Page Creation Stations 1 IPS, Micro IBM Videotex User Terminals 18 terminaux decodeurs Norpak Mark IV	3,500
TELI-68	Cegep de Maisonneuve	Videotex Host 1 ordinateur Southwest 6809 Videotex User Terminals - 1 Telidon Norpak	
Telidon Distance Education Field Trial	Alberta Correspondence School		2,117
Telidon in Education: M.M. Robinson High School	TV Ontario	Videotex Host - DEC PDP 11/34 with 20 ports, Videotex User Terminals - Norpak Mark III with modified Electrohome colour TV	78
Telidon-Sante	Universite de Montreal		
Telidon Videotex Trial	Alberta Government Telephones	Videotex Host PDP-11/70 Videotex User Terminals - 30 - Norpak Mark II decoders Standard - 699 presentation protocol	
Toronto Community Videotex		Videotex Page Creation Stations Norpak IPS 1.5 with Createx C Norpak IPS 2vn3a Apple w/Formic Apple II	

EXHIBIT 7.13 (Continued)
Education Videotex Projects

Project Title	Sponsor	Specifications and Standards	No. of Pages
TV Ontario Telidon Information Services - Edutex and Edutel	TV Ontario	Videotex Host - VAX 11/780 (DEC) Videotex Page Creation Stations 3 - Norpak IPS, NAPLPS level 1 - Norpak IPS, 699 level 1 - IBM PC work station, NAPLPS Standard - NAPLPS	56,000
UBC Picture Creation System	University of B.C. Computing Centre	Videotex Host AMDAHL 470/V8 and 470/V6, Videotex Page Creation Stations - 10 in use Standard - T.500	200
Unitex	University of Saskatchewan	Videotex Page Creation Stations 1 - Norpak IPS-II 1 - DEC VT100 Terminal Norpak Mark IV Decoder 1 - Apple II Videotex User Terminals - 1 - Norpak Mark III decoder 2 - Electrohome RG8 monitors 1 - Microtel VTX202 decoder	
Westex News	Graduate School of Journalism University of Western Ontario	Videotex Host - VAX-11/780 Videotex Page Creation Stations Delta 7300 ASCII terminals Videotex User Terminals - dedicated Telidon terminals Standard - NAPLPS	60-90

EXHIBIT 7.14
Educational Videotex Software

Software	Source	Standard
Edutex User Bulletins	TV Ontario	NAPLPS
Holland College	Holland College	NAPLPS
Indexes	TV Ontario	NAPLPS
New on Edutex	TV Ontario	NAPLPS
SOS et index alphabetique	TV Ontario	NAPLPS
Telereferences	TV Ontario	NAPLPS
TV Ontario Services	TV Ontario	NAPLPS
Accounting Technology	Holland College	NAPLPS
Advertising Layout - a Basic Approach	Alogonquin College	NAPLPS
Business and Education Transcription Agency	Business and Education Transcription Agency	NAPLPS
Canadian Technology and Trade: Quiz and Facts	Words Associated	NAPLPS
How to Write a Resume	TV Ontario	NAPLPS
Think Export	Words Associated	NAPLPS
Hello NATAL	Softwords	NAPLPS
Help	TV Ontario	NAPLPS
Page/Frame Creator Course	Loyalist College of Applied Arts and Technology	
Telidon, Edutex and Edutel	TV Ontario	NAPLPS
Videotex Visuals	TV Ontario	NAPLPS
Visuel	TV Ontario	NAPLPS
Who's Afraid of Red, Green Blue	Douglas Porter	NAPLPS
Crime Prevention	Solicitor General of Canada	NAPLPS
Human Rights	Communications Canada	NAPLPS
Prevention du crime	cree pour le ministere du Solliciteur general	NAPLPS
Autotest	ATN Adaptive Testing Network Ltd.	NAPLPS

EXHIBIT 7.14 (Continued)

Educational Videotex Software

Software	Source	Standard
A Young Driver's Instructional Program	Alphatel Systems Ltd.	
Educational Software Catalogue	TV Ontario	NAPLPS
Ontario Association for Continuing Education	Ontario Association for Continuing Education	NAPLPS
Telidon Volunteer (Museum) Training Programme	National Museum of Man	NAPLPS
Affirmative Action Quiz	Words Associated	NAPLPS
Compass - Job Search Tips	Employment and Immigration Canada	NAPLPS
Guidance Related Information	TV Ontario for Ontario Ministry of Education	NAPLPS
The Job Hunt	TV Ontario	NAPLPS
The Job Hunt Game	TV Ontario	NAPLPS
The Ontario Youth Secretariat Sequence	TV Ontario	NAPLPS
Service informatique d'orientation scolaire	TV Ontario for Ontario Ministry of Education	NAPLPS
SIOS - Renseignements Connexes	TV Ontario	NAPLPS
Student Guidance Information System	TV Ontario	NAPLPS
Women Returning to Work	H. Brown	NAPLPS
Boots, Spurs and Go	Woodland Public School	NAPLPS
Integrated Language Arts Program	University of Calgary	699E
Reading Skills Package	Genesis Research Corporation	NAPLPS
Design for Communication	Keystone Educational Design	NAPLPS
Empty Objects	Douglas Porter	699 and 709
Mondrian: The Life of Truly Modern Man	Douglas Porter	NAPLPS
French I (introductory)	Open Learning Institute	

EXHIBIT 7.14 (Continued)

Educational Videotex Software

Software	Source	Standard
Cartes a la carte	TV Ontario	NAPLPS
Get to Know Ontario	Community Information Centre of Metropolitan Toronto	NAPLPS
The Globetour Game	TV Ontario	NAPLPS
Here's Canada	Words Associated	NAPLPS
Maps a la Carte	TV Ontario	NAPLPS
Passport to Canada	National Museum of Man, Ottawa	NAPLPS
TELIMIGS	Carleton University	NAPLPS
The Electronic Gourmet	Home Management Systems, Inc.	NAPLPS
Heart Disease	University of Waterloo	NAPLPS
Human Circulatory System	St. Paul Junior High School	NAPLPS
Rabies	University of Guelph	NAPLPS
Recipe Roundup	TV Ontario	NAPLPS
Canadian Cultural History	Simon Fraser University	699E
People in Profile	TV Ontario	NAPLPS
Quizzes and Quotes	Encyclopaedia Britannica Publications Ltd.	NAPLPS
Riel	Softwards	699
Blissymbolics	The Blissymbolics Communication Institute	NAPLPS
Constructing in Geometry	R. Hardy, J. Sawyer	NAPLPS
Industrial Mathematics	Open Learning Institute	
Math and the Calendar	Durham Board of Education	NAPLPS
Mathematics from Waterloo	University of Waterloo	NAPLPS
Transformations and Dilatations	D. Trueman	NAPLPS
Ontario MPP's	Community Information Centre for the Ontario Ministry of Government Services	NAPLPS
Seeing is Believing	David Benn	NAPLPS
Atomic Energy of Canada	Videographex	NAPLPS

EXHIBIT 7.14 (Continued)

Educational Videotex Software

Software	Source	Standard
Communications	TV Ontario	NAPLPS
Electricity Utility Operations	Open Learning Institute	
Fascinating Facts	Encyclopaedia Britannica Publications Ltd.	NAPLPS
Forever Green: the Forest Forecast	Words Associated	NAPLPS
High Tech Teaser	Words Associated	NAPLPS
How Things Work	Encyclopaedia Britannica Publications Ltd.	NAPLPS
Qui	TV Ontario	NAPLPS
Science and Technology	National Museum of Science and Technology	NAPLPS
Science, Technology and You	Words Associated	NAPLPS
Sciences et technologie	TV Ontario en collaboration avec le Musee national des Sciences et de la Technologie	NAPLPS
TRIUMF Information Provider System (TIPS)	TRIUMF Meson Facility	NAPLPS
Videoflow	Craig Shorten and Danny Veverka Mohawk College	NAPLPS
Canada en chiffres	TV Ontario	NAPLPS
Essentials of Sociology	Holt, Rinehart and Winston	NAPLPS
Museum of Man Magazine	J. Lomoro, F. Kert and M. Ritchie	NAPLPS
Community Info - Metro Toronto	Community Information Centre of Metro Toronto	NAPLPS

7.8 Training and Videodiscs

Another area of potential considers the combining of videotex with videodiscs. Videodiscs are increasingly being used in the computer learning area with text and graphics being developed using NAPLPS videotex software. This technology, is popular in the industrial training area although not yet widely used in Canada. A recent study examining the use of videodiscs in Canada and North America noted the brightest future for the educational videodisc will be in industrial and skills training. Its effectiveness has been proven by many American industries and the military. Some of the most successful applications are in the fast food industry and companies such as General Motors and Ford.[66] Other large businesses and government agencies using videodiscs are the Library of Congress, Pergemon International, U.S. Dept. of Defense and Sears.

The mass consumer market for videodiscs is still quite limited and the majority of use in this market is for video entertainment rather than educational applications. This market therefore is not considered one of the primary opportunities for videotex based computer learning or instruction. However the industrial training market does provide a number of opportunities for NAPLPS videotex although at the present time its development is somewhat limited to experiments and tests.

7.9 Summary

This chapter has provided the estimates for each of the identified market sectors likely to generate some activity for videotex and teletext. The majority of NAPLPS services are expected to emerge in the business and public access markets. Our forecast of these sectors reveals most of the business activity will be derived from in-house services rather than on-line systems. Public access services have a demonstrated need for the graphics and text capabilities of NAPLPS and these are therefore expected to grow steadily over the next five years.

The greatest growth is expected to be in the ASCII videotex services for in-home consumers, business on-line users, in-home banking and related transactions. We have therefore attempted to show the expected growth in these market sectors and to reveal their importance for service providers.

The emphasis in our forecast has been to provide realistic assessments of the opportunities believed to exist in each of the defined market sectors. We have utilized where possible primary data collected as part of our survey of almost 100 companies along with estimates of growth derived from existing secondary reports or discussions with industry experts.

In most sectors we have focused our attentions on the complementary analysis approach using personal computers as the primary linking technology for videotex. This was the case for residence and business markets and to a somewhat lesser extent the educational market. The selection of personal computers as the primary display technology is justified by the realization of the extremely poor performance within all market sectors of standalone dedicated videotex terminals. Also, there are now numerous software decoder and encoder packages which are available to perform videotex functions on personal computers.

The forecasts which are provided required a number of basic assumptions to be made about the expected trends for videotex over the next five years. In all cases our assumptions have been derived from discussions with industry participants, a review of secondary sources and our own understanding of the market. Some of the sector forecasts are more firmly based than others. This is dependent to a large extent on the available data and existing services or guidelines on which a trend could be interpreted. There is still, within this market, a significant amount of caution among service providers related to the actual market activity, customer counts, revenues and expectations about the future of services. These factors have tended to limit the extent to which a detailed forecast for the market can be made and therefore the confidence which can be placed on these estimates.

However the approach we have taken provides a realistic appraisal based on the known situation, available information and reliable secondary research.

The forecasts have in almost all instances been made on a North American base. This is necessary because the majority of services are, and will continue to be, oriented to the U.S. market. There are very few operations in Canada for on-line information, banking, shopping or even public access videotex. There are no existing teletext services or any immediate plans for such services (since the termination of the CBC trial).

The opportunities in Canada seem greatest in some of the specialized sectors such as education. Therefore in the education sector we have provided a detailed appraisal of this market sector and indicated the likely growth in videotex display technology and software within the formal education sector.

It is our understanding there will continue to be growth opportunities for computer aided learning and instruction but the extent to which this will embrace videotex is still very uncertain. There are however numerous tests and evaluations taking place which are designed to appraise the feasibility of using videotex and teletext for education purposes. The proliferation of videotex (NAPLPS) based courseware and related software would seem to support our assessment of the potential offered in this market.

