

WASHINGTON UNIVERSITY LAW QUARTERLY

Volume 1968

Winter, 1968

Number 1

A PROPOSAL FOR WIRED CITY TELEVISION*

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The present television system could improve its service to the public. Its programs are not as diverse or numerous as books or magazines. There is virtually no pay-TV to serve consumers who would prefer to pay directly for specialized programs. Tax-supported public television is an emaciated industry. Network TV offerings tend, for good reason, to emphasize mass audiences. Commercial TV time is heavily laden with advertisements.

The reason for program deficiencies is not that those who run networks and stations are incompetent. The difficulty is that, under present arrangements, there are too few television signals being delivered to homes. In

* This paper was among those commissioned jointly by Resources for the Future, Inc. and The Brookings Institution, both of Washington, D.C., and served as the basis of discussion at a symposium held September 11 and 12, 1967, at Airlie House, Warrenton, Virginia. The views expressed by the authors do not necessarily represent those of the trustees, officers, or staff of either sponsoring organization. They should not be interpreted as reflecting the views of The RAND Corporation or the official opinion or policy of any of its governmental or private research sponsors. Papers are reproduced by The RAND Corporation as a courtesy to members of its staff.

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For the authors' earlier work relating to wired city television, see Barnett, *The Economics of Broadcasting and Advertising*, 56 AM. ECON. REV. 467 (1966); Greenberg, *Wire Television and the FCC's Second Report and Order on CATV Systems*, 10 J. LAW & ECON. 181 (1967). The authors wish to acknowledge that much of the work presented here also derives from the work of or discussion with RAND colleagues, particularly S. Alexander, P. Baran, N. Feldman, M. Greenberger, J. Goldson, J. Hult, L. Johnson, and A. Phillips. In addition to the growing literature on wire or cable television, important discussion may be found in the Airlie House Conference papers of Federal Communications Commissioner Nicholas Johnson and Leland Johnson, now Research Director of the President's Task Force on Communications. Both of these papers appear in this two part WASHINGTON UNIVERSITY LAW QUARTERLY symposium on communications. Finally, the authors have benefited from discussion with conferees—Federal Communications Commissioner K. Cox, and P. Gifford, H. Goldin, and others. Of course, none of the above is in any way responsible for this paper.

turn, this shortage is due to a combination of limited TV spectrum assignments to populated areas and the high fixed cost of television broadcasting. If more channels were available and the expense for transmitting and network connection of programs were less, and correspondingly more dollars were available for creating programs, then the number of programs and their diversity and range would be greater.

This article proposes that a national system of wired city television (WCTV), inexpensively interconnected, is the best avenue to more and more varied programs. Television would then have capacity and incentive to educate, inform, and entertain specialized interests as well as general interests and mass tastes.

The WCTV system has a number of desirable features: 1. The costs of wired cities would not be restrictive; 2. The improved offerings—volume and diversity—would come about without censorship or other government controls, within a relatively free market governed by individual consumer preferences and citizen group decisions, informed by experimentation and permitting wide choice; 3. Access to channels and costs for sending individual programs and series of programs would be extremely favorable; 4. Local programming would be encouraged because of the availability of channels for local expression and the low costs of broadcasting; 5. Without restricting advertiser-supported TV, there would be channels for pay-TV and for tax-supported stations and programs; 6. Television time for political campaigns would no longer be prohibitively expensive to candidates of moderate or small means; 7. A large quantity of desirable frequencies on the electromagnetic spectrum could be liberated for other uses; 8. The early arrival of a number of new and exciting communication activities would be fostered.

To put the matter as simply as possible, a system of wired city TV makes it possible to increase very greatly the number of operating channels available to almost all of the homes in the nation. The carriage of a television signal to the home from a local studio camera or tape machine then becomes far less expensive than now. Intercity connections would be accomplished as under present arrangements—microwave and cable—or could take advantage of the new satellite technology discussed by Leland Johnson.¹ We try to show below that the great increase in availability of low-cost television channels would be a sufficient condition to insure significant increases in numbers of programs and diversity, and that other alternatives cannot accomplish this as well.

1. Johnson, *New Technology: Its Effect on Use and Management of the Radio Spectrum*, 1967 WASH. U.L.Q. 521.

I. LIMITED NUMBERS OF COMMERCIAL TELEVISION STATIONS

There are almost 700 stations in the United States. New York and Los Angeles have six stations each. About 100 or so other local markets in the United States have three, or occasionally four or five, stations. The remaining several hundred stations are in one or two station markets.

Network viability is limited by the number of primary affiliates available in local markets. This is because network revenues are less if affiliates are fewer, while the cost for programs, national microwave, and some other items is invariant. The third network today is disadvantaged by having only about 125 primary affiliates, as compared with about 170 in each of the other two networks. If a fourth network company were formed, it would find far less than 100 markets in which there were stations not already affiliated and only about 120 if all Federal Communications Commission (FCC) station assignments became operating stations.

The reasons for relatively few stations are several. One is the availability of frequency assignments from the FCC. Although the FCC has made a very liberal allocation to television from the entire available and useful electromagnetic spectrum, and then assigned these to individual population centers, the number of channels in each area is still very limited.

Second, the nature of station costs and revenues impedes entry. Much of the costs of any given operating station are fixed and large. With respect to revenues, stations in effect sell their viewing audience to advertisers. Other things equal, station revenues are proportionate to audience. There is a high threshold for profitability. Further, in the absence of a network affiliation the station has no revenues from network advertisers; and from lack of network programs, the station both incurs extra program costs and draws smaller audiences. In summary, because of high fixed charges, a substantial audience size is a necessary condition for profitability, and this limits numbers of stations. The limited number of stations then limits the number of viable networks, and this in turn further constrains station viability.² (Perhaps there is a similarity with full-coverage newspapers, which also may have a high threshold for entry and profitability related to scale; but we do not know this to be the case.)

2. See Barnett, *Economic Markets in Television*, filed in connection with Plains Radio Broadcasting Co., 32 F.C.C. 811 (No. 14223, 1962) and *Hearings Before the House Committee on Interstate and Foreign Commerce*, 87th Cong., 2d Sess. (March 9, 1962); Greenberg, *Television Station Profitability and FCC Regulatory Policy*, 1967 (Unpublished Working Paper 6702, Dept. of Econ., Washington University); Steiner and Barnett, *Comments of Economic Consultants on the MPATI Petition*, filed in connection with F.C.C. Nos. 14229, 15201 (April 3, 1964).

