Common Carrier Video Delivery by Telephone Companies

Leland L. Johnson
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PREFACE

Much debate surrounds the question of whether to lift the current ban on local telephone companies' delivery of video services to subscribers within their service territories. If the ban is lifted, issues will arise about whether telephone companies should operate as (a) video common carriers, (b) entities free to supply video services as cable operators do today, or (c) hybrids that combine common carrier services with limited ownership interests by the carrier in programming.

Leaving aside a complex set of legal considerations, this study evaluates the relative merits of these three alternative ways to provide video services, measured in terms of economic efficiency and information diversity. Because it delves into a difficult area in which little formal economic analysis has been done, one objective is to identify the most pressing topics for subsequent research.

This is the third in a series of RAND reports, supported by grants from The Markle Foundation and Richard S. Leghorn, that deal with issues of competition among multichannel video systems. The other reports are: L. L. Johnson and D. P. Reed, Residential Broadband Services by Telephone Companies? Technology, Economics, and Public Policy, R-3906-MF/RL, June 1990; and L. L. Johnson and D. R. Castleman, Direct Broadcast Satellites: A Competitive Alternative to Cable Television? R-4047-MF/RL, 1991. The views in these studies are solely those of the authors and should not be construed as representing the views of the sponsors.

Although this study uses economic analysis, it is written to be understandable throughout by noneconomists. Government legislative and regulatory bodies, telecommunications companies, consumer groups, and the academic research community may find it of particular interest.
SUMMARY

The potential development of fiber optic networks that would combine voice, data, and video services has sparked much debate about whether telephone companies (local exchange carriers or LECs) should be permitted to provide cable television. If the current legal restrictions are removed, questions will arise as to whether LECs should operate as (a) video common carriers, offering channels to program suppliers on a nondiscriminatory basis, with no LEC control over content, (b) entities free to discriminate among program suppliers and to control content, as cable operators do today, or (c) hybrids, free to fill a few channels with programming in which they hold an ownership interest, with all other channels offered on a common carrier basis to nonaffiliated program suppliers.

Concerns about public access to multichannel video networks have a long history. Various groups have recommended that cable systems be subject to some form of common carrier, or leased channel access, requirement. In 1972, the Federal Communications Commission (FCC) ruled that cable systems must allow program suppliers to lease a portion of their capacity. However, in 1979 the Supreme Court overturned that requirement on grounds that the FCC lacked the legal authority to impose common carrier requirements on cable systems.

The Cable Communications Policy Act of 1984 stipulates that cable systems with channel capacities above certain limits must allow outsiders to lease a specified number of channels. For several reasons, these requirements have proved ineffective in affording public access.

The FCC has proposed that LECs be permitted to offer common carrier “video dialtone” service, and it is inquiring into whether they should be permitted into programming as well.

In response to this debate, this study (a) evaluates the relative merits of common carrier, unconstrained service, and hybrid models, (b) assesses the appropriate role of government rate regulation (e.g., rate-of-return constraints or price caps) of video networks owned by LECs, and (c) explores the applicability of common carriage, going beyond the LECs, to cable operators and other video providers. Outcomes are evaluated in terms of their contribution to economic efficiency and information diversity.
One might conclude that the greater the amount of information the better, in terms of social welfare. However, information production and dissemination involve a cost as well as a benefit. Economic efficiency becomes relevant, where one must consider questions of how to obtain the greatest social benefit from a given endowment of limited resources.

The value of information is judged here by how much users are willing to pay for it. The greater the willingness to pay, the greater the value of the information to the user—and presumably to society. Of course, some information may have a social value not well measured by an individual's willingness to pay. Such disparities must be kept in mind in evaluating the outcomes of this analysis and in devising well-conceived public policies.

In terms of information diversity, common carriage has three advantages.

First, some programs, not carried in the unconstrained model because of their adverse effect on the revenues of other programs, would be transmitted by the common carrier.

Second, the common carrier's published tariffs would give program suppliers greater certainty about the costs they would face to reach the viewing public. In contrast, access in the unconstrained model is subject to negotiation and attendant uncertainty about the geographical coverage that program suppliers would be able to achieve. Less uncertainty about access would encourage the production of programming that otherwise would not appear.

Third, for some program suppliers charges for access to the network (with charges passed on to subscribers) would be lower than in the unconstrained model.

A potential disadvantage of common carriage is that some program suppliers would be unable to pay a nondiscriminatory access charge even though they would be able to pay a lower fee sufficient to cover the incremental cost incurred by the carrier in providing access. An unconstrained provider, free to discriminate, would more likely carry this programming.

Various price structures might be adopted by the common carrier to reduce the severity of this problem. Distinctions could be established between customer classes (e.g., educational users and commercial users) with each paying a different access charge. Other possibilities are two-part tariffs, volume discounts, revenue sharing, and per-subscriber (instead of per-channel) charges. Perhaps a combination of pricing approaches, including both per-channel and
per-subscriber elements, would lead to greater information diversity than would any of these approaches adopted singly.

In terms of economic efficiency, common carriers would face the same disadvantage, where again adoption of alternative price structures might help. In addition, the carrier could in some cases suffer a disadvantage under the first point above. When programs are partial substitutes for each other, and other conditions are met, common carriage would encourage too much program diversity in terms of economic efficiency. (To be sure, some observers would regard this outcome as advantageous because of possible externalities that would warrant program production and dissemination beyond the levels justified strictly by private willingness to pay.)

On balance, we cannot conclude that common carriage would be superior to unconstrained carriage on grounds of either information diversity or economic efficiency, because it is impossible to quantify the preceding conflicting factors.

Marketing and billing functions may pose bottlenecks to access even if access arrangements for channels themselves work well. Economies of scope in billing may justify a regulatory requirement that billing services be provided by the carrier under “just and reasonable” terms. Marketing may also exhibit economies of scope that would lead to consolidation of this function by one or a few entities. Some programmers may complain that they are being unfairly excluded.

Permitting the carrier, as a hybrid, to have ownership interests in program supply for a few channels, while offering the rest to nonaffiliates on a common carrier basis, would contribute to information diversity and economic efficiency if this arrangement reduces the costs otherwise incurred in dealing with outside program suppliers. Because programming costs are separable from the LEC’s other activities, the threat of cross-subsidization could be protected against by accounting safeguards and establishment of separate subsidiaries for video programming. In contrast, the danger of cross-subsidization is greater in constructing and operating the wireline network, where common costs pervade. This danger raises the issue of whether the LECs should be permitted entry into video at all, quite aside from questions of whether they should be restricted to common carriage.

More relevant to hybrid status than issues of cross-subsidization is the question of whether LECs would use their bottleneck network facilities as an anticompetitive tool. It is unlikely that LEC-owned video facilities could be used to favor affiliated program suppliers as a tool to dominate national program markets. However, if a threat of
anticompetitive behavior is deemed to exist, limiting telephone companies' joint ownership of program affiliates, and restricting the degree of horizontal integration in the telephone industry, would provide safeguards. Moreover, if safeguards are needed against the LECs, the same ones would be equally appropriate for cable operators.

Government rate regulation of LEC-owned video facilities (aside from assurance of nondiscriminatory access in accordance with common carriage obligations) should be similar to whatever regulatory scheme is in place for cable systems. In either case, the manner of regulation would depend on the carrier's market power, reflecting the level of competition in the local market. In accordance with a recent FCC decision, if only a loose form of regulation is imposed on those cable systems deemed not to be faced with effective competition, no basis would exist for more severe constraints on similarly situated networks owned by telephone companies.

If video common carriage is beneficial to society (as the FCC and many others conclude), why limit it only to the LECs? Why not impose the same obligations on cable operators and other video providers? Aside from legal considerations left open here, no sound basis exists for singling out the LECs for common carrier treatment if they choose to enter the video market. Indeed, under plausible assumptions, a stronger basis exists for considering the imposition of common carrier requirements on today's coaxial cable systems than on future LEC-owned (or cable-operator-owned) fiber networks. This analysis does not imply that common carriage obligations should necessarily be imposed on cable operators. Rather, it suggests that the same treatment be accorded to LECs and cable operators—whether they operate as video common carriers, hybrids, or unconstrained carriers.

The relevant factors for deciding whether to impose common carrier requirements relate to the costs of providing service with particular technologies and the level of competition in the local market. Into the foreseeable future, the single video wireline into the home is a much more likely phenomenon than side-by-side competition. If competition from broadcasting stations and other sources weakens, the issue of common carriage will become more pressing than otherwise—regardless of whether the wireline is in the hands of a LEC or a cable operator.
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CONTENTS

PREFACE ........................................ iii
SUMMARY ........................................ v
ACKNOWLEDGMENTS .............................. ix
TABLES ......................................... xiii

Section
I. INTRODUCTION .................................. 1
   The Cross-Ownership Ban ...................... 2
   Concerns About Public Access ................ 4
   Purpose and Organization of the Study ...... 7

II. CHARACTERISTICS OF MULTICHANNEL SERVICE .................................. 9
   Relationships Among Demands for Programs .... 9
   Key Functions in Bringing Programs to Viewers .. 10
   The Unconstrained Service Model ............... 11
   Common Carrier Models ....................... 13
   Information Diversity and Economic Efficiency .. 17

III. THE COMMON CARRIER AND UNCONSTRAINED DELIVERY MODELS .................. 20
    A Four-Channel Illustration ................... 20
    Alternative Common Carrier Pricing Structures .. 26
    Partial Substitutability Among Programs ........ 31
    Advertiser-Supported Video .................... 34
    Marketing and Billing .......................... 34
    Pay-per-View and Switched Video ............... 36
    Program Production and the Certainty of Access .. 36
    Carriage Status and Competitive Video Delivery .. 37
    Conclusions .................................. 38

IV. THE HYBRID MODEL .............................. 41
    Benefits of Vertical Integration ............... 41
    Access to Programming ........................ 43
    Cross-Subsidization and Network Bottlenecks .. 49
    Conclusions .................................. 56
V. GOVERNMENT RATE REGULATION .................. 58
   No Cross-Subsidization: Experience in the Cable Industry .................. 58
   Cross-Subsidization, Cost Shifting, and Access Charges .................. 60

VI. COMMON CARRIAGE, COMPETITION, AND PUBLIC POLICY .................. 62
    Differential Treatment of Telephone Companies .................. 62
    Appropriate Applications of Common Carriage Obligations .................. 67
    Conclusions .................. 68

VII. CONCLUSIONS AND DIRECTIONS FOR FUTURE RESEARCH .................. 70

BIBLIOGRAPHY .................. 75
TABLES

1. Outcomes of carrier models ......................... 21
2. Constant access charges and volume discounts .... 29
3. Examples of partial substitutes in programming in the unconstrained service model ..................... 32
4. Sunk costs and costs of market entry ............... 46
5. Value of diversity, video carriage, and use of fiber ... 65
I. INTRODUCTION

For years, controversy has surrounded the question of whether telephone companies (i.e., local exchange carriers (LECs) or telcos) should be permitted to offer video services within their local telephone service areas. The debate is sparked by (a) the potential emergence of integrated broadband networks (IBNs) that would incorporate high-capacity fiber optic links to combine voice, data, and video services as a substitute for separate narrowband telephone and broadband video networks, and (b) claims that competition by LECs with cable television systems would lower prices for video services and stimulate development of new ones.