The following exhibit represents a summary of those market sectors where subscriber estimates were provided. These are presented seperately for each sector although it should be recognized that there may be substantial overlap particularly with respect to in-home services and interactive banking. This is because subscribers to an in-home services may be given banking as one of a number of options rather than as a separate and distinct service.

EXHIBIT 7.15

North American Market for Videotex Services
1985 - 1989 Estimates

Year	In-Home Videotex (NAPLPS)	In-Home PC Videotex NAPLPS	Total Videotex NAPLPS	ASCII Videotex PC's	Interactive Banking ASCII	Public Access (Systems) Multisite	Public Access Standalone	Business On-Line ASCII	Education Videotex NAPLPS
1984						5	20		
1985	10,000	17,000	27,000	500,000	58,000	8	60	300,000	630
1986	14,000	22,000	36,000	647,000	101,000	15	120	435,000	880
1987	19,600	29,000	48,600	840,000	177,000	25	195	630,000	1,200
1988	27,400	38,000	65,400	1,100,000	300,000	35	300	870,000	1,700
1989	38,400	48,000	86,400	1,300,000	540,000	45	450	1,170,000	2,400

1. Forecast provide the number of terminals likely to support a given service.
2. Estimates were derived through a survey of system providers, secondary research and evaluation of complementary technologies such as personal computers.

CHAPTER VIII - ECONOMIC/INDUSTRIAL IMPACTS

8.0 Introduction

This chapter estimates the net new economic activity in terms of revenues and when possible, employment which, over the short term will be generated by the only growth segments of North American videotex services, including banking, retailing, public access and software.

This chapter is organized in the following way:

A review is first conducted of: investment, revenue, and employment effects of the industry until the beginning of 1983. This phase was concerned predominately with Canada's field trials and is described in Wescom's evaluation of the Telidon field trials. After discussing some of the peripheral industrial effects amongst hardware manufacturers, this chapter describes the most likely revenue and employment effects of new videotex services until 1990, through making certain assumptions about the growth of specific sectors of the videotex industry and about the percentage of the domestic and U.S. software industry which is devoted to the production of videotex transactional software, including transactional banking, purchases, etc. and assumptions about the growth of the Canadian and U.S. software industry. The sectors we have focused on involve (1) transactional services; (2) public access databases; and (3) videotex software in general. Other areas, such as NAPLPS videotex based information retrieval (i.e. Grassroots) involve services which have either leveled off and are showing very stagnant growth. Grassroots, for example, has only around 2,000 subscribers after several years of operation. We recognize the growing importance of the education and specialty markets but with the exception of software sales, there do not seem to be any quantifiable or significant economic benefits which can be evaluated at this stage. We have modeled, in other words, what we consider to be the growth areas for videotex.

After reviewing the revenue and employment effects of the field trials, models are presented for:

1. the industrial effects of videotex - based retailing.
2. videotex - based banking
3. videotex - based public access
4. all in-home videotex, including information retrieval and
5. videotex - related software.

8.1 Field Trial Review

In Wescom's evaluation of the Telidon field trials, it was found that overall investments in Telidon between 1979 and 1982 totalled $47 million on behalf of the federal government, and it was estimated that a further $130 million was invested by all sectors of the Telidon industry for the period of 1978-1982. This provides a total of close to $180 million up to the end of 1982. Estimated expenditures were also provided for each of the major trial operators and system providers, as follows:

EXHIBIT 8.1
Funding for Trial Operations

Company	Amount
Bell Canada	$10,000,000*
New Brunswick Telephone Company	1,000,000
Manitoba Telephone System	2,000,000
Telecable/Videotron	4,500,000
B.C. Telephone Company	2,800,000
Alberta Government Telephone	N/A
OECA	N/A
Infomart	12,000,000

* Based on Wescom's industry interviews.

EXHIBIT 8.2

Allocation of Dollars for Services Required to Maintain Telidon Field Trial Operations Over a Two Year Period

Software and Design	58%
Data Base Maintenance	7%
System Equipment	3.5%
User Terminals	23%
IP Terminals	7%
Background Development and Research	7%

It is evident from the preceding exhibit that a major cost component in trial operation was software requirements and the costs for development and placement of user terminals. However although software and design comprised 58% of expenditures for the two year trial, such may not be representative of a commercial system. Funding provided by DOC was allocated for example against the purchase of IP terminals. Much of the development of software, data base management and engineering however was borne solely by the system operator.

8.1.1 IP Expenditures

The IP sector of the industry was also evaluated. Information providers and sub-IP's were responsible for developing pages, maintaining their pages of information on a trial base, keeping pages up-to-date, marketing their services, conducting research and evaluating new user applications. Estimates of expenditures by information providers are presented in the following exhibit.

EXHIBIT 8.3

Expenditures by Other Industry Sectors

IP's, Sub-IP's

(not operators or system carriers)

(1978-1982)

Publishers	$2,500,000
Retailers	1,500,000
Banks	500,000
Government Agencies	4,000,000
Educational Institutions	400,000
Other Organizations	1,500,000

The costs associated with information provider activity included system operator storage charges, the cost of data collection, the cost of editing and data entry and frame maintenance. In summary, between 1978 and 1982, in excess of $160 million was invested in the videotex industry, but it was found in the current 1985 Wescom survey that overall, there has to date been less than .01% return on net investment to date.[67]

8.1.2 Employment and Job Creation

The purpose of this section is to review the extent to which videotex activities between 1978 and 1982 affected employment opportunities.

EXHIBIT 8.4

Job Types Identified by Videotex Industry Representatives

1. Software Specialists
2. System Engineering/Analyst
3. Administration
4. Data Base Managers
5. Page Creation Specialists
6. Graphic Designers
7. Copy Editors and Writers
8. Marketing Consultants
9. Researcher Specialists
10. Clerical Support

About one half of all the telephone companies interviewed in the Wescom survey indicated that no new jobs had been created, and that staff had generally been provided from other sectors of the company - utilizing individuals from maintenance, installation, systems, administration and related technical areas. Job types most commonly created in this sector were programming, engineering, marketing and sales, page creation, data base management and clerical support staff.

In one field trial service provider organization there were twelve employees directly involved in the Telidon field trial team. Of these, one half were systems personnel, one out of twelve was clerical, two could be classified as manage ment, one in an advisory capacity and two in a research capacity. These included market research and economic forecasting.

The cable companies identified similar types of jobs including page creation, engineering, technicians, data base managers and marketing personnel.

Within the Videotex IP sector, the most common job type created was page creation specialists. These were generally divided into four parts: page creators, Videotex artisits, IPS operators and graphic artists. In a number of instances, freelance personnel -- writers and graphic designers -- were also brought into the Videotex team to assist in such things as colour selection, design and graphic specification. Other jobs types mentioned in this sector were computer programming personnel, training personnel, writers, editors and market research specialists.

EXHIBIT 8.5
Services Offered by IP Companies

1. Page Creation
2. Consulting to Sub-IP's
3. Data Base Design and Layout
4. Training
5. Data Base Management
6. Installation
7. Software Design
8. Information Management
9. Content Development
10. Graphic Design

The manufacturing sector identified primarily technical jobs emphasizing engineering, systems technicians, systems consultants, systems analysts, software programmers and production personnel.

8.1.3 Numbers of Jobs

Staff for most of these trials were usually only medium sized. In the larger trials such as Bell Vista, 40 people were identified as working in videotex related jobs. For others, fewer numbers were mentioned ranging between one or two

working full time in the smaller trials and upwards of 25 or 30 working in some of the larger trials. In most instances these employees were brought from other sections of the company. In only a few instances were new jobs created or was recruiting required to attract individuals from outside the existing personnel.

Among the two major cable companies there tended to be slightly more full time personnel, with approximately 30 employees identified as working in Telidon jobs.

Hardware manufacturers had the greatest number of employees working on videotex related jobs, with major suppliers identifying upwards of 200 employees involved directly in Telidon production. These were generally divided among technical staff, production staff and research staff. For the six manufacturers providing responses, a total of 350 jobs were indicated.

Service providers indicated that in terms of the number and the types of jobs created, the majority of personnel were drawn from other sectors of their respective companies. This was the case for telephone companies, cable companies and the larger IP service providers. In the IP sector, smaller companies dominated with most averaging only three or four employees.

In the Wescom sample phone survey conducted in February 1985 of the nature of service and information providers involved in some phase of videotex production in Canada, it was found that out of 411 jobs which had been created by videotex field trials, about 90% of these (200) were no longer in existence. This is natural enough since virtually all the field trials have been terminated. The majority of individuals working directly in the videotex field are most definitely associated with the large service providers such as Infomart, Viewtron and Keycom. Recent announcements by these companies have all been rather similar in tone; staff has generally been reduced or reallocated to other company divisions. Given the scenario it is difficult to see videotex/teletext as a major job creation mechanism at the present time. While significant amounts of software are being

developed in NAPLPS protocol their production requires only limited labour input. Thus it is not likely that significant levels of employment will be developed in this sector in the near future.

With this somewhat bleak but we feel realistic review of the current situation we now turn to the issue of industrial impacts in what we believe are the most promising sectors of future videotex/teletext developments, (1) transactional services (banking and retailing); (2) public access databases; and (3) videotex software production.

8.2 Banking and Retailing Sectoral Effects

At present, the only home banking service in Canada involves the Bank of Montreal making some limited functions available to Grassroots subscribers. This service has been developed using telecommunications network rather than cable. There is however a belief that perhaps the real opportunity for in-home banking will occur when cable companies begin providing non-programming services. This development seems somewhat uncertain however due to the regulatory constraints still imposed on the provision of two way services in Canada.

In the U.S., we have seen, cable franchises are issued at the local level by city governments. The future effect of videotex developments on cable depends largely on the regulatory stances taken by the CRTC toward this industry and also by other regulatory agencies toward banking. Although this industry will participate, when permitted, in a wide variety of non-programming services (and there have been some recent movements between the alliance of broadcasters and cable companies), there is still real uncertainty in Canada about the regulatory state of cable with respect to non-programming services.

Although electronic transactional services currently operational in Canada are limited almost entirely to automated teller machines, judging from the American

experience described in this work it is quite likely that the new systems such as home banking and retailing on personal computers, telephone bill paying, and point of sales terminals may be a reality in Canada within the decade. The rate at which these developments occur however depends crucially on regulatory stances towards transactional services, cable, the banking industry, etc. Beyond market requirements, the competitiveness of videotex based banking services in Canada hinges on a wide variety of conflicting and inconsistent federal and provincial regulations which interfere with the national flow of financial information. Clearly the industrial and economic impacts of videotex on retailing and banking depend on what policy options over the next five years the Canadian government assumes towards transactional services. For example the government might decide to:

1. Decontrol one way restrictions on classes of organizations, for example to remove restrictions which presently inhibit one class of organizations from offering a particular service (banks involved in retailing, where the converse does not apply, retailers offering banking services). Such a decontrol might be anticompetitive in those areas in which the position of an existing monopoly would be stengthened, that is by way of cross subsidization.

2. Change the emphasis of regulation and control from that of specific interest groups such as banks, savings and loan associations, etc. to classes of services provided (daily and national transactions).

3. Strengthen the federal control of banks and financial institutions involved in providing such national services and at the same time reducing the extent of provincial laws and regulations.

4. Allow the videotex based financial and retail industry to do business without any government intervention.

In the U.S. the growth of the electronic financial/retail industries has been accomplished by breaking down traditional industrial barriers, according to which a wide range of firms not traditionally financial have access to services in automated clearing houses, point of sales network, etc., and are allowed to provide checking and debit services. On the contrary, in Canada all institutions which accept deposits can issue cheques, but brokerage and insurance firms and purely financial firms cannot legally perform this function. It is thus important to open access to a wider range of services.

