Alternative Market Structure for Videotex Service in Canada: The Public Policy Implications

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by

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Supply and Services 05SU.36100-1-0260

March 31, 1982

Preface

This study was carried out under a University Research Grant from the Department of Communications, Government of Canada. The author wishes to express his thanks to DOC and, in particular, to Ms. T. Plowright, who helped formulate the initial design of the project, prior to her departure from DOC, and to Ms. D. Wells and Mr. John Foote, who served as the scientific authorities for the project.

Several persons gave freely of their time and expertise: Mr. David Carlisle of Infomart; Ms. Maria Cioni of OECA; Ms. Gwen Edwards and Mr. Jim Schram of Bell Canada; Professor David Godfrey of the University of Victoria; Mr. Eric Lin of B.C. Tel.; Mr. Fred Mercer of Teleglobe; Mr. Stuart Robertson of VISPAC; and Mr. Kevin Shea of Rogers Cablesystems. The author expresses his sincere thanks to all of these individuals, as well as the many others who responded by mail to a request for information on their organization's videotex involvement.

Finally the author wishes to express his thanks to Dr. Lars Osberg, Dalhousie University, for his help and encouragement in reviewing drafts of the report; Mr. Tim O'Neill who served as research assistant for the project; and Mary Mandrusiak and Chris Gall who served as typists.

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> Out of this widespread availability of information power there will flow social changes and opportunities for human development that promise to make the next few decades among the most critical mankind has ever faced.
>
> - OECD Informatics Studies[1]

> If there is to be real social impact from TELIDON, it will first reveal itself in the marketplace; predictions and warnings made without careful attention to marketplace realities are likely to be invalid.
>
> - D. Godfrey and E. Chang[2]

Videotex is a computer/communications system for mass audience distribution of textual and graphic material by electronic means. Extensive field trials of videotex systems, especially Telidon, are currently underway or have been scheduled in almost every province in Canada. A number of actual or prospective information providers (IP's) can already be identified and individuals or organizations offering broker services, page creation services, equipment manufacture/supply, have already emerged in the marketplace. On the supply side at least, the market is thus developing quite rapidly.

On the demand side, the future of the market is more

uncertain. There is no way to predict, at this point, whether videotex consumers, i.e., users, will appear in sufficient numbers to make commercial videotex a reality in the immediate future.

Not only is there some uncertainty as to the extent of probable demand for videotex, there are also a number of other major issues of public policy which videotex technology presents.

One observer has declared that "Telidon has the makings of the greatest threat to Canadian identity since the first U.S. television stations began to broadcast over our border".[3] The concern here is the possibility of U.S. content and control of videotex service in Canada.

Another observer has made the statement that

> [Videotex is] the social equivalent of an atomic bomb with the potential to blow society, as we know it, wide open, and few people seem to be worrying about what to do with the fallout. This new technology could wipe away whatever scraps of individual privacy remain to us, and that's the least of our worries. It also contains the capacity to fine-tune public mind manipulation in a way that makes George Orwell's "1984" scenario look bush league by comparison.[4]

Issues such as these, foreign control, foreign content, confidentiality and audience manipulation, are important ones and are representative of what might be called the potential "dark side" of videotex. There is of course also a "bright side", potential benefits such as the possibility of a major new industry for Canada; a potentially important

export industry; tremendous gains, in efficiency terms, in carrying out a variety of transactions; instant information for all citizens on almost any topic imaginable; greatly improved access to services for people in remote areas; and so on.

This dichotomy in the potential impact of videotex or equivalent computer-communications systems has been well summed up by Parkhill:

> Even with suitable safeguards however, we will still be faced with the supreme challenge of ensuring the aggressive and imaginative exploitation of our new computer and communications resources for the benefit of all mankind. This is no mean challenge, for it offers nothing less than the opportunity to leap frog decades of normal development and move on a worldwide basis into the post-industrial society. In this new society, the universal availability of "information power" could magnify by orders of magnitude the economic and intellectual capabilities of all of us and lift the entire world in a quantum jump to an unprecedented level of achievement. The wrong policy decisions could easily destroy this glittering promise and make the Electronic Highway Networks no more than computer/communications equivalents of today's commercial TV networks or, more ominously, dangerous instruments of repression.[5]

Solutions to the potential problems posed by videotex and/or our ability to realize the potential benefits of videotex will be very much a function of how videotex markets are structured, how participants conduct themselves, how the service performs, and how the service is financed. These are the specific issues with which this report will be

concerned. They are important not only in their own right but as primary influences to a set of larger social issues involving videotex, such as those reffered to above. To quote Parkhill once again,

> The necessary structure, then, is the one which would make the potentially revolutionary benefits of computer power available to everyone and at the same time provide effective safeguards against the misuse of that power.[6]

As a general proposition, every aspect of the conduct, structure, and performance of the videotex market may have important implications for Canada's ability to realize the potential benefits of this new technology in an efficient and equitable way. Moreover, if the market is allowed to evolve too far on its own, before there has been adequate consideration of the issues posed by market structure, we may find that the structure which emerges is not the optimal one in social benefit terms. As Ouimet has noted,

> Unfortunately the technology will not wait for us to finish these tasks at our own speed. That is why we should tackle them here and now.[7]

To this might be added the following comment made by the Clyne Commission:

> In approaching telecommunications we should realize that its importance demands we view it in a special way. Telecommunications, as the foundation of the future society, cannot always be left to the vagaries of the market; principles that we might care to assert in other fields, such as totally free competition, may not be applicable in this crucial sphere.

> We must look at it freshly, without preconceived ideas.[8]

Definition of Videotex

In quite simple terms, videotex may be defined as "the widespread dissemination of textual and graphic information by electronic means [where] the recipient can selectively control the display of information on terminals (often suitably equipped television receivers)".[9]

This definition highlights several important attributes of videotex:

1. videotex, through the electronic provision of information, involves the combined use of computer and telecommunications technology;
2. videotex, because it involves electronic "dissemination" of information, involves a source of information remote from the user;
3. the emphasis on "widespread" dissemination implies that a key attribute of the service is its availability to a mass audience, though closed networks of specialized users are by no means ruled out. This mass audience characteristic is a major factor distinguishing videotex from other teleprocessing services, most of which are aimed at relatively specialized users, and most of which are prohibitively costly to private, individual

subscribers.

4. videotex involves active participation on the part of users of the system. Users of videotex selectively control the information which they receive. One-way videotex systems, commonly referred to as teletext, simply allow the user to "grab" the frame, or page of information, in which they are interested, from a continuous broadcast of text. Two-way videotex systems involve a higher degree of interactivity which involves a more structured, precise selection of information to be consumed. The interactive nature of videotex is a major distinguishing characteristic of videotex from the conventional broadcast media of television and radio.

   If there is a weakness in the above definition, it is that insufficient weight is given to this interactive characteristic. The definition could mistakenly create the impression that the only active role of the user is in the selection of information. The possibilities, however, can go well beyond this, as is made more clear below.

5. the use of a television set (suitably modified or supplemented) to display the information tells us that videotex can be made available in the home, office, or any of a number of other locations. This re-enforces the mass audience characteristic noted in 3. above.

It is an important characteristic of the technology that the user will have considerable freedom in selecting the "site" or environment in which to use the system and that access to a videotex system is multi-point, subject to the availability of appropriate terminal equipment.

6. the possibility and quality of graphic display, which also includes the use of colour, distinguishes videotex terminals from most normal computer terminals. Animation possibilities are still relatively limited but further development of the technology may eliminate this constraint.

All of these characteristics are of major importance both individually and, more significantly, collectively. As Tydeman notes:

> Computing and communications technologies are coming together to produce a new hybrid technology called teletext and videotex. Its distinctive feature is not the individual technical elements but the assembly of a total system comprising information banks, an editorial and indexing structure, computer and communications hardware and software, marketing management, and billing organizations... In one sense there is nothing new about teletext or videotex. Elements of both have been around for years. However, it is only recently that these elements (e.g. time-sharing networks, computers, television, telephone) have advanced to the point where mass information dissemination has become feasible.[10]

Videotex, it is thus important to realize, is not just defined in terms of a set of technical components; it is

defined in system terms, of which the technical components are but one part.

"Telidon" is the name of a particular technical version of videotex which has been developed in Canada. It has already gained considerable market acceptance in a number of other countries and is the technology being employed in most of the videotex trials presently taking place in Canada. While Telidon offers certain technical advantages over other videotex systems, most notably in graphics capability, it is not however the only videotex technology available. While the reader may wish to equate "Telidon" and "videotex service in Canada", it is nonetheless important to note that the discussion of videotex service in this report is not restricted to Telidon technology. It might also be added that the use of Telidon, as a graphics protocol, is not limited to videotex.

Videotex, at the present time, is seen primarily as an information-retrieval system. Users can employ videotex to receive information on weather, news, government services, stock market reports, product tests, directory services, etc. Any information which can be put in a textual or graphic form capable of being stored in a computer in a form consistent with the technical capabilities of videotex can be offered on videotex service. In addition, however, videotex has the technical capability to also provide two other general classes of service: "transactions service" and

"electronic mail".

"Transactions services" include such items as electronic banking, electronic shopping or teleshopping, and electronic bill paying. They are distinguished from simple "information retrieval" as just described by the "creation" of information by the user in the form of the "instructions" delivered through videotex regarding the completion of the transaction.

"Electronic mail" involves the direct contract between two or more parties through the videotex system. Possible example of this type of videotex service include electronic delivery of letters, "textual conversations", and opinion polling or surveys of other kinds. To be possible, the "electronic mail" option requires a switching capacity in the videotex distribution network and computer software which allows the use of a keyboard as distinct from "information-retrieval services" where users initiate all contacts with the system and need only a keypad to make use of the service. Like "transactions services", "electronic mail" involves the creation of information by the user.

A fourth class of service, personal information-processing, is also possible with videotex if the system is designed to provide individuals access to computing and storage and retrieval capability. Like "electronic mail", keyboard capability would also be required for this option. Possible applications of this

service range from the maintenance of personal records to the running of relatively complex computer programs.[11]

A Functional Classification of Market Participants

Given the definition of videotex service just presented, the "videotex market" would be defined as the buying and selling of videotex services. As such, the videotex market would encompass all aspects of the production and sale of videotex service (including the distribution network) and the purchase and consumption of videotex service.

Within this general definition, six categories of market participants may be identified according to a functional classification:

1. Information providers (IP's): any person or organization involved in providing pages of information to videotex.

   This definition does not presume that IP's technically undertake their own page creation, although this is possible. The primary emphasis of the definition is on those providing the information which goes on a videotex page. In certain cases, there may be two levels of IP's. For example, in the case of a directory, the IP would be the directory publisher, i.e. the person or organization which

publishes the directory for videotex. At the same time, part of the information content is being provided by the persons or organizations listed in the directory. The latter could then be defined as sub-IP's. In general terms, the definition of an IP must emphasize both the provision of information and the act of making that information available to videotex.

2. Videotex brokers: any person or organization which plays the role of market middleman between IP's and videotex service providers (defined below).

In other words, the broker facilitates getting the information base of individual IP's to market. In the broadest interpretation of this definition, a broker may provide such services as page creation, data base design, data base indexing, data base management, computer services, and financial accounting services as well as the more conventional broker-type services of buying and selling information or bringing buyers and sellers together.

When a broker directly provides computer services, it may be regarded as an umbrella IP, i.e. a provider of a single, broad data base which is, however, constituted from the contributions of several (or at least more than one) independent IP's, as previously defined.

3. Storage providers: any person or organization which provides computer facilities which are used to store a videotex data base(s).

   While storage providers are unlikely to have an identity which is not represented in the IP, broker, or service provider categories, the issue of which other category's participants must provide storage or have that right, has some important implications for market structure.

4. Service providers: any person or organization which "sells", i.e., makes available, videotex service directly to users.

   Somewhat akin to the storage provider case, the identity of service providers may be the same as participants in one of the other market categories identified here. A key requirement to be a service provider is that some type of computer facility, directly accessible by users, must be provided and used either to store and directly provide videotex pages and/or to act as a "gateway computer", i.e., to provide transparent links with third party computers, which may be owned by IP's, brokers, or independent storage providers.

5. Distribution providers: any person or organization which provides the physical distribution network used to carry videotex service from the service provider to

the user and/or from third party computers to service providers.

The two primary candidates to provide distribution for two-way videotex in Canada are the telephone common carriers and the cable television companies. Satellite technology, including the rapidly evolving technology of earth-stations, represents a possible third type of carriage option for the future. Teletext will be distributed either by conventional broadcasters, cable companies, or both.

In principle, there is nothing to preclude distribution providers from also being participants in one or all of the preceding four categories. The relative merits of such vertical market integration is a major question to be discussed in other sections of this report.

6. Users: any person or organization which "consumes" or makes use of videotex service. It is important to bear in mind that users may be either private consumers, i.e., individual "home" users, or business users.

As already indicated in several of the above definitions, the identities of participants in each of the above groups are not necessarily mutually exclusive even though, on a functional basis, the roles described for each

category are. A major focus of the balance of this report will be concerned with examining the different degrees of overlap which are possible between these functional categories and the relative desirability of each of these alternatives. As well, we will be concerned with examining the question of market structure within each category. This, as will become obvious, may be highly dependent on how one answers the former question regarding degree of overlap.

The issues of financing and pricing in turn will have implications for, and be affected by, the decisions made regarding both intra- and inter-category structure.

The Theory of Property Rights

In general terms, the question of videotex market structure is the question of "who has the right to do what under which circumstances in the production and consumption of videotex service?". In other words, the market structure question is essentially a question of property rights.

Property rights involve the specification of "the proper relationships among people with respect to the use of things, and the penalties for violation of those proper relationships."[12] Property rights, so defined, do not refer to the relationship between people and things; rather they refer to relationships among people. Put in different words, property rights may be defined as

> the set of economic and social relations defining the position of each individual with respect to the utilization of scarce resources.[13]

For the videotex market the property rights issue is central. To be more specific, the following questions necessarily influence the assignment of property rights (and vice versa) in the videotex market.

1. Who has the right to provide information to videotex systems, and under what conditions?
2. Who has the right to sell videotex service to users, and under what conditions?
3. Do the carriers of videotex service have the right to restrict the use of the carriage network by videotex users and/or suppliers?
4. Do the providers of videotex service have the right to refuse to allow third party data bases to be accessed through their system?
5. Do users of videotex have the right to prohibit service suppliers from divulging or making use of information gained from users' videotex consumption patterns?
6. Do users have the right to receive videotex service without advertising messages included or the right to delete advertising messages, if included?
7. Do carriers or service providers have the right to restrict the equipment which can be connected to the

videotex network?