II. PREFERENCE PATTERNS AND PROGRAMS

It is argued, following Professor Steiner, that program diversity will be limited, given that numbers of stations and networks are limited and given significant costs of programs and operations.³ Steiner postulates that consumer program preferences are characterized by clusters around certain types. In order to maximize profits, broadcasters attempt to reach the largest possible audience. The first broadcaster will attempt to satisfy the largest audience cluster. The second will aim for the second largest cluster or an expected value of about one-half of the largest cluster, whichever is larger. And so forth. Thus, minority-taste audiences—clusters with relatively small numbers—will not be served until a relatively large number of broadcasters are present. Of course, at some point there may be no frequency assignment or the revenues to be derived will be insufficient relative to the costs, so that some audiences will not be reached at all.

The foregoing is theoretical and only describes a tendency. In the facts of the case, viewer preferences in each of the major time periods (or at least broadcaster and rating-service measures of these) do aggregate into large clusters or mass preferences.⁴ Given the relatively small numbers of stations in each local market and the small number of networks in the nation, television offerings in prime time, as is well known, center on successful types of programs. The result is that program diversity—range and variance of program types—is restricted. Contrary to some criticisms that the television business does not care about the public preferences, we think that networks and stations do strive for maximal audience viewing. The mass audience clusters are indeed served, although of course the number of programs for such audience is limited by the small number of stations and networks.

Evidence on the explanatory power of this model includes the fact that where the numbers of television stations are greater (for example, in New

3. See Steiner, *Program Patterns and Preferences and the Workability of Competition in Radio Broadcasting*, 66 Q.J. of ECON. 194 (1952). The emphasis on product differentiation shows the influence of E. Chamberlain's *THEORY OF MONOPOLISTIC COMPETITION* (1960). A similar model, which is less complete in some respects, is to be found in Hotelling, *Stability in Competition*, in *READINGS IN PRICE THEORY* 467 (G. Stigler & K. Boulding eds. 1952); Rothenberg, *Consumer Sovereignty and the Economics of TV Programming*, 4 *STUDIES IN PUB. COMMUNICATIONS* 45 (1962); Wiles, *Pilkington and the Theory of Value*, 73 *ECON. J.* 183 (1963).

4. We do not believe John J. McGowan's comments refute this. See McGowan, *The Economics of Competition and Regulation in Commercial TV Broadcasting*, 1967 *WASH. U.L.Q.* 499. The clusters necessary for the application of the Steiner model should not be identified with such program types as Westerns or situation comedies. It is necessary to think in terms of audience clusters, which are sets of viewers attracted to sets of programs. See Lange, *Areas of Radio Preferences: A Preliminary Inquiry*, 41 *J. OF APPLIED PSYCH.* 7 (1957).

York, Los Angeles, and Chicago) the diversity of programs available in each time period is also greater. The examples of AM and FM radio in large and moderate size cities suggest that a wider variety of program choice is made available to U.S. audiences as the number of radio broadcast stations increases. In another communications medium, magazines, we see publications which serve mass audiences, such as *Life*, *Reader's Digest*, and *Family Circle*, and also magazines which appeal to virtually every specialized interest which one can imagine. The 1967 edition of the *Standard Periodical Directory* lists 30,000 publications, including the *American Miniature Schnauzer Club News Letter*, *Table Tennis Topics*, *National Button Bulletin*, *National Swine Growers Council Newsletter*, and the *Hay Fever Bulletin*.

We conclude that the potentials of the marvelous television medium to entertain, inform, educate, and communicate could be better realized than today if there were more channels and operating stations. These could accommodate not only channels for commercial television supported by advertisers, but also channels for other commercial television forms, including commercial television supported by annual subscribers, commercial television sold to viewers as individual programs, and low-cost commercial television for politicians and others who wished to make speeches or perform. And there should be included low-cost channels for education television stations and possibly other tax-supported, public service broadcasting. Alternatively, if more operating stations are not possible, then some other solution is necessary, if greater program volume and diversity are to become available to the public.

III. BRIEF DISCUSSION OF ALTERNATIVE SOLUTIONS

Assume continuation of a U.S. commercial television industry in which programming decisions are left to private enterprise motivated by a profit incentive, free from direct control by government. Then, if increased program volume and diversity is to be achieved, we need an increase in numbers of stations and networks or another solution. Some alternative reactions and proposed solutions will now be briefly examined. These are not "straw men." Each has been put forth by serious students of the problem. Most have virtues, but each has serious defects as compared to the wired cities television (WCTV) proposal which will be later discussed at length.

A. *Continue Present Policy: Pessimistic View*

As Commissioner Lee Loevinger has stated:

The common man has every right to be common. A demand that popular entertainment conform to the taste standards of critical intellectuals is mere snobbishness. Television is a golden goose that

lays scrambled eggs; and it is futile and probably fatal to beat it for not laying caviar. Anyway, more people like scrambled eggs than caviar.⁵

Within the two constraints of a severely limited number of stations and no government interference, Commissioner Loevinger's stated position may be valid. But E. B. White in his statement to the Carnegie Commission whets our appetite for the caviar:

. . . I think television should be the visual counterpart of the literary essay, should arouse our dreams, satisfy our hunger for beauty, take us on journeys, enable us to participate in events, present great drama and music, explore the sea and the sky and the woods and the hills. It should be our Lyceum, our Chautauqua, our Minsky's and our Camelot. It should restate and clarify the social dilemma and the political pickle. Once in a while it does, and you get a quick glimpse of its potential.⁶

B. *Continue Present Policy: Optimistic View*

The majority of the FCC seems to subscribe to this position. The members contemplate moderate increase in numbers of local television stations, on UHF. The FCC would achieve this by continuing to reserve spectrum space for future entries, by preventing the further growth and development of CATV systems, and by licensing translators which might become ground satellites and eventually TV stations. While this program might be desirable on some counts, there are serious difficulties. First, even if all the UHF channel assignments became stations, there would not be a large number of signals available in major cities. Second, there is substantial doubt that all of the reserved channels could become operative in the near- or medium-term future because of profitability considerations. For example, a great many of these UHF stations are designed to provide second and third services to areas of rather small communities and populations where cost and revenue conditions for additional stations are quite unfavorable.⁷ The possibilities of an increase in broadcast services to, say, AM and FM radio standards seem small or remote. Third, in this effort to foster entry and viability of advertiser supported UHF stations and because spectrum is limited, the FCC policy obstructs the advent and growth of pay-TV and CATV.⁸ Fourth, the policy has the effect of continuing to tie up a large portion of the electromagnetic spectrum for television.