If point of sales systems merge with debit and credit systems there will be increased opportunities for videotex. As this happens, the exclusion of non-financial firms in Canada from traditional financial functions will involve access discrimination and will reduce competition.

With respect to the availability of teleshopping and telebanking using videotex in Canada, the issue is whether the government should allow purely market developments to determine this factor or make attempts to reduce the access restrictions. Since our financial industry is dominated by five major banks, if the possibility of the provision of electronic financial and retail services is not extended in Canada by regulators to traditionally non-financial industries, in-home electronic payment systems will most likely be dominated entirely by the domestic banks and there will be limited competition in both the range and pricing of services. Under this scenario the economic/industrial impacts stemming from videotex in the electronic banking and financial industries will be minimal. The current government has indicated that it is in favour deregulating banking functions and admitting new players. The most important new change involves a proposal to allow a new financial holding company which is federally incorporated and which could itself have a family of banks and (non-bank) subsidiaries under its care --trusts, insurance, mortgage, loan, banking and investment firms.

In summary, the economic/industrial impacts of videotex on these new electronic industries over the next decade depend heavily on the regulatory stance taken toward the new services, but at present there are effectively no articulated home banking as home retailing videotex commercial services in Canada.

8.3 Industrial Effects of Transactional Videotex - Retailing

The following model for videotex in North America involves both a revenue and installed based forecast for NAPLPS text and graphics based systems. However, the installed based projection involves text only services such as the Source and CompuServe for North America. The methodology of this section is based on Wescom's 1985 survey of the Canadian Videotex Industry and Link's 1983 and 1984 surveys of videotex systems ("World Wide Evaluation: Systems and Strategies", Link No. 0050 and Link, "Interactive Videotex Forecast" Second Edition, 1984). The latter involved a survey of videotex systems operators then functioning in the market place. Essentially we have utilized baseline data and growth rates obtained in 1984-1985. In 1984, there were 400,000 subscribers to ASCII services as opposed to around 5,000 subscribers to NAPLPS services in the US and Canada. Hence it is assumed that most developments will involve the former standard.

It should be noted that this section does not include home banking videotex in either revenue or installed base data, nor does it pertain to public access videotex, both of which are examined in subsequent sections.

This having been said, the methodology of this model has divided the market into two portions - text only, i.e., ASCII videotex services such as the Source and CompuServe and text plus graphics services such as Keycom and Viewtron. Although it is not realistic to assume that text only videotex will long remain text only, in the following modeling this assumption represents the situation of today.

8.3.1 Summary of Forecast

Exhibit 8.6 assumes that differing revenues and expenditures are based on different sizes of possible videotex systems for user populations, 5,000, 10,000 25,000, 50,000, and 100,000 users. Exhibit 8.7 then estimates North American system growth until 1989. Exhibit 8.8 in turn illustrates total text and graphics revenues for North America until 1989, in which advertising is assumed to include revenues from page creation. Subscribers are used as a means of quantifying the text only population, because it is thought that there will be an increasing number of multiple subscriptions to text only data bases and access to such data bases by text and graphics personal computers. It is assumed that effectively most of these revenues will accrue in the U.S. since home-based systems are essentially limited to that country, nor, to our knowledge, are there existing plans to develop these in Canada, and the Bank of Montreal - Grass Roots service is experiencing very slow growth.

The following sections detail the assumptions on which these forecasts were made.

8.3.2 Terminals

A central issue in North America involves the cost of a single function videotex decoder compared to the home computer. In the above forecasts, home computers include any intelligent terminal with telecommunications facility -- such as home and personal computers, super phones, and new voice data devices. Our forecast assumes that semi-conductor versions of videotex decoder circuits are available not in dedicated videotex devices but in a wide variety of personal computers in the form of software or firmware boards. It is also assumed that in the coming generation of mid-range home computers, specialized chip sets for communications purposes and text decoding will be eventually incorporated in the form of firmware. Thus it is already clear at this point that the real evolution of text and graphics hardware for videotex will rely almost exclusively on software modifications of personal computers.

EXHIBIT 8.6

Text and Graphics Videotex Systems Model (Revenues Per Year)

# of Users (000s)	Host System ($M)	Communi-cations ($M)	Ad Revenue ($M)	Subs. Revenue ($M)	Trans. Revenue ($M)	Total Revenue ($M)	S.O. Revenue ($M)
5	0.5	0.3	1	1.8	0.018	3.618	2.818
10	0.72	0.6	2	3.6	0.035	6.955	5.635
25	3	1.5	4	6	0.15	14.65	10.15
50	3	3	6	7.2	0.375	19.575	13.575
100	6	6	8	9.6	1.5	31.1	19.1

EXHIBIT 8.7

Systems Growth In North America By System Size

Users (000s)	1984	1985	1986	1987	1988	1989
5	2	3	4	5	6	7
10	0	0	0	0	1	2
25	0	0	0	0	0	0
50	0	0	0	0	0	0
100	0	0	0	0	0	0
Total Systems	2	3	4	5	7	9
Total Users (000s)	10	15	20	25	40	55

EXHIBIT 8.8

Text and Graphics Systems Revenues

Revenues ($M)	1984	1985	1986	1987	1988	1989
Host System	2	1.5	2.0	2.5	3.72	4.9
Total:						
Communication	0.6	0.9	1.2	1.5	2.4	3.3
Advertising	2	3	4	5	8	11
Subscriber	3.6	4.4	7.2	9.0	14.1	19.8
Transmission	0.036	0.054	0.072	0.09	0.143	0.196
Total	8.236	9.8	14.4	18.1	28.2	39.2
System Operator	5.636	8.454	11.27	14.09	22.5	30.97

It has also been assumed that:

1. The vast majority of communicating personal computers will be used in text only videotex services. This represents a possible market in the consumer sector of approximately $1.6 million in 1984 and rises to $17 million by 1988. There will be a convergence between home text and graphics videotex, and home computing will eventually involve a new generation of computers which have been designed to handle videotex in both text only and graphics versions, often based on NAPLPS chips in North America. But in the immediate future, over the next half decade, the North American market for videotex or home computers essentially involves the text only portion.

8.3.3 Videotex Users

Assumptions about usage effect a number of factors including communications revenues, revenues to computer suppliers and revenues involving subscriber payments. In our forecast the following assumptions concerning usage were made; in any real time, nondown-loaded system, the average page numbers viewed per each ten minute session is estimated to be sixteen. Also it is assumed the average use across all systems is simply ten minutes per user per day. Finally it is assumed that monthly subscription is a preferred method for billing of users. It has also been assumed that the average monthly subscription charge will decrease according to some type of tiered pricing structure. It is assumed that in marketing, with low penetration the average monthly subscription fee is $30 per month and that for a larger system this figure is eventually adjusted downward to $8 per month. Although these assumptions involve numerous simplifications, they are necessary to handle the unpredictability and complexity of a situation involving novelty effects which create high initial use which rapidly tapers off, and possible increases in local telephone rates. Finally, relevant to the ordering of goods and services through videotex, it has been assumed that users will order both durable and non-durable goods, the latter of a familiar nature.

8.3.4 Advertising

In forecasts for advertising revenues, it has been assumed that the potential of the advertising component of any videotex system operators revenues will not be realized in early cycles of development. Put differently, advertising revenues will not significantly exceed subscriber revenues for the remainder of the decade. Here it is thought that advertising revenues will be based on one of the following two assumptions:

1. Service providers will continue to create their own large files which will generate gateway or storage revenues in exchange for the service or maintaining the files on the system or simply allowing gateway access to the service provider's host.

2. Videotex system operators will perform a significant amount of frame creation for advertisers, which will have the effect of leveraging their investment in page creation. Finally it has been assumed that initial advertising rates will be high with respect to conventional forms of advertising, but once set, will not be subject to significant price increases over the next five years.

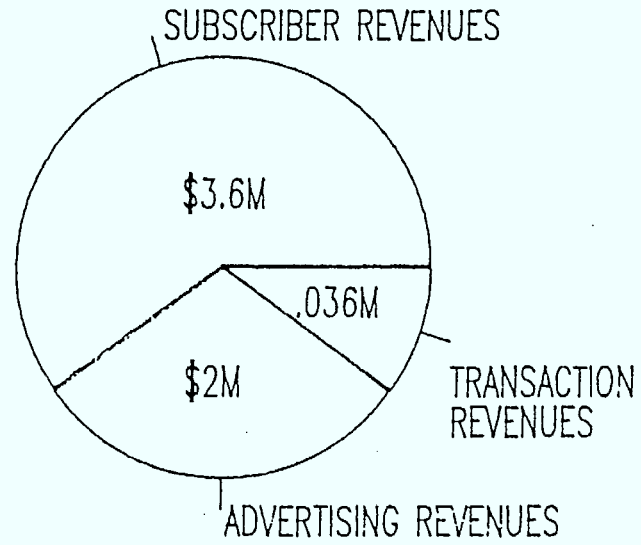
The advertising revenue forecast for North America (Exhibit 8.9 and 8.10) show advertising revenues growing from $2 million in 1984 to $11 million in 1989. During this period the revenues from users' subscriptions will be significantly higher than revenues for system operators. Finally it must be noted that it has been assumed that subscriber-supported text only services will have no advertising revenues, and electronic directory services are not included in these figures.

EXHIBIT 8.9

Text and Graphics System

Operator Revenues

1984



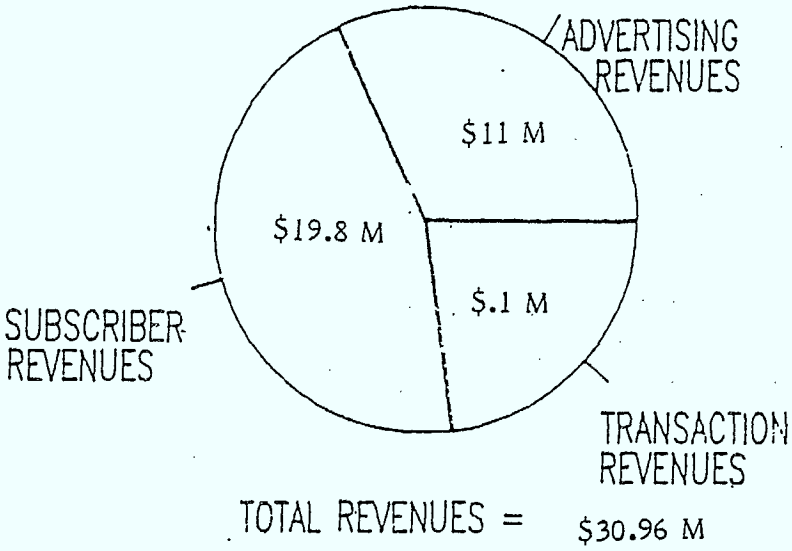
TOTAL REVENUES = $5.636M

EXHIBIT 8.10

Text and Graphics System

Operator Revenues

1989



TOTAL REVENUES = $30.96 M

In the projections of sales for host computer hardware in the videotex market, a continued use of mini and super-mini processors in clusters has been assumed. In systems with 10,000 to 25,000 potential users however, the use of several mini-computers is the basic approach of the projections. However, at the other end of the scale, that is, large systems with 100,000 or more potential users, any costs that are associated with a large cluster of super-minis is as large, or exceeds, the cost of main frame computer systems.

It is assumed that in the early market stages, service providers who offer their services through Gateways will utilize existing data processing centers.

Again it should be emphasized these figures pertain to text and graphics segment and not to the main frame text only segment.

It must also be noted that if we examine software revenues as a percentage of combined hardware and software, the software contribution declines from around 30% to 20% of the combined revenues over this period. Thus it is expected that videotex software houses will begin to feel pricing pressure from computer manufacturers who are attempting to capture the business of new large systems operators such as home banking and retailing.

