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ABSTRACT

Interactive cable television systems take advantage of the ability of coaxial cables to transmit information in two directions. QUBE in Columbus, Ohio, and Project Ida in Canada use cable's interactive ability to provide a variety of services. QUBE allows electronic "town meetings" and provides access to stock quotes, newspaper headlines, encyclopedia listings, and electronic games. Using sensors, it can also provide home security. Among other services, Project Ida provides automatic meter reading and teleshopping to a thinly populated region. There are, however, dangers associated with interactive cable systems. Media corporations seek regulated monopolies as a way of maximizing profit, not customer service, and the use of interactive cable also opens up the possibility of violations of privacy through the improper collection or misuse of information about subscribers. Since these potential economic distortions and violations of privacy are directly related to lack of competition in providing these services, public policy should formulate regulations that encourage competition. (JL)

ALL ON ONE WIRE:
PROS AND CONS OF MEGA-CHANNEL, INTERACTIVE CABLE

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Cable television's trade-offs accrue because of the number of needs once served by transportation that can now be fulfilled and concentrated through this one communication channel. Where home residents once drove their car to a theater or store, where public service employees once drove through neighborhoods reading gas and electric meters, an interactive cable can now fulfill all of these needs. In the past, these functionally diverse and fragmented events extruded from the house into the environment.

Interactive cable reverses this flow and allows the environment to come to the house in a very individualized configuration. When the records of a person's activities are scattered among coat pockets, the bottom of shopping bags and the bills tray, the chaos itself is the first defense against "invasion" of privacy. If a consumer invites the cable into his/her home, the conduit carries convenience to the subscriber and information about that subscriber to the cable's head-end. The high degree of organization that characterizes this information creates the potential threat to privacy. Thus, the dangers are inherent in any technology which allows previously scattered activities to be concentrated in one place and requires monitoring to inform the providers of the diverse services.

The remainder of this paper is divided into four parts. First, a brief discussion of the technological capabilities of cable will be presented. Then, a description of the advantages that interactive cable can offer will be presented by examining Warner Amex's QUBE in Columbus, Ohio and Manitoba Telecommunication System's Project Ida. Next, trade-offs with respect to privacy and economic distortions will be explored. Finally, a summary and conclusions will be offered.

TECHNOLOGICAL CONSTRAINTS ON CABLE

Cable systems can distribute "downstream" up to 60 channels of full-band video in a single coaxial cable. "Downstream" means the signals flow from the program originator to subscribers' homes. These channels are frequency-division multiplexed which means that all of the channels flow simultaneously to the homes.

As a result of using one cable that carries many channels, channel choice must occur at each subscriber's home rather than at the "head-end" (originating point) of the signals (Switzer, 1983 p. 23). An alternate, but extraordinarily expensive, approach would be to send the equivalent of 60 individual broad-band phone lines to every home. With this configuration, the cable company could selectively prevent any programming from reaching any individual subscriber's home.

Under current system architecture, cable companies jam or scramble chosen signals which are unscrambled or "trapped" by the viewer's decoder box. The company decides which signals to scramble based on the signal's economic value (HBO, pay-per-view) and/or program content (e.g. adult films).

Earlier versions of this "addressable" technology required viewers to call the cable company on the telephone and ask them to de-scramble the signal. This was a bother for the viewer (busy phones, inertia), and from the cable

company's point-of-view, a costly bottleneck that limited impulse purchases of programming. A better alternative was to distribute "on-line addressable" boxes which would permit an event-by-event, instantaneous selection by the viewer.

Two-Way Systems

Any coaxial cable is technically capable of carrying information simultaneously in both directions, i.e. "upstream" and "downstream." However, the cable must be equipped with band-splitting repeater amplifiers that boost the signal over the length of the cable and work in both directions (Switzer, 1983, p. 25).

Early cable systems were built with one-way repeaters so this addressable was not built-in. Nor would it be economically justifiable to tear up the cable and upgrade the systems with two-way capabilities. However, newer systems such as Warner Amex's Columbus QUBE system (1977) are equipped with two-way capability from their inception.