5. Tobin, *Closing the TV Quality Gap*, SATURDAY REV., April 8, 1967, at 73.

6. Carnegie Commission on Educational Television, *PUBLIC TELEVISION: A PROGRAM FOR ACTION 13* (1967).

7. See note 2 *supra* and sources cited therein.

8. See Greenberg, *Wire Television and the FCC's Second Report and Order on CATV Systems*, 10 J. LAW & ECON. 181 (1967).

C. *Increased Regulation, Particularly of Networks*

Perhaps the most likely victims of increased regulation would be the three major networks. There is considerable feeling within the Commission that the networks have too much power and are responsible for the lack of diversity in television broadcasting. One result of this view is the proposed rule-making of the FCC which would limit network production to 50 percent of prime-time programming. While the networks do indeed have very great social power, perhaps justifying this or similar restrictions, it does not appear to us that such a step will significantly increase diversity. It does not increase the number of stations or networks. We still expect advertisers to reward best those broadcasters which deliver the largest audiences to them. The networks' strong position is a result of strong program service to the mass audience. The limitation in numbers of networks is primarily a result of a limited number of stations available for affiliation. If we could increase that number, much of the oligopoly power of the present networks would disappear.

An interesting regulatory scheme has been proposed by John McGowan⁹—to tax additional programs of particular types to discourage their proliferation. However, he points out the difficulties in administering such a system; it might also be noted that putting programs into types is extremely difficult: not all Westerns appeal to the same audience, for example, so that what appears to be duplication under one assignment of programs to types may not be duplication under another assignment. Finally, we question a scheme which gives power differentially to destroy, shape, and coerce communications to those who determine the tax rates.

D. *Pay Television*

It has frequently been argued that pay television will make it possible for minority audiences to view the programs they desire. This argument is generally based on an analogy with other goods in the market system, where open entry and differential prices make it possible for varied tastes to be satisfied. However, as has been noted, an important distinction in the television case is the small number of stations, and obstacles to free entry from channel shortage or high fixed cost or too few networks.

It seems that a likely result of substituting a commercial pay-TV system for an advertiser-supported one in a market with few stations is that programming designed to appeal to mass audiences could then appear on the pay-TV channels to the extent permitted by the FCC. A commercial pay-TV system properly will aim for profits, and the greatest profits will still

9. See McGowan, *supra* note 4.

appear where the audience is largest, irrespective of whether audience or advertisers pay. In general, commercial pay-TV would contribute a solution to the problem of diversity and numbers of programs only to the extent it would provide additional stations.

In any event, the emasculated version of pay-TV which has been proposed by the Communications Commission seems unlikely to accomplish anything toward increased diversity. The FCC has been so concerned to protect the advertiser-supported stations from losing viewers or programs that its proposal makes pay-TV virtually noncompetitive and hardly viable.

E. *Ford and Carnegie Foundation Proposals to Aid ETV*

The recent proposals of these two influential foundations¹⁰ differ with respect to details of financing and organization, but the aim of each is to support on a much greater scale the programming and facilities of non-commercial television stations. These proposals are imaginative and exciting, but in our view they make only a limited contribution to the central problem—the shortage of viable broadcasting outlets. If the proposals were adopted, we would, at a cost of about a quarter of a billion dollars per year, have a single additional, well-operated, non-commercial channel in most cities. Thus the Ford and Carnegie proposals would, if adopted, support with tax funds and some private gifts a network which would appeal to a small, but eloquent and outspoken minority of viewers. This would be a gain: in providing diversity as such; in experimenting with new programs which, if successful, would sometimes be followed by commercial TV stations; and in providing high-culture programs to improve society. These gains could also be realized in the wired cities system, described below, at lower cost. Of course, there are also hazards in providing so powerful a tax-supported communication tool whose function includes “upgrading” audience tastes, but this question occurs also in civic symphony orchestras, opera, and theatre, and in operation of colleges, museums, etc.

F. *Satellites*

What will be the effects of space satellites on the television industry? Satellites can significantly reduce the costs of long-distance transmission between stations. This reduces networking cost. But it could have only small effect on the present economic barrier to station entry (revenues vs.

10. See Carnegie Commission on Educational Television, *supra* note 6; Ford Foundation, *Comments of the Ford Foundation*, in response to Commission request, *In re* the Establishment of Domestic Non-Common Carrier Communications-Satellite Facilities by Non-Governmental Entities, 2 F.C.C.2d 668 (1966) (filed Aug. 1, 1966).

costs) and thereby only very small effect in increasing station numbers.

What about the possibility of direct satellite-to-home broadcasting?¹¹ Leland Johnson¹² sees several problems with this. In the first place, such broadcasting will not increase the total number of signals available to homes; it thus does not overcome what is the main problem. Secondly, by substituting for the local stations, the possibilities for local broadcasting are very greatly diminished. Third, such satellites would require more powerful home receivers and antennas, additional costs which would have to be borne by the television set owner. Fourth, satellites designed to broadcast directly to homes would be more expensive than those designed to broadcast to ground stations.

Of course, using satellites for long-distance transmission to local stations is perfectly compatible with various systems of local television; can reduce the costs of such transmission significantly; and can thereby increase the number of networks, provided there are local station outlets.

G. *Community Antenna Television (CATV)*

CATV is a wire system which picks up near or distant broadcast signals and conveys them to homes, but does not originate programs. CATV has the desirable characteristic of providing its subscribers with signals originated in distant stations. A widespread development of CATV would increase diversity. It would provide, in effect, several networks for conveyance of programs originated in large stations, particularly unaffiliated ones, to other areas and regions. While the present diversity of the national array of U.S. television programs would not be greater, the diversity which already exists would become available more widely.