Basic to the debate are issues about whether LECs should operate (a) as video "common carriers" that would offer channels at nondiscriminatory prices, and with no control over content, to all program suppliers, (b) as "unconstrained service" providers permitted to discriminate among program suppliers and to hold ownership interests in programming, and thus to control content, as cable operators do today, or (c) as "hybrids" permitted to fill a limited number or percentage of their channels with programming in which they hold an ownership interest, while being required to offer the remainder to nonaffiliates on a common carrier basis. Of central importance is how these alternatives compare with respect to enabling information providers to reach the American public. This issue is fundamental to concerns about freedom of speech protected by the First Amendment.

The issue of carrier status is important whether LECs own the single video wire into the home or compete by constructing video networks side by side with cable operators. An earlier RAND study (Johnson and Reed, 1990) concluded that telephone company entry into residential video delivery would probably take two forms: (a) acquisitions or mergers involving cable systems in existing communities, and (b) construction and ownership of cable systems in new communities. In either case, side-by-side competition between two wireline video transmission systems—one owned by a cable operator and the other owned by the LEC—is unlikely. The continuing

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1Recent technological advances reinforce this conclusion. Breakthroughs in the development of digital video compression may enable cable operators to expand capacity and to offer new services similar to those that could be delivered over telco-owned IBNs. *Broadcasting*, October 7, 1991, pp. 51–52.
prospects of serving homes with only a single video wireline highlights the importance of assessing the terms under which the public should have access to video channels.

At the same time, if side-by-side competition were to emerge, the issue of carrier status would remain. In this case, assessing the merits of alternative carrier status for telephone companies would need to take into account the simultaneous availability of wireline facilities owned by cable operators.

**THE CROSS-OWNERSHIP BAN**

Cross-ownership rules, adopted by the FCC in 1970 and codified in Section 613(b) of the Cable Communications Act of 1984, prohibit a telephone company from providing “video programming directly to subscribers in its telephone service area.” However, subject to approval by the FCC under Section 214 of the Communications Act of 1934, LECs are permitted to construct facilities within their service territories to provide common carrier transport of video signals, called “channel service,” to unaffiliated cable operators. In turn, a cable operator is permitted to serve the public only after obtaining a franchise from the local municipality or other governmental agency having jurisdiction over local public rights of way.

Until recently, an additional burden was placed on the Bell Operating Companies (BOCs). Under terms of the Modified Final Judgment (MFJ), the BOCs have been prohibited from offering “information” services (presumably including video services) in the absence of a court waiver, and have been prohibited from manufacturing telecommunications equipment and providing interLATA transmission services. The ban on BOC provision of information services was lifted by court decision in mid-1991.

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2LECs are permitted to own and operate cable systems outside their territories, and some have done so. Exceptions to this ban exist for rural areas (as defined in the Act), where separate cable service would, presumably, not be economically viable. The FCC believed that the cross-ownership rules were necessary for “preserving, to the extent practicable, a competitive environment for the development and use of broadband cable facilities and thereby avoiding undue and unnecessary concentration of control over telecommunications media either by existing entities or other entities.” Section 214 Certificates, 21 FCC 2d 397, 325 (1970).

3The BOCs account for about 80 percent of operating revenues of local exchange telephone companies. FCC (1988/1989), p. 36.

4United States v. Western Electric, Civil Action No. 82-0192, D.D.C. Order, July 25, 1991. A stay was imposed on the decision but was lifted soon thereafter.
Debate at the FCC, in Congress, and elsewhere centers on the terms under which LECs should be permitted to offer video services on a common carrier basis, and whether they should be permitted to offer at least a few channels to affiliated program suppliers.

In October 1991, the FCC took several significant actions. First, it issued a Further Notice of Proposed Rulemaking in which it proposed that local exchange carriers be permitted to offer common-carrier-based “video dialtone” service. The Commission envisions video dialtone as analogous to ordinary telephone dialtone, which gives consumers access to a wide range of services. The Commission has tentatively concluded that a “video dialtone” policy will provide the best foundation to achieve our goals of promoting the development of an efficient, nationwide, publicly accessible, advanced telecommunications infrastructure, facilitating robust competition, and fostering the First Amendment goal of ensuring a diversity of information sources.

Second, it issued a First Report and Order in which it concluded that the provisions of the Cable Act do not require that a LEC or its customer-programmer obtain a local cable television franchise to offer video dialtone service. If this interpretation is upheld, the LECs could proceed to offer video dialtone services without revision of the Act.

Third, it issued a Second Further Notice of Inquiry, which asked whether local exchange carriers should be permitted to participate in video programming in addition to offering common carriage. If the LECs are so permitted, the FCC is concerned about “whether special safeguards would be necessary to protect against cross-subsidization.”

Not surprisingly, telephone companies generally argue that common carrier constraints, including prohibitions against their involvement in programming, would be overly burdensome. In the words of Southwestern Bell:

For telco operated cable TV networks to viably compete, they need the freedom to provide programming. The ability to provide programming will permit carriers a more rapid transition from traditional narrowband to broadband facilities by providing additional

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6FCC (1991b), para. 5.
7FCC (1991b), para. 56.
revenue possibilities. The types of programming entering the telco operating network under a common carrier approach might have such limited public interest appeal that there would be little subscriber demand. \textsuperscript{9} Telcos need the same basic freedom as cable TV companies to compile the programming of various providers so that they have a product to which the consuming public will want to subscribe.\textsuperscript{10}

Congressional legislation has also been written, but not yet passed, to permit LEC entry into the video market. A notable recent example is a U.S. Senate bill that would authorize telephone companies to provide video dialtone service along the lines proposed by the FCC. In addition, after specified government certification and approval of plans submitted by the LEC, it would be permitted to fill up to 25 percent of the “equipped capacity of its video gateway services” with programming from a separate affiliated subsidiary.\textsuperscript{11} Thus, under this legislation a LEC could operate as a hybrid along lines treated in this report.

**CONCERNS ABOUT PUBLIC ACCESS**

Concerns about public access to video channels have loomed prominently in policy debates, triggered by apprehension that a cable operator, with the only video wireline to the home, would become the single video information “gatekeeper.” Proposals to facilitate access to cable networks have a long history.\textsuperscript{12} For example, Owen (1970) argued that common carriage would allow “the carrier to take advantage of economies of scale in the transmission process, and at the same time provide an opportunity for considerable competition among message services.” Although it rejected the notion of full common carrier status for cable, the Sloan Commission on Cable Communications (1971, p. 148) recommended that channels be made available for lease by others to ensure “diversity and widespread access by a myriad of voices not subject to the control of the cable owners.” The Committee for Economic Development (1975, p. 70) pro-

\textsuperscript{8}Southwestern Bell Corporation (1989), p. 8.
\textsuperscript{9}Ibid., p. 11.
\textsuperscript{10}Ibid., p. 10.
\textsuperscript{11}S.1200, “Communications Competitiveness and Infrastructure Modernization Act of 1991,” 102nd Cong., 1st sess.
\textsuperscript{12}This discussion of concerns about public access draws heavily from Besen and Johnson (1982), pp. 10–14.
posed that cable operators be permitted to program only a limited number of channels and be required to offer the remaining channels to lessees.

Support for the separation of conduit and content has arisen also within the federal government. In 1972, the FCC ruled that, generally, cable operators must make available a limited number of channels for lease by others.\textsuperscript{13} Going further, in 1974 a Cabinet Committee endorsed the notion of common carrier status, with the qualifications that (a) the cable operator be permitted to program “one or two” channels, and (b) common carrier status be imposed only after the cable industry had “matured,” which was interpreted to occur when cable penetration had reached 50 percent of television households.\textsuperscript{14}

In the late 1970s, the FCC’s jurisdiction over cable was challenged, and the Supreme Court struck down the FCC’s access requirement because it cast cable systems in the role of common carriers.\textsuperscript{15} The court held that because the Communications Act of 1934 explicitly prohibits the FCC from treating broadcasters as common carriers, and because the FCC’s authority with respect to cable was based on its jurisdiction over broadcasting, no common carrier requirement could legally be imposed on cable by the FCC.

Debate has continued about whether some type of public access requirement should be imposed, culminating in provisions of the Cable Communications Act of 1984. The Act requires that cable systems with specified characteristics make available channels for commercial lease by unaffiliated entities. The purpose is “to assure that the widest possible diversity of information sources is made available to the public from cable systems in a manner consistent with growth and development of cable systems.”\textsuperscript{16} The requirement does not apply to systems with fewer than 36 activated channels. Systems with 36 to 54 activated channels must set aside 10 percent for leased access

\textsuperscript{13}47 C.F.R., Sec. 76.254(a)(4).
\textsuperscript{14}Cabinet Committee on Cable Communications (1974), pp. 29–30. Cable penetration has since exceeded that level, and today cable service is available to more than 80 percent of households, and more than 60 percent of that portion subscribe. See FCC (1990b), paras. 3, 4, and National Cable Television Association (1991), p. 1.
\textsuperscript{16}FCC (1990a), para. 169.
and those with more than 54 activated channels must set aside 15 percent.\footnote{The Cable Act also permits local franchising authorities to require cable systems to set aside channels for public, educational, and government use (so-called PEG channels). U.S. Congress (1980), p. 3.}

One might conclude that issues about public access to video channels could be resolved simply by applying these same provisions to telephone companies. However, for four reasons, these provisions have failed to stimulate the growth of leased access on cable systems.

First, cable operators are free to establish lease rates and other conditions such that leased access “will not adversely affect the operation, financial condition, or market development of the cable system.”\footnote{Ibid., para. 171.} Subject to such general constraints, cable operators have latitude to establish rates to preclude the carriage of programming that the operators would not voluntarily choose.

Second, cable operators are not required to provide “marketing, billing, or other such services”\footnote{Ibid., para. 173.} to channel lessees. Costs could be high for such activities conducted channel by channel, as discussed in Sec. III. In principle, lessees could cooperate in sharing the costs of marketing and billing. But joint action is handicapped because the maximum number of access channels is low. For example, a 40-channel system is obliged to offer no more than four leased channels.

Third, the enforcement mechanism is cumbersome. Aggrieved parties may resort to the federal courts and to the FCC, but the parties have a heavy burden of proof. The courts and the FCC are “directed to presume” that the price and conditions of access in question are “reasonable and in good faith unless shown by clear and convincing evidence to the contrary.”\footnote{Ibid., para. 175.}

Fourth, cable operators are not required under the Act to offer nondiscriminatory access as would a common carrier. They are permitted to consider the “nature (but not the specific editorial content) of the service . . . how it will affect the marketing of the mix of existing services being offered by the cable operator to subscribers, as well as potential market fragmentation that might be created.”\footnote{Ibid., para. 173.}

Were such terms of leased access extended to the LECs, they would be free to negotiate with program suppliers essentially as cable operators do now.
In light of these circumstances, some observers maintain that if the LECs were to provide video services, society would benefit if they were required to operate as common carriers.

In principle, cable systems could also be required to operate as common carriers. Indeed, the analysis in this report, concerned with issues of economic efficiency and information diversity, is just as applicable to cable companies as it is to the LECs. Section VI examines the conditions under which broader application of common carriage would be appropriate.

PURPOSE AND ORGANIZATION OF THE STUDY

The purpose of this study is not to recommend whether or not the ban on telephone company entry into video services should be abolished, but rather to address issues that would be relevant if the ban were removed. The study evaluates the relative merits of the common carrier, unconstrained service, and hybrid models; it assesses the appropriate role of government rate regulation (e.g., rate-of-return or price cap regulation); and it inquires into the merits of extending common carrier obligations to other video delivery systems, such as cable networks and direct broadcast satellites.