Interactivity is becoming nearly a prerequisite for cable companies to offer if they hope to win a franchise. Warner Amex considers their experience with Columbus-QUBE important in having helped them win awards in Pittsburgh, Dallas, Houston and Cincinnati. Most recently, Chicago checkerboarded the city with five franchises; each successful bidder offered 120 channels and interactive capability (Broadcasting, 1/10/83, p. 32). Similarly, seven of the eight contenders for Philadelphia's franchises have proposed interactive capability (Broadcasting, 1/3/83, p. 34).

QUBE

QUBE, the first large-scale two-way TV system began in Columbus in late 1977. Today, the service offers 30 programmed channels and a 5-choice interactive response console. More recently-built Warner Amex systems are more sophisticated, offering 110 channels and ten-choice interactive consoles.

Stereo movies, FM and weather radar services are available in all QUBE cities. In addition, programming can be narrowcast to selected households. In Columbus, various "town meetings" have been carried out on QUBE, which Becker (1981) envisions as cable's promise for "teledemocracy."

The interactive capability includes more than just TV programming. QUBE, in an experiment with locally-based Compuserve, offers videotex services to 100 households. This provides these households with access to stock quotes, newspaper headlines, encyclopedia listings and electronic games. Bill McGowen, chairman of MCI heralds two-way cable as offering a potential option to the local phone company's service for a lower monthly charge (Schley, 1982, p.1.).

Home security is also an optional service offered by Warner Amex in Columbus. Homes are custom-fitted with sensors for intrusion and fire. If the alarm is tripped, a computer calls the police, fire department and hospital as needed. Depending on consumer choices, the system can cost over $500 for installation and around $20/month for the service.

An interesting feature of the security system is the user's option of providing personal information to emergency services. The fire station can be notified of the number of children who live at home and the medical loop can provide the paramedics any relevant medical history about the occupants.

Warner Amex's interactive services have been inspired by the profit motive--they expect to make a good deal of money when the market reaches a critical mass. And in the sense of market penetration, the Columbus experiment has already proved fruitful. Warner Amex's new franchises in Pittsburgh, Cincinnati, Dallas and Houston all dwarf Columbus in subscriber-base. Though these interactive systems are all inspired by the profit motive, government has also financed interactive cable. Project Ida in Canada's Manitoba province is a case-in-point.

Project Ida

Manitoba's telecommunication needs are handled by the Manitoba Telephone System (MTS). The MTS owns the rights to all current and future coaxial cable facilities in Manitoba (Hylnka & Hurley, 1981, p. 87).

Manitoba is a thinly-populated rural province; slightly more than one-million people are distributed over one-million square miles. MTS services 212 communities in Manitoba, of which 161 have less than 1,000 persons (Hylnka & Hurley, p. 87).

One of these small communities, Headingly, was chosen as the site for Project Ida. One hundred homes were linked via two-way coaxial cable and provided with basic and pay cable, automatic meter reading, telephone and teleshopping services in 1981. The cost of wiring these 100 homes was 1.8 million dollars (Hylnka & Hurley, p. 98).

As with other technologies, these costs will decrease in the future and distribute more economically as the service universe expands. MTS feels this approach is justified because the costs can be spread across many services provided by the one "electronic highway" (Bloom, et al., 1980, p. 39). From the citizens of Headingley's perspective, the project is a true bonanza. The phone system has been upgraded to digital service, the first cable tv signals have been made available, and a fire monitoring service (smoke detectors) has been installed; especially important to a community without a local fire department. The Trempeleau County, Wisconsin rural cable consortium presents another example where cable can bundle services attractively for rural populations (Ekdom and Larson, 1982).

Whereas DBS can serve rural area's entertainment needs, the interactive capabilities offered through cable can't be replicated. Cable allows benefits to flow both ways along the wire. Headingley subscribers are eligible to save 25

percent on fire insurance premiums and to guard against loss of heat as well. Through the cable, the gas utility can tell whether the heating system is malfunctioning. This can save lives and property damage (from burst water pipes) during the Manitoba winter, characterized by temperatures down to -48 degrees Fahrenheit.