There are, however, several difficulties with CATV. So long as it does not undertake program origination on a substantial scale, it does not increase the diversity of the national array of programs, nor sponsor the growth of local programs. Second, CATV is not a common carrier, but a single private company with discretionary control of what it offers on its wire system. Third, for legal and institutional reasons, CATV's survival prospects are precarious. Federal courts have recently ruled that CATV pick-up and conveyance of TV broadcast signals beyond the immediate area of the station is infringement.¹³ Moreover, the FCC has placed pun-

11. Goldin, *The Economics of Broadcasting and Advertising*, 56 AM. ECON. REV. 470 (1966).

12. Johnson, *supra* note 1.

13. *United Artists Television, Inc. v. Fortnightly Corp.*, 255 F. Supp. 177 (S.D.N.Y. 1966), *aff'd*, 377 F.2d 872 (2d Cir.), *cert. granted*, 88 S. Ct. 474 (1967) (No. 618); *cf. United States v. Radio Corp. of America*, 358 U.S. 334, 348-52 (1959); Cable

ishing restrictions on CATV entrance and expansion.¹⁴ The Supreme Court is expected to decide cases in Spring, 1968, involving infringement and the FCC restrictions.¹⁵ Finally, neither the present copyright law,¹⁶ nor the copyright bill which passed the House of Representatives in April, 1967,¹⁷ nor the bill now before the Senate provide for compulsory licensing,¹⁸ without which it is extremely unlikely that CATV can operate satisfactorily.

H. *Wired Television*

This article proposes a national system of wired city television, interconnected with satellite or other relays. It is described in detail in the following section.

IV. WIRED CITY TELEVISION (*WCTV*)

A. *Physical Description*

The great majority of homes in U.S. cities are served with both telephone and television systems. Within cities, telephone messages are carried on street or underground wires, with drop lines to subscribers' telephones. Television broadcasts, on the other hand, are radiated by each station from a tall tower and transmitter through the atmosphere to home antennae. For good color reception on all of a locality's stations, a roof antenna is generally used; the stronger stations can be received frequently with an in-house antenna.

Vision, Inc. v. KUTV, Inc., 211 F. Supp. 47, 56-58 (D. Idaho 1962), *rev'd on other grounds*, 335 F.2d 348 (9th Cir. 1964), *cert. denied sub nom. Klix Corp. v. Cable Vision, Inc.*, 379 U.S. 989 (1965).

14. *Philadelphia Television Broadcasting Co. v. FCC*, 359 F.2d 282 (D.C. Cir. 1966) (holding that regulation of CATV was a necessary adjunct to the Commission's regulation of the nation's broadcasting system); CATV: Second Report and Order, 2 F.C.C.2d 725, 6 P. & F. RADIO REG. 2d 1717 (1966); CATV: Memorandum Opinion and Order, 1 F.C.C.2d 524, 5 P. & F. RADIO REG. 2d 1655 (1965); CATV: First Report and Order, 38 F.C.C. 683, 4 P. & F. RADIO REG. 2d 1725 (1965). *But see* *Southwestern Cable Co. v. United States*, 378 F.2d 118 (9th Cir.) (holding that the Commission could *not* regulate CATV programming in order to lessen competition between CATV systems and local broadcasters), *cert. granted*, 88 S. Ct. 235 (1967) (Nos. 363 & 428); *cf.* *KAOK-CATV, Inc. v. Louisiana Cable T.V., Inc.*, 195 So. 2d 297 (La. App. 1967) (holding that transmission lines for CATV, utilizing existing telephone poles, were not subject to local franchising authority).

15. *Southwestern Cable Co. v. United States*, 378 F.2d 118 (9th Cir.), *cert. granted*, 88 S. Ct. 235 (1967) (Nos. 363 & 428) (extent of FCC authority over CATV systems); *United Artists Television Inc. v. Fortnightly Corp.*, 255 F. Supp. 177 (S.D.N.Y. 1966), *aff'd*, 377 F.2d 872 (2d Cir.), *cert. granted*, 88 S. Ct. 474 (1967) (No. 618) (copyright infringement).

16. 17 U.S.C. § 1 *et seq.* (1964).

17. H.R. 2512, 90th Cong., 1st Sess. (1967).

18. S. Res. 597, 90th Cong., 1st Sess. (pending before Judiciary Committee) (1967).

The wired city television systems would carry programs to homes the way telephone calls are carried—on wires. It would thus eliminate television towers and broadcast transmitters; home antennas and leads; the portion of the TV set which relates to the weakness of over-the-air signals; and the use of electromagnetic spectrum which the signal occupies over the city. At the same time that it permits these savings, however, the proposed system requires street or underground wires and leads to the homes.

Table 1 summarizes the physical character of the present system and the proposed one.

TABLE 1
COMPARISON OF SYSTEMS

<i>Present Electronic Systems</i>	<i>Proposed Wired City Electronic System</i>
(1) Capacities: 1 to 6 or 8 TV channels per city; telephone grid; no extra capacity	(1) Capacities: initially, 20 TV channels per city; telephone grid; several of the TV channels (each equals 1,000 voice channels) could be extra capacity for other and future uses
(2) Television occupancy of electromagnetic spectrum (1 TV channel per station)	(2) None
(3) Television station towers (usually 1 tower per station)	(3) None
(4) Television transmitters (1 transmitter per station)	(4) None
(5) Home television antennae and leads for color sets (usually 1 per home)	(5) None
(6) Home TV sets with tuners for over-the-air reception	(6) Home TV sets with selectors for off-the-wire selection
(7) Picture quality: fair to good to excellent	(7) Picture quality: uniformly excellent
(8) Multiple studios with TV cameras, tape recorders, and players	(8) Multiple studios with TV cameras, tape recorders, and players
(9) Poles or conduits carrying telephone wires, with a drop line to each home	(9) Same; but add or substitute a 20 channel coaxial wire
(10) Telephone exchange and switching stations	(10) Same; but add an input switch so that each studio can put a signal onto the coaxial wire
(11) Intercity relays to other cities and foreign nations	(11) Intercity relays to other cities and foreign nations

B. *Some Observations*

We may observe several implications in the above table, relative to the concern for increasing the number of stations. First, note lines (1) and (2). By shifting off of the electromagnetic spectrum to wire, the limited availability of assigned TV channels no longer constrains station numbers or offerings. Spectrum is released for other purposes. And there could be extra wire capacity—for incorporating telephone signals, FM, public announcements, shopping service, and other future developments.

Second, note lines (3) and (4). A station need not invest half a million dollars in a transmitter to send its signal, nor experience an additional \$50,000 annual cost for operating. Divisibility and access are greatly improved; indeed, if the coaxial wire system exists as a common carrier, then any individual offerer of an individual program—an opera company or a politician or a department store—may offer its program merely by paying the common carrier charge for that time period.

Third, note lines (5), (6), and (7). Present sets and pictures are constrained by weak atmospheric signals; wire carries a stronger signal. With wire, the pictures would be uniformly better; antennae and leads are not needed; and TV sets could more easily be redesigned to permit larger, finer grain pictures and/or lower cost.

Fourth, note lines (1) and (11): the wired city proposal provides a very large increase in local transmission capacity for possible carriage of network company or other signals originated elsewhere.