Although much general discussion has surrounded issues relating to public access, surprisingly little systematic analysis has been undertaken on how common carriage of video would likely be structured and how it would contribute to societal goals, in comparison with unconstrained delivery. Because of the complexity of the area and the lack of prior analysis, one objective is to identify the most pressing topics for future research.

Section II provides a foundation for the subsequent sections by discussing the nature of the video market, the key functions involved in multichannel service, and the distinction between common carrier and unconstrained models of video delivery. Especially important is identification of what is meant by "common carriage." Does nondiscriminatory access mean that all potential information providers whose cost of service to the carrier is the same receive the same terms and conditions of access? Or is the carrier permitted to set different terms for various customer classes even though the cost of service does not vary from one class to another? In other words, can a carrier discriminate among customer classes? If discrimination is, or is not, permitted, how do outcomes in terms of economic efficiency and information diversity differ from those of the unconstrained model?
Section III seeks answers to these questions. More generally, it evaluates the relative merits of common carrier and unconstrained service models. It proceeds by using simple numerical illustrations, supplemented by other factors that may affect outcomes, such as potential bottlenecks that may arise from marketing requirements. In these models, transmission providers negotiate at arm’s length with unaffiliated program suppliers, i.e., no vertical integration exists.

Section IV explores the consequences of vertical integration between carriers and program suppliers within the context of the hybrid carrier, which is permitted to offer a limited number of channels to affiliated program suppliers, while offering the others on a common carrier basis to nonaffiliates. Key issues are: What effect would vertical integration have on economic efficiency and information diversity? Is vertical integration needed to help assure LECs of adequate opportunities to acquire programming? Would cross-subsidization of programming by telephone ratepayers pose a threat? Would the LEC use its bottleneck facilities to give preferential treatment to its own programming affiliate? What safeguards against anticompetitive behavior would be appropriate?

Section V explores the conditions under which government rate regulation should be applied to LEC-operated video networks. Today, telephone rates and, in some instances, cable subscriber rates are regulated to help assure that the entity in question does not earn excess profits as a consequence of its monopoly (or near monopoly) position in the local video market. In light of this experience, this section asks: What is the appropriate regulatory regime for LEC involvement in the video market? Does the potential threat of cross-subsidization from telephone ratepayers affect the answer?

Section VI asks: If video common carriage is beneficial to society (as the FCC concludes), why limit it only to the LECs? Why not impose the same obligations on cable operators and other video providers? After addressing this question, it inquires more generally into the conditions—rooted in local market competitiveness—under which imposition of common carriage obligations would, and would not, be appropriate.

Section VII brings together major conclusions and suggestions for future research.
II. CHARACTERISTICS OF MULTICHANNEL SERVICE

This section treats several topics as background for Secs. III and IV: (a) the relationship among programs in terms of subscriber demand, (b) the various actors involved in bringing programs to viewers, (c) the characteristics of common carrier and unconstrained service models, and (d) the concepts of information diversity and economic efficiency.

RELATIONSHIPS AMONG DEMANDS FOR PROGRAMS

It is important to distinguish among three program types: those that are (a) independent of each other, (b) substitutes for each other, and (c) complements to each other. A program is independent of another if its presentation has no effect on the other's audience. This situation would arise if the audiences for the two programs are entirely different or if the programs serve different needs for the same audience.¹

Programs are substitutes for each other if showing one reduces the audience for the other. They are perfect substitutes if the total audience for the two programs is the same as the audience for one in the absence of the other. An example of a perfect substitute is the same movie shown separately on two channels at the same time of day, with both channels being equally available to all potential viewers.

Programs may also be only partial substitutes for each other—a common situation centrally relevant in this study. Showing a second program attracts some of the audience from the first, but the combined audience nevertheless increases. Examples of this situation abound: (a) two newscasts that take a somewhat different approach to news reporting, with each having special appeal to some viewers, and (b) a program that is shown repeatedly to increase the chances that a particular viewer will select it.

¹Although particular programs, and channels of programs, may be independent of each other in content, they may compete for (a) the subscriber's limited viewing time, (b) the subscriber's receiving equipment, or (c) a limited household budget for video services. In such cases, the showing of one program may reduce the audience for the other.
Programs may also be complements to each other. The presentation of one increases the audience for another. An example is a related series of instructional programs where presentation of one in the series increases the audience for the others. Two programs are perfect complements if one has no audience unless the other is also available. By regarding such bundles of related programs simply as single programs, we need not take explicitly into account complementary relationships in this study.

The preceding has treated only "programs" as the unit of analysis. But we can regard "channels" of programs, i.e., bundles of distinct programs, within the same categories as above. This study will be primarily concerned with channels, rather than individual programs, as the unit of analysis.

KEY FUNCTIONS IN BRINGING PROGRAMS TO VIEWERS

Five kinds of entities perform key functions in bringing programs, and channels of programs, to viewers.

- *Program Producers*. These are responsible for the creation of programs that, either in real time or on a delayed basis, are transmitted by carriers to viewers.
- *Program Packagers*. These assemble the output of program producers for transmission by carriers. Examples are "cable program networks" that include pay movie channels (such as HBO and Cinemax) and basic cable networks (such as CNN and ESPN). Packaged programs are generally intended for use by many carriers on a regional or nationwide basis. For convenience, we will lump together program producers and program packagers into the single term "program suppliers."
- *Transmission Providers*. These provide the radio or wireline facilities for transmission of programs to the subscriber (e.g., broadcasting stations and cable systems). This study is primarily concerned with wireline facilities owned by either telephone companies or cable operators.²
- *Programmers*. These decide which individual programs and program packages are to be transmitted and the pricing structure within which they are to be offered. Thus,

²Multichannel providers also include direct broadcast satellite systems, wireless cable networks, and other radio-based systems. For an extended discussion of these competitive alternatives to cable television, see Johnson and Castleman (1991).
decisions about whether a given channel is to be offered as part of a basic service bundle or as a separate pay-per-view channel, and subscriber rates to be charged for various services, are embraced within the programmer function. The programmer, as an information gatekeeper, controls content.

- **Marketing and Billing Agents.** These pursue promotional activities to encourage purchase of particular programs and groups of programs by potential viewers, along with subscriber billing. Marketing and billing may be performed by separate entities.

THE UNCONSTRAINED SERVICE MODEL

Control over Content

Consider a model in which no constraints are imposed on a single entity in performing any combination of the above functions. Thus, the unconstrained entity would have the freedom to control both the content and transmission of information. This model describes, essentially, the situation faced by today's cable industry. Cable operators are electronic publishers for whom, like newspaper publishers, the functions of programming, editing, and distribution are tightly integrated. As discussed in Sec. IV, some are vertically integrated into program supply, e.g., they hold ownership interests in cable program networks. Cable operators also perform marketing and billing functions, and some cable program networks undertake independent marketing activities.

To be sure, cable operators do not have complete control over content. First, they carry signals of local broadcasting stations whose content they do not control. Indeed, until 1985 cable systems were required under the FCC's "must carry" rules to carry all local or significantly viewed broadcast signals within their capacity limits.\(^3\) Second, in deciding to procure a program package from an outsider, cable operators generally do not exercise control over individual programs in the package. Third, cable operators are subject to leased access requirements specified in the Cable Act. However, for the reasons noted above, those provisions are of severely limited effectiveness. Thus, although cable operators do not have total control over

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\(^3\) The FCC's "must carry" rules were struck down by the courts in 1985, but cable systems have continued to carry local signals, with some deletions and repositionings in the subscribers' channel listings. FCC (1969), paras. 32.
content, it will be convenient on expositional grounds to regard the "unconstrained" model in this study as describing essentially the situation faced by today's cable industry.

**Control over Price of Access**

Either explicitly or implicitly, the cable operator sets a price to program suppliers for access to channels. By controlling the price to program suppliers for access to the wireline network, the cable operator controls the content of material available to viewers. At first blush, this statement may seem puzzling—for one generally thinks of the cable operator as buying programs and channels of programs from suppliers, with the prices charged by suppliers varying widely by program type.

This situation arises as a consequence of the way that billing and collection are handled. Generally, it is the cable operator who bills and collects from subscribers. The amount the cable operator collects minus the portion of revenues remitted to the supplier (i.e., the amount the cable operator pays for the programming) minus the amount the cable operator collects is equal to the (implicit) access charge paid by the supplier for access to subscribers.5 For example, suppose that a pay-movie channel is offered to subscribers for $7 a month, with the cable operator collecting the $7 and remitting $4 to the supplier. The cable access charge—in this case an implicit charge—is $3 (including marketing and billing). In other cases, cable operators explicitly charge a fee for access to the network.6 If a cable operator refuses under any circumstances to carry a program, the access charge can be regarded as infinitely high.

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4This subsection draws heavily from the more detailed treatment in Besen and Johnson (1982).

5To be sure, the cable operator does not collect revenues separately identifiable with specific channels included in basic service packages. In this case, the revenue from a particular channel of programs reflects the subjective valuation of its inclusion estimated by the cable operator. That valuation is reflected, for example, by the degree to which inclusion of a particular cable network channel is judged to encourage subscriber signups or permits an increase in the price of the basic service package. Only if that valuation exceeds the price paid to the supplier of the network channel (i.e., only if the access price is positive) would the cable operator be willing to carry it.

6As one example reported by Besen and Johnson (1982), p. 31, the national Spanish Television Network made an explicit payment of 10 cents for each subscriber with a Spanish surname, with costs of programming and channel access covered by advertising revenues.
The price of access varies widely among program types. A popular movie channel could cost a subscriber a few dollars; a children's channel or one catering to a small audience might cost only pennies per subscriber. Channels with high access charges are frequently offered individually; those with small access charges are bundled together as a basic service package and offered for a single monthly fee.

Government Regulation of Rates

Some cable systems are also subject to local government regulation of subscriber rates for basic service. Before passage of the Cable Act of 1984, cable operators generally were required to obtain approval from the local franchising authority for upward adjustments in rates for basic television service. The Cable Act abolished this restriction in cases where the cable system is faced with "effective competition" as defined by the FCC. In turn, the FCC defined effective competition to exist if the local market is served by at least three unduplicated broadcast television signals. Thus, in markets served by more than three broadcast stations (together containing about 97 percent of the nation's cable systems), subscriber rates were freed of regulation.

As discussed in Sec. V, the FCC has more recently adopted a stricter definition of effective competition. This change is in response to large increases in subscriber rates that have occurred since passage of the Cable Act.

COMMON CARRIER MODELS

Nondiscriminatory Access

Title II of the 1934 Communications Act describes the common carrier as an entity that holds itself out indiscriminately to all, in contrast to the unconstrained carrier, which has more freedom. In ac-

7The wide range of access charges for channel types is demonstrated in Besen and Johnson (1982), pp. 24–34.
8The decision whether to offer a service alone or in a bundle with others depends in part on transaction costs. It would be administratively burdensome and costly to price separately a channel that is available for only pennies per subscriber, in contrast to a popular movie channel. The decision to bundle also depends on whether doing so would increase program viewing (and cable revenues).
9Pay channels were exempt from local rate regulation.
cordance with this provision, the carrier is required to offer access to its transmission facilities on a nondiscriminatory basis. However, questions arise about what is meant by "nondiscriminatory." Is the common carrier required to offer the same terms and conditions of access (the "price" of access) to all users for whom the cost of rendering service is the same? Or does it have flexibility to set different prices for different classes of users, even though its cost does not differ across classes.\textsuperscript{11} In other words, is the carrier free to discriminate among customer classes? If it is free to discriminate among classes, what constraints on its freedom should be imposed?