8.3.5 Penetration Rates

The scaled down forecasts for the penetration rates for the North American market segment (across both the U.S. and Canada) involves a 1989 install base of less than nine systems. It is clear that what growth has occurred has been based on the tremendous growth in the market for home computers, which in the past few years has expanded in excess of 200 percent annually.

8.3.6 Subscriber and Transactional Revenues

In this part of the forecast, subscriber revenues means direct payments by users and excludes revenues which have been created by users indirectly through goods purchased. It is also assumed as the number of users increases, the cost per subscriber decreases. However, while the total base of users may increase, the revenues from this new installed base may increase at a considerably lower rate. Thus as monthly subscription costs billed by a system operator to a user decline, these decreased revenues might be filled by a tiered price service provider, who bills the user directly or through the system operator for services. For example some of E.F. Hutton's services on Viewtron add monthly services on top of the Viewtron charge. Thus any videotex user is offered a tiered service which is the same as tiered cable programs in the U.S. However it should be emphasized that this multi-tiered revenue stream is not included in calculations of projected user revenues which accrue to system operators. Rather it is simply assumed that monthly charges drop up to 75 percent for systems operators through the five year cycle. We recognize that according to this assumption, the total revenues flowing from subscribers may be underestimated. According to these assumptions, starting from $3.6 million in 1984 for the text and graphics segments, projected subscriber revenues grow to $19.8 million by 1989.

Again, such a forecast is based on assuming a significantly lower revenue per subscriber when compared to present levels.

In this section of the forecast we have examined the facility of videotex systems to provide marketers with a vehicle for the selling of goods and services. The approach to forecast revenues involved first a projection of the total volume of goods sold through systems. Such a projection was based on actual expenditures of field trials in the U.S. and Canada with the capability to capture orders and perform volume measures in terms of average user purchases through the system. It was also based on estimations of what types of future products would be merchandised in this way. Thus it was possible to estimate a revenue stream which could be realized by system operators in this type of business.

The second step involved assumptions about the percentage any system operator would realize from a sale made through such a system. Assumptions range from 3.5 percent to 6 percent, and it is realized that these figures may be too high. However as Link has noted (Link 0054, September 1983, page 35)[68]

> "As the demographics of the installed base start to move downward into segments with less disposable income, more children and more time for in-store shopping, the increase in the number of subscribers will result in a decrease in the average volume of goods purchased by each user. Therefore, the growth and revenues will not be directly indexed to the growth in the subscriber base."

8.4 Home Banking Projections

It is now clear that home banking services are capitalizing on the North American installed base of home computers. Based on existing and announced services, a home banking forecast until 1989 is presented in Exhibit 8.11. Estimates involve the number of distinct home banking systems and services which will be introduced in North America until 1989, total subscriber revenues likely to derive from such systems and total numbers of home banking subscribers. Again, given the lack of Canadian initiatives in home banking, and the regulatory problems involved, it is likely that most of these revenues will accrue in the U.S.

In these projections a home banking service is defined as one involving bill paying, funds transfer or account inquiry. Although we have reviewed the merging of banking and other financial institutions, in previous chapters, it is assumed that the banking rather than the stock broker/insurance elements will be the central one to attract customers.

The model assumes (based on our market situation analysis) that the average monthly charge for home banking services will be around $8, and accordingly it is thought by 1989 there will be in excess of 50 financial institutions such as banks, saving and loan companies, and financial management firms offering videotex based banking facilities, and in excess of ½ million subscribers.

To reinforce these figures the American banker[69] has estimated (Home Banking Highlights, July 1985 page 4) that videotex banking has increased 33 percent since January of this year with 50,000 users now utilizing computers or terminals to bank from homes or offices. The latest figures show in fact there are 27 banks or financial institutions in North America in full commercial operation running 28 video banking services. Twenty three depository institutions are running pilot tests, and 17 institutions are presently intending to enter into a videotex banking operation.

EXHIBIT 8.11*

Home Banking Model

Number of Systems

Users (000s)	1984	1985	1986	1987	1988	1989
1	8	13	18	25	29	35
5	0	4	5	9	14	21
10	1	0	1	3	6	10
25	1	1	2	3	4	8
50	0	0	0	0	1	2
100	0	0	0	0	0	0
Total Systems	10	18	26	40	54	66
Total Users (000s)	43	58	103	175	309	540
Subscriber Revs. ($K)	4,128	5,568	9,888	16,800	29,703	51,840

* Estimates refer to the first of each year.

8.5 Public Access Videotex

In this section the public access videotex market is severed into two parts -- multi-site systems requiring extensive networking and computer power and standalone systems involving a few terminals situated in, say, a single shopping mall or office lobby. These latter contain information directly related to the site location and, based on personal computers, cost only about $50,000 per system, while the former cost in excess of $10 million dollars for implementation. Again in this forecast it is assumed that both segments offer text and graphics videotex. Exhibit 8.12 presents a five year forecast for the public access videotex market and also contrasts terminal numbers in this market with the point of sales/interactive video disc market which is in competition with such systems. According to our model it is thought the growth rate of both types of systems will be rapid, although the number of terminals installed by 1989 will total just over 5,000. Although we have not been able to make revenue estimates here, it is clear that the important factor is first the number of accesses per system and how competently the system operators translate such accesses into advertising revenue from information provided. (Our industry survey was unsuccessful in obtaining valid estimates of advertising revenues from system operators). It has been estimated however that a 150 terminal multi-site system in an urban area of 2.5 million could attract 1.5 million accesses per week, while a standalone system with 2 terminals in a shopping mall should attract 100,000 accesses per week.

EXHIBIT 8.12

Text and Graphics Public Access

Videotex Systems and Interactive Videodisc

Point of Sale Systems

		1984	1985	1986	1987	1988	1989
Multisite	Systems	5	8	15	23	32	44
	Terminals	500	800	1,500	2,300	3,200	4,400
Standalone	Systems	20	60	120	195	300	450
	Terminals	60	180	360	585	900	1,350
Total	Systems	25	68	135	218	332	494
	Terminals	560	980	1,860	2,885	4,100	5,950

Interactive Videodisc

Point of Sale Systems

Multisite Terminals	50	200	1,000	4,000	15,000	24,000
Standalone Terminals	1,500	3,500	7,200	16,000	30,000	54,000
Total Terminals	1,550	3,700	8,200	20,000	45,000	78,000

Revenues for system operators could not be derived in this sector due to the lack of an estimate of the advertising revenue per access. However the sales of hardware and software can be estimated based on the average cost per system. Based on a cost of $50,000 per standalone system and $10 million for a multisite system the following revenues could be assumed:

EXHIBIT 8.13

System Sales Revenues

Year	Multisite 000's	Standalone 000's
1984	50,000	1,000
1985	80,000	3,000
1986	150,000	6,000
1987	230,000	9,750
1988	320,000	15,000
1989	440,000	22,500

Sales of multisite public access systems will reach almost a half billion dollars by 1989 in North America while standalone services will total just over twenty two million dollars in the same year.

These individual service forecasts may be compared with revenue forecasts for in-home services of all types (banking, transactions, information retrieval, etc.), deriving from in-home market forecasts of Chapter 7. Exhibit 8.13a assumes an average monthly subscriber revenue of $5. It will be noticed that there is a discrepancy between these revenue figures and those deriving from adding total revenues by year, for banking and retailing as derived from the individual models (Exhibit 8.24). This is because (1) the revenues of Exhibit 8.13a are extremely sensitive to pricing; (2) the models are based on varying assumptions; (3) many of the current ASCII subscribers receive a bundle of services for a single price.

Even so, both revenue streams converge to around $90 million in 1990 for transactional services.

EXHIBIT 8.13a

In-Home Revenues From Subscribers*

	1985	1986	1987	1988	1989
NAPLPS based ($ million)	2.5	2.8	3.9	4.8	6.2
ASCII based ($ million)	30.0	38.8	50.5	66.1	83.5

* Includes videotex based banking, retailing, information retrieval, etc.

8.6 Videotex Software Forecasts

Although videotex related technologies range from display and standalone technologies such as micro-computers for in-home shopping and banking, and photographic display technologies for linking video disc and laser disc technology together to transmission technologies, videotex is predominately a technological advance in software. In the following discussion, by videotex software we will refer to software for page creation, page display, data base creation and management, graphics development and text editing, etc.To understand these developments and the percentage of revenues that might be captured by the videotex component of this industry, the following sections describe some central software industrial and marketing trends in the Canadian software industries which are relevant to possible future economic impacts, changes in the industrial structure in the North American software industry, and software growth in terms of both revenues and employment. Explicit assumptions will then be made concerning the percentage of these revenue growths and employment changes that may be captured by the portion of Canada's industry involving software for videotex, teletext and related services.

8.6.1 Software Industrial and Marketing Trends

Although the computer services industry comprises a small share of total software produced in most countries (compared to in-house production and other sources), it is the most rapidly growing component of the software industry. Software houses are the main software supply source for small and medium sized firms in many countries. In several countries, and not merely in Canada, a typically sized software house will comprise less than 10 persons and will have a limited geographical market size.

Despite their limited size the cumulative effect of these companies on the economy is quite substantial. Exhibit 8.14 presents a five year forecast for Canada's information processing industry which culminates in a $15.77 billion market by 1988, with software accounting for $4.62 billion. The 1983 revenues increased 18.3% over 1982, with software revenues increasing at 29%.

In 1982 the US market for systems software comprised $2.6 billion, and was growing at approximately 30%-35% annually. It was expected to reach $11.7 billion by 1987. However, applications software, is expected to will grow by more than 40% annually and will comprise more than $18.8 billion by 1988, up from $2.5 billion in 1982.

EXHIBIT 8.14

Canadian Information Processing Industry Revenue Forecast to 1988

(C$ Million – Includes Exports)

	Actual			Forecast					
	1980	1981	1982	1983	1984	1985	1986	1987	1988
Hardware									
Sales, Lease, Rental	2,183	2,770	3,415	4,030	4,830	5,785	6,860	7,925	9,400
Maintenance	450	600	730	860	990	1,140	1,310	1,485	1,750
Total Hardware	2,633	3,370	4,145	4,890	5,820	6,925	8,170	9,410	11,150
Annual Growth (%)	25	28	23	18	19	19	18	15	18
Services									
Software									
Application Packages	62	95	154	220	310	410	560	725	1,010
Systems Packages	111	164	221	290	370	475	620	780	1,010
System Development	172	216	265	315	380	500	600	710	820
Total Software	345	475	640	825	1,060	1,385	1,780	2,215	2,840
Annual Growth (%)	50	38	35	29	28	31	29	24	28
Consulting, Education, Misc.	210	270	310	380	450	525	620	710	840
Annual Growth (%)	24	29	15	23	18	17	18	15	18
Processing Services	550	655	700	755	800	840	880	910	940
Annual Growth (%)	17	19	7	8	6	5	5	3	3
Total Services	1,105	1,400	1,650	1,960	2,310	2,750	3,280	3,835	4,620
Annual Growth	27	27	18	19	18	19	19	17	20
TOTAL REVENUES	3,738	4,770	5,795	6,850	8,130	9,675	11,450	13,245	15,770
ANNUAL GROWTH (%)	25	28	21	18	19	19	18	16	19

Source: Forecast by Evans Research Corporation based on (1) Statistics Canada figures for 1980 and 1981; (2) Evans [redacted]

8.6.3 Software Growth

As personal computers become increasingly a standardized off-the-shelf product like telephones and contain even more computing power, there is a continuous and severe shortage of software which can take advantage of these more powerful machines. As an indication of software growth, in 1981 North American software sales were less than $3 billion, but by the end of this year they were expected to be greater than $10 billion. Collectively in the US and Canada there are more than 6,000 software firms, and a number of analysts expect the software market to continue growing by 32% annually and to exceed $30 billion by 1988.