But, finally, note lines (9) and (10): there is a cost. This is for addition of the coaxial cable to the city's existing wire systems.

C. *An Illustrative Economic System*

Let us now imagine that the Federal Communications Commission, after appropriate proceedings, determined that the conception of a national system of wired cities for television was a good one, and authorized private enterprise and/or municipalities to proceed. Then we would expect various companies—existing ones and newly formed ones—to apply to the common carrier authorities of municipal and state governments for franchises to wire up the cities with 20-TV channel coaxial cable. Rival firms would propose to do this in prospect of profits from charging for the use of the facilities; while municipal or other governmental utility corporations might propose to extend their utility services already provided—electricity, telephone, transit, water, etc. Among private companies, CATV firms are already in the business of wiring up cities; so are telephone and electric companies; gas and water companies might be interested, and other firms would be happy to enter if they saw prospects for profits appropriate to

their appraisal of risks. Let us assume for simplification that a common carrier firm is selected by the governmental authority, and that it is the electric company or a CATV company or another firm, but *not* the telephone company. We so specify so that we can initially contemplate addition of a complete new system. We later consider the possibility of adding to the phone system.

The physical design is kept simple. The 20-TV channel coaxial wire is the same kind as CATV systems are now installing in their 12-TV channel systems. One wire is carried throughout the city. There is a drop line to each home which is willing to pay \$1.00 to \$1.50 per month. This is equivalent to 15 to 20 percent for annual capital and operating charges on an investment of \$50 to \$75 per home for the street wire and drop wire system. Initially, the coaxial dropline terminals are compatible with present TV tuners. Almost all homes accept a dropline. As now, free TV guides are available with newspapers, or by subscription from a publisher. In addition to the wires, the common carrier system also provides optional rental studios, with or without cameras, tape recorders and players, and studio personnel. Similarly, switching facilities are available for receiving microwave or satellite or wire or wave guide relays from elsewhere and putting them onto the wire.

The system is now open for operation. As a common carrier, it will put any sender's signals on the wire, according to published tariffs approved by the regulatory commission. Customers may lease a TV channel by the year, by the month, by the day, by the hour; or by the half hour per week, for a year; or in any other way, subject to availability and tariff. In the same way as businesses or politicians or others now buy access to common carriers or to people—plane tickets or mail or bill boards or concerts or broadcasts—so they would in this case. Senders could use their own studios and merely rent access to the wire channel. Or they could also rent studios, cameras and crews, etc., in addition. If more channels are required, they will be provided in due time, according to usual common carrier franchise. Senders would pay. There would be no additional charge to the homes.

Let us consider the various ways in which television programs may be put onto the 20 TV channels of the wire.

Television stations with advertiser sponsors. These would operate the same as present stations, except that their programs would be sent by wire. New stations would save an investment of about \$500,000 for tower and transmitter, on which the annual cost is about \$50,000 for amortization and \$50,000 for operating expense. Existing stations would save less because they have a sunk investment. Of course, the stations would have

to pay an annual lease charge for use of the wire, but this cost would be far smaller.

Pay TV. This could be provided by entertainment companies which, for an annual subscription fee, would provide programs. The public now buys season or series tickets for plays, concerts, and ball games; subscribes to magazines and to book-of-the-month; etc. Presumably, some of us would subscribe to pay TV. The entertainment company would lease a channel from the common carrier for the appropriate period. The lease would not necessarily be for 24 hours per day, 365 days; it could be for, say, Sunday afternoons, during winter months. Or there could be several series—subscription A, subscription B, etc. To prevent non-subscribers from viewing, a coding or scramble device could be used; or the common carrier, for a fee, could operate a device to interdict the program at the drop line; or a meter could be installed which recorded the time spent viewing the pay TV channels. In addition to the possibility of annual or season or series subscriptions, there could also be pay TV by the program, just as we now buy tickets to single concerts or ball games or buy single books.

Politicians would seek access to a TV channel for individual time periods. They could buy time from the commercial stations, above. Or it is possible that other business enterprises would develop whose specialty was political and other one-shot broadcasts. These companies would lease a channel for a period and retail time to individual politicians. Or political parties could lease for periods; or the politician could simply rent time and studio facilities directly from the common carrier. Further, his coverage could be limited to his own constituency.

Educational TV is of two types: instructional, such as French or history lessons, primarily for schools; and non-instructional, primarily in the form of public affairs or culture broadcasts, such as Congressional hearings and Shakespeare's *Age of Kings*. It is probable that a number of the wire channels would be available for instructional TV, on a part-time or full-time basis; preschool children would undoubtedly be offered instructional programs as would students confined to their homes.

Concerning non-instructional ETV, the Carnegie Report on Public Television recommends that the United States have about 380 such stations, connected by intercity relays. An investment of about \$200 million would be required for signal transmission facilities. This amount would be saved in the wired city television proposal. The annual operating cost of transmission would also be saved, but this saving could be partly offset by costs to lease or share a lease of a channel on the wire.

Network programs. Networks could continue to operate as now,

through their affiliated stations, which then share in the network revenue received from advertisers. Or, subject to FCC rules, it would be possible for networks to lease their own channels on the wire. There would be opportunity for more networks because of the increase in local channel outlets and the lower cost to reach the audiences. Supplementing the multiplication of local channels and the reduction in cost to use them is the fact that intercity relay charges—and, indeed, intercontinental relay charges—will decline steeply with development of satellite communications and wave guide. It is likely that a large increase in network programs would develop. Many more foreign programs could be sent in also.

Competition for viewer time. With up to 20 low-cost channels available for very low-cost rentals, there will be a great increase in programs. Competition for viewer time will greatly increase. One of the results will be a very large increase in numbers of home TV sets and home TV viewing, as the various members of the family each find more and more diverse programs of better picture quality. That is, additional audience will develop. Another result will be diffusion of the audience over the large number of offerings. Each television "station" will have more local competitors, and more network competitors as well. Total advertising volume will increase, but concentration will be less. With channels costing much less to lease or share-lease, we think local stations will not only survive but will increase in numbers. As now, the mass audiences in prime time will watch the more lavishly produced network programs. The situation would become highly competitive, and very desirable to viewers. As is now the case with printed matter, in which the public chooses over a wide variety of books, magazines, and newspapers, the consumer would choose from among the large array of national and local program offerings. Or, as in the case of present radio, the consumer will choose from the large array of programs originated nationally and locally. Compare also the case of movie theaters, in which consumers have access to news theaters, foreign films and art movies as well as more lavish Hollywood productions. And compare also live theatre, where consumers have not only Broadway but also off-Broadway, summer theater, repertory companies, and school performances. This increase in television program offerings—numbers of programs and diversity—is, of course, the objective of the proposed innovation.