8. In the case of teletext service broadcast over the vertical blanking interval, who owns the vertical blanking interval, the broadcaster who holds the licence for that channel or the cable operator who re-transmits the broadcast?
9. Should the number of videotex carriers or service providers be limited through licensing procedures?
10. Is a service provider liable for the quality of the information available from his videotex service?

The list could go on but the above is illustrative of how the more important questions surrounding videotex service are fundamentally questions of property rights. By putting the questions relating to videotex market structure in terms of property rights, certain principles of property rights theory can be used to recognize and/or analyze the implications of alternative videotex market structures.

To begin, we will set down certain principles of the theory of property rights.

First, ownership, which is the legal assignment of the right to use, subject to various possible restrictions, is an essential precondition for trade.[14]

Second, it is essential that the restrictions that apply to ownership, the rights of non-owners and the "rights that accompany ownership" be specified in detail, in order for the system of property rights to work effectively.[15]

Third, "if trade is to be effective in allocating resources and in resolving conflicts, rights must be transferable"[16], i.e., it must be possible to buy and sell property rights.

Fourth, "complete transferability of rights requires that the different types of rights associated with ownership of a particular thing should be transferable independently of one another".[17]

Fifth, "to be effective, a system of rights must be enforceable, and effectively enforced."[18] Furthermore, the penalties for violation of rights should be specified and should be greater (in their expected value) than the possible gains from violation.[19]

Sixth, non-attenuated property rights imply the unrestricted right of the owner to "change the form, place or substance of an asset" (the asset being defined by the property rights as specified) and to "transfer all rights to an asset to others at a mutually agreed upon price".[20] In other words, non-attenuated property rights imply exclusive ownership and unrestricted trade.[21]

Seventh, "any specification of non-attenuated property rights may lead to efficiency"[22] in resource allocation.

Eighth, "the establishment of a completely non-attenuated set of property rights,...[essential for efficient resource allocation may be] itself at variance with the moral and ethical value system of any society".[23]

Ninth, "the attenuation of private (or state) property rights in an asset, through the imposition of restrictive measures, affects the owner's expectations about the uses to which he can put the asset, the value of the asset to the owner and to others, and, consequently, the terms of trade."[24]

Tenth, "the value of any good exchanged depends, ceteris paribus, on the bundle of property rights that is conveyed in the transaction".[25]

These selected principles of the theory of property rights indicate that the property rights specification for videotex will be crucial to the way in which the market develops; that economic efficiency alone cannot be used as a criteria for assessing alternative market structures independent of a knowledge or consideration of the property rights specification which accompanies each structure; and that societal values may dictate or assign a higher value to non-efficiency objectives, in which case some attenuation of property rights may be optimal from society's point of view.

The Specification of Property Rights for Videotex Service

As an initial premise, assume that we wish to specify a non-attenuated set of property rights for videotex service. Such a specification might be as follows:

1. IP's have exclusive ownership of their own data base, i.e., their own content.

2. Videotex brokers have exclusive ownership of their own broker services.
3. Storage providers have exclusive ownership of thier own storage facilities and services.
4. Service providers have exclusive ownership of their own computing and marketing services.
5. Carriers have exclusive ownership of their own physical (transmission/switching) network.
6. Users have exclusive ownership of their user profiles (including their name), however these are compiled, i.e., whether they are compiled by the user directly or by the service provider, indirectly, through a record of a user's videotex transactions/use.
7. Service providers offering the videotex data bases of independent IP's for sale, directly or indirectly, to the general public are to be classified as <u>common service providers</u>. Common service providers are unable to refuse access to their service by either IP's or users as long as the price of access is mutually agreeable to all parties; they cannot price discriminate between different users or IP's except when such discrimination is due to cost differences[26]; they do not have exclusive right to store the data base of IP's listed on their service, i.e., they have to permit the connection of third-party computers or IP's own computers as long as a mutually agreeable

price for such connection can be determined and as long as all of the equipment in question is compatible, technically, with the service provider's; and they cannot, themselves, act as IP's to their own service, i.e., they cannot own any content listed on their own service other than the index or directory listing for their service; conversely IP's wishing to offer their own information directly to the public could not also be a common service provider offering the content of other IP's.

8. carriers offering to transmit videotex service to the general public arelto be classified as common carriers. Common carriers may not refuse access to their carriage network within its technical capacity by either common service providers, IP's, storage providers, brokers, or users, as long as there is a mutually agreeable price for access use determined; they cannot price discriminate between different users, service providers, etc., except where there are differences in the cost of allowing use of the network by different users, etc.[27]; and they cannot act as an IP to a service they are carrying or act as a common service provider if they carry that service themselves, except in the provision of gateway networks. In the latter case, however, the carrier can provide no content outside of a master index,

user-created user profiles and billing services.

9. users of videotex service acquire only the right to consume or make personal use of the information content of the data base. Any reproduction or resale of the data base is subject to the authorization of the IP who owns the content in question or the service provider who owns the distribution rights, if these are transferred exclusively to the service provider by the IP. In other words, users have the right to use the service of a service provider (at a mutually agreeable price) and the content of an IP's data base (at a mutually agreeable price) and to gain benefits from such use but they do not have the right to alter the content or the service or to resell them. The same principle applies to the rights of users with respect to the carriage network.

Users, through their exclusive ownership of their user profile, have the right to refuse to allow any other party to have access to that information, either directly or indirectly[28], either at all or without appropriate compensation. They also have the right to inspect their profile at any time and to require a periodic purging of information which is no longer required by the service provider for any authorized purpose or for the efficient operation of his own service.

This specification produces a non-attenuated set of property rights. Thus, it is consistent with the goal of economic efficiency. By creating the possibility of exclusive ownership rights for each segment of the market, the potential for unrestricted transferability is maximized. By creating the classifications of "common service provider" and "common carrier", as these have been defined, the possibility for service providers or carriers to attenuate the rights of other market participants is reduced.

It is important to bear in mind that there are other property rights specifications which might have been made that, given the specification, is equally consistent with the goal of efficiency. This particular set of rights has been selected because, as subsequent analysis will demonstrate, it not only produces a non-attenuated specification, but, simultaneously helps to achieve a number of potentially desirable non-economic objectives of videotex service.

It must be remembered that efficiency goals are not always consistent with other objectives, i.e., that efficiency goals may conflict with other goals or the moral/ethical values of society. In this case, further restrictions which involve an attenuation of the property rights of various videotex market participants will be required, if the non-economic objectives are deemed paramount. Let us consider these other goals in more

detail.

Society Values and the Attenuation of Property Rights

To this point, governments in Canada, both provincial and federal, have made no concrete definitive statement of the goals for videotex. There have been a number of public statements by politicians which emphasize the potential uses of videotex, many of which uses assume, implicitly, certain societal goals. There has been a federal government task force[29] which has adressed the issue but whose recommendations have not yet been officially endorsed and/or implemented. There have been various, indeed numerous, statements by bureaucratic officials of both levels of government on objectives and/or uses of videotex. But there has not been an official setting down of goals or a priorization of goals. There has been no official acknowledgement of the actual or potential conflict between various of the goals which have been discussed explicitly or implicitly. Finally, there has been little attention focussed on the way in which various goals can be achieved.

It is beyond the scope of this report to determine the social goals for videotex and to rank these. Since a clear specification of goals and their ranking by government does not, however, exist at the present time, we will proceed by considering possible goals and, <u>without ranking</u> these,

analyze the implications each of these goals would have in terms of government imposed restrictions on the property rights of videotex market participants.

In a 1980 speech, Bernard Ostry, then Deputy-Minister of the federal Department of Communications, set out five principles or values which he suggested should be the "guiding principles" for information technologies. These are:

1. freedom of expression ("which encompasses both freedom of speech and freedom to create")
2. freedom of access ("which... mean[s] public access to the full range of interactive and one-way telecommunications services...not...just the passive reception of TV or other signals...[but]...active involvement, whether through community channels or interacting with a Telidon system".)
3. freedom of enterprise ("As to content, it has been the government's policy to ensure open access to the telecommunications system. Where a carrier also provides its own information or programming services, it has been argued that regulation may be needed to preclude the danger of unfair advantage or discrimination against competing services.")
4. freedom of development ("...which mean[s] national development...the need to ensure our <u>economic independence</u>...to protect our <u>technological</u>

sovereignty...[through] new technology [being] developed and manufactured right here in Canada..[forming] the basis for an industrial strategy to ensure that Canadian business can take full advantage of the new information technologies...[and to] help us strengthen our cultural integrity in the face of a deluge of external information".)

5. the freedom to enjoy privacy ("This freedom extends equally to national security and to the safeguarding of industrial and trade secrets...but...must be weighed against the public's freedom of access to information".)[30]

While Ostry is not talking exclusively about videotex in setting down these five principles, videotex is included in the information technologies to which he would apply these principles. If we take these principles then as reflecting societal values/goals, it is only clearly the third principle, freedom of enterprise, which conforms to what we have termed the efficiency goal. The non-attenuated set of property rights set out in the last section would then achieve this principle. But what of the other four principles? What are their practical implications for videotex? Are they in conflict with one another, in whole or in part?

Freedom of expression as defined by Ostry has basically to do with IP access to the videotex market. At one extreme

it could mean the right of all citizens to be videotex IP's subject, perhaps, to their ability to pay. At the other extreme, it could mean the right of all citizens to be IP's in some information medium though not necessarily videotex. This too might be subject to the ability to pay. If Ostrey wants the latter extreme, there are no necessary restrictions which need to be considered for the system of property rights previously spelled out. If, however, he wants the former extreme this is not the case. If all citizens must have the right to be videotex IP's, then common service providers and common carriers must be required to provide as much capacity as is demanded in computing and transmission capability. If this right is further not subject to ability to pay, then subsidies for page creation, storage fees, service fees, etc., must be provided either through some form of cross subsidization or directly through government. If all citizens must have the right of equal access, then communication costs paid by IP's may have to be distance independent; advertising financing might be precluded since this would provide an advantage to large IP's and/or transactions-oriented IP's; and there could be a need to regulate common service providers and common carriers to ensure that their access policies and their price structure reflect this goal of equal access to all.

Freedom of access as defined by Ostry has basically to

do with user access to videotex. As with IP access, the question arises as to whether this right is independent of ability to pay. If it is, then, again, subsidy programs of some form, such as government provision of user terminals in public places, will be called for. If access must be equal, then user communication charges may have to be distance independent; free content, i.e., advertising financing, may be called for; and regulation may be in order. Alternatively the right of access may be non-equal, according to this goal, with socially or physically handicapped persons being assigned access priority.

Freedom of development as defined by Ostry relates to maximizing Canadian equipment manufacture, Canadian service providers, Canadian carriers, Canadian storage providers, and Canadian content/IP's. Carried to the extreme, it would attenuate the rights of service providers to carry all IP's requesting access (regardless of their nationality); the rights of service providers to sell their business (versus their service) to non-Canadians; the rights of users to buy their information from the cheapest source (which might be foreign) or to buy the information they choose (which might be foreign); the right of service IP's to seek the cheapest source for storing their information (which might be a computer located outside of Canada); the right of service providers, brokers, carriers, and users to buy the equipment of their choice at the best price (which might mean foreign

manufactured equipment and/or a foreign equipment supplier); and so on.

The freedom to enjoy personal privacy, as defined by Ostry, relates to confidentiality of information but could also relate to confidentiality of records regarding users and usage of service. The latter is consistent with the non-attenuated property rights specification of the preceding section. The former, however, may raise problems regarding the common property rights implicit in government information and the communal or cooperative property rights of closed user groups.

This discussion of how the five principles set out by Ostry might require the attenuation of property rights as previously specified is not exhaustive; it is merely illustrative of the possible implications. To provide a definitive discussion would require a) a more precise definition of the goals and a clear agreement that these are the goals or principles to be pursued and b) a ranking of the goals in order of priority as a means of resolving goal conflicts. There is clearly conflict in these goals.[31] For example, most of the restrictions noted just above conflict with the efficiency goal or Ostry's freedom of enterprise principle; freedom of expression which could imply restrictions on service providers' right to finance their service through advertising is in potential conflict with freedom of access which may require advertiser financing

versus a user-pay financing structure; and so on.

The use of the theory of property rights provides a useful framework for analyzing the role of societal values as a determinant of the desired market structure for videotex service. It also provides a policy device for determining how the videotex market can be contained or re-shaped in order to satisfy these values, given an agreed upon ranking of the values. And it provides a framework for achieving an efficient market structure insofar as efficiency is regarded as a paramount goal. What is obvious, however, is that quite different specifications of property rights are possible and that the type and extent of attenuation of property rights can only be decided or prescribed if society's values are spelled out and ranked.

In Gutenberg Two, Douglas Parkhill sets out what he considers to be the elements of a "necessary structure" for videotex service in Canada.[32] This "necessary structure", as defined by Parkhill, is as follows:

1. Information Providers unregulated and with the same freedom to publish and freedom from censorship as for the conventional press.
2. Total content/container separation except for over-the-air, vertical blanking interval, broadcast services.
3. Cable systems regulated as common carriers subject to the same rules as telephone companies.

4. All prices set by service providers.
5. Bill collection by either Carrier or service provider at the latter's option, or by an agency like a bank, credit card company, etc., to which both the subscriber and service provider subscribe.
6. Strict privacy and freedom of access rules with both stringent criminal penalties and civil redress for enforcement.
7. Directory services provided by carriers as an obligation and optionally by anyone else.
8. Public access databases supplied on a competitive basis by anyone, unregulated except with respect to privacy protection and file security.
9. Electronic mail boxes supplied by the consumer as an add-on to the normal videotex terminal with telephone number as mailing address.
10. Electronic mail distribution normally by telephone carriers, with the exception of that material for which an acknowledgement of receipt is not required in which case over the air broadcast or one-way cable distribution can be employed.
11. Individual ability to "lock" the box against unwanted messages.[33]

Parkhill's recommended structure for videotex has many of the elements of the non-attenuated set of property rights which was set out above. It also has some major

differences. Most of these differences represent restrictions on property rights which Parkhill would impose. But the meaning and logic of many of these restrictions are not clear. For example, Parkhill recommends that "all prices be set by service providers". If his definition of a service provider corresponds to ours, then this requirement represents a major restriction on the ownership rights of IP's, storage providers, and carriers. If, alternatively, as may be the case, a service provider in Parkhill's terminology is any provider of a service in any segment of the videotex market, then all he is saying is that each participant has the right to set his own price, a condition which is clearly implied by exclusive ownership in a non-attenuated property rights specification.