The utilities themselves benefit because water and gas meter reading can be done remotely saving labor and transportation costs in their wide-flung service area. On a larger scale, an interconnected monitoring system would allow energy to be allocated to meet peak demands. More efficient use of existing power could save constructing costly new generating plants (Hylnka and Hurley, 1981, p. 91). The potential of the system and the operation itself are highly regarded by MTS which is beginning a second, more expensive, project involving fiber optics.

DRAWBACKS OF INTERACTIVE CABLE

There are two potential drawbacks inherent in interactive cable and the combination of services that can be provided through this technology. The first was alluded to in the introduction -- privacy. The second concerns regulated-monopoly pricing of services as granted by most municipal franchises.

To win franchises, cable companies are offering money-losing bids for basic services with the expectation of earning large profits in tiered and ancillary services. For example, even with estimated costs of from 74- to 175-million dollars, each of the five companies bidding for Chicago offered a basic service of 120 channels for five-dollars-a-month or less (Broadcasting, 1/10/83, p. 32). Looking at the earlier Dallas competition, Gary A. Dent Associates (using the bidders own figures) project rates-of-return ranging from 4.74 percent to -5.32 percent over the 12-year life of the franchise (Smith, 1981, p. 37). Clearly these profit levels are not what is of interest to the competing cable companies.

Cable companies are interested in the opportunity to run a regulated monopoly and this is what attracts low bids for basic services. Duffy (1982) attacks this arrangement by comparing economic efficiency with economic fairness. He argues that media corporations seek competition-limiting government regulations as a profit-maximizing strategy (Duffy, 1982, pp. 4-7). At the same time, the companies fight profit-losing regulations promulgated for the "public good." For example, in the FCC 1972 Report and Order, cable systems in the major TV markets were required to have the potential for 20 channels of programming and to provide at least four access channels. Both FCC regulations have been rescinded on challenges brought by the cable industry (NCTA Cable Primer, 1981, p. 33).

A related economic argument against monopoly franchising is the likelihood of encountering commodity bundling practices. Under monopoly conditions, prices are set to maximize profits without regard to competitive response. If a monopoly offers two or more products, each product can be priced individually, only as part of a package (bundle), or with a mixed bundle strategy in which each product can be purchased either alone or as part of a package. The strategy that maximizes profits is the one that attracts the highest prices while excluding the fewest customers.

When bundling is used, many consumers (or cable subscribers) are forced to pay for a service they don't want in order to get something they do. For example, Warner Amex will will not give its Columbus subscribers access to the $12/month HBO channel unless the subscriber also takes the $13/month QUBE service. So, if a viewer only wants to watch HBO and network television, he/she is paying $13/month bundling charge for that privilege (for a full discussion of commodity bundling, see Adams and Yellen, 1976).

The potential distortions of granting exclusive franchises to interactive cable companies is still of secondary concern to the general population. Today, citizens seem most concerned about cable's potential threat to privacy.

Privacy

Nash and Smith (1981) have identified four facets of the privacy issue: (1) intrusion, (2) interception, (3) misuse of information, and (4) aggregation by household.

Intrusion is the trade-off for the benefits offered by monitoring services. Monitoring energy use or video reception can identify whether the home is occupied. Data collected from energy load management can serve to set policy for energy consumption under potential brownout conditions. Intrusion is a form of constant surveillance.

Interception is of particular concern. As stated earlier, all information flows simultaneously on a coaxial cable. Cable systems are designed using a "tree structure", with individual homes feeding into branch lines which in turn feed into trunk lines which ultimately concentrate at the head-end. As one moves closer and closer to the head-end, more and more of the upstream information is available for potential interception. A properly configured home computer can capture the system's data and read it to disk. Later, the software can be deciphered and subscriber information extracted (Campbell, 1983).