First, common carriers, within and outside telecommunications, generally do have some freedom to discriminate among customer classes, as discussed below. Second, were the carrier totally free to define customer classes, the outcome would be essentially the same as in the unconstrained model: The carrier could perfectly discriminate among users simply by defining a user class so narrowly that only a single user fit into it. Thus, for the concept of common carriage to be meaningful, some mechanism must be established to assure that distinctions among classes are "just and reasonable."

For expository convenience in establishing a baseline for comparisons, we will define an "inflexible" common carrier as one that is required to offer nondiscriminatory access to all users. We will define a "flexible" common carrier as one that does have freedom to discriminate among customer classes. Constraints on that freedom will be treated within the cases under discussion. The term "common carrier," when used without qualification, is to be read as either a flexible or inflexible common carrier, depending on context. The term "carrier," used without qualification, encompasses any form of common or unconstrained carriage, depending on context.

No Control over Content

A salient characteristic of the common carrier is that it has no control over content. As one observer states:

Non-discriminatory access must be available regardless of content, in sharp contrast to newspapers or broadcasters. Thus, the

\textsuperscript{11}An alternative question is whether the carrier should be free to set the same price across classes of users even though its cost varies across classes.
telco has no freedom to restrict access or edit transmissions based
upon message content.\textsuperscript{12}

Here, program suppliers—acting either individually, collectively, or
through agents—control content and, thus, perform the programmer
function described above.

\textbf{Government Rate Regulation}

Common carriers are generally, but not always, subject to rate
regulation (e.g., rate-of-return and price cap regulation) by the cog-
nizant federal or state agency. Local exchange carriers are subject to
regulation for local telephone services because of their monopoly
character. AT&T has been subject to progressively looser regulation
as a consequence of growing competition in the long distance market,
while its competitors, such as MCI and US Sprint, are essentially
unregulated. If telephone companies offered video services as
common carriers, rate regulation might be imposed (on access charges
to program suppliers or on subscription charges to viewers) depending
on whether significant competition exists from cable systems, direct
broadcast satellites, or other sources.

\textbf{The Obligation To Serve}

Common carriers may or may not have an “obligation to serve,”
under which the carrier is required to provide service of specified
quality to most or all potential subscribers within its service territory.
This obligation is generally regarded as a quid pro quo for the firm’s
having a privileged, monopoly position. Thus, a firm with the right to
provide exchange telephone service in a given local area holds a poten-
tially lucrative monopoly. In return, the firm has an obligation to
serve, perhaps to serve some customers at high costs that can be cov-
ered only by cross-subsidization from others.

However, in cases where monopoly status is eroded by competitive
entry, the obligation to serve is under stress—a common situation to-
day. A competitor may skim the most lucrative portion of the incum-
to provide a specified degree of widespread service in competing with AT&T. They can pick and choose their markets, but AT&T has an obligation to serve dating back to the time when it held a nationwide monopoly of long distance service. Local exchange carriers, which still hold a monopoly (at least to residential and small business customers), continue to have a clear obligation to serve. If telephone companies were permitted into the cable television market, the cognizant government authority would probably impose an obligation to serve in cases where they do not face significant competition from cable systems or other sources.

At the same time, the obligation to serve is commonly imposed on cable systems as well. In exchange for potentially lucrative local franchises, cable operators are commonly expected to stand ready to serve most if not all of their potential subscribers.

For purposes of this study, the two most important characteristics that distinguish common carriage from unconstrained service are nondiscriminatory access and no control over content. Varying degrees of rate regulation and service obligations may be applied to both carrier models, determined largely by the extent of competition in particular local markets, as discussed in Sec. V.

Common Carrier Video Service

Arrangements for video could be similar to alternatives used today for audio services. Of basic importance is that program suppliers would be free to deal directly with the public in advertising and promoting their program offerings, and they would pay fees to the transmission provider (here the telephone company) for channel access. Program suppliers could collect revenues directly from subscribers or they could use the telephone company as the billing agent. For example, they might use services similar to today's 976 and 900 numbers with the charges (a portion of which goes to the telephone company) added to the customer's telephone bill.

The role of marketing is of major significance. Although program suppliers would be free to deal directly with subscribers, it is not clear that many would choose to do so. The economies of marketing could render more attractive the contracting of these functions to one or a few entities. Indeed, the marketing and promotion of particular channels and bundles of channels might be placed in the hands of the entity that markets, and arranges installation of, the multichannel facility itself. Today, these functions are handled by the cable opera-
tor. A major policy issue is whether the telephone company should be permitted to perform those functions if it provides common carriage video.

INFORMATION DIVERSITY AND ECONOMIC EFFICIENCY

Fundamental to the subsequent analysis is an understanding of how the concepts of information diversity and economic efficiency are related. Information diversity has three dimensions—the number of information flows (or programs), the differences among them, and the terms under which they are made available to potential users.

To illustrate, if two television programs have identical content and are offered under identical conditions to viewers, diversity is not increased by including the second offering. At the other extreme, if the information content of the two is wholly dissimilar, the availability of both would increase diversity. In the middle is the commonly observed case of programs with some degree of similarity (e.g., two newscasts with differing slants on the news).

The terms of program availability involve three components—convenience, price, and geographical location. With respect to the first, a television program offered only at 2:00 AM would contribute less to diversity than if it were offered during prime time. Conversely, if the program were offered during both prime time and at 2:00 AM, availability—and information diversity—would be broadened. With respect to price, a given program may contribute to diversity in terms of content, but the price to potential users might be so high that only a few are willing to pay. Thus, a channel of programs priced at $10 per month would contribute less to diversity than if the price were $5. Finally, with respect to geographical availability, a program shown only on the East Coast contributes less to diversity than would be true with nationwide coverage.

Unfortunately, the above dimensions cannot be measured and added together to provide an overall estimate of the "value" to society of the level of information diversity that exists at any given time. Nevertheless, we would expect diversity to be subject to "diminishing returns," as is true of goods and services in general. Although an expansion of diversity has positive value to society, the value of an increment of diversity falls as the level of diversity expands. Thus, for two otherwise identical societies, an increase in diversity in one society where an abundance already exists would be valued less than would the same increase in the other society with a paucity of diver-
sity. The concept of diminishing returns is of key importance in the analysis in Sec. VI.

A basic problem with the concept of diversity, and of the commonly expressed goal of encouraging diversity in line with First Amendment freedoms, lies in determining how much is enough. From the preceding, one might conclude that the more information the better. However, information production and dissemination involve a cost as well as a benefit. To say that we should adopt the goal of “maximizing” information diversity would be too broad. To be meaningful, the goal of maximizing diversity must be evaluated in terms of costs as well as benefits.

It is here that economic efficiency becomes relevant. The concept of economic efficiency involves questions of how to obtain the greatest social benefit from a given endowment of limited resources. Options that increase economic efficiency are those that permit society to extract an increase in the benefits from that resource endowment. In accordance with this concept, the value of information is judged by how much users are willing to pay for it. The greater the willingness to pay, the greater the value of the information to the user—and presumably to society.

Of course, some information may have a value not well measured by willingness to pay. For example, society might judge the value of certain educational information to be greater to the collective whole than to the individual. Or certain information that satisfies the needs of low-income households may be judged to be of great social value even though the recipients are not able to pay for it. The external benefits or “positive externalities”13 of such information would justify making it available, perhaps by public subsidy, beyond the point where users would be willing to pay for it. The existence of externalities provides the rationale for publicly supported education, low postage rates for certain printed material, and other activities where social benefits are not fully taken into account by market forces. Economic efficiency, measured by willingness to pay, provides a baseline with which society can judge whether additional amounts of information, in specific cases, should be expanded on grounds of positive externalities.

13The phrase “positive externalities” is used in contrast to “negative externalities,” illustrated, say, by efforts to reduce smog, where some sort of tax (rather than a subsidy) might be justified to encourage a reduction (instead of an expansion) of output, relative to the level dictated by market forces.
It is economically efficient to expand the level of information diversity so long as the amount users are willing to pay for additional information is at least equal to the additional cost of producing and disseminating the information.\textsuperscript{14} But if the information involves a cost above the willingness to pay, the cost exceeds the benefits (unless positive externalities add to the benefits) and society suffers a net loss.\textsuperscript{15} In other words, too much information is produced. Information diversity expands but now at the expense of economic efficiency. The resources used for the programming would be better used elsewhere in the economy.

With willingness to pay as the criterion for measuring value, the maximization of economic efficiency involves maximizing total social "surplus." Total surplus consists of two components: (a) consumer surplus, which is the collective amount consumers would have been willing to pay for the product or service in excess of the amount they actually pay, and (b) producer surplus, measured by the revenues to producers in excess of their costs.

Throughout this study, we will judge the merits of alternative carrier status in terms of how total surplus is affected and how changes in total surplus are related to changes in information diversity.

\textsuperscript{14}This statement is based on the assumption of independence in demand among information types. The complications raised by partial substitutability are treated in Sec. III.

\textsuperscript{15}We could include advertisers' willingness to pay as well but, as explained above, this study is confined to viewer-supported services.
III. THE COMMON CARRIER AND UNCONSTRAINED DELIVERY MODELS

Drawing from the components in Sec. II, we construct a simple four-channel illustration to compare, in terms of information diversity and economic efficiency, the relative merits of common carrier and unconstrained delivery models. Two characteristics of this illustration must be emphasized at the outset. First, none of the transmission providers in the two models have ownership interests in program supply. The consequences of vertical integration, with ownership ties between transmission providers and program suppliers, are treated in Sec. IV. Second, program suppliers pay access charges to the carriers for the lease of channels, and they collect directly from subscribers. Because of competitive pressures, any reduction in the price of channel access to the program supplier is passed on to subscribers, with the supplier able to just cover its costs (e.g., excess profits are zero).

After exploring the illustration, we consider alternative common carrier pricing structures for access aimed at enhancing economic efficiency and information diversity. We then evaluate more briefly the consequences for the analysis when (a) programs or channels of programs compete with each other for subscribers, (b) advertiser revenues are introduced alongside subscriber payments, (c) the functions of marketing and billing are taken into account, (d) pay-per-view and switched video are included with conventional distributive video, (e) program suppliers have access to channels under published tariffs, and (f) the carrier faces little or no competition in the local market from broadcasters or other video providers.