The reason for quoting Parkhill's necessary structure, however, is not to criticize it, per se. Rather it is to emphasize, again, that the question of market structure is ultimately a question of property rights; that property rights theory can be used to analyze the implications of alternative videotex market structures; that the desired economic and social policy goals must be fully specified and ranked before alternative market structures can be evaluated or compared in any terms other than those of economic efficiency criteria; and that goal specification and ranking should precede the specification of property rights. Parkhill's structure proves ambiguous or inconsistent in

part because the economic and social policy goals are not as fully specified as they should be and, in part, because goal achievement is related to nominal market and/or technical characteristics rather than the underlying property rights inherent in those characteristics. If you want all IP's to have non-discriminatory access to videotex networks, for example, is it possible to exempt over-the-air, vertical blanking interval, broadcast services from the content/carrier separation requirement? Parkhill's reason for this exemption is based on the extremely limited capacity of the vertical blanking interval, which in turn leads to his recommending that broadcast licensees have control over the information content inserted into the vertical blanking interval, including the right to insert their own information.[34] This recommendation is based on the grounds of "ease of regulation, maximizing public choice...and fairness to the broadcast licensee".[35] This rationalization, however, does not necessarily require the non-discriminatory access principle to be waved. Indeed if container/content separation were enforced at the same time as exclusive ownership rights to the vertical blanking interval were vested in broadcast licensees subject to non-discriminatory pricing, then the available content space on the vertical blanking interval could be rationed through the price system.[36] There is also another option which Parkhill does not appear to consider. The vertical blanking

interval could be separated and made transferable exclusive of the broadcast channel it is associated with and declared a common property resource. The government would then be in a position to directly allocate control of the use of the resource, or license private operators to manage it or to auction it off to the highest bidder. From society's point of view, the overriding objective should be to maximize the benefits of the resource. A market procedure such as auctioning off the vertical blanking interval may achieve this more closely than a non-market procedure such as licensing by an administrative tribunal.

Identifying Alternatives by Segment

The non-attenuated property rights specification set out above will be used in the balance of this report as a base specification by which we can judge:

1. the property rights arrangement and resulting market structures which could evolve if the market is left on its own and
2. the property rights implications of government imposed restrictions to achieve non-economic or non-efficiency goals.

As a first step in this analysis, it will be useful to consider the alternative possible arrangements which might be obtained in each market segment. This review will

identify not only possible alternatives but also major issues of concern.

Alternative Market Structures

A. Information Providers

Information providers are an obviously key segment of the market since the quantity and quality of the information base will be a fundamental determinant of user acceptance and use of the system.

The question of "who will be an IP?" will depend, inter alia, on such factors as the cost of being an IP, the degree of control over content exercised by service providers, service provider policy respecting ownership of the information base, the willingness of service providers to allow third party computers to connect to their host computers, service providers' policies regarding "sponsorship" of individual data bases and the ability of IP's to charge users a fee for the use of their data base.

Service providers and/or carriers could be IP's, if they are unrestricted in this regard. If so, they might have strong incentives to closely control content and IP participation. If service providers opt for an advertiser-financed system, private IP's seeking to sell their information base, might find themselves precluded from participating in the system.

Another aspect of the identity question is whether the

system will be structured to favour private individuals or commercial enterprises acting as IP's. This will depend on the service orientation of the system (transactions versus information retrieval, for example) and on the financing alternatives chosen.

Two other issues relating to the identity of IP's are 1) the role of government as an IP and 2) the nationality of IP's and/or the content of IPs' data bases. Concern over possible manipulation of public opinion could argue for restricting government's role as an IP while purely economic considerations would likely make government one of the largest (if not the largest) IP's in the country. It is possible, for example, that once certain levels of market penetration have been achieved amongst users that regulations requiring public availability of certain government information could be legally satisfied by putting the information on videotex rather than printing it in hard copy. Such an option could quite literally save the government millions of dollars in printing costs, distribution costs, and storage.

Concerns over foreign domination of Canadian videotex could lead to a policy restricting the nationality of IP's and/or the content of the information base. This is obviously a concern for social/cultural reasons but there may also be economic implications of major importance. For example, imports of information services by Canadians might

have serious balance of payments implications as well as employment implications for Canada. If nationality restrictions are not imposed on the market, however, it is a virtual certainty that efficiency considerations will lead to major U.S. content and U.S. IP's on Canadian videotex.

The willingness of videotex consumers to make use of various services (information) will necessarily play a major role in the provision of specific types of service by individual IP's. But the issue is far more complex than this. For example, an advertising financed service (analogous to the financing model employed by radio and television) may eliminate many private IP's who are unable or unwilling to finance themseles and who cannot find a sponsor for their material. Whether or not free computer storage/system access is provided to public interest, non-profit organizations, who are otherwise unwilling to identify themselves with commercial sponsors, could seriously affect the availability of information from, and about, such organizations.

If videotex service is to be paid for on a user financed scheme, the particular pricing structure adopted may greatly influence the information base. Flat rate subscription fees or block subscription fees (i.e., purchase of either a given number of pages or a given amount of time) will influence IP's in quite different ways than a pay-per-page or per-individual-data-base scheme.

B. Videotex brokers

Broker services may be integrated forward or backward with other market segments or they may be operated by independent agents. For example, broker services may be part of the package provided by the service operator. Such an arrangement could seriously hamper the degree of effective competition between different service providers, especially in relation to small IP's. Alternatively, IP's could provide their own broker services. This situation could provide an effective barrier to entry for small independent IP's who either lack the skills, or who cannot afford, to broker their own data base.

Even when brokers operate as independent agents not directly employed by service providers, their independence may be only nominal. It is conceivable that nominally independent agents may choose to associate themselves predominately with particular service providers. Such a situation could limit price competition between service providers. It could also produce distortions/imperfections in the broker segment of the market.

If, as is likely, broker-type services are provided by a combination of independent brokers, self-brokering by large IP's and direct sales by service providers, the independent broker may be "squeezed" in such a situation with consequent implications for the effective participation

of small independent IP's.

C. Storage Providers

The possibilities for independent or third-party computers to connect to the videotex network will be of significant impact to the question of who provides storage facilities for IP's data bases. Theoretically, storage could be provided by IP's themselves (using their own computers), it could be provided by brokers, or it could be provided by service providers.

Which of these options ultimately dominates will depend on a) the fee schedule for storage where storage is provided by brokers or service providers b) the service provider's fee schedule for provision of a computer-to-computer interface where storage is on a computer other than the service provider's own, and c) the willingness of service providers to allow third party computers to be linked to their system.

Storage charges it is important to realize are likely to represent a significant on-going cost to IP's participating in the videotex market. The degree of competition in the storage provider segment of the market will influence how closely storage charges reflect the underlying cost parameters. In turn this will influence the extent to which storage fees act as a barrier to entry for

IP's and/or system users.

For videotex transactions services such as electronic banking from the home, travel reservations, shopping, etc., third party computer connections will necessarily have to be offered by service providers. The service provider's computer in such cases will be a gateway computer providing access to the computers of banks, airlines, etc. Whether participation in the offering of transactions services requires IP's to provide their own computer is, however, a different question, the answer to which could have implications for the number and range of IP's participating in transaction services. The threshold point for participating will, under this condition, be a function of the cost of acquiring and operating a videotex compatible computer with a transactions service capability plus the cost of the interface with the service provider's gateway computer (except in cases where transactions service IP's act as direct service providers).

For electronic mail type services where users become IP's in terms of their interaction with other users, the storage issue takes on yet another dimension. The user's terminal in this case could quite conceivably be a micro-computer such that, if a permanent record of "conversations" is desired, the user/IP could provide his own storage. This would, however, require that such micro-computers be able to connect to the system at a price

which is not prohibitive. The issue of confidentiality may also be of importance here. If private information flows from user to user pass through the host computer of the videotex network, if only nominally for routing purposes, the possibility exists for the host computer to retain a record of the message content. Reasons for doing this might be entirely innocent, related, for example, to the need to have a record for billing purposes of the number of messages transmitted. The reasons for doing this might also be profit-related.

Confidentiality is a general concern with videotex. Conceivably, for the individual using videotex extensively for information retrieval, transactions, and correspondence, the host computer could wind up with a record of what the person reads and buys, whom he corresponds with and what he says, banking/financial information, and so on. While regulations constraining permanent storage of such information or the form in which such information is held can be imposed to curb this practice, the form of maket structure could make this practice more likely and/or the enforcement of regulatory safeguards against the practice more difficult. For example, a pricing structure for users based on a "per page" or "per event" formula will require the service provider to log more information about individuals' use of the service than an annual subscription pricing scheme or an IP/advertiser financed system. The

greater is the number of service providers and/or storage providers, i.e., the greater is the number of computers operating in the system, the greater is the possibility for some to engage in this practice without being detected. In other words, all other things equal, the problem of enforcing regulations designed to safeguard confidentiality becomes more difficult the greater is the number of computers or computer operators to be monitored. On the other hand, and perhaps more significantly, the greater is the number of computers operating in the system, the smaller is the probability that any one of them will be able to amass a complete file on an individual.

D. Service Providers

Service providers are a key segment of the market and, in a very real sense, are potentially in a position to control or at least profoundly influence the structure of the overall system. Thus the structure which is adopted for the service provider segment of the market will be a major influence on the overall market structure.

The number of service providers who ultimately enter the market will be of importance to the level of effective competition. All other things equal, the greater the number of service providers the greater the level of effective competition. At the same time, the fixed costs associated

with acquiring and operating a host computer, a billing system (depending on the financing scheme adopted), software services, maintenance services for users and marketing services could act to restrict entry and foster a relatively small number of large providers. It is important to distinguish the cost of entry for a service provider from the marginal cost of servicing an extra IP and/or an incremental piece of information.[37]

If user access to service providers is direct rather than through a carrier operated gateway computer, and if at least some major service providers institute a subscription fee for users, the potential for an oligopolistic-type structure for service providers becomes greater. Similarilty if per unit costs for storing and processing information decline as volume grows, then, again, a small number of large operators will be more likely. Within the capacity limits of a large computer, declining unit costs are likely and there could also be scale economies of at least a minor nature in adding on machines to an existing system.

Service providers could be independent public operators, major IP's, and/or carriers. Linkages between service providers and the IP, broker, and storage provider segments of the market have been previously mentioned. Carrier involvement in the service provider segment of the market, however, has not yet been discussed.

Some service providers already in the market have argued very strongly that carriers should not be permitted to be involved in storage, processing, or content activities except at arm's length. Their fear is that if the organization which controls the means of delivery is also competing in any of the other market segments it will be in a position and have the incentive to operate the network in its own favour. This is not an unjustified fear, in the abstract. Indeed it is not obviously clear that even an arm's length participation by carriers in the service provider market will be a sufficient safeguard against such practice.

On the other hand, the common carrier telephony companies have demonstrated an interest and desire to act as service providers. It is the telephone companies who are undertaking most of the videotex field trials in Canada acting not only as carriers but as service providers, storage providers, and, in some cases, IP's. An example of the latter type of involvement would be, for example, electronic yellow pages directories. Cable TV operators have also expressed a keen interest in videotex service. While only one cable company is currently actively involved in a videotex field trial, most cable companies are currently making plans for the introduction of a variety of non-broadcast services such as pay-TV, electronic monitoring of home services, burglar alarm service, and other emergency

services. Videotex is seen by many cable companies as a natural field into which they might move once they have set up the two-way capability and the addressing capability all of these other services will require and given that they feel videotex will be an obvious addition to this total "basket" of services, the complete basket being an important component in their perception of consumer acceptance. Both telephony carriers and cable companies thus appear to envisage themselves acting as service providers.

It is generally agreed amongst non-carrier service providers that it would be a legitimate function for carriers to maintain a central directory or index and to operate a billing/collection system, although these are not seen as necessary functions for carriers. If this were done, however, carriers would take on a modified service-provider role. They would still not be involved in the selection, storage or processing of the information base but they would be undertaking a potentially important piece of service provision, especially in providing a central directory service.

An obvious extension of the function of a central directory service would be the provision of a gateway computer. It can be argued that a gateway system is most likely to maximize the participation of small IP's and small service providers and produce greater effective competition in both of these segments of the market. If the gateway

system involved transparent connection to independent service providers, there might be at least a nominal perception by users that the service was carrier provided.

Two other issues are potentially important with regard to the service provider segment of the market. First, there is the issue of whether non-Canadian service providers should be permited to directly offer service in Canada. Second, there is the issue of how much control, if any, service providers should be able to, or will, exercise over the content of the information base offered on their system. At one extreme, many observers would argue that service providers should own no content themselves and should exercise no control over the content decisions of IP's who wish to put up content. In other words there should be completely open access to IP's, all of whom should be treated equally, a situation which might not prevail if service providers also acted as IP's and owned content themselves. At the other extreme, some (potential) service providers argue that they must play some role in the selection of content because they must answer to their users for quality, for users preferences and for usage patterns. Moreover they express concern regarding potential legal liability in such areas as copyright laws, merchantable quality of information, and obscenity laws and assert that this calls for some degree of content control.

In a broadcast mode, teletext service, because of the

severe limitation on capacity, may have to be subject to content control. Use of a full TV channel, rather than just the vertical blanking interval on existing TV channels, would do much to alleviate this constraint but would still not eliminate it altogether since there would still be a very finite limit on the size of the information base.

E. Carriers

Mention has already been made of the likely competition between cable TV companies and telephone carriers in the delivery of service. Telephony carriers have a clear advantage over cable operators at present in their level of penetration, notably in non-urban areas and in commercial buildings. Cable companies historically have not wired commercial buildings because the potential market for cable TV service within this group is very low. The videotex market, however, could be quite large. In a similar vein, cable TV in Canada has been largely an urban phenomenon unlike, for example, the United States, where major urban centres were not the initial market for cable TV. Telephone carriers in Canada, on the other hand, have devoted major attention to the business market and have similarly devoted major attention to rural service, often under directive from regulatory tribunals and/or government. Cable companies also suffer the relative disadvantage that, at the present

time, cable systems are one-way. Two-way capability can be added to the present system, but for interactive videotex the technology presently at hand for doing this may pose some problems, for most transactions and electronic mail type services.[38]

On the other side, cable operators have the advantage that their systems are completely wired with coaxial cable, which provides them with a major advantage over parts of the telephone network which are still using copper wires. With the expected introduction of fibre-optic transmission lines in the future, however, this advantage may be only a short to medium term one for the cable companies. This, of course, depends on how quickly the telephony carriers move to convert their cable system to fibre-optics. Perhaps more importantly, the speed with which the telephony carriers convert to a fully digitized switching system will greatly influence the relative load capacity of the telephone companies versus cable companies.