Although today software revenues are equal to approximately 25%-28% of all hardware sold, if the above figure is correct, by 1988 software annual sales will comprise half of the hardware business.

The fastest growing portion of the software industry over the next three years will occur in software for perscoms and for super perscoms (collapsed minis), and estimates for annual growth in these areas have ranged from 30%-50%.

8.6.4 Summary

A basic structural change in the software industry is the blending of differences between types of software suppliers. Hitherto, software firms could be meaning fully divided into those that write systems software and those that write applications programs. This distinction no longer holds, and firms which have written software for mainframes are now entering the perscom software market, and firms which have previously concentrated on perscom software have teamed up with mainframe software producers. This is a natural enough development, given the trend in linking perscoms into company's mainframes. (Visicorp, for example, has joined up with Informatics General Corp. to produce VisiAnswer, a software package which allows users of an IBM PC to exchange data with an IBM mainframe.)

Given the increased competition and industrial mergers, one short-term trend involves a reduction in prices of software. For example, Visicorp has recently decreased the price of its Vision package from $495 to $95. Unfortunately at the same time as software prices will be falling, the development and marketing costs for new software will be increasing. The important question which remains therefore is the effect of these developments on the Canadian videotex industry?

1. In spite of the fact that a number of micro and mini computer manufacturers are embedding videotex options in their products, the trend toward distributed processing opens up opportunities for videotex software producers. However, NAPLPS firmware by computer producers is developing very slowly.

2. The U.S. trend in consolidations between applications and systems houses as well as the trend of computer manufacturers to buy up software houses, mean that through complementary specialization in both systems and applications software, these expanded firms will be able to more directly and immediately exploit videotex software opportunities.

Since our revenue estimates for videotex/teletext software involve assumptions about the growth of the software industry, the following discussion reviews employment and growth of this industry.

In a 1985 study done by the Evans Research Corporation, the following empirical picture of the Canadian software industry emerged:

1. The Canadian domestic market for computer software was $464 million in 1981. Evans anticipates that this market will grow at an annual rate of 28%, reaching $2.7 billion by the end of the current decade. Applications software presently is the fastest growing market segment, but the 1980 and 1981 markets for applications

software were only $114 million and $161 million, respectively. Evans anticipates that the applications software market will be $1.25 billion by 1989, showing an annual average growth increase of 34% in the 1981 to 1990 period. Sales of custom software, on the other hand, which were $215 million in 1980 (47% of the total software market), will increase to only $1.4 billion by 1990, or 25% of the total software market.

2. In 1983 there were over 1,000 firms located in Canada supplying custom or applications software to the Canadian market. However, revenues from 516 of the largest software suppliers which were captured in this study accounted for 98% of this total market.

3. In 1981, 53 suppliers had software revenues which exceeded $1 million. Of these 53 suppliers, 28 were foreign owned, and the revenues of these 28 foreign owned companies comprised 54.3% of the total 1981 Canadian software market. The other twenty-five Canadian owned software suppliers created revenues which comprised 23% of the 1981 software market.

   Of these 53 key software suppliers, 24 were manufacturers of hardware. In 1981, the software revenues of these hardware manufacturers comprised $326.4 million, or 54% of the total Canadian software market.

4. More than 5,000 people are employed in 1985 in some phase of software development in Canada.

Of the total 1981 software revenues of $608.27 million, 66.5% ($404.3 million) resulted from sales by foreign owned firms. Twenty-five Canadian owned software firms amongst these 53 top suppliers had revenues amounting to $139.9 million in 1981 (23% of the 1981 total software market). In the second

category, the 463 software firms with revenues of less than $1 million, over 79% of these (366 firms) are Canadian owned and the majority of the remainder are US owned.

8.6.5 Software Employment

It is estimated that there are more than 5,000 persons employed in Canada's software industry, including persons directly involved in developing, maintaining or modifying software systems, but not including clerical, managerial, marketing and sales staff.

The top 53 software suppliers employed 2,566 people in software development (or 60.3% of the total number of employees involved in developing software in 1982).

The other 463 cottage type/small business software companies employ an average of three persons each in software development. The biggest employers of software development are Canadian service bureaus which employ a total of 886 persons (20.8% of the total number of employees in software development in 1982).

8.6.6 Market Size and Growth

Although Evans has found a 33% annual growth in the Canadian software market size from 1980 to 1981, this figure includes only sales of "unbundled" software and excludes "bundled" and special purpose software, such as that for telecommunications and video games.

Evans predicts that the software market share of the foreign hardware manufacturers will decrease from 56% in 1980 to 38% in 1990 because of increased competition from software houses, EDP consultant firms and the traditional tendency of the hardware manufacturers to concentrate more on systems software rather than applications. (However, as we have seen, many of the

hardware manufacturers are simply vertically integrating by buying out the independent software firms).

Canada's service bureaus comprised only 11% of the total 1980 software market and 10.5% of the 1981 market, but Evans predicts that this group's share of the market will increase to 16% by 1990 because the general decline of service bureaus will force them to become more involved in software production, and they already have the necessary development expertise and firm infrastructure to enter this field.

There will clearly be a constant growth in systems software such as network management/communications software, control software, installation management software, and data and terminal access systems.

In summary, the largest US software firms developing packages have sales in the range of approximately $100 million annually, but over 90% of US software firms in the package business have revenues of less than $3 million yearly. The Canadian software industry, in contrast, has only three firms in the range of $20-$40 million annual sales, and over 90% of the companies have sales below $5 million annually.

More recent market forecasts to 1990 for the Canadian software industry, by software type are presented in Exhibit 8.15.

EXHIBIT 8.15

Canadian Software Industry Forecast to 1989

($ Millions)

	1981	1982	1983	1984	1985	1986	1987	1988	1989
Applications Software Revenues ($)	95	173	260	370	510	660	825	1020	1250
Annual Growth (%)	--	82	50	42	38	29	25	24	23
Per Cent of Total Software Revenue (%)	20	29	34	38	42	44	44	45	46
Systems Software Revenues ($)	154	213	295	375	475	590	725	890	1050
Annual Growth (%)	--	38	38	27	27	24	23	23	18
Per Cent of Total Software Revenues (%)	33	35	38	39	39	39	39	39	39
Systems Development Software Revenues ($)	215	220	220	225	230	245	295	365	420
Annual Growth (%)	--	2	0	3	2	7	20	24	15
Per Cent of Total Software Revenues (%)	47	36	28	23	17	16	16	16	15

SOURCE: Evans Research Corportion

EXHIBIT 8.16

Videotex Applications Software Revenues (Canada)

	1984	1985	1986	1987	1988	1989
All Applications Software						
- $ Million Canadian	370	510	660	825	1,020	1,250
- % Growth	42	38	29	25	24	23
- Percent of Total Market	38	42	44	44	45	46
Videotex Related Software						
- $ Million Canadian	.30	.41	.53	.66	.82	1.0
- % Growth		38	29	25	24	23

EXHIBIT 8.17

Videotex Systems Software Revenues (Canada)
(1984-1989)

	1984	1985	1986	1987	1988	1989
All Systems Software						
- $ Million Canadian	375	475	570	725	890	1,050
- % Growth	27	27	24	23	23	18
- Percent of Total Market	39	39	39	39	39	39
Videotex Related Software						
- $ Million Canadian	.11	.14	.18	.22	.26	.32
- % Growth	27	27	24	23	23	18

EXHIBIT 8.18

Total Revenues of Videotex Related Software (Canada)

(1984-1989)

Year	Amount ($Million Canadian)
1984	.41
1985	.55
1986	.71
1987	.88
1988	1.08
1989	1.32

EXHIBIT 8.19

Employment Effects Canada

	1985	1986	1987	1988	1989	1990
Number of Videotex Related Software Employees	230	245	263	281	291	310

EXHIBIT 8.20

U.S. Software Industry Forecast to 1990

Software Type	1979	1980	1981	1982	1983	1984
SYSTEM SOFTWARE						
- $Millions	1,100.00	1,500.00	2,009.40	2,632.91	3,433.56	4,458.96
- %Growth		36.4	34.0	31.0	30.4	29.9
- Percentage of Total Market	23	25	27	29	31	33
APPLICATION SOFTWARE						
- $Millions	900.00	1,100.00	1,637.24	2,360.74	3,322.80	4,594.08
- %Growth		22.2	48.8	44.2	40.8	38.3
- Percentage of Total Market	19	18	22	26	30	34
SYSTEM DEVELOPMENT						
- $Million (1)	2,700.00	3,500.00	3,795.42	4,085.55	4,319.64	4,458.96
- %Growth		29.6	8.4	7.1	5.7	3.2
- Percentage of Total Market	57	57	51	45	39	33
TOTAL	4,700.00	6,100.00	7,442.00	9,079.00	11,076.00	13,512.00
% Growth		30	22	22	22	22

	1985	1986	1987	1988	1989	1990	Average Annual Growth 1979-199
SYSTEM SOFTWARE							
- $Millions	5,796.40	6,837.40	8,341.56	10,176.88	12,415.78	15,147.34	
- %Growth	29.4	18.5	21.9	22.0	22.0	22.0	27.0%
- Percentage of Total Market	35	34	34	34	34	34	
APPLICATION SOFTWARE							
- $Millions	5,769.40	7,038.50	8,832.24	11,074.84	13,876.46	17,374.89	
- %Growth	25.6	22.0	25.5	25.4	25.3	25.2	31.2%
- Percentage of Total Market	35	35	36	37	38	39	
SYSTEM DEVELOPMENT							
- $Million (1)	4,945.20	6,234.10	7,360.20	8,680.28	10,224.76	12,028.77	
- %Growth	10.9	26.1	18.1	17.9	17.8	17.6	14.8%
- Percentage of Total Market	30	31	30	29	28	27	
TOTAL	16,484.00	20,110.00	24,534.00	29,932.00	36,517.00	44,551.00	
% Growth	22.0	22.0	22.0	22	22	22	22.7%

Source: Extrapolated from data provided by Input and Hambrecht & Quist (does not include bundled software revenues).

(1) Includes consulting and educational services to upgrade or enhance clients electronic processing staffs as well as custom developed software.

8.6.7 Revenue and Employment Estimates of Videotex Related Software in Canada

In a Wescom survey of the Canadian software industry conducted during 1984/1985, it was found that among firms producing predominately applications software, on average .008% of total software revenues involved videotex related software, and that of firms producing predominately systems software, on average .003% of revenues were derived from videotex related software. By "videotex related" software we include interactive software written for the display, construction, transmission and receiving of data and information on videotex/teletext systems and related electronic media. Under these proportionate assumptions and also assuming that videotex related software grows at the same rate between 1985 and 1990 as the applications and systems sector of the industry, Exhibits 8.15 through 8.18 presents estimates of videotex related software revenues until 1990. Videotex related software arising from the applications portion of this industry (written mainly for personal computers) will rise from approximately $.41 million in 1985 to $1 million by 1989. Similarly for revenues involving videotex related software arising from the systems software portion of the Canadian industry, revenues rise from only $.14 million in 1985 to $.32 million in 1989. This means the cumulative Canadian revenues for this range of software products will still be less than $1 million by 1987 under the above assumptions. However, as we vary these assumptions, we shall see, possible Canadian revenues change drastically.

8.6.8 Employment Growth

Software is not a particularly labour intense industry, and in Wescom's survey of the Canadian software industry, it was found that less than 250 persons were directly involved in writing, maintaining and selling videotex related software. Assuming that software employment grows at approximately a quarter of the rate of revenue growth between 1985 and 1990 (Exhibit 8.19) it can be seen that by 1990 there will be only 187 new jobs created in videotex related software production. (In related studies, the assumption about the relation between

employment and revenue growth of software firms has been found to be accurate). If one assumes however that employment grows at half the rate of revenue growth, by 1990 there are still less than 200 new jobs created in this sector of the industry.