A FOUR-CHANNEL ILLUSTRATION

Consider the numerical illustrations in Table 1, where we compare the inflexible form of common carriage defined in Sec. II with unconstrained carriage. The columns are defined as follows:

1. **Number of Channels.** Four channels are listed with each offered separately to subscribers. Each channel carries a separate “type” of program. Each program type can be supplied by any number of equal-cost competing suppliers so that the supplier for each channel just breaks even by supplying the program type at minimum cost.
Table 1
OUTCOMES OF CARRIER MODELS
($ thousands)

<table>
<thead>
<tr>
<th>Number of Channels</th>
<th>Allocated Fixed Cost</th>
<th>Marginal Access Cost</th>
<th>Average Access Cost</th>
<th>Maximum Access Charge</th>
<th>Actual Access Charge</th>
<th>Carrier Excess Revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
<td>(6)</td>
</tr>
<tr>
<td>Case A: Unregulated Inflexible Common Carrier</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
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<td>10</td>
<td>58</td>
<td>80</td>
<td>70</td>
<td>12</td>
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<tr>
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<tr>
<td>Totals</td>
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<td>20</td>
<td>116</td>
<td>150</td>
<td>140</td>
<td>24</td>
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<tr>
<td>Case B: Regulated Inflexible Common Carrier</td>
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<td>[20]</td>
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</tr>
<tr>
<td>Totals</td>
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<td>30</td>
<td>126</td>
<td>195</td>
<td>128</td>
<td>0</td>
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<tr>
<td>Case C: Unconstrained Carrier</td>
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<td>10</td>
<td>34</td>
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</tr>
<tr>
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<td>40</td>
<td>136</td>
<td>205</td>
<td>215</td>
<td>79</td>
</tr>
</tbody>
</table>

Thus, the market for a given program type is perfectly "contestable."\(^1\) Under this condition, any reduction in the price of channel access to the program supplier is passed on to subscribers, with the supplier continuing to just cover its costs. Subscriber demand for each channel varies as a consequence of the material carried and, to simplify the analysis, we assume that the demand for each program type is in-

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\(^1\) Perfect contestability differs from perfect competition. In the latter, the number of firms is so large that no single firm has any control over price, i.e., it can sell all that it chooses to produce at a given price determined by overall supply and demand. The wheat farmer is a good example. Because the assumption of perfect competition is so clearly unrealistic for video programming, we adopt the concept of perfect contestability: Only one firm (or a few) may serve the market, but potential competitors can so easily enter the market that the firm is forced to set a competitive price for its output. The seminal work on contestability is by Baumol, Panzar, and Willig (1982). For a critical evaluation of the concept of contestability, see Shepherd (1984).
dependent of the demand for all other program types. The assumption of independence among program types will be relaxed later.

2. **Network Fixed Cost.** This is the portion of the cost of building and operating the network that does not vary with the number of channels carried. The fixed cost of $96 (say in thousands) is a levelized figure covering the time period in question.\(^2\) These costs are (arbitrarily) divided equally among whatever number of channels are filled. We assume that the video network is a separate dedicated facility, thereby avoiding the problems of treating common costs associated with an integrated voice, data, and video network. The network is constructed to serve potential subscribers up to the total number of households within a given geographical area.

3. **Marginal Access Cost.** This is the additional cost to the carrier of transmitting material on the channel shown. For convenience, we take the marginal cost as constant (at $10) for all channels used and independent of the number of subscribers.\(^3\) This is called the marginal access cost because it is the amount that the carrier would have to charge the program supplier to cover the additional cost of making the channel available.

4. **Average Access Cost.** This is equal to the average access charge required per channel for the carrier to break even. It is given by the sums of the figures in Columns 2 and 3.

5. **Maximum Access Charge.** This is the maximum amount that the carrier is able to charge the program supplier for the channel in question. This amount is equal to the maximum amount that the program supplier is willing to pay for access, which is equal to its revenues collected from subscribers minus its programming cost.

6. **Actual Access Charge.** This is the actual charge by the carrier to program suppliers as channel lessees.

7. **Carrier Excess Revenue.** This is the carrier's total revenue in excess of its cost, given by the differences between the amounts shown in Columns 4 and 6.

To illustrate the use of Table 1 consider, first, Case A. The carrier is unregulated in the sense that it is free to set whatever access charge it chooses; but as an inflexible common carrier its access charge must be nondiscriminatory among potential channel lessees.

\(^2\)A description of a methodology for estimating levelized (e.g., annualized) costs from an initial lump sum investment is contained in Johnson and Reed (1990), pp. 23–24, and Appendix 1.

\(^3\)A cost for network hookup to individual subscribers may also be incurred. This cost could be covered by a lump sum payment by the subscriber outside the framework illustrated in Table 1.
with the same cost of access. Thus, in Table 1, potential lessees of the channels fall in the same user class because the cost of access does not vary by program type. Under these conditions the carrier sets an access charge of $70 because that is the level that maximizes its profits (excess revenues). If it sets the charge at $80, only Channel 1 would be leased, and the carrier would not cover its total cost ($96 fixed cost plus $10 marginal cost for one channel). Moreover, it would not lower its access charge to $45 (the maximum amount available from Channel 3) because the additional revenue of $45 (minus the marginal cost of Channel 3) would be more than offset by the reduced revenues for Channels 1 and 2, given that the carrier must offer the same access charge to all potential lessees. Total revenues would fall even further if the access charge were lowered to $20 to include Channel 4. Thus, only Channels 1 and 2 are leased with the carrier earning excess revenue of $24. The bracketed figures signify that Channels 3 and 4 are not leased.

In Case B the carrier is subject to “perfect” government rate regulation in the sense that regulation (a) generates no administrative costs, (b) forces the carrier to set access charges just sufficient to cover cost (i.e., no excess revenues are permitted), and (c) does not affect the carrier's costs. In this situation, the carrier sets an access charge of $42 because that is the only level that just covers total cost, which amounts to $126 for three channels. In contrast to Case A, Channel 3 is carried. This outcome increases information diversity because an additional channel is made available and because subscriber prices for Channels 1 and 2 fall as a consequence of the reduction in the access charge from $70 to $42.

For two reasons, economic efficiency also increases. First, the amount the program supplier is willing to pay for Channel 3 ($45) exceeds the marginal cost ($10) to the carrier. The surplus of $35 reflects the fact that the benefit to society of adding the channel exceeds its cost.

To be sure, economic efficiency (and information diversity) would expand further if the carrier could be induced to carry Channel 4 as well, since the $20 maximum access charge would also exceed the $10 marginal cost. But this expansion would inflict a loss on the carrier since all four channels charged at the nondiscriminatory level of $20 would generate a total revenue of only $80—far less than the $136 required to cover total cost.

Second, even if the carrier did not add the third channel, but carried the other two channels at a nondiscriminatory rate of $58 (equal to the average access charge of $58), economic efficiency would be fa-
vorably affected in moving from Case A to Case B because social surplus would expand.

To demonstrate, Fig. 1 shows the subscriber demand curve $D_2$ for subscribers to Channel 2. The curve (a rectangular hyperbola) labeled "$58 access" is drawn so that all combinations of price and number of subscribers would give the same total of $58 paid to the carrier. With a $58 access charge, the program supplier would set a price of $P_1$, $N_2$ subscribers would sign up, and the $58 access cost would be shown by the rectangle consisting of the portions labeled $X$ and $Y$. Similarly, at a $70 access charge, price $P_2$ would be combined with $N_1$ subscribers and the access charge of $70 would be shown by the rectangle consisting of portions $X$ and $Z$. If the access charge falls from $70 to $58, consumer surplus expands by the whole area under the demand curve between $P_1$ and $P_2$. Producer surplus falls by the area of rectangle $Z$ (equal to $24$). Thus the rise

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As Fig. 1 is drawn the supplier would like to set a higher price to earn additional profits, but under the assumption of perfect contestability discussed above the supplier would be forced to set price at the point $P_1$ that just covers cost.
in consumer surplus exceeds the loss of producer surplus by the area of the shaded triangle—an increment of social surplus that depicts the increase in economic efficiency with a fall in price.\(^5\)

In short, Case B is clearly superior to Case A on both information diversity and economic efficiency grounds. More channels are carried in Case B than in Case A, and the channels that are carried in both have a lower price in Case B.

Case B demonstrates that on grounds of both economic efficiency and information diversity, and with independence of demand among program types, a given type should be carried so long as it meets the "marginal (or incremental) cost test": As long as the access charge that the program supplier is willing to pay is no less than the marginal cost to the carrier of providing access, the program should be carried. As discussed below, a different test applies when program types are partial substitutes for each other.

Two other points are notable. First, information diversity would further expand even if the program supplier were accommodated at below marginal cost. But the level of diversity would exceed the socially optimal level unless positive externalities exist, as discussed in Sec. II.

Second, the assumption of "perfect" rate regulation is unrealistic. The cost of regulation and the perverse incentives that it generates make Case B less attractive than depicted here. The key point in the comparison is that average cost pricing in Case B is superior to profit-maximizing pricing (subject to the nondiscriminatory constraint) in Case A. However, if regulation is the only way to induce average cost pricing, and if regulation is costly, the outcome in Case A may be preferred.

In Case C, the transmission provider is both unregulated and permitted to impose discriminatory access charges on prospective channel lessees. In this situation, it simply imposes the maximum possible access charge against each. Without the requirement for nondiscriminatory treatment, its excess revenues ($79) exceed those of the unregulated common carrier ($24). But more significant for our purposes are two other characteristics which work in opposite directions in affecting economic efficiency and information diversity. First, it leases out the fourth channel, which adds to information diversity and economic efficiency, since the additional cost to the carrier of adding Channel 4 is only $10, yet the program supplier is

\(^5\)Only if the demand curve were perfectly inelastic, i.e., lower prices attract no additional subscribers, would a price reduction not generate an increment of surplus.
willing to pay up to $20. Second, its access fees are generally higher than those charged for the same channels in Cases A and B. Thus, both information diversity and economic efficiency are adversely affected.

In short, in the unconstrained service model the unregulated transmission provider makes available more channels, but with some offered only at a higher price than would be possible under common carriage. The regulated common carrier is superior to the unregulated common carrier (given the assumptions here), but whether common carriage is superior to the unconstrained service model is indeterminate.

This indeterminacy arises because of the inefficiency that accompanies the nondiscriminatory price requirement imposed on the common carrier. As illustrated in Case B, the additional cost to the carrier—and to society—of carrying Channel 4 is only $10, but subscribers would be willing to pay more than that amount.

If greater leeway existed in setting access charges than shown in Table 1 for the “inflexible” common carrier, more channels would be carried to the benefit of society. We now turn to alternatives open to the “flexible” common carrier free to engage in price discrimination among customer classes.

ALTERNATIVE COMMON CARRIER PRICING STRUCTURES

Price Discrimination Among Classes

A commonly used approach involves differentiating among classes of customers with a different price assigned to each. Among the multitude of examples, small business users pay higher monthly rates for basic local telephone service than do residential users, although the cost of serving the two classes is roughly the same. Postal delivery for printed matter is offered at a lower rate to qualified nonprofit organizations than to other users.

Such differentiation is commonly justified on the basis of Ramsey pricing and the inverse elasticity rule. If setting prices at marginal cost generates revenues insufficient to cover total cost (because average cost exceeds marginal cost, as in Table 1), the optimal strategy is to set prices so that the relative markups of prices over marginal costs for the various classes deviate in inverse proportion to their respec-
tive demand elasticities. Thus, classes with relatively inelastic demands pay relatively more than classes with elastic demands. By discriminating on the basis of demand elasticity, this approach achieves better outcomes than does average cost (nondiscriminatory) pricing, because it generates outputs closer to those dictated by marginal cost pricing.

Accordingly, relatively high access charges are imposed on program suppliers whose willingness to lease channels is relatively insensitive to the amount of the access fee; those who otherwise would not be able to afford the lease would be offered more favorable terms. Thus, for example, the lessee for a popular movie channel would probably pay a higher access charge than would the lessee for a children’s educational channel.

Of course, controversy would arise about which particular classes should be accorded more favorable treatment. This is a pervasive problem in the telecommunications, postal, and other fields, where conflict exists between the need to cover total cost and the desirability of setting prices equal to marginal cost.

One particular aspect of this controversy deserves special mention. A potential danger exists of control over information content by manipulating the definition of program classes. For example, suppose one class is designated “family planning” as a subcategory of the broader class of educational programming. By adjusting access charges for this subcategory, the carrier could either encourage or discourage the carriage of family planning programs which may contain material whose dissemination is either supported by or opposed by particular groups. This situation illustrates potential conflict that may arise on both ideological and economic grounds, in according some classes more favorable treatment than others.