A potential problem in the carrier or distribution segment of the market is that users, especially residential users, would undoubtedly prefer a single wire into the home, with all-inclusive service provided through the one line. This problem gets compounded if, in addition to separate lines, different carriers require their own "black box" or decoder for connecting the service to the television set. If for technical or financial reasons, users are forced to

make a choice between different carriers than they may in turn be limited in the choice available in the information base(s) provided through a particular carrier. To the extent that carriers are kept separate from the service provider segment of the market and users make direct contact with the service provider of their choice, this problem may be reduced, although it would still not be eliminated. Moreover, to the extent that videotex is provided by carriers as one part of a package of home computer services, the consumer's choice of carrier may be based on the non-videotex components of the package, a situation which could inhibit the use of videotex and hence, the overall development of videotex service.

In addition to telephony companies and cable operators, there is one other present carrier system, broadcasting, and the potential for other carrier systems to emerge, especially given anticipated advances in satellite and small earth station technology.

Looking at the latter first, it could well develop that as and when small earth station technology evolves to the point where it becomes both technically and economically feasible for private residences to install their own earth stations, a means of delivering videotex service which bypasses both the telephony carrier and cable operators could emerge. If the earth stations in question are merely receiving dishes the videotex service offered will be only

one-way teletext-type service, analogous to the presently available broadcast videotex which is discussed below. If a satellite "uplink" capability is included, the service could be a fully interactive two-way system. Large computer manufacturers in the U.S. are currently implementing or considering such systems for business sector teleprocessing users. While these satellite networks are not intended for videotex, once the carrier option exists, it could be used in this way. It is worth noting that to the extent that the present carriers are permitted to also be service providers, they could have greater leverage to prevent the emergence of this option in terms of actual usage. Their incentive to do so would be the protection of their investment in the existing network, a charge which has been levied against the telephone carriers in Canada already in the context of using (or more correctly, not using) satellite transmission systems for conventional telephony service.

Broadcast videotex is a third carrier option which is already available and which is being used in at least two present field trials in Canada. Broadcast videotex has the advantage of being relatively inexpensive and easier to update or change compared to on-line service. It has some distinct disadvantages however. First it is a one-way system, i.e., a teletext system, which limits the types of uses to which the system can be put. Transactions services or correspondence services of the electronic mail type are

not possible on such a system, for example. Second, at any given time, the data base which can actually be received by the user is extremely limited. Only 200 frames can be inserted into the broadcast spectrum at one time, if the teletext service is provided by making use of the vertical blanking interval. This constraint is far less severe if a full channel capability is assigned to the teletext service but a finite limit (in the order of 10,000 frames) still remains. Thus, on a given day, a user would not necessarily be able to access a particular piece of information. On-line services have no such limitation and, in terms of information available, are subject only to the constraint of the quantity and nature of the information base which has been put up on the computer network. Third, the limitation on the daily information base which is broadcast necessarily means that IP access to the system will have to be restricted and that the service provider may have to exercise some form of content control.

Not unexpectedly, cable operators may be more interested in providing teletext service than full, two-way videotex. Their existing access to a relatively large amount of unused channel capacity, the costs of converting their present system to two-way, and the suitability and hence viability of teletext as an advertising mode are reasons to suggest that this is the way the cable companies might wish to go.[39]

A final point to note regarding carriers is that a number of observers maintain that the present public transmission/switching network of the telephone carriers will be inadequate for high volume videotex usage, resulting in frequent delays in getting on-line, reduced quality of reception and, potentially, periodic system breakdown due to overload. How serious a problem this may be is uncertain. When and if the telephone carriers achieve universal digital switching and optical fibre lines, any load constraint will disappear. The real question is how quickly these technologies will be adopted across the board and whether the development of the videotex market will be held up waiting for these changes to occur. As long as a load constraint exists there could be serious implications for market acceptance, and hence growth, of a videotex system which relies on the public-switched telephone network.

F. Users

The number of users and their identity will depend on a) the capital cost of joining the system b) the price structure adopted for videotex and c) the range of services provided by videotex.

At present the cost of a videotex terminal falls, on average, in the range of $1500 - $2000. If this price were to continue to hold, then the number of participants would

be adversely affected and the participant group would be dominated by the relatively affluent. But this price is not expected to hold. Terminals are already coming down in price. As with the whole micro-electronics industry, it can be expected that the price will continue to fall in real terms over the foreseeable future.[40]

The pricing structure adopted for use of the system is likely to be a greater and more lasting influence on the number and composition of users. There are four general pricing options for content to consider. First, the content could be "free" to users. In this case the content would be financed or paid for by charges levied against IP's and/or advertising revenues. Second, users could be charged on a subscription fee basis which is unrelated to usage. Third, users could be charged for usage, based on either number of pages or time, with the possibility, if price is of a per-page type, of employing a differential price system, i.e., charging different prices for different elements of the data base. As a fourth option, combinations of the above could be introduced.

Offering the information service free to users would increase the number of users and the volume of usage and put the service more in reach of lower income persons. The user cost of being on the videotex network would then be only the cost of the terminal and the cost of communications or carrier services. The latter might conceivably be paid for

by the service provider, being absorbed.into the service provider's cost structure. If it is not, then the effect may be to promote more decentralized data bases and/or more service providers operating at a local or regional, versus a national, level, in order to minimize long distance communications charges.[41] To the extent that users pay directly for their communications costs, the service may be biased heavily towards major urban centres versus rural areas or small urban centres.

Present tariff structures of telephony carriers do not employ usage-sensitive pricing for local service. Within local calling areas then, assuming that users are served by local service providers, the marginal communications costs for use of videotex service will be zero. But local service providers are unlikely to exist outside of major urban centres. Thus, although smaller urban centre and rural area users will have lower communications costs in using the local service offerings of nearby urban centres versus the cost of on-line connection to a national service, they will still face a positive incremental usage charge for communications unlike the users in the same calling area as the local service provider. One possible solution to this problem which is actually being used in the "Grassroots" system in Manitoba is for all users to pay the same charge for communications, say, for example, 5 cents per minute. This in effect, creates a cross-subsidy scheme, with users

who are in areas closest to the computer installation subsidizing those farthest away. This example is cited only as an illustration of one way in which this problem is being handled.

The use of a fixed, annual or monthly, subscription fee imposes a higher barrier to entry for users than the first option of providing the information base free. It does not, however, influence the extent or volume of usage. The third option, of a usage-sensitive price structure based on units of time or units of information, does have implications for volume. From a pure economic efficiency point of view this option is superior to the others. However, if non-efficiency goals, especially equity goals, are deemed more important, then one of the other options might be the best overall. In this regard, the fourth option of combining the other three in some fashion may provide a reasonable compromise.

User acceptance of videotex, i.e., participation in the system, may also be influenced by the range of service offerings and the content of the information base. As a general proposition, users will be willing to bear the cost of joining the system when the value of a particular videotex service or combination of services for which they have a perceived use passes the cost of initial joining and on-going participation. Particular information items in themselves are unlikely to put home users over this

threshold entry point, although it is conceivable that a basket of items might do so. Transactions services on the other hand present the possibility for major savings both in money, time and convenience.

The magnitude of potential savings to be realized on transactions is seen by some as a key element in getting consumers to join the system. Once the decision to join has been taken, the marginal or incremental cost of using other elements of the data base will be relatively low and hence participation across all categories of service will grow. This is not an unreasonable scenario but it does pose a possible conflict with those observers who feel that the ultimate social value of videotex lies in its use as a public information medium and as an interaction medium between users rather than a commercially-oriented transactions medium. Even if one agrees with this view, however, a commercial orientation, at least during the formative years of videotex, may be necessary to help establish the system. Business users, it should be emphasized, represent a very important segment of the potential videotex user group. Much of the above discussion has been put in the context of residential users but, in general terms, applies equally to business users. Indeed, based on criteria of ability to pay and potential value of instant access to certain information items and/or of interaction with already defined business associates, the

business user group may prove to be a dominant focus for many service providers in providing an initial user core. This will mean that initial service offerings are likely to be highly specialized and aimed at particular groups of business users. "Grassroots", which is aimed at farmers, is a good example of this type of marketing strategy.

The discussion of this sub-section on alternative market structures has a) identified a variety of alternatives within each segment of the market and b) identified a number of issues/problems/concerns associated with these alternatives. In particular, the issues of integration between market segments, financing arrangements, price structures, centralization of data bases and accessibility both by IP's and by users are seen to be particularly important. These issues will now be related to the previous discussion of property rights and the base specification of a set of non-attenuated property rights.

Market Integration

In Gutenberg Two, Douglas Parkhill argues very strongly for "the principle of Content/Container separation in which there is a legal wall of separation between those who distribute the services; i.e., the Electronic Highway operators and those, like pay-TV producers, videotex information providers, etc., who provide them."[42] Parkhill

argues that there are two further conditions which should accompany this separation of content and carriage:

1. an obligation on the part of the Carrier to meet any reasonable demands for service; and
2. a legal requirement on the part of the Carrier to distribute the services of all suppliers on a non-discriminatory basis at authorized tariffs.[43]

Is this a desirable policy position for the government to take?

Traditionally, public telephony carriers in Canada have been subject to content/carriage separation and the attendant principles of universal access and just and non-discriminatory rates as outlined by Parkhill. Cable operators, however, have not. The case for this separation in the case of telephony carriers has been well-stated by the Clyne Commission:

> The need to distinguish between carriage and content is perhaps best illustrated by the story of the Persian general who ordered the execution of the messenger who brought bad news. The lesson is that a carrier should not be held responsible for the content of the information he receives and delivers; conversely, a carrier must not be permitted to tamper with the information entrusted to him for transmission. By an extension of this argument into the field of telecommunication, it is a desirable principle that a carrier should not be permitted to use its technological resources to compete with those who have to depend on its services.[44]

The fact that telephony carriers have traditionally been governed by this rationale is not, in itself,

sufficient reason to automatically apply this principle to videotex service. Telephony service has traditionally been a voice message medium. Carriers could not offer content in this case; a message from the telephone company does not substitute for a message from "Aunt Jane". The exceptions to this would be pre-recorded message services and answering services. These exceptions are however a relatively minor phenomenon in the total voice telephone market. Also, they are types of services that carriers would find it difficult to exclude others from also offering though, via cross-subsidization schemes, there could be discriminatory pricing.[45] As data-communications services have emerged over the past twenty years, especially the last ten years, this same separation principle has been applied. But data communications, or computer-communications more generally, have, to date, been essentially of a point-to-point private nature,[46], thus retaining an essential characteristic of voice messages.

The mass audience characteristic of videotex does not change either the incentive or the potential for discriminatory practices by carriers who are also content providers. But the mass audience characteristic does have certain implications which may influence the arguments for and against the separation of content and carriage.

With a mass audience technology, an argument can be made for certain carrier-provided content or quasi-content.

First, a master index is, in the abstract, a highly desirable component of a videotex system. The carrier might be best suited to provide such an index in the same way that the telephone companies are best suited to provide telephone directories. However, insofar as such an index permits IP's or service providers to buy additional space in which they can insert ads for their content or service, in a manner analogous to "yellow pages" advertising, the carrier who provides such an index could be competing with other content providers, especially publishers of various directories, for advertising dollars. Second, the carriers might be in the best position to provide other quasi-content components, such as billing, for systems which include some type of usage-sensitive pricing, and gateway facilities, for systems which provide a centralized connection to independent storage computers.[47] Such services as these are described as quasi-content because, although they are not a part of the content base, they do include a data processing function, which implies an involvement with content.

Closely associated with this argument is the changing technology of carrier networks, which have now acquired an intelligence capability. In the case of the telephone carriers, TCTS, in May 1981, officially announced their intention to field test iNet, "an intelligent network to provide a gateway for computerized information of all kinds."[48] iNet will not be limited to videotex systems or

users of videotex systems but it will be open to them. From a different perspective, however, iNet might be considered to be a master videotex system. The TCTS member companies, in this view, would be service providers. Essentially iNet puts the full range of information and services available from any connected computer at the disposal of any iNet subscriber who has the right to access a particular computer or data base. It is very definitely intended as a mass audience, albeit business-oriented, service. It has direct content in the form of an electronic directory of services and personal user profiles which are computerized files built up by users and/or user organizations. It carries out a processing function in providing gateway links, utilizing user profiles, providing a messaging service, and providing consolidated billing. It is, in the words of TCTS, "a single point of access to satisfy all your business information needs".[49] In other words, iNet will do almost everything a videotex service provider does but it will do so on a larger scale, very probably more economically and efficiently, and it will be easier and more appealing to use because of the single point access, the maintenance of user profiles, and the consolidated billing features.

iNet is illustrative of the difficulty posed by mass audience computer communications networks for the traditional arguments regarding content/carrier separation. Technology has made carriage far more than providing a

physical link between two points and a mass audience service makes it a viable proposition to utilize the intelligence capability which can now be given to the telephone network. This discussion points out that debating the desirability of separating content and carriage for videotex service may be missing a more important issue, service provider/carriage separation. Although a service such as iNet has certain quasi-content components, the market segment most likely to be affected by an iNet-type service is the videotex service providers. A universal gateway system has the potential of rendering independent service providers redundant. At a minimum it represents a strong competitor. When it is carrier-operated, as iNet will be, then the carrier could acquire a monopoly or quasi-monopoly position in the information market-place which could make the traditional content/carriage separation issue irrelevant.