When we add in equivalent figures for the U.S., the situation with respect to videotex related software revenues improves. Exhibit 8.20 presents U.S. software industry forecasts to 1990. Making the same assumptions (that on average videotex related software will involve .003% and .008% of respective revenues derived from systems and applications producers), Exhibits 8.21 and 8.22 present forecasts for revenues in the U.S. for videotex related software. Revenues in this area deriving from systems houses will rise from around $1.7 million (U.S.) in 1985 to in excess of $4.5 million (U.S.) by 1990. Similar revenues deriving from the applications portion of U.S. industry will rise to $13.9 million U.S. by 1990.

Exhibt 8.23 presents the total North American market for videotex related software available to Canadian producers over the next half decade, including software revenues for interactive videotex/teletext (shopping, banking, public services, etc.) with these above assumptions. By 1989 this potential market will exceed $15 million U.S.

The model presented thus far however, is extremely sensitive to the portion of software revenues captured by software for videotex, teletext and related services such as interactive shopping and banking. Although it is difficult to accurately predict how this portion will vary, in view of the software trends delineated in this chapter, it is clear that over the next five years, it is growing.

EXHIBIT 8.21

Videotex Software Revenues Deriving From Applications Producers (U.S.) 1984–1990

	1984	1985	1986	1987	1988	1989	1990
All Applications Software							
- $ Million U.S.	4,594	5,769.4	7,038.5	8,832.2	11,074.8	13,876.5	17,374.89
- % Growth	38.3	25.6	22	25.5	25.4	25.3	25.2
- Percent of Total Market	34	35	35	36	37	38	39
Videotex Related Software							
- $ Million U.S.	3.7	4.6	5.6	7.0	8.9	11.1	13.9
- % Growth	-	25.6	22	25.5	25.4	25.3	25.2

EXHIBIT 8.22

Videotex Software Revenues Deriving From Systems Producers (U.S.) 1984–1990

	1984	1985	1986	1987	1988	1989	1990
All Systems Software							
- $ Million U.S.	4,458.96	5,796.4	6,837.4	8,341.6	10,176.9	12,415.8	15,147
- % Growth	29.9	29.4	18.5	21.9	22.0	22	22
- Percent of Total Market	33	35	34	34	34	34	34
Videotex Related Software							
- $ Million U.S.	1.3	1.7	2.1	2.5	3.1	3.7	4.5
- % Growth	-	29.4	18.5	21.9	22.0	22.0	22.0

EXHIBIT 8.23

Total Revenues of Videotex Related Software
U.S. Plus Canada, 1984-1989

Year	Amount ($ Million U.S.)
1985	6.6
1986	8.2
1987	10.2
1988	12.6
1989	15.7

8.7 Conclusion

It is, in conclusion, instructive to compare the results of the revenue models for retailing and banking videotex with those revenue forecasts for videotex software (Exhibit 8.24).

As stated, unless there are some rapid and drastic developments in Canada in videotex based banking and retailing, it is clear that almost all of these revenues will accrue to U.S. based concerns. The precise percentage of software revenues captured by Canadian producers depends, of course, on their ability to sell into the U.S. market.

EXHIBIT 8.24
Comparison of Revenues Between Models

	1984	1985	1986	1987	1988	1989
Total Revenues from videotex based banking and retailing ($ Million)	12.3	15.4	24.3	34.9	57.9	91.0
Total Revenues from videotex related software	5.4	6.6	8.2	10.2	12.6	15.7

The emphasis in this chapter has been placed on the market sectors which are most likely to dominate the videotex/teletext industry in North America over the next five to ten years. These have included text and graphics systems for public access services, home banking and transactions, and videotex software in general. It is clear from developments reviewed in this study that the main revenue streams that are likely to accrue to Canadian producers in the short term involve videotex software revenues, and that most of these sales will occur in the U.S. At the present moment, there are no plans in Canada for videotex based banking or retailing services in the private sector. Given the limited activities for videotex in Canada and the somewhat uncertain future of services it is not surprising there is only a very small revenue and employment potential.

The appraisal of market activities and our own forecasts indicate that the main thrust of videotex developments for the future will involve ASCII rather than NAPLPS services. These services will constitute the largest share of in-home services and a significant number of those in the business sector. We have assumed that ASCII services will be provided through general graphics and texts packages included in our software forecast.

The impact of videotex services on the telecommunications industry has not been formally assessed in this chapter. This is due to the very tenuous nature of the videotex market in North America and the fact that presently in Canada there are no services being operated over the telephone lines into consumers' homes. The one or two trials now being operated, INET and Grassroots, are the only ones currently in operation, but these are on a very small scale and their effect on the telecommunication industry cannot easily be gaged from the experiences to date.

In the U.S. several of the services now in operation utilize the telephone lines as the method of transmission but none of the operators were able to provide realistic appraisals of the impact of such services on the telecommunications industry. However, in general, it is often acknowledged that over the next five to ten years the transmission of data and related services will exceed voice services as the primary source of revenue for telecommunication suppliers.

The main competitor to the telecommunications carriers are the cable carriers. As illustrated in the previous chapter revenues from non-programming services such as information retrieval, transactions and downloading of software etc. are expected to exceed $200 million by the late 1980's. However, to date, very few services are operational, making even these industry forecasts quite tenuous.

One of the most important developments in the technology base of the telecommunications industry is the growing emphasis on fibre optics. This technology is expected to have a significant effect on the way new services evolve and the diversity of these services. As fibre cable becomes more widerspread, particularly in the consumer market, carriers will be interested in new and innovative ways of utilizing this increased capacity. It is expected therefore that in the next five to ten years new services will be developed to utilize the network. It is at that time, in-home utility services, in-home banking, and transaction services are likely to gain renewed importance. The extent to which videotex services per se will affect these developments seems limited at the present time, given the pessimistic forecasts which have emerged.

One major question still remains in Canada which will continue to inhibit the ability to assess the impact of videotex on the telephone companies. That is the type of regulatory stance which is taken and the nature of the services telephone companies are allowed to provide. Until that issue is resolved there is no firm basis to predict the effect of the carriage or content of videotex signals for the telecommunications industry.

Over the past few years teletext services have been considered as the most likely way of delivering NAPLPS based text and graphics to North American homes. This was particularly the case when the market for videotex services failed to develop as originally planned. As the telephone based services were curtailed and in-home videotex failed to materialize on a mass scale numerous forecasts and prognostications were made regarding the future of teletext. However in Canada the only large scale teletext service was undertaken by the

CBC and this has been curtailed due to severe budget cutbacks. In the U.S. market there are a number of planned teletext services but presently these are not being operated on a commercial basis. Networks such as NBC and CBS have announced trials of services and their intentions to operate commercial services but these have not progressed as planned.

There is therefore very limited information about North American teletext services. These seem to still offer the potential for being introduced on a larger scale but to date very limited activity seems to be actually under way.

CHAPTER IX - CONCLUSIONS

9.0 Introduction

This chapter presents the conclusions to our report and is divided into two parts. The first part provides an assessment of a set of broader issues related to the market developments for videotex while the second part is a summary of our suggestions stemming from this work. The more general conclusions focus on the context of infrastructure within which the videotex and teletext services will evolve. We consider here such things as the broader context of software strategies, fiscal policies, R & D support, regulation and standards, banking policy, cable television policy, copyright and export stimulation. The more specific recommendations consider the different applications for videotex and teletext and suggest which areas might be the most likely to develop in the next few years.

9.1 Fiscal Measures for Software

If one of the major videotex opportunities for Canada now involves software, it then makes sense to consider general industrial stimulation measures of our software industry.

In this context government procurement is usually called for, but government procurement for goods and services makes sense (as proven by both the Telidon and office automation field trials) only when there is a real user need. Otherwise, procurement may involve significant market distortions, the government purchasing of technologies and services which no one else would buy, and entire industries being dependent on a single client.

Another frequently mentioned factor is inadequacies in marketing expertise and strategic planning as barriers to the viability of our software industry. Our own interviews with software developers, as well as our review of the relevant

industrial literature, confirms the importance of marketing expertise in the videotex applications software market for transactional services. Therefore the DOC could provide enhanced market information in this area.

Also, given the emergence of economies of scale in the marketing of packaged software and the acknowledged scarcity of marketing expertise in Canada, there should be increased interest in merging, joint ventures and other forms of cooperative marketing of transactional software in the US. Although we do not normally see a role for the government to play in this regard, there may be a limited role for the Department of Communications in fostering such joint venturing.

Another factor that must be kept in mind is the significant intervention of other governments in their software markets, and the fact that the extensive involvement of these governments has already distorted "pure" markets for software, including Videotex-based transaction software.

In sum, a number of policy measures directly or indirectly affect transactional software development, including tax, fiscal and R&D treatment and support, export policy, marketing support, etc. Some of these areas are directly relevant to DOC and some are not; however, taking R&D tax support of software as a central illustrative issue, unless DOC, with its expertise in knowledge-intensive industries provides significant input into this basic question, the tax, fiscal and R&D support of software firms will be decided in large by other parts of the government, which may have limited knowledge of the problems of this industry. R&D in knowledge-intensive industries is significantly different from R&D in manufacturing, in a number of ways, and as one reads through the existing tax rules pertaining to software, one realizes that they were conceived from an industrial manufacturing perspective. These differences are brought out by the following examples; average marketing costs as a percentage of total cost to develop and bring a product or process to the market involve, on average, only 7.5% of total cost for traditional manufactures, while the marketing start-up costs of software products may involve one-third to one-half of this total cost.

Secondly, the manufacturing start-up phase to develop traditional industrial products, on average, involves about one-third of the total cost to bring the product to market, while the "manufacturing start-up costs" of software products are often small compared to other costs involved in software design, marketing and maintenance. We thus recommend that the Department of Communications provide input to the Department of Finance's current investigation of the R&D tax treatment of computer software. Problems which should be focused on involve the following:

1. The fact that the current R&D tax rules allow firms to deduct R&D expenses if and only if they are wholly attributable to "scientific" research, and that if a firm doesn't have a physically separate R&D operation used exclusively for R&D, it can't claim overhead portions of resources utilized. This latter ruling is economically adverse with respect to the software industry.

2. Another issue involves the fact that firms are allowed 100% capital cost write-offs for a two-year period for applications software acquired under licensing arrangements and a 20%-30% write-off for licenced systems software. (In the US and other countries, in contrast, software vendors have the option to defer any software purchases for five years, and in some instances to write-off entire amounts as a current expense.)

3. Another issue is whether or not software development costs should be written off as a current expense as occurred or capitalized as the cost of a depreciable asset.

4. Another issue involves which types or components of software production should be considered as research and development and given the appropriate R&D deductions? (For example, under recent Department of Finance rulings, the development costs of all applications software do not qualify as scientific research or development.)

A final area of intervention by DOC might involve examining the issue of the liberalization of depreciation schedules for capital equipment utilized by videotex producing software firms. Some of Canada's small software firms can not even afford their own minicomputer, for example.

9.2 R&D and Application Areas

This section describes areas in which further R&D could be beneficial. Since most of the viable transactional services offer Videotex products which are incorporated into personal computer networks, the area of priority R&D focuses on applications running on perscoms. Canadian companies engaged in this pursuit are small, specialized, and many cases ahead of US producers. Their products include a wide range of videotex functions, including page creation, decoding, database software, etc., available for the more prominent personal computers. Of special R&D interest are the efforts of a number of Canadian companies to pursue developments in hybrid videotex/videodisc combinations, since such systems could appeal to a number of markets in the US and Asia, (their main present use seems to be electronic shopping, tourism and training, i.e. public access).