What would be the effects of this increase in programming on an hour of programming costs? While for some types of programming these might rise, there are a number of forces which would tend to reduce average programming costs: 1. The availability of channels would encourage repeat programming, as is the case with motion pictures in theaters and

book anthologies. A viewer would not have to wait an indefinite time or never have the opportunity to view a program which he missed on its initial appearance. 2. By appealing to minority audiences, new categories of talent which are presently not in great demand would be utilized, allowing lower production costs than at present. 3. Again, by aiming for smaller audiences, some broadcasters would not be induced to spend lavishly to attract increments of the mass audience. 4. By opening up competition, network control of studios and other elements of cost which tend to inflate programming costs would be broken.

D. *Costs*

We now examine the costs of providing TV channels to the home by wiring the city, and compare this with broadcasting from a TV transmitter. Since intercity connections as well as studios per channel are common to the present system and the new one, we leave out consideration of these. Table 1 showed the following information:

<i>Item</i>	<i>Present System</i>	<i>Proposed WCTV</i>
Spectrum	Uses 1 TV channel per station	Doesn't use
Transmitter and tower	Uses 1 per station	Doesn't use
Home antenna	Uses 1 per home	Doesn't use
Home sets	One or several per home	One or several per home; some cost saving in the chassis
Poles, conduits, droplines	Doesn't use for TV	One coaxial wire on pole or in conduit, plus 1 drop wire per home

The proposed system is advantageous on the first four lines. It has a cost disadvantage on the last line.

What is the magnitude of the cost of wiring the city—the item on the last line? The cost figures are closely related to: (1) the numbers of homes, and (2) the density of homes per street mile. For most cities we estimate a cost averaging between \$30 and \$80 per home. At 15 percent per annum for capital charges and maintenance, this would calculate to \$1.00 per month or less. Allowing for contingencies and uncertainty, a figure of \$1.50 is possible. These figures are very rough.

Table 2 presents data on estimated capital costs for CATV systems in sixteen Connecticut communities.¹⁹ The average of these figures is \$55 investment per home to wire the city. The data apparently include the tower and community antenna and some amplifying and control facilities, which should be excluded for our purposes since we are interested in substituting a wired city for over-the-air broadcasting. In at least two cases, lower estimates were reported by different franchise applicants—Torrington at \$208,000 and Winsted at \$116,000. However, all of these estimates are presumably for 12-channel wire, whereas the plan advocated by this article contemplates a 20-channel wire. Note also that the average of \$55 per home assumes that all the homes connect. If only 90 percent do, costs per home would be about 10 percent higher.

TABLE 2
ESTIMATED CAPITAL COSTS FOR CATV SYSTEMS IN 16 CONNECTICUT COMMUNITIES²⁰

<i>Town</i>	<i>Total Number Homes</i>	<i>Street Miles</i>	<i>Approximate Investment²¹</i>	<i>Cost Per Home²²</i>
Waterbury	31,700	246	\$ 984,000	\$31
Naugatuck	6,400	76	304,000	48
Thomaston	1,800	33	132,000	73
Watertown	4,800	104	416,000	87
Middlebury	1,500	55	220,000	147
Prospect	1,500	35	140,000	93
Wolcott	3,000	70	280,000	93
Torrington	8,300	134	536,000	65
Winsted	3,230	80	320,000	99
Ansonia	5,700	51	204,000	36
Derby	3,400	36	144,000	42
Shelton	5,400	117	468,000	87
Bristol	12,300	154	616,000	50
Plainville	3,650	45	180,000	49
Farmington	3,500	72	288,000	80
Southington	7,000	107	428,000	61
	103,180		\$5,660,000	\$55

19. M. Seiden, REPORT TO THE FEDERAL COMMUNICATIONS COMMISSION, AN ECONOMIC ANALYSIS OF COMMUNITY ANTENNA TELEVISION SYSTEMS AND THE TELEVISION BROADCASTING INDUSTRY 24 (1965).

20. Source: CATV Hearings, Public Utility Commission of Connecticut, Docket 10318 (Nov. 1964, unpublished).

21. The approximate investment is based on a figure of \$4,000 per mile which includes the total construction costs and the total anticipated losses from initial stage of operation.

22. Based on an assumption of 100 percent penetration. The variation among systems in cost per home would be the same regardless of the degree of penetration provided the percent of penetration is the same for all communities.

Another piece of cost evidence is the estimated capital cost per CATV subscriber from the financial statements of 24 operating CATV systems. These appear in Table 3. It is difficult to estimate a cost per home for our wired city TV, since the table relates to subscribers, and the number of homes in each area is not known. Seiden states that for established CATV systems, such as these, the number of subscribers is usually less than 50 percent. In that case, we should divide these figures by about 2 or 3 to estimate cost per home in wired cities; if we divide by 2, then 20 of the above 24 cities would have costs of less than \$75 per home. These figures apparently include the tower and community antenna and perhaps other equipment unrelated to our concern; but the cables are 12 channels or less, rather than 20.

TABLE 3
TOTAL CAPITAL COST AND CAPITAL COST PER CATV SUBSCRIBER BY SIZE
OF OPERATING SYSTEM²³

<i>Number of Subscribers</i>	<i>Dollars of Capital per Subscriber²⁴</i>	<i>Total Cost of Fixed Equipment</i>
10,500	\$ 72	\$ 759,917
8,300	140	1,162,870
7,900	96	758,221
6,800	92	627,391
6,000	132	793,611
5,300	58	305,864
4,900	92	451,716
4,100	92	376,885
3,600	106	382,650
3,400	152	517,643
2,800	101	282,290
2,300	117	268,767
2,200	202	444,817
2,100	134	281,211
2,000	144	288,913
1,800	104	187,872
1,800	124	222,577
1,400	120	168,593
1,300	128	166,146
1,300	397	516,718
700	130	90,841
700	50	34,882
600 ²⁵	766	459,700
500 ²⁶	361	180,749

23. Source: Seiden, *supra* note 19.

24. "Capital" is here defined as the cost of fixed equipment before depreciation.