Three further points relating to market integration need to be addressed. First, given the preceding discussion of content/carriage separation and the identification of service provider/carriage separation as potentially a more important issue, is there also a case to be made for service provider/content separation? The answer to this is a qualified yes. The traditional arguments supporting carrier separation from content in the conventional telephony field would appear to hold equally for the videotex service provider <u>if</u> it is agreed that the service provider should be

obligated to provide access to all IP's at non-discriminatory prices. Second, there would appear to be no justifiable reason for treating cable companies and telephone companies differently with regards to the issues of content/carrier separation and service provider/carrier separation in the provision of videotex service. Both should be treated the same. As noted previously, this has not been true with respect to the traditional operations of the two industries. Telephone companies have been subject to content separation while cable companies have not. In the videotex case, the two industries will potentially directly compete with one another. Consistency alone demands that they be treated the same. Apart from this, however, the traditional argument that the cable companies are a broadcast undertaking and hence not subject to the separation principle does not hold for videotex service, whether or not it is justified for cable-TV service.[50] Third, if service providers are possibly to be excluded from content provision, should content providers, i.e. IP's, be excluded from being service providers? This is not a redundant question. It is not impossible to imagine certain large IP's, especially in the area of transactions services, wanting to provide service directly to the public without going through a service provider as an intermediary. Banks might well fall into this class of IP, for example, not only because they are potentially very large IP's with an

established or tied customer base but because the confidentiality concerns of the banks might dictate having as few intermediaries as possible involved in electronic banking transactions. In general, so long as an IP who acts as his own service provider does not also attempt to service other IP's, i.e. is not a common service provider, this should not present a major problem. It may be of some concern if, because a number of large commercial IP's provide direct service to their customers, common service providers lose the relatively lucrative revenue base such IP's would otherwise contribute to their system. This could influence the viability of common service providers. It could force common service providers to institute a strict user-pay principle. Alternative pricing and financing arrangements will be discussed in more detail below. For now the point to be made is simply that such an option brought about by the conditions described could have the effect of restricting the access of certain types of IP's, most notably public interest groups, if we assume that such IP's might otherwise be subsidized, in whole or in part, by service providers. If the participation of such IP's is deemed socially desirable, however, internal cross-subsidization by service providers is not the only way, or perhaps not even the preferred way, of ensuring their participation.

If, as a starting point, an efficiency goal is taken as

paramount, then we want to create a set of non-attenuated property rights which is consistent with as much of this discussion of integration as possible. On this basis we can now see the rationale for several of the components of the base specification of a set of non-attenuated rights set out earlier.

The suggested base specification 1) separated each market segment, by creating independent ownership rights for each 2) created the class of "common service provider" and "common carrier", while not precluding "private" service providers or carriers and 3) made common service providers and common carriers subject to a separately specified set of property rights which places restrictions on the rights otherwise implied by exclusive ownership and transferability.

Under this proposed set of property rights, there is content/common carrier separation imposed. All common carriers and common service providers are treated in the same fashion. Open access, subject to a non-discriminatory pricing schedule, is required as a condition for both common carriers and common service providers. Carrier provided gateway networks are allowed but the access access provisions mean that non-carriers can also provide such service, making use of the common carrier's basic transmission network. Such carrier-provider networks are limited to being only gateway networks. IP's have access

rights to both common service providers and common carriers. The latter allows IP's to provide service direct to users if they wish to do so. An IP providing only his own data base is not regarded as a common service provider.

The base property rights specification does not fully address all of the concerns noted in the above discussion of market integration. Pricing behaviour is constrained to be non-discriminatory but nothing is said about the level of prices. The notion of "just" prices would represent an attenuation of property rights. Access priority for disadvantaged persons would similarly involve a government imposed restriction on the property rights of some. Some observers might argue that carriers should be precluded from providing gateway services at all. Such a policy would involve an attenuation of carriers ownership rights in their transmission network. If common carriers and common service providers are to be regulated by an administrative tribunal for non-efficiency reasons, then again there would be an attenuation of property rights.

Any or all of these restrictions might be highly desirable. We are not arguing for their exclusion. Rather we are pointing out that they conflict with a pure efficiency objective and, if imposed, must be justified on the basis of a well-defined set of social or non-economic objectives.

Financing Arrangements

When we speak of financing options we are referring to alternative sources of funds to pay for the costs of providing videotex service and returning a profit to brokers, storage providers, service providers, and carriers.

There are four sources of funds which individually or collectively might generate the financing requirements for videotex service: IP's, advertisers, government and users. The distinction between IP's and advertisers in this case is perhaps a subtle one since videotex advertisers are, by definition, IP's. But even though all videotex advertisers are IP's, all IP's are not advertisers. IP's who are not advertisers might, however, choose not to charge for access to their data base. A government IP might be one example of this. Non-profit organizations acting as IP's might be another example.

A videotex system which has no direct user-charges for content, i.e., where the creation and use of the date-base is IP/advertiser financed, has a number of attractions. Most importantly, such a system would lower the on-going participation cost of users. This would produce higher participation rates, both in terms of the number of users and the level of participation per user. But there is a certain element of "catch-22" in this. Without an IP/advertiser financed system, participation may rise only

at a very slow rate, but without high levels of participation, the medium will be less appealing to advertisers. Transactions-oriented IP's might provide a way out of this dilemma if they bring an already established clientele with them when they go on videotex. Larratt suggests that it is even conceivable that transactions IP's might be willing to subsidize terminal costs.

> Sellers want to make a pitch, advertise, be informative and be able to take the order. It is easy to see TELIDON's advantage here. They also might be prepared to pick up the cost of all or part of the terminal because that might be cheaper than their alternative methods of reaching their customers. Consider the retailer's other non-store selling alternatives: direct mail, telephone shopping, and reaching the customer via home computers. TELIDON covers the sellers' requirements best, if the population has terminals.[51]

Getting potential users into the system, if users must bear the entire cost of a terminal, could be a major stumbling block to the growth rate of the videotex market. Over the next few years, the price can be expected to fall in real terms but it will still be significant.

A user's willingness to join the network will depend on the trade-off between the cost of joining plus minimum on-going costs and the expected benefits. As one observer has stated, "The product has to be affordable and it must fill a need."[52] Transactions services, to the extent that they will provide users with savings in money, time, and convenience, are likely to be an essential component of

expected benefits.[53] Moreover, the money savings provided by transactions services will be a very tangible, visible benefit unlike, for example, the rather intangible benefit of being able to see the news or weather whenever you want. If, in addition, transactions IP's also find it worthwhile to subsidize all or part of the terminal cost of users, as Larratt suggests is possible, then it is easy to see how transactions services may hold the key to achieving successful penetration rates.

Systems which are wholly or substantially IP/advertiser financed do have drawbacks, however. If the most attractive services and content are free to the user, in terms of direct cost, IP's who want to sell their information, rather than use information to sell something else, or who cannot find sponsors, may be squeezed out of the market. This could work both ways, of course. If "free" access is provided for items which users would otherwise have bought, then, theoretically at least, they can use this money, within their videotex operating budget, to purchase other content. Although this is possible, it is impossible to tell how likely or significant such substitution may be in practice. Undoubtedly, some small, independent IP's will be squeezed out in a predominantly IP-financed service.

At the other end of the spectrum, system financing would be wholly user-financed. Alternative pricing structures will be discussed below. The point to stress at

the moment is that the more direct user charges the system has, the slower will be the pace of market penetration, all other things equal.

A 1980 study carried out by Roger Hough estimated that, at a monthly operation cost of $25[54], and assuming that households spend 5% on their "information and message-service budget" on videotex, a household income of $70,000 would be needed to support this level of expenditure on videotex.[55] If this is correct, then, by 1985, using Statistics Canada projections of household income, Hough concludes that the eligible household base of Videotex users would be only approximately 26,000 families. This is not enough to constitute a "mass market". Hough's methodology in arriving at this forecast may be faulted. It is, at the least, conservative, and, at worst, inappropriate. Consumers may substitute videotex for entertainment,[56] intra-city travel (shopping trips, etc.) and other categories of expenditure. They may switch more of their information and message service expenditures to videotex than the 5% forecast by Hough. They may not have to pay all the head-end computer and administration costs or even all the communication costs if there are IP's or advertisers who pick up some or all of these charges. Finally, the Hough projections are concerned only with household or residential use; in fact, the business market is regarded by many IP's and service providers as equally or even more important to

the formative period of commercial videotex service.[57]

Whether Hough's estimates take proper account of the realities of the videotex market is not, however, the most important aspect of his results for our purposes here. What is more significant is the clear demonstration which his work provides of the possible implications for the household penetration rate of a wholly user-financed system.

So far in this discussion of financing, little has been said about the role of govenment in financing videotex. There are several reasons why government may find it justified to subsidize videotex:

1. the potential advantages to the economy at large of developing such a high-technology industry. The fact that Telidon is Canadian makes this a credible possibility. Moreover, the potential advantages of a high technology industry, especially in the information sector of the economy, are obvious. One must treat this argument with a lot of caution, however. Canada gains nothing from a high technology industry per se if the subsidy required to create and maintain the industry outweighs the spin-off benefits which can be realized. If this argument is going to be used, it has to be proven.[58]
2. the potential social benefits of videotex. Videotex may be of use in delivering education services; it has

a great deal of potential use for handicapped persons, such as the deaf or persons with restricted mobility; it may be an important medium for persons in isolated communities; and so on. In other words, videotex may be of use in delivering social goods, such as education, or in meeting certain of Canada's social welfare objectives, such as providing services to the handicapped. The social benefits of such services and/or the potential cost savings of delivering these services by videotex versus other delivery systems may justify government subsidization.

3. the potential monetary savings to government of using videotex to fulfill existing statutory obligations regarding the public release of information. Government spends many millions of dollars per year publishing reports and documents, warehousing them, and distributing them. While it is vital in a free, democratic society that such information be available to citizens, very few people use much of this information and fewer still have any need for a permanent copy. Using videotex to provide public access to this information would be much, much cheaper. But there must be a minimum level of public access to videotex in order to legally (and morally) allow a complete substitution of videotex for the present documents. It may thus be quite worthwhile

for the government, as an IP, to subsidize users' terminal costs and the cost of its own information base as a way of achieving the level of penetration it will require in order to use videotex and hence realize the monetary savings that videotex will permit. This argument it should be noted is applicable to all levels of government, although it is the federal government which has the most to gain. It should also be noted that a complete substitution is unlikely for many years even assuming that videotex markets develop quickly.

4. various other government information services such as weather information, tourist information, health and nutrition information, and so on could utilize videotex either to reduce the cost of delivering these information services or to increase the benefits. The Ontario Government's involvement with the "Visitor's Guide" videotex project is one example of this.[59] "Visitor's Guide" also provides an example of how government-financed terminals can be located in public places as a way of increasing the number of Canadians who can potentially make use of the service.
5. the potential value of using videotex for tender calls for government contracts. With a high market penetration of videotex amongst business users, it would become a very simple matter for businesses to

regularly "look through" a government "contracts to be awarded" file. In the process, government might receive a greater number of competitive bids, realizing considerable savings in the process. Such a system could also be used as a mechanism for promoting a "Canadian preference" policy with greater efficiency and less reliance on informal channels.

A primary disadvantage of government or IP/advertiser financed videotex, at least in the short to medium term, is that it may lead to too much usage. This may seem a somewhat ironic statement after the previous discussion of the importance of achieving significant penetration rates. The explanation, however, lies in the capacity constraints of the telephone network in the short to medium term. In the longer term, as Parkhill has noted, "as all digital systems evolve, the exchange load problem for the telephone company will vanish... in the normal course of events."[60] Optical fibre lines, as noted in a previous section, will also increase the load-carrying capacity of the telephone carriers in the longer term. Until these changes take place, however, it may not be physically possible to accelerate the introduction of two-way videotex. None of this will impede teletext penetration and, indeed, it may even help it.

The market structure created by the base specification of property rights could be expected to give rise to a

combination of all four types of financing. It is already quite clear that sponsors and direct advertisers will wish to participate in videotex, as will government. And there is potentially a very large number of IP's who would like to sell information under a user-financed scheme. The access requirements for IP's provided by the base property rights set makes it impossible for any of these to be excluded. A common service provider as defined would be unable to preclude any of these options. There is, however, nothing to preclude the system being structured so as to bias the outcome. For example, it is quite reasonable to assume that in a system which has a lot of advertiser/sponsored content, users will make maximum use, on average, of "free" content and minimum use, on average, of "pay" content. If no limits are placed on the proportion of sponsored or advertising content, small independent, information-sales IP's may find it very difficult to establish a market. In other words, if the latter type of IP is desired, it may be necessary to limit the proportion of sponsored content or to require some charge, however nominal, to users for all videotex use. Measures such as these would attenuate the rights of some IP's, service providers, and/or users.

Other biases might also emerge. Service providers might, for example, set the same price for all IP's, regardless of whether the IP wants to charge users or not, and make it the IP's responsibility to collect charges from

users, where a user-pay scheme is adopted. If billing and collections are the responsibility of individual IP's, small independent IP's will again be at the greatest potential disadvantage. To require either common service providers or common carriers or both to provide a billing/collections service would, however desirable it may be, involve an attenuation of property rights.

As another example, public-interest groups may not want to accept commercial sponsors but, at the same time, may be unable to sponsor or finance their own data base and may be unwilling to charge users or, if they do, may get little or no use. This may or may not be seen as a problem. Some would argue that if not enough users are willing to pay for the service to support it, then it simply isn't considered valuable enough and shouldn't be offered. Others would argue that it is socially desirable to suport such groups because they perform a public service. Moreover, the number of paying users may be a very inadequate measure of value because of externality effects. The information may be passed around by users to non-users or the publication of certain information, such as consumer product test results, may produce changes which benefit all consumers not just videotex-users.

One solution to this problem, if the participation of public interest groups is desired, is to require common service providers to provide free access to such groups or

at least a certain amount of free access. This would involve an attenuation of the property rights of service providers once again.

Price Structures

When we speak of price structures for videotex service, we mean the system of direct user charges employed. The system of user charges adopted, including the level of those charges, will be of major importance to the development of videotex.

Basically there are three general types of pricing policies which can be used: flat rate subscription fees; usage-sensitive prices; or combinations of flat rate subscriber fees and usage-sensitive charges. There is also a fourth option, that of free usage or zero prices for content. This option we have discussed above as the IP/advertiser financing option.

A flat rate subscription fee would make marginal uses of the system "free". As such it would encourage greater levels of usage by existing subscribers. On the other hand if the level of flat rate fees is too high, it could be an impediment to subscribers joining the system especially if they are uncertain as to the value of videotex.