---

6 The Ramsey rule for two classes i and j whose demands are independent of each other is given by

\[
\frac{P_i - MC_i}{MC_i} = \frac{P_j - MC_j}{MC_j} = \frac{\epsilon_j}{\epsilon_i}
\]

where in the i\textsuperscript{th} and j\textsuperscript{th} market \( p = \text{price} \); \( MC = \text{marginal cost} \), and \( \epsilon = \text{elasticity} \). Price elasticity of demand is a measure of sensitivity of the amount of a product or service demanded relative to its price. The greater the percentage change in the amount demanded relative to the percentage change in price, the greater the elasticity. For detailed expositions see Baumol and Bradford (1970) and Mitchell and Vogelsang (1991).
Two-Part Tariffs

A commonly used approach in the public utility field involves setting access charges close to marginal cost and imposing a fixed charge for generating additional revenues required to cover total cost. For example, in the electric power industry a usage charge is commonly combined with a fixed monthly charge.\textsuperscript{7}

Here, we could visualize the subscriber's bill consisting of two parts. The first consists of a fixed charge paid to the LEC for use of the network. The second consists of the various per-channel fees paid to program suppliers, as before. With the fixed charge covering a portion of network cost, access charges by the LEC to program suppliers may be lower than otherwise. How two-part tariffs for video services affect economic efficiency and information diversity involves complex analysis that goes beyond the scope of this report. This is another example of needed future research tabulated in Sec. VII.

Volume Discounts

Another possibility is establishment of discounts for multiple channels, with the telephone company, consistent with its common carrier status, offering the same discounts to all comers. In this way, the marginal price paid by lessees would approach the marginal cost of access, as an increasing number of channels is leased.\textsuperscript{8}

The situation is illustrated in Table 2. On the left are shown the values for a constant charge of $50 per channel. The marginal charge, which also remains constant at $50, is the same as the average charge or price of access. A program supplier, unable to pay this marginal price of access (yet able to pay more than enough to cover the carrier's lower marginal cost of access), would be excluded. On the right is a set of discounted prices, where program suppliers would be offered multiple channels at a declining marginal price per additional channel. Note that the charges for only one or two chan-

\textsuperscript{7}Use of a hookup charge, combined with a channel charge (both per-channel and per-bundle), is common in the cable industry.

\textsuperscript{8}In some cases, volume discounts reflect the reduced additional units costs of handling additional volume. For example, the price of a three-ounce letter is less than three times the price—and the cost of handling—a one-ounce letter. Above, however, we assume that additional channel cost as a function of volume remains constant to focus exclusively on how appropriate price structures may mitigate problems created by disparities between average and marginal network cost.
Table 2
CONSTANT ACCESS CHARGES AND VOLUME DISCOUNTS
($ thousands)

<table>
<thead>
<tr>
<th>No. of Channels</th>
<th>Constant Price Structure</th>
<th>Volume Discount Price Structure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total Revenues</td>
<td>Average Charge</td>
</tr>
<tr>
<td>1</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>2</td>
<td>100</td>
<td>50</td>
</tr>
<tr>
<td>3</td>
<td>150</td>
<td>50</td>
</tr>
<tr>
<td>4</td>
<td>200</td>
<td>50</td>
</tr>
<tr>
<td>5</td>
<td>250</td>
<td>50</td>
</tr>
</tbody>
</table>

Channels are set higher than in the constant charge case, required as an offset to the revenue reductions occasioned by larger volume sales. This situation would improve outcomes insofar as additional channels would be filled as the marginal price falls. Along with the increase in viewer choice would be an improvement in economic efficiency.

Possibilities of channel resale pose difficulties. A program supplier might procure large quantities of channels and resell them to others who want only one or a few channels. The telephone company would need to devise a way to prohibit resale by monitoring the use of channels and enforcing resale prohibitions incorporated in its published tariffs.

However, prohibitions against resale lead to another problem. Program suppliers would have an incentive to merge. To illustrate, suppose one supplier desires three channels, entailing a total payment of $150, and another wants two, for a total of $110. By merging, the two suppliers would pay a total of $200, for an overall saving of $60.

At the extreme, we can imagine a single supplier emerging to procure all the available channels. In this case, the supplier would become the single information gatekeeper that negotiates with all prospective channel lessees. Any prospective lessee seeking to deal directly with the carrier would be handicapped because it would pay a higher marginal access fee than would the single larger lessee. In effect, this single entity would lease the transmission system from the carrier (in the same way cable operators are free today to lease networks built by telephone companies), and deal with program suppliers as cable operators do now. In this case, outcomes of the common carrier and unconstrained service models would be the same.

This is a notable conclusion because it suggests that separating the control of content from conduit does not necessarily avoid the prob-
lems associated with the single information gatekeeper. Even with common carrier status for the transmission network, the single gatekeeper could emerge, depending on the pricing structure for access adopted by the carrier.

Other Pricing Strategies

The preceding pricing strategies have been confined to per-channel charges. A contrasting possibility is a per-subscriber access charge (with a minimum charge included to assure coverage of the marginal cost of access).9 Program suppliers with a small subscriber base would more likely gain access than under a per-channel nondiscriminatory rate. The leading potential difficulty is that, with the same per-subscriber rate to all program suppliers, some would pay much less than they would under per-channel/per-customer class pricing. This reduction in revenues would conflict with the requirement to cover network fixed costs. As a remedy, per-subscriber rates could be raised, but doing so would shut out some of the program suppliers who would otherwise have been accommodated.

Another possibility is revenue sharing.10 For example, the access charge might be set at 25 percent of the gross revenues collected by the program supplier. In this way, channel lessees with small revenues would more likely be accommodated than they would in a per-channel pricing regime. An obvious problem, however, is that some program suppliers would not be able to afford the 25 percent charge (or whatever other nondiscriminatory revenue split is adequate to cover total network cost), yet they would be able to cover their marginal cost of access.

These examples highlight the need for more research on promising ways to price broadband services. Perhaps a combination of the above, including both per-channel and per-subscriber elements in the access charge, would lead to more economically efficient outcomes than would any of the above approaches adopted singly.

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9 For a formal treatment of per-subscriber access charges, see Besen and Johnson (1982).

10 Revenue sharing is embodied in the approach to common carrier video proposed by Nadel (1985).
PARTIAL SUBSTITUTABILITY AMONG PROGRAMS

We have proceeded under the assumption that subscriber demand for any channel of programming is independent of the demand for others. But, to be realistic, demand is affected by whatever else is being offered. The case of interrelated demands is not modeled in this study. Suffice it to say that the problems associated with disparities between average and marginal cost would remain. To illustrate, suppose that all four channels in Table 1 carry programs that are partial substitutes for each other, and that the maximum access charges shown are those for each channel if all four channels are being leased. As before, Channel 4 would not be transmitted by the common carrier (either regulated or nonregulated), even though the program supplier would be willing to pay an access charge above marginal access cost.\(^{11}\)

Notable for our purposes is the disparity between outcomes of the unconstrained service model and the common carrier model in the face of interrelated program demand. Consider, first, the unconstrained service operator facing demands for access on two channels that are partial substitutes for each other, illustrated in Table 3. Channel 1 is a popular news program (perhaps appealing to a mass audience) and has relatively high revenues of $130 (thousands of dollars). The program cost is $15 and the marginal access cost is $10. If the operator imposes an access charge of $115 it earns a net revenue of $105 (115 minus 10).\(^{12}\) Channel 2 treats the news in a different way and, offered by itself, would have revenues of $60, also with a program cost of $15.

The amount that subscribers are willing to pay for one channel depends on whether the other channel is available. If both are offered, Channel 1 revenues would fall to $95 and Channel 2 revenues would fall to $45 because of audience shift between the channels. Total revenues of $140 from the combination would be higher than the revenues from either channel offered alone, because some households would subscribe to both. Since a cost of $25 is incurred for each chan-

\(^{11}\)Since Channel 4 would not be carried, the maximum access charges for the remaining channels would have to be adjusted (upward) to reflect the loss of Channel 4 as a partial substitute. Conceivably, the rise in the maximum access charge for Channel 3, in the absence of Channel 4, would be sufficiently great to enable its carriage by the unregulated, as well as the regulated, common carrier.

\(^{12}\)Note that excess revenues are not necessarily equal to excess profits because these revenues may contribute to covering fixed network costs, as discussed above.
<table>
<thead>
<tr>
<th>Number of Channels</th>
<th>Subscriber Revenue</th>
<th>Program Cost</th>
<th>Marginal Access Cost</th>
<th>Maximum Access Charge</th>
<th>Actual Access Charge</th>
<th>Net Revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channel 1 alone</td>
<td>130</td>
<td>15</td>
<td>10</td>
<td>115</td>
<td>115</td>
<td>105</td>
</tr>
<tr>
<td>Channel 2 alone</td>
<td>60</td>
<td>15</td>
<td>10</td>
<td>45</td>
<td>45</td>
<td>35</td>
</tr>
<tr>
<td>Channel 1 if</td>
<td>95</td>
<td>15</td>
<td>10</td>
<td>80</td>
<td>80</td>
<td>70</td>
</tr>
<tr>
<td>Channel 2 offered</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Channel 2 if</td>
<td>45</td>
<td>15</td>
<td>10</td>
<td>30</td>
<td>30</td>
<td>20</td>
</tr>
<tr>
<td>Channel 1 offered</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Channels 1 and 2</td>
<td>140</td>
<td>30</td>
<td>20</td>
<td>110</td>
<td>110</td>
<td>90</td>
</tr>
</tbody>
</table>

Table 3
EXAMPLES OF PARTIAL SUBSTITUTES IN PROGRAMMING IN THE UNCONSTRAINED SERVICE MODEL
($ thousands)

Channel (marginal cost of the channel plus program cost), net revenue to the unconstrained operator is maximized ($105) when Channel 1 is carried alone.

The unconstrained operator can avoid carrying Channel 2 simply by raising the access price to a level above $30, since at any price above that the lessee of Channel 2 could not afford to pay the cost of programming plus the price of access ($45) when faced with competition from Channel 1. Thus, information diversity is adversely affected when the unconstrained service operator chooses among channels that are partial substitutes for each other.

In contrast, the common carrier, forced to offer nondiscriminatory access, could not carry one channel unless the other were offered on the same terms. To be sure, this situation does not guarantee that Channel 2 will be carried. The common carrier can avoid carrying Channel 2 by setting the access charge at any "nondiscriminatory" level above $30—a figure available to all lessees but affordable only by the lessee of Channel 1.

Suppose, however, that many more potential lessees seek access, in addition to lessees of Channels 1 and 2. Assume that these others could not afford to pay more than, say, a $20 carrier access charge, and that at $20 the carrier would find profitable the carriage of these channels because they do not compete for audience, unlike Channels
1 and 2. If the carrier is constrained to set a single nondiscriminatory access charge for all channels, carriage of Channel 2 along with others at an access charge of $20 (at which the carrier earns net revenue of $10 per channel) may be more attractive than carriage of only Channel 1 at the $115 access charge postulated above.

In this situation we have two potentially conflicting considerations. On the one hand, carriage of Channel 2 adds to information diversity. On the other hand, its carriage may be economically inefficient by imposing costs that exceed benefits, even though carriage meets the marginal cost test defined above for program independence. Carriage of Channel 2 reduces the demand for Channel 1 that would have been generated by the carriage of Channel 1 alone. This reduction must be taken into account in determining whether Channel 2 should be carried. Judged in terms of economic efficiency, Channel 2 should be carried only if the surplus generated by adding Channel 2 more than offsets the surplus lost by Channel 1.