The above scenario requires a sophisticated criminal with a computer. Such persons exist, and currently plague the banking industry where the rewards for stealing the information are much more obvious. The cable industry's greater problem is that a much less technologically-sophisticated interception is possible. The system operator can extract any information of interest at the head-end using the system's own computer. A dishonest employee can aggregate lists as requested by a marketeer or politician.

The forms of interception discussed above are clearly illegal and never condoned by the cable systems. Nonetheless, from the perspective of the consumer, even legally-gathered information can be misused. To address this issue, Warner Amex has developed a comprehensive Code of Privacy that it distributes to its cable customers. Article V of this privacy code reads:

> Warner Amex will refuse requests to make any individual subscriber information available to government agencies in the absence of legal compulsion (emphasis added), i.e., court order, subpoena. If requests for such information are made, Warner Amex will promptly notify the subscriber prior to responding if permitted to do so by law. (Warner Amex Privacy Code, 1981).

This article was tested in a 1980 pornography case in Columbus. An adult-movie theater, Studio-35, showed a film titled Taxi Girls. It was raided by the police and charged with exhibiting obscene material. The Adult Film Channel on QUBE has shown Taxi Girls, earlier that year. The theater's attorney subpoened QUBE's individual viewing records relevant to that film to use as part of a community standards defense. QUBE refused the request for individual records, but did provide aggregate viewing records. These data showed 10,665 households had tuned in Taxi Girls, more than the number of customers who had seen the film at Studio 35 (Jenkins, 1982, pp. 58-59). Partially because of this evidence relevant to contemporary community standards, the case against the theater was dismissed (Franken, 1980, p. 1).

Warner Amex's Privacy Code also addresses Nash and Smith's (1981) fourth privacy category--aggregation by household. Three of their code's eleven articles address this issue. Article III states (in part): "Individual subscribers viewing or responses may be recognized only where necessary to permit billing or to render a subscriber service." Article VIII states: "Subscriber mailing lists shall not be made available to third parties...without first providing subscribers with the opportunity to have their names removed from such lists." And Article X includes this phrase: "Third parties who participate in providing services to

Warner Amex subscribers shall be required to adhere to the Company's Code of Privacy..." Unfortunately, enforcement procedures are not specified; a particular concern since these data are so central to the billing and marketing functions that service providers undertake as part of their regular business.

SUMMARY AND CONCLUSIONS

The advantages and potential drawbacks of the mega-channel, interactive cable system come about because of the coaxial cable itself--a single electronic highway that links an individual home with a multitude of external services. Whereas in the past, each person had to lead a comparatively disorganized life, cable allows for a much tidier, and recordable, existence. This is the source of potential drawbacks and advantages of interactive cable.

Since the system multiplexes information onto a single cable, access to that information must be carefully controlled. It is doubtful that viewer privacy can be strictly protected as cable systems enter into an increasing number of third-party contracts. Further, as the population grows more technologically-sophisticated, the likelihood of outside individuals tapping the cable's information increases.

The central issue is whether public policy should continue to protect exclusive franchises that fosters the concentration of services. The economic distortions and the presently unavoidable privacy concerns are directly related to this lack of competition.

Another public policy issue revolves around whether the right to privacy should be assignable by the individual. To date, it has been implicitly asssumed by mailing list sellers. While the rationale seems tenuous, it is argued that in return for your name you receive information of value to you. Whether the right to privacy should be assignable by anyone could become an issue to those who prefer not to assign their right. For, if an individual lives in a cabled

neighborhood and 70 percent of his/her neighbors assign their right to privacy, the aggregated data will likely produce a statistically accurate profile of the uncooperative household.

In conclusion, public policy may best serve its constituency by formulating regulations that encourage competition within franchise areas. Alfred Kahn (1982) argues that competition could be introduced at the "fringes" of franchises, allowing one system to expand its boundaries at the expense of its neighbor. In a more radical (and worrisome to the cable industry) approach, Denver citizens are challenging an exclusive franchise award on First Amendment grounds (Huffman, 1982, p. 1-ff.). In a competitve cable environment, the subscriber is more likely to enjoy the phenomenal advantages of interactive cable without the pricing and privacy problems raised by the current structure.

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