A usage-sensitive price scheme would, for a given level of usage charges, discourage spontaneous or impulse use of the system; it would discourage "browsing". It could, also,

lead to higher quality expectations by users: if a "free" page turns out to be disappointing, you try another page but if a page you have paid for is a disappointment, you demand your money back. The practical implications of these two points will be greatest for small independent IP's seeking to sell information. Such IP's are less likely to be known in advance than large commercial IP's. With direct user charges discouraging "browsing" or impulse use, they might never be discovered. By the same token, these IP's may lack the resources, both financially and technically, to create as "polished" a product as large commercial IP's. They may lose out because their product doesn't look as good.

On the positive side, a usage sensitive pricing scheme is, economically, more efficient than a flat rate non-usage-sensitive price system. Usage-sensitive prices perform a rationing function which relates usage, and hence the resource cost of providing the service, to the expected value of the usage. Inferior content, inferior IP's, and inferior service providers will quickly be weeded out. This will be less likely with a flat rate subscription fee.

Subscription fees may have another negative side-effect, for those who believe that there should be equal access to the network by all IP's and many service providers. If the subscription is with a service provider, as is likely, it is unlikely that very many users will subscribe to more than one service. The market may become

segmented into subscriber groups for each service provider. Large commercial IP's may not find this a serious problem; they will simply list with more than one service provider. Small IP's, however, may not be able to afford this; alternatively by listing only once, and given their expected smaller market appeal, on average, they may fail to attract enough users to stay in the IP business. On the other side, major IP's may elect to list only with major service providers, i.e., those with the largest subscriber groups. Small service providers may find that because they can't get high profile IP's, they cannot get enough subscribers to stay in the service provider business. Thus flat rate subscription fees might foster increased concentration of both the IP and the service provider segments of the market.

Price structure relates not only to the system of prices, it also includes the level of prices. Price levels will be of obvious importance to users. The level of prices, if high enough or low enough, may make the type of price system irrelevant.

The conclusion which emerges from this consideration of only flat rate subscriber fees or only usage-sensitive pricing is that both types of price structure have advantages and disadvantages. There are advantages in having some IP/advertiser financed content but disadvantages if this is the only option. There are advantages in using a flat rate subscriber fee to provide a base level of service

and cover service provider administration costs but the exclusive use of a subscriber fee could push it so high that it becomes a barrier to users joining the videotex network, puts undue strain on the carrier network because of the zero marginal usage charges, and distorts the allocation of resources to the system. Exclusive usage-sensitive pricing may work against the interests of small IP's. It would not permit sponsored programming which might be important to customer acceptance of the medium; it could discourage certain transactions uses, such as banking, because users are not use to explicit charges for such services, even though the hidden or indirect costs of carrying out such transactions in person (extra time, inconvenience, travel costs, etc.) may be greater; and it could discourage the fullest exploration of the information-retrieval base.

A tier system of all three of the above options might give many of the advantages of each with less of the disadvantages of each. One portion of the data base would be free to all terminal owners. It would include government financed content, IP/advertiser financed content and public interest group content. Part of the latter might be financed by the public interest groups themselves, while part might be provided by service-providers in the form of free storage and other head-end computer costs. This level of content could also be available on public terminals which might be put in place by government or private sponsoring

agencies.

A second portion of the data base would be available for a flat rate subscription fee. It would permit unlimited usage by subscribers. The subscription fee would pay administrative costs of service providers and could return a share of revenues to participating IP's on a pro-rata basis proportional to their relative use. This would provide IP's, especially small IP's, at least some revenue base at the same time as it would provide an opportunity for them, or more correctly, their product, to become better known. The third portion would involve a usage-sensitive price scheme, i.e., it would be accessible only on an incremental charge basis. IP's in this category would be primarily sellers of information as would be the case for the second tier of the data base. The possibility of IP's selling information being able to choose between the second and third tiers would give them a means of establishing a clientele more readily while still affording the option of switching to a usage-sensitive price once their market was established.

The major danger with this three-tier system is that it might bias users heavily towards the first tier. The subscription fee however might be non-optional except for public terminals. Some type of charge by the service provider is likely to be necessary in any case unless all service provider costs, including a return on investment,

are covered by the price charged to IP's for storage and processing. If the second tier is non-optional for all non-public terminals, the independent IP would have an entry point to the market. The third tier would then be available to move to once a market was established or for IP's who start out catering to a specialized segment of the user market, known to already exist. High volume uses, such as games, might have to go into the third tier in order to help keep users from tying up the system with such uses.

This proposal is not as radical as it may seem. As already noted, the availability or possibility of all the different financing options is consistent with a specification of non-attenuated property rights. Moreover it is also consistent with such a specification to require common service providers to independently fix a charge to cover their administration costs, including a return on investment, rather than collapse this in the price to IP's or to users. Restrictions would be called for in requiring, as a condition of being a common service provider, the offering of such a tiered data base; in fixing subscription fees to cover not only service provider cost, but to also establish a revenue pool to be shared amongst second-tier IP's; in requiring service providers to act as the billing/collection agent for at least the second tier; and, possibly, in limiting the allowable shares of the data base which each tier can account for.

Our discussion so far has related to content charges, i.e., the price paid by users to access and use the computer data base. But there are two other price elements which users could, and probably will, be charged: the cost of their videotex terminal and the communications costs of using the system.

Terminal costs, as noted previously are, at the moment, considered too high to generate large volume sales. In part, this high cost in the Canadian case is due to the fact that Telidon terminals are more expensive than the alternative alpha-mosiac terminals. Largely, however, the high price is a function of the small scale of production and the relative newness of the product. Prices are, however, expected to fall in real terms, partly reflecting the general downward price movement of the whole microelectronics industry and partly reflecting the greater economies which should be realizable as the volume of production grows. Basically, the higher the price of the terminal the higher the entry-threshold of users. This is important because getting people to join the system may be a bigger obstacle to growth of the videotex market than getting people to use the system once they belong. These two decisions are, of course, closely related. But the up-front costs, which are largely the terminal costs, look more important; potential users will not, necessarily, correctly, or fully, perceive their expected benefits over

time in assessing the value of such an expenditure. In general, the longer the time period over which the expected benefits are stretched before reaching a break-even point relative to terminal costs, the greater the bias against buying the terminal. By the same token, the greater the terminal cost for a given stream of expected benefits, the less likely it becomes that the terminal will be purchased. The possibility that certain IP's and/or government may find it justified to subsidize terminal costs could be very important to the achievement of a mass audience and hence to the successful introduction of videotex over the next few years. Similarly, as previously discussed, the role of transactions services, assuming that they offer significant real savings to consumers, could be very important. A specific transactions need which contributes an immediate, known, significant benefit could greatly influence the benefit-cost calculation of buying a terminal, i.e., of joining the system.

Much of this has been well summed up by A.M. Chitnis of Nabu.

> Another problem is that the price of the videotex terminal is perceived to be too high for the type of service or utility it offers. There are three ways of overcoming this problem: 1) reduce the price of the terminal by high volume production and technological development (for example, VLSI chips; 2) suit the price of the terminal to the user's needs by offering two or three grades of terminals of different capabilities; and 3) devise and offer

services for which the user is willing to pay the higher price.[61]

Communication costs are a rather complicated issue and there is not a great deal which can be said at this point. The videotex network architecture will greatly influence the communication costs as will the transmission technology employed, the level of data base centralization, the level of service provider centralization and the price structure of the carrier, which may bear little or no relation to costs per se.

The iNet system being developed by TCTS proposes using the Datapac network, charging users the communication costs of getting to the closest Datapac node and charging IP's the communication costs out of the iNet access node to the host computer. This type of model, generalized to videotex at large, would mean that users would pay directly the communications costs of getting to the host or gateway computer of the service provider. The communications cost of getting to the IP's computer, if the data base is not stored in the service provider's host computer, would be paid directly by the IP. The service provider would bear the direct charges for the communications links between different host computers when a decentralized data base with more than one host computer operated by the service provider is involved.

This model does not seem to be an unreasonable one and

is consistent with our set of non-attenuated property rights. If users were charged directly for all communication costs and if they didn't know in advance where the information was stored or how much the access to a particular data base would cost, they might become quite reluctant to use the system.

As a variation on this model, one might also consider the possibility of an average communications charge (probably per minute but possibly per page) that would be the same for all users. This would have a certain administration appeal in terms of simplicity and ease of billing. More significantly, it would not inhibit access to the service by people in relatively isolated communities, people more distant from a Datapac node or a service provider.[62]

One possible implication of this type of averaging procedure for communications costs is that it could mean the introduction of a form of usage sensitive pricing in the local calling areas of telephone companies. To retain flat rate local calling tariffs for telephone service included videotex use would leave residents of those local areas with a local service provider or a data network access mode with no direct communications costs. This might be considered undesirable from an efficiency point of view because it would unduly increase the demands on the local transmission, switching network. It would be undesirable from an equity

point of view because it would mean either higher local calling fees for all subscribers and hence cross-subsidization of videotex users by non-videotex users or it would leave a differential between major urban centre users and small urban centre or non-urban users which would bias user access to videotex towards the former, all other things equal.

Another possible implication of the type of communications cost structure outlined above, i.e. charging the user the cost of getting to the service provider, is that it could create a bias towards local versus national service providers or, at a minimum, provide an impetus for local service providers with gateway links to national service providers who, in this context, would become a type of umbrella-IP. It would also be consistent with the above bias of this communications cost structure to see national service providers operating as chains, i.e., having local branch offices. In other words, it does not necessarily follow that less concentration in the service-provider segment of the market, taking the country as a whole, would result. We turn to a fuller examination of the centralization/concentration issue in the next section.

For the moment, we are left with the conclusion that the communications cost structure likely to emerge is, in fact, a reasonable one. The local service provider bias is both consistent with a non-attenuated set of prperty rights

and is a desirable social goal. But any user communications charges which do not reflect the cost of service to different users will be inefficient. To promote an averaging procedure, for example, except in the case of satellite transmission systems, will be inefficient.

Centralization of Data Bases

When we speak of data base centralization there are, in fact, several issues which are involved. At one level, it is a question of how many host computers there are and where they are placed. At another level, it is a question of whether third party computers will or should be allowed to connect to the service provider's host computer.[63] At a third level, it is a question of local versus national service providers.

The first level approach is, for our purposes, not a very interesting one in itself. One of the obvious determinants of the number of computers is the technical capacity of an individual machine relative to the size of the information base. Beyond this, the choice of number, size, and location of the computers of a given service provider will depend on market/financial factors which are more explicitly addressed by the other two approaches to the centralization issue.

The question of third party computer connection is an important one. Without such connection, the service

provider will be the only storage provider. The lack of competition in the storage provider segment of the market could lead to monopoly pricing of storage facilities with consequent impact on the participation rate of IP's, espcially small IP's. Perhaps more significantly, the lack of third party computer connections could lead to a kind of balkanization of the total videotex market. Only those IP's with a data base stored on the host computer of a particular service provider would be available to the subscribers of that service provider. Unless IP's paid storage charges to several service providers or users subscribed to several service providers, the data base available to any given user and the user base available to any given IP would be sharply curtailed. This would ultimately threaten the number of service providers, creating a tendency towards increasing concentration; it could threaten small IP's who couldn't afford multiple listings; and it could affect consumer acceptance by limiting their range of offerings within a given budget constraint.[64]

The alternative option would be for service providers to allow third party computers to connect at will, so long as there were no problems with equipment compatibility, at a price commensurate with the cost of providing the computer interface and the communication links. This would permit brokers to act as umbrella IP's, providing a common data base to a number of service providers. Such a system would

not only maximize the market access of small IP's, it would also foster greater competition in the service provider segment of the market. In particular, it would encourage the growth of local service providers which, in turn, would foster the growth of local IP's and local-interest data bases. In such a case national service providers could be turned into umbrella-IP type organizations. This option is discussed in more detail below.

It should be emphasized that service providers offering transactions services will have to provide gateway links to transactions-IP's computers. But we are looking at more than that. Gateway links for information-retrieval IP's are important in light of the above. They also favor small IP's at a different level by opening up the possibility of using a micro- or mini-computer to create and store their own data base, thus bypassing the storage charges on someone else's main-frame computer. As Godfrey has noted,

> The individual or collective will be able to produce information for the network with a relatively small investment and to allow access to that information at a price which will be low and should not be subject to monopolistic pricing.[65]

For Godfrey's scenario to unfold, however, requires that the individual or collective's microcomputer be allowed access to the network.

In summary, it is for all of these reasons that common service providers are required under our base specification

of property rights to permit third party computer connections.

The issue of local versus national service providers is also potentially an important one. Domination of the videotex market by large national-level service providers will mean a greater commercial orientation for videotex, a greater transactions orientation, with large national companies more typically acting as transactions-IP's, and a more uniform or homogeneous definition of the information needs of Canadians. For those who stress the importance of videotex as a medium of individual expression, creativity, diversity and, most importantly, interaction, this is not viewed as a particularly desirable scenario. These people want local IP's, local content, and local service providers who can be influenced by, or sensitized to, local needs.

On purely economic grounds, national-level service providers may provide economies of scale,[66] lower content prices because of the expanded market size and greater technical capability/knowledge.[67] The economics of scale and price arguments may be particularly important. These advantages would not necessarily be lost,however, if local service providers were encouraged to develop, so long as local service providers had a gateway access to a national-level network. Users would then gain access to national service providers/content via their local service provider.

sure that large scale commercial services do not exclude small scale IP's. Local service providers, coupled with gateway systems and national service providers acting as umbrella-IP groups, may be the way to produce this result.

As noted above, the structure of communications charges may bias the market towards local service providers. If, however, it is also desired to have local ownership versus local branches of a national chain, and to keep locally owned service providers from having to compete with national (or international) service providers, then restrictions on national (international) service providers may be called for. For example, common service providers seeking to market their service in more than one centre or more than one province might be restricted to offer their service only through other service providers. In other words, they would be precluded from offering their service directly to the public. They would, in effect, become umbrella-IP's.

Access

The access issue both for IP's and users has already been discussed or referred to in several of the preceding sections. Because there is little point in repeating all of this discussion, we will simply briefly summarize the important points which have been made.

Regarding IP access:

1. a commonly perceived objective is one of universal

access on a non-discriminatory basis.