25. In operation less than one year.

26. In operation less than one year.

Another set of estimates may be derived by using the CATV investment estimate of \$3,500 to \$4,000 per street mile. These figures are also for 12-channel wire. If connected homes average 100 per mile, then the figure is \$35 to \$40; if 200 per mile, then \$20 or under.

Another set of data may be inferred from CATV rates. These run about \$5.00 per home. In 1963 the \$5.00 was sufficient to permit average profits of 57 percent (before interest, depreciation, and Federal tax) for a group of 28 CATV systems. This was also after payment of intercity microwave charges, which ranged from 2 to 23 percent for a group of 12 systems. There may have been other expenses irrelevant to our interest in cost of wiring the city, such as payment of salaries to the CATV manager and owners. We don't know the density of homes *served* per mile, but apparently it was usually less than half of actual home density. In addition, it is said that most CATV subscribers paid a connection and installation charge.

Further data are available in the tariffs which five Bell telephone companies filed in 14 states. In these the Bell company offered to provide CATV companies with a complete wire system for the following charges:

- \$ 75 to more than \$100 per month per street mile; plus
- \$.35 to \$.50 per month per dropline; plus
- \$ 10 to \$ 25 as a one-time installation charge for droplines.

If we assume 100 homes per street mile, this gives a figure of \$1.10 to \$1.50 per month per home, plus installation charge. It is stated that CATV companies find these charges much higher than their own costs to wire up the community, and no CATV was a Bell customer for this type of service.²⁷

Still another figure could be estimated from the minimum telephone rates for telephone service. These, of course, include much more than only the street wires and droplines; they include major switching and exchange facilities, operators, instruments, etc.

A tentative guess is that the investment cost of the wired city poles, conduits, wire, droplines, and installation would be between \$30 and \$100, probably between \$50 and \$75. If cost for capital charges and maintenance is expressed as an annual rate relative to investment, it would be about 15 percent or 20 percent. The figures need further research, particularly on density of homes and on the costs of underground installations, but these data will suffice for present purposes. In a city of 100,000 homes (in the

27. Seiden, *supra* note 19, at 35 states: "Since a CATV operator can construct a modern 12-channel system for approximately \$4,000 per mile, he is naturally reluctant to pay the telephone companies one-quarter to one-third that amount each year for each mile of cable." However, the relatively higher price charged by Bell could be wholly or partly due to higher quality specifications.

neighborhood of half a million people), the estimated investment cost would be \$6,000,000 to set up the wired city with service to all the homes. These are the costs if a company other than the telephone company built a new wire system, separate from the telephone company grid.

But if, contrary to the foregoing, the telephone company in each area were given the common carrier franchise to wire up the city with 20-TV channel wire, substantial cost savings would be possible. Many of the facilities which the telephone company already has in place could be used for the WCTV system—poles, conduits, dropline equipment, etc. It would probably be sensible to merge the present telephone system into the WCTV system. In such event, there could be available substantial economies in installation, maintenance, and operation of the WCTV system. The fact is rather obvious that the WCTV common carrier wire system which is proposed could be merged with the telephone common carrier wire system which already exists, with considerable saving.

A less obvious fact must be noted. It is possible that in some cases, the local telephone companies would respond unsatisfactorily—in timing, alertness, rates, franchise and user equipment conditions, design—to a community decision to move to WCTV. In such event, communities do have access to alternative common carriers. Some of them, such as electric utilities and CATV firms, are already experienced in wiring cities. It is *their* cost to create a new wire system, not the telephone companies' cost to add to the present system, which we tried to estimate above.

E. *Benefits*

What are the benefits which might justify the investment cost of approximately \$60 per home for wiring the city? These have been touched on already, but a more systematic discussion is here presented, under the following topics:

1. Number of channels;
2. Cost, numbers, and diversity of offerings;
3. Picture quality;
4. Cost savings;
5. Spectrum saving;
6. Flexibility for further innovations.

Number of channels. The plan calls for initial installation of a coaxial wire with capacity for 20 TV channels. This is a very large increase in potential service. As noted earlier, most TV markets are now served with about three commercial and educational TV signals, and even if all the new UHF assignments were activated, the figure would average only

five or less. The WCTV proposal breaks through the present limitation on TV channels due to limited spectrum assignments for television.

Cost, numbers, and diversity of offerings. The cost to carry a signal to the home would become extremely low under the WCTV proposal. Recall that the investment cost in wiring a city of 100,000 was estimated above at \$6,000,000. Homes were assumed to be paying 15 to 20 percent of this per year for the wired city, including droplines. Assume that, *in addition*, the common carrier were to charge the *senders* of signals a rental of 5 percent of the cost of wired city each year; then the cost to senders of TV signals for the city would be \$300,000 per year. If all 20 channels are used, the rental is \$15,000 per channel per year. This is less than \$50 per day per channel. For a broadcast day of 10 hours, this is less than \$5.00 per broadcast hour. If senders desire only half as much time as this—either 10 hours a day on 10 channels or 5 hours a day on 20 channels—the cost would be under \$10 per broadcast hour, for delivery of the signal.

At these low costs, we think it extremely likely that there will be a sizeable increase in number and diversity of programs offered. These would occur on advertiser-supported TV; pay TV; network and other imported TV; educational TV; political campaign TV; governmental TV; and possibly other forms of TV.

At these low costs and with open time available, minority-taste audiences could be served with the specialized TV fare they desired, either because they would pay for it themselves or because someone else was willing to pay in order to deliver the program or its related messages. The objective of diversity and wider consumer choice would be met. Opportunities to watch programs with less or no advertising would develop, for those with this preference. Television time for politicians would no longer be restricted to candidates with large financial means or rich sponsors. Moreover, these favorable results for communication freedom would occur without governmental controls on programs or scrutiny of political speakers.

Picture quality. While the present quality of the best pictures on TV is excellent, the average quality for all the pictures in a locality is at best only good, and some of the pictures are poor. Improvements require special antennae or more costly sets. The wire system would serve uniformly excellent pictures on all channels on sets of present quality, because the signal would be stronger and interference negligible.

Beyond this considerable improvement from coaxial wire of a type which is in use on present CATV systems, there would be opportunity for vastly greater improvements in picture quality—size, resolution, definition, colors—from use of improved wire and completely redesigned and improved TV sets. These would, however, involve additional costs.

Cost savings for homes and broadcasters. Operating to offset the cost of creating the wire system, estimated at \$6,000,000 for a city of 100,000 homes, are cost reductions to homes and broadcasters.