If subscriber revenues in Table 3 are considered satisfactory proxies as measures of willingness to pay, Channel 2 should not be carried. The maximum amount that the lessee of Channel 2 is willing to pay for access, given that Channel 1 is carried, is $20 as shown in Table 3. The $10 surplus generated by carrying Channel 2 ($20 minus $10 marginal access cost) is less than the reduction of $35 to the cable operator in carrying Channel 1, when Channel 2 is added.

At the same time, the numbers in Table 3 may not represent consumer surplus well. Suppose that the demand for Channel 2 is relatively inelastic. The subscriber revenue of $35 for Channel 2, given that Channel 1 is also carried, would exclude a large amount of consumer surplus, not shown in Table 3, that would be generated by carrying Channel 2. Suppose, further, that the demand for Channel 1 is quite elastic, so that not much consumer surplus exists above the $130 revenue shown for Channel 1 carried alone. In this case, the addition of Channel 2 could add to consumer surplus and, thus, to economic efficiency—as well as to information diversity.¹³

In short, when program types are partial substitutes, the common carrier may carry programs that the cable operator would seek to avoid. Carriage of these programs would contribute to information diversity; but whether it would contribute to economic efficiency depends on individual circumstances.

¹³This analysis draws from the literature dealing with optimal product diversity. See, especially, Spence (1976) and Dixit and Stiglitz (1977).
ADVERTISER-SUPPORTED VIDEO

We have considered only direct subscriber payment as a source of revenues for programmers and carriers. Surely, however, advertiser support will play a role (albeit secondary to direct subscriber payment) in overall revenues. A salient characteristic of advertiser support is that it takes into account the number of viewers but not the intensity of individual tastes. Inclusion of advertiser support would modify the overall demand for programs, but it is not immediately apparent that this addition would notably alter the outcomes discussed above.

A formal treatment of program choices with mixtures of advertiser and viewer support with varying arrangements for multichannel access lies beyond the scope of this study. It is one of a number of topics that deserve future analytic attention.

MARKETING AND BILLING

If channels, groups of channels, or individual programs are separately marketed, with program suppliers having access to the network on a common carrier basis, it may be most economically efficient for the telephone company to undertake the billing function for all lessees, with consolidated statements sent to subscribers. This arrangement is similar to telephone company billing for 900 and 976 number service and for those long distance carriers who choose not to do their own billing.

Consolidated billing could be critical to the success of some information providers—a point brought home by today’s experience. Refusals by some telephone companies to bill for adult talk line service could, some assert, put many of these operators out of business.

For video service, one might advocate that telephone companies, as common carriers, be required to provide billing services to all lessees under reasonable terms. This requirement would help prevent the carrier from discriminating against suppliers who might compete against the carrier’s own program offerings (relevant to issues of vertical integration treated in Sec. IV) and would assure suppliers of benefitting from cost savings of centralized billing.

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14 Advertising constituted about $2 billion of the $17.2 billion in revenues earned by the cable industry in 1989. FCC (1990b), para. 8.
At the same time, billing by the carrier raises two issues. First, would the carrier have the right to deny billing to those who deal in pornography or in other matter deemed offensive to the public taste? More fundamentally, would the carrier have the right to refuse carriage to such program suppliers, irrespective of billing arrangements? Second, would delinquencies in the payment by a subscriber for certain program services (perhaps because of a billing dispute) provide grounds for the discontinuation of all video services to that subscriber? More broadly, would failure to pay the bill for video constitute grounds for discontinuing telephone service to the subscriber? These questions are similar to those being grappled with today in billing for outside network users. The search for answers falls far beyond the scope of this study.

Perhaps more so than with billing, marketing by individual lessees on a common carrier network could be very costly—illustrated by the vision of door-to-door salespersons seeking signups for a single pay channel service. Undoubtedly, lessees would enter into cooperative marketing agreements to achieve economies comparable to those that cable operators currently enjoy in marketing together with their many combinations of basic and pay services.

However, cooperative marketing raises again the possibility that a single information gatekeeper will emerge. If the economies of joint marketing are strong, a program supplier could be severely disadvantaged if it does not join the group. At the same time, the central marketer (earning a percentage of revenues as its commission) would have incentives to behave as a single gatekeeper. For channels that are partial substitutes for each other, the marketer would take into account the effects of offering one on the revenues earned from others. For the same reasons as those discussed above, the marketer might decline to handle a particular service even though the supplier is willing to pay more than the marginal cost of network access.

Thus, even though the network itself operates as a common carrier—and with price structures that mitigate difficulties associated with the disparity between average and marginal cost—the marketing function could emerge as a bottleneck in the access by information providers to the network.

Detailed examination of the economics of marketing, and the potential for undesirable foreclosure to the network, is beyond the scope of this study. We note it here as another task that merits future attention.
PAY-PER-VIEW AND SWITCHED VIDEO

We have so far used channels of programs as the unit of analysis. However, many cable operators are offering individual programs as a pay-per-view service. It is safe to assume that some groups seeking access to a common carrier network would also offer programs individually.

Pay-per-view is easily accommodated in the above framework. One could substitute the word “program” for “channel” wherever it appears and derive the same general outcomes. Marginal access cost would refer to whatever network costs are incurred to include the program in question; subscriber willingness to pay would be measured in terms of these programs; and economic efficiency and information diversity outcomes would follow as before.

More fundamentally, we have assumed throughout that the network supplies “distributive” video as do today’s cable operators. That is, channels of programs (or individual programs) pass through the entire network to be made available simultaneously to subscribing households. In contrast, telephone company entry into video is commonly assumed to include switched or “on demand” services, with individual subscribers being able to dial up a particular program. The program would need to pass through only the portion of the network required to reach that subscriber. In this case, the supplier would stand ready to transmit the program over the common carrier network at the convenience of individual viewers. To accommodate this service, one would consider the demand for a particular program over time, with the marginal cost of access varying with the geographical location of the subscriber and the time of day. The challenges of designing an economically efficient pricing structure would be similar to those above, with the large literature on the pricing of (switched) telephone service providing useful guidance.\textsuperscript{16} The considerations raised by marketing and billing, interrelated demands for programs, and the comparative behavior under the common carrier and cable service models would also be similar to those discussed above.

PROGRAM PRODUCTION AND THE CERTAINTY OF ACCESS

With common carriage, program suppliers would have greater certainty about the terms of access, which would be defined in the car-

\textsuperscript{16}See especially Mitchell and Vogelaar (1991), Ch. 12.
rier's published tariffs. This feature would benefit suppliers who need widespread access to video networks to attract a sufficient regional or national audience to cover program production and other costs.

At the time programs are being considered for production, with large prospective costs to be incurred, the producer cannot be sure how many cable operators will provide access (i.e., how many operators will buy the product). Assurance of access under published tariffs (subject to capacity constraints) would provide a clearer notion in the early planning stages of the degrees of regional and national geographical coverage that will be possible under varying budgets for program distribution. Of course, uncertainty would remain about how many households will sign up once network access is achieved. Nevertheless, greater certainty about terms of access would make program production, packaging, and distribution less risky, thereby encouraging additional production and contributing to information diversity.

CARRIAGE STATUS AND COMPETITIVE VIDEO DELIVERY

The case for common carriage is strongest when the carrier faces no competition, such as from another wireline network, other multi-channel distributors, or broadcasting stations. Assured access under terms of published tariffs would be especially valued by program suppliers if they depend on a single delivery system. If the number of competing delivery systems expands, program suppliers have more outlets, market pressure to lower prices increases, and issues of control over content become less important.

However, the possibility exists that the video wireline operator will face less competition, rather than more, in the future. This outcome is suggested by a recent FCC staff study:

Broadcast television . . . has suffered an irreversible long-term decline in audience and revenue share, which will continue throughout the current decade. . . . Although broadcasting will remain an important component of the video mix, small-market stations,

\footnote{The certainty bestowed by published tariffs would be greatest for the inflexible common carrier constrained to charge the same price to all customer classes that have the same cost. The flexible carrier, free to discriminate among classes, may attach prices and other conditions to access that may reduce the certainty of access. Nevertheless, for both carriers greater certainty would exist than for the unconstrained carrier free to negotiate with all program suppliers.}
weak independents in larger markets, and UHF independents in general will find it particularly difficult to compete, and some are likely to go dark.\textsuperscript{18}

With the demise of broadcasting stations, cable systems would face less competition than today unless new competitors emerge. As noted above, Johnson and Reed (1990) conclude that LEC entry will not likely lead to side-by-side competition with cable systems. Rather if entry occurs, it will take the form of LEC mergers with incumbent cable systems and construction of wireline networks in new communities. In another RAND study, Johnson and Castleman (1991) conclude that if competition to cable emerges from any direction, it is most likely to come from direct broadcast satellite (DBS) systems. If numerous broadcasting stations do go off the air, and if significant competition does not emerge from DBS systems, the issue of common carrier status for the single wireline service will become more pressing than otherwise.

CONCLUSIONS

In terms of information diversity, common carriage has three advantages over unconstrained service:

\begin{itemize}
  \item[a.] More programs, and channels of programs, would be carried when they are partial substitutes for each other.
  \item[b.] Published tariffs would reduce uncertainty about the terms of network access to program suppliers, possibly encouraging additional program production.
  \item[c.] Prices paid by program suppliers (and subscribers) would be lower for some programs, i.e., programs for which discriminatory access charges are higher than those under nondiscrimination.
\end{itemize}

In terms of information diversity, the unconstrained service model has one advantage:

\begin{itemize}
  \item[d.] Prices to some program suppliers unable to pay a nondiscriminatory access charge would be low enough to permit these suppliers to be accommodated.
\end{itemize}

Whether the flexible common carrier model is better than the unconstrained model, in terms of outcomes, depends on whether the reduction in information diversity under d is more than offset by the increase in diversity under a + b + c. We have no basis here for measuring the elements embodied in these four categories. Among the complications, the various elements of diversity cannot be easily valued and added together.

The flexible common carrier would have leeway to price access to permit accommodation of some suppliers who would have been denied access under the inflexible common carrier model illustrated in Table 1. Flexibility would reduce the importance of d as a factor that adversely affects economic efficiency and information diversity.

Various price structures might be adopted by the flexible common carrier to reduce the severity of the problem under d. Distinctions could be made between customer classes (e.g., educational users and commercial users) with each paying a different access charge. Other possibilities are two-part tariffs, volume discounts, revenue sharing, and per-subscriber charges. Perhaps a combination of pricing approaches, including both per-channel and per-subscriber elements, would be superior to any of these approaches adopted singly.

At the same time, the greater the flexibility to respond under d, the greater the flexibility to more narrowly define customer classes, possibly having adverse effects on information diversity under a, b, and c. An open question for policymakers is how to weigh these conflicting considerations to formulate the terms and conditions under which video service is to be provided in the future.

Similar ambiguity exists with respect to economic efficiency. Common carriage would suffer the same disadvantage under d and, in some cases, would suffer a disadvantage under a. When programs are partial substitutes for each other, and other conditions are met, common carriage would encourage too much program diversity in terms of economic efficiency. (To be sure, some observers would regard this outcome as advantageous because of possible externalities that would warrant program production and dissemination beyond the levels justified strictly in terms of private willingness to pay.)

In other dimensions, the common carrier does at least as well as the unconstrained service provider. As in marketing, bottlenecks to access may arise even if common carrier arrangements work well. But the outcomes, at the extreme, would be no different from those of unconstrained service.