2. content/common carrier separation will be required to achieve this objective, albeit with a modified concept of content which does allow carriers to provide indexes, gateways, and billing.
3. content/common service provider separation will also be required for the same reasons as for content/common carrier separation.
4. storage alternatives must be available if the participation of some IP groups is not to be discouraged.
5. umbrella-IP's, listed with many service providers, may be important for small IP access to the mass market.
6. the possibility of direct user charges is crucial to the participation of small information-sales IP's. By the same token, an exclusive use of usage-sensitive prices across all services could inhibit the market possibilities of small unknown IP's.
7. government has much to gain as an IP and should not be precluded from serving as an IP. At the same time, care must be taken that government content not be partisan or manipulative.[69]
8. the cost of page creation, storage, computer-processing charges, and communications will be important determinants of IP participation, especially small IP's. Brokers may be important in

the market in keeping these costs down. Most importantly, a competitive service provider segment of the market will be essential to keeping these costs down.

9. it will be impossible to provide open access for IP's on one-way videotext, i.e., teletext, even if full-channel teletext is provided. For efficiency reasons, a rationing system based on price would be the preferred solution to this problem.

Many of these conclusions are consistent with our base specification of property rights. Others, if desired, require property rights restrictions to be introduced by government.

Regarding user access:

1. the problem regarding users is more one of whether they will want to use videotex and how much, rather than whether they will have the opportunity.
2. there is a strong possibility that the cost of videotex participation for users (terminal costs, information costs and communications costs) because it is so high will bias the service towards high income earners. This bias will be lessened to the extent that terminal and/or information costs are subsidized by IP's or government. It will also be partially offset by government provision of public terminals. Such involvement by government may be based on equity

goals and/or the efficiency of government service provision.

3. the terminal costs of videotex, at present levels, pushes the threshold entry point to the market (in terms of the level of perceived benefits) quite high.
4. non-subsidized communications costs which are borne by the user and priced on a usage sensitive basis could create a bias which favors users in large urban centers, whereas the social benefits of videotex may be greater outside such areas. This may be a basis for imposing a restriction on the structure of communications charges to create, for example, a uniform average price structure.
5. content will be one of the most critical factors (along with price) in determining consumer willingness to use videotex. This is discussed in more detail below.
6. business users represent a major constituency for videotex service. Because the income constraint is less pronounced and the expected benefits often easier to recognize on the part of business users versus household users, the business user market has become the focus of many of the first videotex services to appear.[70] The successful penetration of the business market will likely be crucial to the long-term development of videotex.

7. the relative user-friendliness of videotex plus its relatively cheaper cost (because of the mass market) are the major advantages of videotex over other business-oriented computer-communications systems. But these other systems already exist, whereas videotex is just starting. More importantly, videotex, because it is cheaper and simpler, cannot do many of the things which the existing systems or service bureaus offer.
8. a potentially major problem for users with tele-shopping services is that it could result in a lot of impulse buying. Legislation which provides for a "cooling-off" period similar to that already in place in most provinces for door-to-door sales may be required to deal with this. The normal right of a seller to insist that a transaction is final may have to be restricted.
9. a means of guaranteeing privacy for users will be required. In other words, there must be strict controls on access to records of users videotex transactions, as little information as necessary regarding videotex transactions compiled in the first place, and as little as possible of what is compiled permanently retained. The user profiles which major videotex usage would allow to be assembled could be awesome in their completeness and if uncontrolled as

to use could lead to major invasions of privacy. Vesting the ownership of user profiles in users seems a relatively straightforward way to solve this problem.

10. preferential access may be desirable for certain groups such as the handicapped, relatively isolated communities, etc., where there is a significant social benefit to be realized from the use of videotex service.[71] This would involve an attenuation of the rights of some.

Content

The importance of the content or information base provided by videotex to the success of the service is illustrated by the following comments:

> -The main difficulty is lack of useful information. No one buys TELIDON. They buy information or some useful service.[72]
>
> -The biggest problem is a lack of adequate content...[73]
>
> -Behind these concerns lies the conviction that below the thin layer of early-adopters there are a majority of consumers who will only take the time to acquire the new information skills and habits implicit in videotex adoption if they have found a useful purpose for videotex before the novelty wears off.[74]

Unfortunately, at this point, there is relatively little known about the videotex content preferences of Canadians. The videotex field trials in Canada, so far,

have been largely technology/hardware trials, they have not been marketing trials.[75] As Fierheller notes,

> The main reason for the failure of the trials is that they are really hardware tests with little thought to the real needs of the consumer.[76]

To this comment can be added another, this one from an equipment manufactuer:

> There has not been enough market planning. Most of the introductory services tested so far involve information currently available through traditional sources. Furthermore, not enough attention has been paid, in these early tests, to the difference between the needs of the home and business user.[77]

This lack of information on what content will make the service sell is beginning to be remedied. The most notable case of a marketing trial is Grassroots. Another example, at least in conception, is the B.C. Tel. trial, although this trial as it is unfolding in practice has turned out to be somewhat different than originally planned.[78]

A lot is being learned as well from non-Canadian field trials of videotex as well as the experience of up-and-running systems elsewhere, particularly Prestel in the U.K.[79]

A particularly significant trend which has emerged in marketing strategies and is reflected in the Canadian case in the approach of Infomart in general and Grassroots in particular is what Larratt refers to as "narrowcasting":

> In short, in North America today there is no single simple mass market. The mass market has disaggregated, and the media narrowcasting which panders to this trend will serve to accelerate this flying apart of values, tastes and consumptive consumptions.[80]

Larratt goes on to note that Prestel is now turning away "from the Universal database notion towards the more business-like "sectorize the market" approach"[81]

This is the view which has been taken by Manitoba Tel and Informart in their Grassroots project. As Anderson, of Manitoba Telephone, explains:

> The real question is one from the consumer. What is the real utility of this service for me? Why do I need it? The product has to be affordable and it must fill a need. We think that the best way to answer those needs is by concentrating on specific groups.[82]

Larratt adds to this explanation:

> MTS estimated a target market size of 27%, 7,371 farms. Videotex, as a concept, has strong appeal for about a quarter of the farmers. The ones interested are the younger, more innovative and better educated, on the bigger farms. This group is now being targeted by Grassroots as the probable early adopters.[83]

As a marketing strategy, narrowcasting makes a great deal of sense. Does it, however, have other implications besides creating a more profitable service?

The earlier quotation on narrowcasting by Larratt suggests that the market fragmentation implicit in narrowcasting may not always be socially desirable since it may foster collectively undesirable social trends. In

addition, the narrowcasting approach potentially limits the level of interaction achieved through videotex outside of already defined special interest groups. It postpones, perhaps indefinitely, the goal of developing a universal database aimed at a mass residential market by creating the equivalent of a number of closed user groups. It makes business users the primary focus.

Whether or not these implications are seen as problems depends to a large extent on the goals which videotex is expected to accomplish. Pragmatically, it must be recognized that unless a market can be created, the goals set down for videotex will not have much meaning. Narrowcasting may not conform to many people's expectations or desires regarding the potential of videotex but it may be the best way of opening the door in the short run. That could still leave the longer term to implement the original objectives. What will be important will be maintaining enough flexibility in the structure and institutions servicing the market to make this change, when the time comes. David Carlisle of Infomart has stated,

> Next comes the home market which will be driven by the business usage. When I get 5,000 executives with these terminals on their credenzas, they'll want them in their homes, in hotels, in first-class lounges of airports, since they will be accustomed to [them].[84]

Carlisle's comment is both encouraging and worrisome, at the same time, for those who ultimately want a "people-oriented"

system. It demonstrates that, in opening the door, other possibilities, particularly the residential market, may become more real. It also suggests, however, a bias towards the people at the top of the social and economic order. Terminals which sit in first-class lounges at airports will not provide access for the average citizen.

It is also very relevant to note that the focussed applications of narrowcasting may imply a certain amount of content control/packaging by service providers. To quote Larratt once again:

> The Times-Mirror Company believes that the videotex trials to date have been engineering demonstrations and it is convinced that without the proper content videotex has no mass appeal. The company notes critically that the British Post Office sold blocks of pages (computer storage and facility) to whomever wanted to buy. While it is hard to imagine how the BPO could have excluded anyone, the result was an incoherent and confusing warehouse of data, often redundant, and frequently inadequate. The company considers the Knight-Ridder test in Florida to be more under control in terms of discipline exercised over content and index.[85]

The base specification of property rights we have set out does not preclude the narrow casting marketing strategy. It does, however, constrain the way in which common service providers can pursue such a strategy. Content/common service provider separation, coupled with the access provisions common service providers must allow IP's, makes it impossible for common service providers, by themselves, to create a service aimed exclusively at a particular user

segment with completely tailored content. On the other hand, there is nothing which precludes brokers from assembling such packages and putting them on the market via a common service provider.

Indirectly, common service providers will cater to specialized markets under such an approach, but it will not be a single focus per service provider. The same service provider simultaneously could well carry several packages aimed at special market segments and parts of those packages might be in common. There are obvious potential efficiency gains in such a situation. Moreover IP's gain insofar as those who don't neatly fit into any predefined segment of the market would not be kept out; the risk of participation would, however, be their own. Users also would benefit because, even if they joined the videotex network on account of the availability of a special package, their use of videotex would not be limited to that package. If service providers do the packaging themselves, they will not only control content and IP access but users may have far more limited choice.

If it is deemed socially desirable to foreclose any type of narrow casting approach, i.e., if government should decide to require a "super data-bank" where all IP's go into the same pot, then some attenuation of rights will be involved. The approach suggested here of constraining the role of common service providers in the narrowcasting

approach, while permitting umbrella-IP's, i.e., brokers, to pursue such a strategy is consistent with a non-attenuated property rights specification and is, it is suggested, to be preferred to a complete ban on the approach. The narrowcasting approach is being adopted because it promises to help sell the service to the potential user population. If it is forsaken entirely, the result may well be to forestall or even to permanently retard the emergence of videotex. It must always be remembered that one needs to consider more than just the reasons for imposing restrictions, however sound or justified those reasons may be. The costs, particularly the impact on producers' incentives, must be carefully weighed.

Teletext Versus Two-Way Videotex

The discussion of this report up to now has been primarily concerned with two-way videotext. Teletext has been referred to several times but it has not been the primary focus. In this section, teletext is addressed more explicitly both because it could be an important videotex service in its own right and because the development of the teletext market could be of importance to the development of two-way videotext.

Teletext is a one-way videotext system which is typically transmitted in a broadcast mode, either over the air or via cable systems. Because it is one way, like the

existing cable system, it is a natural market for cable operators to be looking at to develop.

Use of a broadcast mode means that the information base provided by teletext is quite limited. When it is done using the vertical blanking interval of regular TV broadcasts, the capacity is limited to approximately 200 pages. If a full channel is devoted to teletext, the capacity increases considerably to approximately 10,000 pages. But this is still small relative to the almost unlimited potential of two-way videotext.

Teletext has a number of advantages over a two-way service, which, inter alia, include the following:

1. it can be provided to households using the existing cable transmission system
2. it is less expensive to operate than a two-way on-line system
3. it is easier to update or change pages on a broadcast service than on an on-line service
4. television sets are likely to soon have teletext decoders built in at the factory so that there will be no additional, separate hardware cost to join the system[86]
5. household penetration rates can be expected to be high because of the present penetration of cable and the anticipated zero hardware cost
6. the amount of information available (i.e., the number

of pages broadcast per cycle) on a teletext system, while limited, will be a much less severe constraint with full-channel teletext. Cable has made local channels a relatively abundant good as compared to the sharp scarcity of over-the-air broadcast channels within a local viewing area.[87]

7. teletext, as a medium, is highly suited to advertising and, further, with the addition of a packet-switching protocol at the cable head-end, to tailored advertising, i.e., different messages for different users based on the clientele the advertiser wishes to reach and the use of user profiles to identify sub-groups of subscribers who match the clientele specification. Thus financing would not be a problem if the users can be delivered. Because content would be free under an advertiser financed system, the probability of getting the appropriate number of users will be reduced.
8. access is not limited by the number of other simultaneous users, unlike on-line systems where the computer can accommodate only so many users at a time.

Teletext also has a number of disadvantages. These include, inter alia:

1. it does not provide two-way, interactive service, although a two-way capability could be offered via a hybrid cable-telephone system

2. it offers a limited number of pages compared to videotex
3. a one-way system greatly limits the range of services which can be offered relative to the total potential of videotex
4. an advertiser financed scheme limits IP access to those IP's who can afford to advertise and/or those who can find sponsors for their content
5. a cable-operated teletext service, at least initially, would bias user access towards those areas already serviced by cable. Cable in Canada has traditionally had an urban bias.
6. the limited capacity of teletext implies, potentially, some form of content control. This could threaten the application of the content/carrier separation principle to teletext although it need not do so. It does preclude the corollary principle of universal access for IP's at pre-determined, non-discriminatory prices.

The TAMEC Report is a study undertaken for the cable television association on the market potential of cable-operated videotex services.[88] It argues that cable is a superior carrier to telephone for delivery of a mass audience service. It goes on to argue that cable operators should pursue this advantage and introduce videotex service which is a) one-way b) exclusively advertiser financed and

c) strictly controlled by the cable operator as to content.

If the strategy recommended by the TAMEC Report is adopted by cable operators, then videotex in Canada could become strictly a teletext system with the inherent disadvantages noted above. As Godfrey notes,

> From the consumer's point of view, there are obvious flaws in this strategy, primarily in that it turns an interactive technology into a one-way delivery system dominated by those who can afford to advertise.[89]

For those who do not feel that this version of videotex is a desirable one, a major question is whether, if such a system develops, it will preclude the emergence of the alternatives. There is some probability that this could happen. An advertiser-financed teletext service would draw on part of the advertising base potentially available to a two-way videotex service, thus reducing what might be an important revenue source for two-way videotex. Moreover, on the information-retrieval side, it can be expected that the data base of the two systems would involve a lot of duplication in the type of information available: news, weather, sports, etc. If the teletext is free to users, either the two-way service must be free also, thereby taking away any discretion as to preferred or best pricing structure, or face a major competitive disadvantage in charging for something which can be received free from someone else. Two-way service has other cost disadvantages

also such as the high terminal cost and the communications charges.[90] Thus the probability that teletext may drive out two-way videotext, especially if the cable companies establish their market first, is a real one. The cable companies, so far, are moving fairly slowly concentrating more attention on pay-TV and various home-monitoring services.

In the abstract, it would not be undesirable, in fact it would be highly desirable, to have both types of videotext available. Moreover, it is suggested that the same separation principles should apply to teletext as to two-way videotex. If cable companies are to provide the carriage, they should not be directly involved either as service-providers or as IP's. If it should be decided that ownership of the vertical blanking interval belongs to broadcasters, then, except where the vertical blanking interval is used directly as an adjunct to regular broadcast programming, (e.g., for insertion of co-options for the deaf), the separation principles should still apply.