Accordingly, software products (either embedded in chip boards or in the form of applications software) which would merit further R&D support involve the following:

1. Software for banking and transactional services.
2. Software for database creation and management over videotex.
3. Graphics display software.
4. Networking software for the provision of interactive services over a variety of media, including the telephone, satellite, fibre optics, and CATV.
5. Educational videotex, courseware and modules for computer aided learning.

6. Informal educational training software for the home and business markets.
7. Software for video disc/videotex combinations in fields such as public access, specialty applications and education.

9.3 Regulations/Standards

The way in which videotex is regulated, or not regulated, will have a profound impact on its development. Historically, the telecommunications sector in Canada has experienced a high degree of government control. Whether videotex is offered over telephone lines, cable-TV, or the airwaves, it will emerge as a new service delivered by extensively regulated industries. Discussion has been occurring for some years as to which facets of traditional regulation, if any, should be applied. At the same time, videotex is also a form of publishing -- a largely unregulated activity, steeped in a tradition of "freedom of the press". videotex is also a computer service, which is a relatively unregulated industry as well. Furthermore, with specific videotex applications, such as banking, different sets of regulatory concerns may come into play.

The major regulatory issues that stand out at present are access, the nature of competition, and the regulation of content. These issues fall under the responsibility of the Canadian Radio-Television and Telecommunications Commission (the CRTC, which regulates telecommunications industries) and the Department of Communications, while matters such as consumer protection and copyright are handled by the Department of Consumer and Corporate Affairs. In the prairie provinces, however, telephone companies are Crown corporations and are regulated on a provincial basis.

9.4 Banking: Market Entry and Consumer Protection

One of the characteristics of videotex is that new industries will be drawn into the informatics sector. "Transaction services" offered by banks and retailers

have emerged as the strong performers in the early videotex industry. Particularly in the U.S. banks have moved into the area of home banking services: Bank of America and Chemical Bank, for example, operate extensive home banking services.

A primary issue with banking services is market entry. In the U.S., industrial barriers have been removed to permit a variety of firms that are not traditionally "financial" to experiment with automated clearing houses, point of sales networks, etc., and to provide services such as chequing and debit cards. In Canada, the financial industry is dominated by five major banks who (in 1980) controlled over 90% of total bank assets. If entry into financial services is not liberalized by regulation, there will be limited competition in services offered. In the last few years, as a result of regulatory changes, deposit institutions have broadened their activities, but nonetheless Canadian financial institutions are among the most highly regulated businesses in the world.

From a consumer perspective, a wide variety of financial services and payment means are desirable. To improve consumer choice, deregulation should admit new players to traditional financial services.

A second major concern in home banking is consumer protection. Regulations must cover a number of important points including: adequate disclosure of the consumer's rights and obligations; privacy considerations; and procedures for error resolution. The Criminal Code must also be sharpened regarding computer crime: computer fraud in electronic banking may mushroom as services expand.

9.5 Regulatory Approaches to Videotex and Teletext

Far from being a lineal descendant of any of the industries reviewed above, videotex is a mosaic of services with the potential to be delivered over a variety of media. The decisions as to which regulatory frameworks, if any, should be inherited remain unmade and unclear. Sporadic attempts have been made to

grapple with relevant questions, but the CRTC has not yet had a major issues hearing.

At this point, the major questions to be resolved are structural matters: which functions the three major telecommunications industries (telephony, broadcasting, and Cable TV) will perform, how the separation of content and carriage will be applied and what the conditions of access will be.

It has been argued that if those parties who control transmission are allowed to create content, they may exclude competitors. However, if a stringent policy of content-carriage separation is applied to telephony and Cable TV, in a country like Canada with a limited number of information providers, valuable competitors will be excluded from a fledgling industry. The need for content-carriage separation is dependant on the number of carrying media available. Presently, videotex and teletext have at least three potential outlets: telephone lines, Cable TV, and off-air TV signals, each considered below. (Other delivery media are also possible, including radio signals or MDS -Multipoint Distribution Systems, not yet authorized in Canada).

Under these conditions of multiple media, regulation can become more flexible. The recommendations offered here consider access opportunities for information providers, while also creating the appropriate conditions for the major telecommunications industries to invest in videotex as well.

9.6 Broadcast Teletext

Since the vertical blanking interval (vbi) of television is a scarce resource, it has been suggested that broadcast teletext should be directly regulated in the public interest, as is the case for broadcast programming. Two approaches are possible: the existing broadcaster could use the vbi as part of its broadcasting license, or an unaffiliated party might be licensed by the CRTC to lease the vbi from the broadcaster. The capacity of narrowband teletext (the 200 pages of the vbi) is so

small that it can feasibly accommodate only one publisher. Out of practicality, it seems likely that the CRTC will allow broadcasters to control their entire licensed signal, including the vbi. The fact that teletext might frequently be used during TV commercials breaks is a further argument for broadcasters to program the vbi themselves.

A second policy issue is content regulation: whether the Television Broadcasting Regulations - including Canadian content requirements - should be applied to broadcast teletext, and whether the spirit of content rules could be effectively enforced.

Content rules were developed from continuous programming; their meaning becomes questionable when content is information accessed by the user at his or her discretion as with interactive videotex. There is also a risk that content rules could inhibit the development of teletext although this has only been developed to a limited extent in Canada at this time. Furthermore, rules might be circumvented in this media as they have been in others.

It is recommended here that the CRTC create a new non-regulated status for narrowband teletext, so that services are not subject to content rules (beyond editorial prohibition of obscene and abusive material). System operators should have the freedom to select content, to create pages, and to switch back and forth between free and pay services if desired.

9.7 Telephone Videotex

There are three main policy issues associated with telephone base videotex: whether carriers should be allowed to provide videotex content; whether rate of return regulation should be applied to telco videotex; and whether type of access should be provided by telephone companies to external videotex services. There are a number of broad policy options for access by IP's and system operators to a carrier's network:

- a common carriage model could be followed, completely separating content and carriage and requiring the carrier to provide access to all;

- a carrier could be permitted to operate videotex systems through an arms-length subsidiary. External information providers would be guaranteed access to the communications network, but not to the videotex system.

- carriers could themselves act as videotex systems operators, with the responsibility to provide access to all external information providers.

- a carrier could be permitted to operate a videotex system, and to exercise selective decisions about which services are included.

Videotex services in the US have recently been classified as "enhanced services" and are thus unregulated. The US Federal Communication Commission felt that a competitive market approach for new services such as videotex was preferable. However, critics have argued that:

- the monopolistic position of a telephone company could allow them to use monopoly revenues to subsidize enhanced systems;

- telephone companies could use their control of transmission lines to place restraints on their competitors;

- undue concentration will occur if a telephone company is allowed into the electronic publishing industry.

Although the Bell Telephone system informed Congress that it was not interested in the electronic publishing business, it is interested in putting its print services, such as the yellow pages, into videotex form. The newspaper industry has argued

that computerized yellow pages are essentially an advertising service and that AT&T can unfairly exclude competitors. In response to such arguments, a series of Senate Bills has attempted to limit AT&T's videotex services to weather, time and directories. Bill S.898 allows telcos to provide computer storage of videotex content supplied by other firms, but this must occur through an arms-length subsidiary, and the storage facility must provide open access to any information provider. Furthermore, AT&T is prohibited from editing information content. However, it seems there are no restrictions against AT&T providing interactive videotex services such as banking or mail.

It is recommended here that telephone companies be permitted to offer and originate videotex information, data and transactional services, using an arms-length relation and without rate regulation. At the same time, however, telcos should be required to provide equivalent access to their switched networks by external videotex systems operators and information providers. This approach would go further than US deregulatory measures, to give phone companies a measure of competitive incentives in this new area in order to stengthen the Canadian videotex industry. The telco's subsidiary firms should be responsible for any content offered, but information services should not be subject to any specific content regulations such as a specified amount of Canadian material.

9.8 Teletext and Videotex Delivered by Cable TV

Cable TV in Canada, as discussed earlier, has been given a "hybrid" status by regulators, with characteristics of both a programmer of content and a carrier. There are several alternative ways in which videotex/teletext could emerge on Cable TV: the cable operator could create content; the cable operator could assemble a package of services from external sources; or capacity could be leased to outside videotex systems operators.

At present, Cable TV systems in Canada have limited channel capacity and are capable of only one-way communication. In the future, however, systems will

upgrade to two-way capabilities with greater bandwidth, and a cable system will approach the conditions of "unlimited capacity" that characterize telephone, and that underlie the notion of common carriage in which anyone who wants to input to the system can be accommodated. In this case, a major regulatory question is whether Cable TV should be required to provide common carriage access to its network or not.

The recommendation here is that if further deregulation of Cable TV occurs, Cable companies should be allowed to provide information and transaction services without being required to provide access to their networks by other systems operators or information providers. This approach reflects the role of a cable operator as a retailer of a select package or services to subscribers, subject to regulatory monitoring. Cable operators would continue to require CRTC approval for channel usage, and in the case of teletext (where a service requires a full channel of bandwidth) a relatively small number of services could be carried. Problems of diversity (regarding either type of content or information source) could be dealt with as they arise.

The initial aim of policy should be to stimulate Canadian industry. At later times, if necessary, further regulatory provisions may be developed - to provide interconnect access, for example to outside videotex system operators if cable evolves into a two-way information utility medium.

Finally, given the nature of videotex/teletext content (where "information" and "advertising" easily blend and financial support from advertising may be significant), cable regulations must be amended to allow appropriate "advertising" forms.

In general, with all three delivery media considered here, a deregulatory stance is proposed. A softening in the traditional policy of separation of content and carriage will encourage vertical integration and the development of coalitions involving carriers, broadcasters, newspapers, cable companies and financial

sources. Access to the switched telephone network is guaranteed for small information providers, but the development of larger IP's, able to compete effectively with foreign products, is also essential. Diversity, meanwhile, is fostered by assured access to the public phone network, and attractive provisions for a number of industries to enter videotex/teletext services and provide distinct sources of information in a given community.

9.9 Broader Policy Issues

Copyright is an issue that cuts across all forms of videotex. Copyright in Canada is the legal recognition of the right of a creator to determine the use of a work, and to share in the benefits produced by that use. Copyright provisions were originally developed for printed works, and have been inadequately extended to electronic information in Canada to date; copyright for computer software remains a murky area. Certain changes in legislation have been proposed, but it is also possible that copyright problems will be dealt with through trials brought before the judicial courts.

The most volatile area of copyright infringements for computer software has been the piracy of software diskettes by consumers. At the corporate level, however, there have also been major cases where firms have accused competitors of selling copyrighted material.

One of the cornerstones of copyright is "originality" in expression and independance of effort. It may be extremely difficult to decide at which point computer program B is or is not a "copy" of computer program A. With applications such as videotex, where content is constantly updated and altered, copyright may be more complicated still.

At this point, in Canada computer programs in human-readible form are protected by copyright in the same ways as literary of scientific works, but protection has not been extended to machine-readible programs. The status of

programs in machine-readible forms varies greatly from country to country. The United States was the first industrialized country to mention computer programs in its copyright legislation; an Australian court, on the other hand, found that copyright does not exist in computer programs.

A recent White paper on copyright in Canada recommended that the definition of a computer program include both human-readible and machine-readible programs, and that a set of measures be developed to protect machine-readible programs. However, until either the courts or legislation clarify copyright, uncertainties remain a disincentive for content creators to invest in the extensive work needed to make software.

9.11 Export Markets

On a world wide scale the main export market opportunities (outside North America) for the Canadian videotex industry are in Japan and to a lesser extent Europe. It is recommended that efforts be directed to assist Canadian software producers in the provision of products specifically to Japan and other Asian countries. This assistance should be directed to defining market opportunities and in promoting Canadian goods in these markets. The most direct means of accomplishing this is through the commercial trade offices in selected countries. Given Japan's adoption of NAPLPS as almost a second standard in that country, Canadian producers are likely to have significant sales opportunities.