One saving to homes would be in elimination of need for antennae. If we assume that all the homes have antennae for color sets, this saving is approximately equal to the entire cost of wiring the city! The fact is that an outside antenna for color TV and UHF costs as much or more per home as the cost per home of the wired city.

In addition, new color sets and possibly new black and white sets for wire TV would be cheaper because they eliminate the TV set elements which are related to picking up and handling the weaker, less clean, over-the-air signals. The saving on sets for 100,000 homes might be half as much as the \$6,000,000 cost of wiring the city, or possibly as much as that cost. About \$30,000,000 or more of TV sets are involved! There would be, in addition, savings in annual maintenance charges due to the elimination of these elements.

For broadcasters there would be a saving in transmission facilities. The investment cost is about \$500,000 per station, and the annual capital and operating charges are about \$100,000. Assume the city of 100,000 homes would have, say, 6 TV stations in the absence of the wire system. Then the investment saving (overlooking the fact that capital is partly sunk in the stations already in being) would be \$3,000,000, offsetting in part the \$6,000,000 investment required to wire the city. As compared with \$100,000 or more annual cost per channel for transmission over-the-air, it was estimated above that the annual charge by the common carrier per channel might be \$15,000.

In summary, savings to offset the \$6,000,000 capital cost of wiring a city of 100,000 homes are considerable:

	<i>Savings in Capital Cost</i>
Home antennae for colors sets, at \$60 per home	\$ 6,000,000
Home sets, saving of 10% on 100,000 color sets, at \$300 each	3,000,000
Transmitters and towers, 6 at \$500,000 each	3,000,000

Spectrum saving. We have already discussed the fact that limitation of spectrum allocated to TV limits numbers of stations and thereby programs. It is generally believed that there is a shortage of spectrum for other purposes as well. If this is true, then one of the very important savings of WCTV could be in permitting some of the spectrum now allocated to TV to be assigned to other valuable purposes, such as use by land and marine mobiles and in satellite relays.

Flexibility. Finally, a virtue of the wired city is that it provides flexibility for further communication innovations. The initial coaxial wire can

provide extra channels, which could be made available at nil or nominal charge to sponsor innovations. These could include, ultimately, shopping services, credit purchases, facsimile mail, data processing, bookkeeping, reference services, etc. A wire system is, of course, indefinitely expandable.

V. PROBLEMS AND PROSPECTS OF WIRED CITY TELEVISION

In previous sections it was argued that wire television has a number of advantages over the present system. In this section we discuss some questions concerning WCTV and the positions which may be taken by several interested parties.

What if supply and demand conditions for programming are such that, despite increased volume of offerings, little or no increase in diversity takes place after moving to a wire television system? In that case, the wire system would allow something like the present programming, an increase in number of services, an improvement in picture quality and the release of some radio spectrum for other uses. But we are very optimistic about the possibilities of increased diversity in view of television's great power to create tastes. This has been evidenced by the public's interest in roller derby, professional football, automobiles that talk, wives who are witches, and a nun that flies. Who dares to predict what we will learn to like under conditions of extremely easy access to channels?

Rural television service is an important issue. Our data concern television service to urban and rural *communities*—cities, suburbs, towns and townships, villages, and the like. The proposal and the cost and benefit data related thereto are, therefore, valid for the great bulk of American homes, but not for all. The question of television service in very sparsely settled regions, where homes are very substantial distances from each other, has not been considered, but further study is planned. Meantime, the following very preliminary comments are offered.

First, it seems that the proposal for wire television is in general appropriate wherever we observe the *fact* of telephone, electricity, or CATV service. Wherever telephone and electricity wires and their services are offered at reasonable prices, then a coaxial wire for common carrier television service can also be offered at a reasonable price. The same circumstances under which rural customers are or are not provided telephone and electricity services tend to govern provision of a common carrier television wire to them.

Second, there will be cases where television cannot be economically provided by wire. In such cases, it is possible that television service to rural areas would be provided over the air—by direct broadcasts, translators,

boosters, or other means. In such cases we assume that the FCC will continue to provide for this purpose some of the electromagnetic spectrum now allocated to television. We should not underestimate the ingenuity of private enterprise in devising methods to reach rural customers, nor the willingness of government to sponsor public goods, public utility services, and subsidies for the rural population in order that they may share in the nation's gains and technical advances.

Is it likely that there will be adverse effects on local television broadcasting? Rather than harm local broadcasting, wire television can greatly increase the extent of local programming, especially in prime time, by providing outlets for such programming. At present, the opportunity cost of a local program in prime time is a popular network program and the large advertising revenue foregone. But the opportunity cost for at least some of the channels becomes very much lower in the wired city. Further, local areas which are contained within the viewing area of large cities—"overshadowed" markets—would have channels available for their own local programming. For example, viewers in the small communities of northern New Jersey might find it possible to view programming relevant to their local interests rather than being limited to programs carried all over the viewing area of the New York City stations.

A number of quite powerful economic groups would not be pleased with the advent of a WCTV system because it would mean increased competition: (1) Television stations now enjoy oligopoly positions in their markets. WCTV would provide an increase in program offerings to the public, and competition for viewers and for advertiser dollars. (2) The present three television networks each own five of the most profitable big-city stations, and would resist the entrance of WCTV on this account. In addition they would view as unfavorable the prospect of competition from additional networks and additional local programming. (3) Other enterprises engaged in providing communication services would find increased competition from wire television. These would include such entertainment media as motion picture exhibitors, concert halls, newspapers, and magazines; and such advertising media as newspapers and magazines, bill boards, and direct mail.

The foregoing oversimplifies. For example, the present broadcasters and networks have important advantages: large libraries of program material, experience in broadcasting, established connections with advertisers, and close relations with program producers and sources. Newspapers and magazines might find ways to utilize the increased availability of television channels to extend their service to their readers.

There are also industrial groups which would benefit from the advent of wired city television. These include companies with expertise in wire communications; users and suppliers of land mobile radio equipment, who would gain from the release to them of spectrum space now devoted to television; and producers of electronic equipment for an enlarged television industry.

Crucial to the question of wire television is the FCC. At times this agency exhibits a tendency to act as protector of over-the-air, commercial television interests against wire television innovations.²⁸ Statutory authority for such preference cannot be found. It is hoped that the Commission will seriously consider a wire television system of the type described here as an alternative to present arrangements: the 1934 Communications Act created the FCC to regulate “. . . interstate and foreign commerce in communication *by wire and radio*. . . .”²⁹

28. See Greenberg, *supra* note 8.

29. 47 U.S.C. § 301 (1964) (emphasis added).