Given the capacity constraints of teletext, some form of control of access must be implemented. This need not, however, imply content control, although it could. As has been stated previously, a price rationing system which gives access to the highest bidder would be one way of allocating the resource without requiring direct content control. If such a solution does not conform with the government's

social objectives, another option would be for government to assign access rights versus having private operators do it. No recommendation on the desirability of this is being offered but it is clearly an option.

Conclusions

At the beginning of this report we stated that commercial videotex service was a vertual certainty within the 1980's. We also stated that the market structure adopted for videotex would have important implications for Canada's ability to realize the potential benefits of this new technology in an efficient and equitable way. The analysis of the report which followed this statement has demonstrated or proven the statement's truth. What has been learned is that a number of market structures are possible and that, left alone, the videotex market is highly likely to evolve along lines which do not ensure maximization of the potential benefits for Canadian society. What we have also learned is that market structure is, fundamentally, a question of property rights and that, to finally decide on the most desirable market structure means deciding first on the preferred property rights structure for the videotex market. But the preferred property rights structure cannot be defined or decided upon until and unless society (government) has fully specified and ranked its goals (and

the inherent values behind those goals) which the videotex market is expected to achieve.

A non-attenuated specification of property rights has been set out here as a base point. It meets the objective of economic efficiency and, simultaneously, includes several other attributes which many observers view as desirable. It addresses aspects of the privacy issue, the separation issue, the centralization issue, the access issue, for both IP's and users, the financing issue and the pricing structure issue. It does not, however, fully address such issues as foreign ownership, concentration, urban bias, IP and user access, financing and price structure. Full resolution of these issues is not consistent with an efficiency objective and cannot be fully addressed in a report such as this without a clearly specified and ranked set of social goals for videotex.

As a final comment it is perhaps important to note that, in setting the goals for videotex, the temptation to make videotex "all things to all people" must be resisted. Too many restrictions on the property rights of the various producers of videotex service could well mean that the service is stopped before it can get started. This is in part why the priorization of goals is so important. Also, however, one must remember that videotex is only one type of computer/communications network and that some of the other network alternatives which do not have the mass audience

characteristic of videotex may be better instruments for achieving various social policy goals than videotex. Videotex markets must be structured to achieve their potential but, in the process, they must not shut off the potential of other information network alternatives. The set of nonattenuated property rights which was spelled out earlier and the market structure which that implies should be the starting point. From there government must decide on further possible restrictions aimed at meeting clearly specified goals at the same time as the viability of the market is maintained and the expectations of the market are realistic. Very importantly the structure adopted must retain the flexibility to cope with changing technology and alternative market opportunities.

Footnotes

1. "Terms of Reference for OECD Panel on Policy Issues of Computer/Telecommunications Interaction: May 1970", in "Computers and Telecommunication, Vol. 3, OECD Informatics Studies, Paris 1973. (Quoted in D. Parkhill, "The Necessary Structure", in D. Godfrey and D. Parkhill (eds.), Gutenberg Two: The New Electronics and Social Change (Victoria: Press Porcepic, 1980), p. 95.

2. D. Godfrey and E. Chang, "Telidon Is More Than Videotex" in D. Godfrey and Chang (eds.), The TELIDON Book, (Victoria: Press Porcepic, 1981), p. 2.

3. David MacDonald, "Rude Awakenings", an address delivered to the Canadian Bar Association Conference, Vancouver, March 1981.

4. Andrew Osler, "Warily into a Wired-Up World", Maclean's, November 16, 1981, p. 6.

5. D. Parkhill, op. cit., p. 72.

6. Ibid., p. 72.

7. A. Ouimet, "The Communications Revolution and Canadian Sovereignty" in Godfrey and Parkhill, op. cit., p. 137. Ouimet makes this comment with respect to TV but it is equally applicable to videotex.

8. Consultative Committee on the Implications of Telecommunications for Canadian Sovereignty, Telecommunications and Canada (Ottawa: Supply and Services, 1979), p. 2.

9. John Tydeman, "Relevant Aspects of Technology Assessment of Teletext and Videotex in the U.S.", research proposal, January 29, 1980, p. 1.

10. Ibid., pp. ii and 2.

11. This service option might not prove to be very important given the current generation (and cost) of microcomputers.

12. Alan Randall, Resource Economics, (Columbus: Grid Publishing, 1981), p. 148.

13. E. Furobotn and S. Pejovich, "Property Rights and

Economic Theory: A Survey of the Recent Literature", Journal of Economic Literature, X, 4, 1972, p. 1139.

14. A. Randal, op. cit. , pp. 145-146.

15. Ibid., p 146.

16. Ibid., p 146.

17. Ibid., p 147.

18. Ibid., p 147.

19. Ibid., p 148.

20. E. Furobotn and S. Pejovich, op. cit., p. 1140.

21. A. Randall, op. cit., p.152.

22. Ibid., p. 152.

23. Ibid., p. 152. (The words in brackets have been added.)

24. E. Furbotn and S. Pejovich, op. cit., p. 1140.

25. A. Randall, op. cit., p.148.

26. This would mean, for example, that IP's using service provider storage could be charged a higher price in total than IP's providing their own storage, but IP's providing their own storage could not be charged the same price as IP's using the service provider's computer for storage.

27. It should be emphasized that the expected cost of network overload would be an allowable cost to factor in to the price determination here. This could give rise to differential prices where certain users or uses which place disproportionate demands on the system can be identified. It should be emphasized, also, that a price rationing system would be the most efficient means of handling the problem of a technical capacity contraint. This would also be true in the case of teletext service. Finally, it should be noted that, although in the long run a pricing solution would lead to an easing of the capacity constraint, in the short run, for the case of telephone carriers, peak-load videotex usage could infringe on the rights of normal telephone users. While, theoretically, this could be solved by giving regular telephone subscribers the right to be compensated for the cost

of this "externality effect", thus internalizing the externality through the specification of property rights, in practice such a specification would be unenforceable.

28. Service providers could, for example, attempt to circumvent the nominal ownership rights of users by selling access to types of subscribers who, however, remain unidentified except in the memory of the computer holding the file.

29. Consultative Committee....., op. cit.

30. B. Ostrey, "Keynote Address", in Communications, Computers, and Human Settlement, Proceedings of the Ninth Annual Urban Studies Symposium, York University, March 1980, pp. 4-5.

31. Ostrey does acknowledge this. Ibid., p. 4.

32. D. Parkhill, op. cit.

33. Ibid., pp. 93-94.

34. Ibid., p. 84.

35. Ibid., p. 84.

36. Non-discriminatory pricing implies only that everyone be treated the same, subject to costs being the same; it does not indicate anything about the level of prices.

37. See, for example, D. Godfrey, "Introduction" in Godfrey and Parkhill, op. cit., pp. 4-5.

38. See R. Larratt, "Market Factors", in Godfrey and Chang, op. cit., p. 11.

39. For a discussion of the relative advantages/disadvantages of cable, see Tamec Inc., Videotex Services: The Market Potential for Cable (Montreal: 1979).

40. For a discussion of cost trends in the micro-electronics field, see J. Madden, "Simple Notes on a Complex Future", in Godfrey and Parkhill, op.cit.

41. Theoretically, the use of satellite transmission systems should make communications cost independent of distance. Whether this promise is realized in

practice, however, will depend on the degree to which common telephony carriers modify, or are required to modify, existing tariff structures to reflect this change in their underlying cost structure.

42. D. Parkhill, op. cit., p. 93.

43. Ibid., p. 82.

44. Consultative Committee...., op. cit., p. 17.

45. The telephone carriers have been accused of such behaviour, for example, in the case of mobile telephone service.

46. This argument is not altered by the fact that certain data banks may allow multi-party access because of the relatively small number of parties who are allowed access.

47. The gateway linkages referred to here could involve local, regional, national and/or international linkages.

48. Press Release, of the Computer Communications Group, Trans Canada Telephone System, May 20, 1981.

49. Computer Communications Group, iNet, TCTS, May 1981.

50. See, for example, A. Ouimet, op. cit.

51. R. Larratt, op. cit., p. 68.

52. G. Anderson, quoted in D. Godfrey, "Marketing Strategies", in D. Godfrey and E. Chang, op. cit., p. 87.

53. Infomart in particular believes that transactions services will be a key factor in putting consumers over this threshold point in the residential market.

54. This figure is attributed by Hough to DOC.

55. R. Hough and M. Kirby, A Study to Forecast the Demand for Telidon Services Over the Next Ten Years, (Ottawa: Roger W. Hough and Associates Ltd., December 1980), pp. 61-83.

56. Godfrey, for example, predicts a potentially high use of games. See D. Godfrey, "Epilogue", in D. Godfrey and D. Parkhill, op. cit., p. 189.

57. For a discussion of some of these points see R. Larratt, op. cit., pp. 70-74.

58. There is often a tendency with this argument to assume that desirability automatically translates to possibility.

59. For a discussion of "Visitor's Guide" see R. Larratt, op. cit., pp. 60-61.

60. D. Parkhill, op. cit., p. 79.

61. A. Chitnis, quoted in D. Godfrey, "Marketing Strategies", in D. Godfrey and E. Chang, op. cit., p. 89.

62. This type of communications cost structure is being used by the "Grassroots" system.

63. "Host computer" as used here could refer to a chain of host computers owned and operated by the service provider.

64. The impact on IP access may be particularly crucial for public-interest, non-profit organizations wishing to be IP's. Infomart has currently adopted a policy of giving up to 10% of the data base storage free of charge to such groups. It may be that government will decide to impose such a requirement on all service providers.

65. D. Godfrey, "Apples, Sorcerers, and Other Monsters", in D. Godfrey and D. Parkhill, op. cit., p. 162.

66. Madden, (op. cit., p. 55), for example, notes that "An important characteristic of videotex systems is that it costs as much to format and insert information which is seen by one viewer as it does if one million people see it."

67. Larratt, for example, (op. cit., p. 78) notes the leadership role of Infomart and the importance of this in promoting Canadian, U.S., and other sales.

68. Gordon Thompson, "Memo from Mercury", (Bell Northern Research, 1979).

69. This comment could be offered with respect to government content in any information medium.

70. "Grassroots" is oriented towards agri-business,

"Novatex" is aimed at the business market and B.C. Tel's field trial was intended to be aimed at assessing business market potential.

71. Madden, for example, (op. cit., p. 85) makes this recommendation.

72. G. Fierheller, quoted in D. Godfrey, "Marketing Strategies", in D. Godfrey and E. Chang, op. cit., p. 82.

73. D. Parkhill, quoted in ibid., p. 92.

74. R. Larratt, op. cit., p. 51.

75. For a description of the various field trials see M. Kurchak, Telidon: the information providers (Ottawa: Department of Communications, March 1981).

76. G. Fierheller, op. cit.,p. 82.

77. A. Chitnis, op. cit.p. 89.

78. The B.C. Tel trial was originally intended to a) represent a marketing trial and b) concentrate specifically on business users/applications. However, a number of planned business firm participants decided not to participate. The result is that 50% of the TUT's have ended up in public access areas (shopping malls, libraries, etc.).

79. For a discussion of major field trials/market offerings outside Canada, see R. Larratt, op. cit. and E. Ferrarini, "Videotex: The Race to Plug In", Computerworld Extra, XV, 11a, March 18, 1981.

80. R. Larratt, op. cit., p. 19.

81. Ibid., p. 24.

82. G. Anderson, quoted in D. Godfrey, "Marketing Strategies", in D. Godfrey and E. Chang, op. cit., pp. 55-56.

83. R. Larratt, op. cit., pp. 55-56.

84. D Carlisle, quoted in M. Mehr, "Videotex: Initial marketing a chicken and egg problem", Financial Post, Special Report, June 14, 1980, p. S3.

85. R. Larratt, op. cit., p. 48.

86. Ibid., p. 26.

87. For a discussion of this point see A. Ouimet, op. cit., p. 137.

88. TAMEC, op. cit.

89. D. Godfrey, "Survival of the Fastest" in D. Godfrey and D. Parkhill, op. cit., p. 102.

90. It should also be noted that the operator costs, e.g., billing, data base management, etc., will be higher with two-way service.

Glossary

Addressing Capability - the ability to interact a specific user.

Block subscription - to purchase access to a given number of pages of information or a given amount of access time.

Broker - see Videotex broker.

Common carrier of videotex - carriers offering to transmit videotex service to the general public.

Common service provider - service providers offering the videotex data bases of independent IP's for sale, directly or indirectly, to the general public.

Distribution provider - any person or organization which provides the physical distribution network used to carry videotex service from the service provider to the user and/or from third party computers to service providers.

Electronic mail - direct contact between two or more parties through the videotex systems. It may take the form of a store and forward message service.

Financing structure - the system employed to pay the costs of videotex.

Flat rate subscription fees - a fixed fee for service charged, for example, on a monthly basis. The amount of usage does not affect the amount paid.

Gateway computer - a central computer which provides automatic access to third party computers.

Host computer - a computer used to store the data bases of IP's.

Information provider (IP's) - any person or organization involved in directly providing pages of information to videotex.

Information retrieval service - the use of videotex to receive pages of information upon request.

Master index - a central directory of the videotex information base by title, subject, and/or by service provider.

Price structure - the system of direct user charges employed.

Service provider - any person or organization which makes available videotex service directly to users.

Storage provider - any person or organization which provides computer facilities used to store a videotex data base(s).

Telidon - a particular technical version of videotex developed in Canada.

Teletext - a one-way videotex system which is typically transmitted in broadcast mode on either cable systems or over the air.

Third-party computers - computers involved in videotex transactions other than those of the service provider and/or the carrier.

Transactions services - the use of videotex to carry out commercial transactions such as banking, shopping, and bill paying.

Transparent user connection - the use of gateway computer, such that the user appears to have direct access to an IP's data base.

Umbrella IP - a videotex IP whose data base is a collection of the data bases of more than one independent IP.

Usage-sensitive fees - a user pay system where users are charged on a per page or unit of time basis.

Videotex - the widespread dissemination of textual and graphic information by electronic means where the recipient can selectively control the display of information on terminals. (often suitably equipped television receivers).

Videotex brokers - any person or organization which plays the role of market middleman between IP's and videotex service providers.

Videotex market - the buying and selling of videotex services. This encompasses all aspects of the production and sale of videotex service and the purchase and consumption of videotex service.

Videotex market structure - the way in which the videotex

market is organized and conducted.