9.12 Export Stimulation

In a broader framework, assistance for the export of all computer software and hardware produced in Canada is desirable. Export incentives could be similar to those arranged in other countries where tax and fiscal measures are set up to encourage firms to seek out foreign markets. Such incentives could take the form of tax rebates on foreign sales or reduced taxation levels on exporters.

9.13 Software Development - Funding

Since many firms involved in software production are small, they also tend to be under capitalized. In Japan software firms have access to low interest loans and loan guarantees through the commercial banking system. The loans and guarantees are backed fully by the government. To encourage Canadian software firms to continue their efforts in software production funding sources must be secured. However direct government involvement in such ventures is not desirable given the high risk factor in product development. Therefore indirect measures such as loan guarantees would assist firms in securing the necessary funding (on qualification) through the commercial banking system.

9.14 Product Awareness Overseas

In our review of videotex and teletext developments abroad there emerged a generally low level of awareness about Canadian software or hardware products. It is recommended that more efforts be directed to fostering a greater awareness of Canadian products in selected foreign markets. Some of these markets include Japan, Korea, Singapore, Switzerland and Austria.

9.15 The U.S. Market

The U.S. market represents, to a large extent, the major opportunity for Canadian videotex software and hardware procedures.

A number of factors however contribute to making this a very difficult market to address. It is quite fragmented with only a few very large scale services in place. Therefore numerous small scale operations dominate this market and make it problematic for suppliers to identify the main service providers interested in particular software or hardware products. Another problem involves product distribution. In a large and complex market introducing the product is only one part of the process, distributing it is another. Canadian

suppliers must establish efficient channels of retailing their products in the U.S. market if volume sales are to occur. This may occur through alliances with established vendors or software houses or through some form of software clearing-house for Canadian products.

9.16 Fibre Optics and Videotex

The future development of telecommunications networks in Canada will be based largely on fibre optic cable. As these developments take place, particularly with local loop (in-home) connections, the interest in a variety of information services is likely to grow quite substantially. It is expected therefore, that with the growth of new fibre services renewed interest in videotex by the telephone companies will emerge. Whether these services are based on NAPLPS or ASCII is uncertain at the present time. However it is most likely that ASCII will predominate particularly where on-line banking and related transaction services are implemented.

The growth of fibre will provide the telephone companies with a greatly expanded capacity for carrying voice and data services. This capacity (supply) may be sufficient to allow the growth of large numbers of resellers i.e. service providers each addressing very specialized and targeted audiences. This increased supply of services will most likely contribute to lower priced and more diverse services than now currently exists. That development will expand the opportunities for videotex services to the home and business market and consequently enhance the opportunities for the software and hardware sectors of the industry. This however will be closely tied to a more liberal regulatory environment which encourages a diversity of suppliers and virtually open access to the telephone networks.

9.17 ASCII Vs NAPLPS Videotex

The main opportunity for the videotex market at the present time is in ASCII rather than NAPLPS services. Application software this protocol is widespread and for the most part adequately supplied through existing software houses. There seems to be very little need at the present time to undertake any specific actions to aid this industry sector other than those included as part of a broader software strategy.

9.18 Videotex Software

The market opportunities for standalone videotex terminals are extremely limited. However in North America, Europe and Japan the demand for decoder, encoder and database software is likely to grow over the next few years as advanced new videotex services emerge. This represents one of the prime export market opportunities for Canadian companies specializing in these products.

9.19 Banking and Transactional Videotex

Banking and related transactional services are expected to grow substantially in the next five to ten years. However, in Canada these services have not developed to any great extent and show no signs of doing so in the near future. In the U.S. however these services are proliferating and therefore provide market opportunities for Canadian software products.

9.20 Public Access Videotex

Public access videotex and related forms of electronic merchandising were revealed to offer substantial possibilities for growth in the future. Canadian companies already have experience in these areas and should therefore be encouraged to pursue domestic and export market opportunities in this sector. Particularly appealing opportunities exist in the Japanese and U.S. markets.

9.21 Content Development

Domestically the market for in-home videotex is not likely to grow to any great extent until there is widespread adoption of VLSI chips into the production of personal computers or television sets. Presently commercial services are not growing and despite optimistic statements by service provider they are not expected to expand in the next few years. Personal computers based videotex is possibility the one area of potential growth but this requires services to be developed which offer the appropriate content and applications. With the exception of education and specialized applications there has not been any market development of on-line content beyond the most basic services of entertainment guides, restaurant guides, news, weather and sports. Efforts to develop content should be pursued further and this should be viewed as a priority area to aid further market developments.

9.22 Social Uses and Benefits

Since education and special uses of videotex seem to be the most successful in Canada emphasis on the social benefits of videotex seems quite justified. The government efforts to assist videotex have continually been directed to the market and economic benefits deriving from investments in this technology. In the case of videotex it may very well be that the social benefits outweigh the economic benefits. Government should therefore consider these social benefits fully when assessing the impact of its role in promoting videotex services. In fact its role would probably best be served by promoting the social benefits of these technologies rather than simply seeking to identify the economic benefits.

FOOTNOTES

Chapter 2

1. Tyler, Michael: "Electronic Publishing: A Sketch of the European Experience, Institute for the Future; Menlo Park, California, 1979.

2. Bown, H.G., O'Brien and W. Sawchuck, "Telidon Technology Development in Canada," Department of Communications, Ottawa, undated manuscript.

3. Parkhill, D.F., "Developments on the Canadian Scene," Paper presented at Viewdata '81, International Conference and Exhibition, October 6-8, 1981, London, England, p.2.

4. Lum, Y.F., "Videotex Standards, A World Perspective," Videotex '83, Sao Paulo, Brazil, October 10-11, 1983.

5. Lum, op. cit., p.16.

6. CSP International, In Context Update, April 1984, Vol. 4, No. 6.

7. Speech to the New York Banking Associated, cited in Teleservices Report, November 1982.

8. Evans Research, personal communication.

9. Wills, R. et al Telidon Evaluation Vol. IV Doc., 1983.

10. Nordicity Group, "Non-Programming Services," Study for the Cable Telecommunications Research Institute, Ottawa, 1983.

11. Nordicity, 1983, p.17.

Chapter 3

12. CSP International, In Context Special Report, April 1984.

13. "Financial Information Services," International Resource Development Inc., 1983, p.3.

14. Kavenaugh, D., Bank of Montreal, Speech to Pacific Automated Office Show, November 28, 1984.

15. Philip Maner, "Videotex Aids GE Marketers", Business Marketing, September 1984, p. 12.

16. George Leepold, "Corporate Videotex Systems Will Pave Way For Consumer Versions Maintains Expert", Electronics Week, July 23, 1984, p. 58.

17. Martin Lane, "Public Access Videotex", Videotex Canada, Spring 1984, p. 18.

18. Chang, K., "Videotex, Through Microcomputers with a Review of Current Developments in Canada," Ottawa, Department of Communications, April 1984.

19. "Home Banking Forges Ahead", The Banker, May 1984, p. 100-101.

20. Wesley R. Iversen, "Simple, Low-Cost Videotex Terminal May Burst Through Home-Use Barrier", Electronics Week, August 13, 1984, p. 16.

21. "Banking Goes Home", Fortune, December 10, 1984, p. 149.

22. Forbes, C., "Applications and Implications for Transactional Services," Videotex '84, Chicago, April 1984.

23. Katherine Joyce, "Why Electronic Shopping's Future is Moving Closer Toward Being on Line", Stores, September 1984, p. 62.

24. Joyce, p. 66.

25. Yankee Group Report, Video Interactive Merchandising, November 1983

26. CBC Research, The Potential Impact of Broadcast Teletext in Canada, November 1984.

27. Nordicity Report, Economic and Marketing Division, Department of Communications, Suppliers of Equipment and Services to the Canadian Television Industry, October 1983.

28. Norpak 1985, Teletext Services (NTS) Report 1, The Applications, Their Analysis and Derived Technical Requirements. Department of Communications, Ottawa, 1985.

Chapter 4

29. Link Report, Interactive Videotex Forecast 1984-1989, Second Edition, September 1984.

30. La Revue du Minitel Avril/Mai 1985, Paris France.

31. Link Report, World Wide Videotex Evaluation, System and Services, July 1983, New York.

32. Business Week, "For Videotex, the big time is still a long way off", January 14, 1985.

33. Wescom, Interview Prestel Service Office, February 1985.

34. Bruce M., Changing the Social Impacts of Videotex: New Designs and Markets in 2. Schweizerischer Videotex-Kongress in Basel, September 1984.

35. Witcher B., 1982 Videotex in the U.K. in Trends in Information Transfer (ed) Hills P.

36. Wescom, Interviews Prestel Service Office, February 1985.

37. Commiot Dominique "Le Plus Grand Reseau Informatique", in La Revue du Minitel Avril/Mai, 1985, p. 8.

38. Wescom, Interviews with CAPTAIN service managers, Tokyo, January 1985.

39. Wescom, Interviews with CAPTAIN service managers, Tokyo, January 1985.

40. Wescom, Interviews with NTT service manager, Tokyo, January 1985.

Chapter 5

41. John Laman, "Keeping the Lid on Atlanta's Box", Euromery, June 1984, p. 51.

42. "Simple Low Cost Videotex Terminal May Burst Through Home Use, Electronics Week, August 1984.

43. Touchton, C.F. "Applications and Implications for Transactional Services", Videotex 1984 Chicago, April 1984.

44. Simons, D. "Selling Videotex - Part III", Videotex 1984, Chicago, April 1984.

45. Chang, K. "Videotex Through Microcomputers", Department of Communications, Government of Canada, April 1984.

46. Link, "Optical Disk Strategies for Electronic Publishing", October 1984.

Chapter 6

47. Lane, p. 1.

48. Rodger Hough, "A Study to Forecast the Demand for Telidon Services over the next Ten Years", December 1980, Department of Communications.

49. Hickling and Johnston "Field Marketing Trial Strategy for Telidon", February 1979, Department of Communications.

50. Tyler, M., "Market Projects for Personal Computers and Electronic Publishing", in Context, Report Six, London, December 1980.

51. Link, "Worldwide Videotex Evaluation: Systems and Services", July 1983.

52. Wescom, Industry Interviews.

Chapter 7

53. Link, Personal Computer Markets 1984, August 1984.

54. CSP, "Electronic Financial Services in the Home", Profit Opportunity Series, 1983.

55. Link, p.27

56. North American Banker, American Banker Inc., New York, 1985.

57. Martin Lane, Public Access Videotex, The U.S. Scene in Videotex Canada, Spring 1984, p.17-21.

58. Frost and Sullivan Report, "In Store/Public Access Videotex Market in the U.S.", 1984.

59. The Yankee Group, "Home of the Future Planning Service", Videotex Interactive Merchandising, Report No. 83-4, November 1983.

60. Seelinger W., "The Outlook for Corporate Videotex" Videotex 84, proceedings 1984, p. 155.

61. Dugan Brian T., "Defining the Corporate Videotex Market" in Videotex 84 proceedings.

62. Kearsley, Greg et al "Electronic Education" paper in preparation, 1982.

63. Plowright, T., "Computer Learning, the Policy Imbrodio", Regional Industrial Expansion, July 1983.

64. Catalogue Consortel, January 1985, Second Issue.

65. UNESCO, TV Ontario, Communications and Information Technologies in Canadian Elementary and Secondary Schools, January 1984.

66. UNESCO, "New Technologies in Canadian Education", Education Videodisc in Canada, Paper No. 13, January 1984.

Chapter 8

67. Wescom, based on 75-100 industry interviews as part of this study.

68. Link, "Worldwide Videotex Evaluation: Systems and Services", No. 0054, pg. 35, 1983.

69. "Home Banking Highlights", American Banker, July 1985 page 4.

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