The case for common carriage is strongest when the carrier faces no competition. The possibility exists that the video wireline operator
will face less competition, rather than more, in the future. If less
competition does emerge, the debate about common carrier status will
become more pressing than otherwise.
IV. THE HYBRID MODEL

Here we inquire into the consequences of permitting telephone companies to have an ownership interest in the production and packaging of material for use on no more than a limited percentage (say 10 percent) of the total active channels on each of their local video networks. Thus, as a hybrid with vertical integration into programming, each firm would control the content of a portion of its video capacity, while making available the remainder on a common carrier basis to nonaffiliated program suppliers.

We begin by treating briefly two general reasons why vertical integration can be socially beneficial—whether in the video field or elsewhere. We then evaluate the relationship between vertical integration and the availability of programming, taking into account cases in which competition does and does not emerge with cable operators. Finally, we assess the potential anticompetitive use of cross-subsidization and bottleneck network facilities and then draw conclusions.

BENEFITS OF VERTICAL INTEGRATION

Reduction of Transactions Costs

Vertical integration can be socially beneficial for two reasons. First, it may reduce the transactions costs between links in the production and distribution process, thereby enabling price reductions to consumers and, more generally, increasing economic efficiency.1

For example, an automobile manufacturer can contract with outside parts suppliers or can establish its own supply facility. In some cases, the costs of contracting may be sufficiently high that the manufacturer is better off integrating the parts supply functions. Among possible problems, uncertainty about the quality of production by an outsider, and difficulties of coping with this uncertainty through contracts, may justify vertical integration to facilitate quality control.

Similarly, in the video field an ownership interest by cable operators (or telephone carriers) in program supply may reduce contracting costs to the ultimate benefit of subscribers. Among the possibilities,

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1The seminal treatment is by Williamson (1975). For a recent study focused on cable television, see Salinger (1990).
vertical integration may facilitate production of programs that would otherwise not appear.

Avoidance of Double Marginalization

Second, integration may reduce inefficiencies associated with "double marginalization." Above, we assumed a perfectly contestable programming market to simplify analysis of potential bottlenecks in the carriage of programs. Any attempt by a supplier to seek a higher-than-competitive price in the bargaining process would be immediately met by offers of other potential suppliers of perfectly substitutable material at the competitive price. Of course, the program supply market is not perfectly contestable. Rather, it can best be described as "monopolistically competitive"—a characteristic common to many industries—where product differentiation exists and where the seller of a product has some control over price. Many programs, and channels of programs, have an appeal that cannot be exactly mimicked by other suppliers. Thus, suppliers do have bargaining power against cable operators and, prospectively, against local exchange carriers. Moreover, since a wireline network is an important (in some cases sole) outlet for suppliers, the wireline operator also has bargaining power. This situation may encourage socially beneficial vertical integration by avoiding the problem of double marginalization, as well described by Salinger (1990, pp. 5–6).

Prior to vertical integration, the intermediate good monopolist sells its product to the final good monopolist for some price above marginal cost. After vertical integration, the final good monopolist receives the intermediate good for marginal cost. In essence, vertical integration makes the input less expensive for the final good producer. Just as a single product monopolist passes on at least some of any cost increase to consumers, it also passes on at least some of any cost decrease. The higher price that prevails when the successive monopolists are not merged is referred to as double marginalization.

By reducing costs, vertical integration encourages preferences toward affiliated program activities. To illustrate, suppose that carrier C accommodates three independent program suppliers X, Y, and Z. Subsequently, C vertically integrates with Y to reduce transactions costs and to eliminate double marginalization. Because dealings with Y involve lower costs than before, C would have an incentive to pass at least a portion of the cost savings back to Y. Thus, C would show a
preference for Y—but only because the costs of dealing with Y are lower than in the absence of vertical integration, and not because of any anticompetitive intent against X and Z.

If C is a common carrier, it would be constrained by the requirement of nondiscriminatory access and would, therefore, be barred from reducing the access charge to Y. However, Y would also benefit from vertical integration, putting it in a more favorable position in competing with X and Z. This shift would give the appearance of preferential treatment by C in the carriage of Y, even if all access charges are identical.

ACCESS TO PROGRAMMING

The preceding reasons for vertical integration explain, at least in part, the growth of ownership ties between suppliers and cable operators. For example, at the end of 1989 the largest multiple system operator (MSO), Tele-Communications, Inc., held ownership interests in 23 cable program services, and Viacom and Cablevision, respectively, held ownership interests in 10 and 12 percent.2

Although vertical integration can be socially beneficial, some allege that integrated cable operators are able to disadvantage their competitors by withholding access to programs. Without these programs, telephone companies would be severely handicapped in video markets. As remedies, so the argument goes, telephone companies should be permitted to enter into the same vertical relationships as do cable operators, or legislation should be enacted to ensure access to programming under reasonable terms.

Concerns about equitable access to programming must be evaluated in terms of scenarios in which telephone companies would, and would not, compete with cable operators. In the latter case, only one video wireline facility would exist in each market; in the former, two facilities would co-exist.

The Single Video Wireline to the Home

If conclusions of an earlier RAND study (Johnson and Reed, 1990) are correct, side-by-side competition between telephone companies

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2FCC (1990b), Appendix G, Table VI. At the same time, many program services are independently owned. One study identifies 35 such services, along with 35 others with cable ownership interests. Ibid., Tables IV and V.
and cable operators will not occur for video services, at least during the 1990s. Rather, the telephone company, without ownership ties to program supply, would be in much the same situation as nonintegrated cable operators. Although large MSOs have vertical ties, hundreds of (relatively small) cable franchisees operate as stand-alone transmission providers who deal with outside program suppliers, including suppliers co-owned with other cable systems. Complaints have been voiced that independent cable operators receive less favorable treatment for cable programming services than do the larger integrated firms. However, this pricing pattern is not, by itself, evidence of anticompetitive conduct. This experience suggests that large MSOs have greater bargaining power against suppliers than do smaller, independent operators. Indeed, the advantage of consolidating program procurement at least partially explains the widespread pattern of horizontal mergers among cable systems in recent years. Were telephone companies permitted into video, they would be no smaller than large MSOs. Thus, they would likely not face the difficulties of which small cable operators complain.

Moreover, since cable operators are generally confined to their own franchise territories, rather than competing among themselves in individual markets, integrated operators have no strong incentive to withhold from outside cable operators the programs in which they hold ownership interests. On the contrary, they would have incentives to sell to outside operators, since nearly all of the additional revenues would “flow to the bottom line” for programming that would in any event be produced.

The most serious complaints about inequalities in access come from other multichannel providers—such as satellite master antenna and wireless cable operators—which do constitute a direct competitive threat to cable systems. In response to such complaints, federal legislation has been written—but not yet passed—to help ensure “reasonable” access to programming by other multichannel systems, as discussed below.

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3The FCC notes that “small cable operators have complained that they also receive less favorable treatment from many cable programming services, even when they try to enhance their appeal to program suppliers by combining their program purchasing efforts.” FCC (1990b), para. 114.

4Horizontal merger activity is reflected in the fact that the top four cable companies had a market share of 52.3 percent in 1990, compared with 37.3 percent in 1982. FCC (1990b), Appendix G, Table 11.

5For a discussion of such complaints, see Johnson and Castleman (1991), pp. 64-66.
In conclusion, if telephone companies do not compete with cable operators, a strong case for vertical integration would be difficult to make on grounds of ensuring reasonable access to programming. However, a case for vertical integration might be made on the more general grounds of reduction in transactions costs and elimination of double marginalization—the same benefits that lead cable MSOs to hold ownership interests in programming.

Two Video Wirelines to the Home

If telephone companies threaten to enter existing cable markets, the situation could be quite different. Cable operators, including those vertically integrated, would have easily understandable reasons to seek to deter entry. One possible strategy is to deny telephone rivals access to attractive programming.

Restricting access to programming rests on the notion that program supply is not perfectly contestable. With perfectly contestable markets, vertical integration could not give the firm any advantage over its rivals, since the rivals would remain unimpeded in acquiring other equally attractive programs under no less favorable terms than in the absence of vertical integration.

However, as noted above, the programming market is monopolistically competitive. Many programs, and channels of programs, have an appeal that cannot be exactly duplicated by competitors. The denial to a cable system of even a handful of today's most popular pay-movie and basic channels would pose a serious, if not fatal, handicap.

It is easy to show examples where the benefit to the incumbent of deterring entry is greater than the value to the prospective newcomer of entering the market, giving the incumbent an incentive to outbid the prospective entrant for resources (such as programming) that would be required for successful entry.

Table 4 is an illustrative example. Column 1 shows the situation faced by a cable operator, with no multichannel competitor, that has invested $30 (say, in millions) to construct its facilities. The present value of its gross revenues and operating costs are $60 and $5 respectively. The cable system (with profits assumed to be maximized) has a net present value of $25. Column 2 illustrates the effect on the incumbent if a competitor were to enter with the same service.
Revenues and the net present value would fall to $40 and $5, respectively.\(^6\)

Suppose that just after the $30 investment is made, a second multichannel provider (here the telephone company) contemplates building a more advanced system. This system would involve an investment of $18 (lower than the $30 earlier investment to reflect technological advance), and a present value of $-6 in operating expenses. If the second operator proceeds, the market will be evenly split between the two, with each having revenues of $40.

Table 4 illustrates two points. First, the incumbent is willing to pay more to deter entry of the potential competitor than the amount an entrant would be willing to pay to compete with the incumbent. The prospective entrant would be willing to pay no more than $16 if it must compete against the incumbent, since this figure is the net present value of investing in this market. In contrast, to avoid the reduction in its net present value—$20—occasioned by competition, the incumbent would be willing to pay up to $20.

Second, an asymmetry exists as a consequence of the incumbent’s sunk investment. The entrant would be willing to pay more than the above $16—up to an additional $20—to force the incumbent out of the market, since the entrant would then enjoy a present value of $36 as sole supplier. At the same time the incumbent would be willing to forgo more than $20 to avoid being driven out of the market. Because the investment is sunk, the incumbent would remain as long as the

<table>
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<th>Incumbent Alone (1)</th>
<th>Incumbent with Market Entry (2)</th>
<th>Prospective Entrant Against Incumbent (3)</th>
<th>Prospective Entrant Alone (4)</th>
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<td>60</td>
<td>40</td>
<td>40</td>
<td>60</td>
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<tr>
<td><strong>Investment</strong></td>
<td>-30</td>
<td>-30 (sunk)</td>
<td>-18</td>
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<tr>
<td><strong>Operating cost</strong></td>
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<td><strong>Net present value</strong></td>
<td>25</td>
<td>5</td>
<td>16</td>
<td>36</td>
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\(^6\)With competition we assume that subscriber prices will fall to encourage additional signups and growth in total market revenues from $60 to $80, with a 50:50 split in revenues.
operating cost—the only cost yet to be incurred—continued to be covered. With $40 in revenues in the competitive case, the incumbent would be willing to pay up to an additional $35 to remain in the market. The upshot is that the incumbent has strong incentives to foreclose entry, while the prospective entrant cannot hope to drive the incumbent out of the market.7

Ownership interests in programming. How might the incumbent proceed to deter entry? One way is to seek to raise the competitor's costs to the point of making entry unprofitable,8 e.g., by raising the prospective rival's programming costs. Ownership interests by the incumbent in popular cable networks could be used as a foreclosure tool. It is this possibility that led in 1990 to legislation (not enacted) that would bar “vertically integrated, national programmers from unreasonably refusing to deal with any multichannel video distributor or from discriminating in the price, terms, and conditions in the sale of programming if such action would have the effect of impeding retail competition.”9 In this legislation, vertically integrated companies are singled out—as opposed to nonintegrated program suppliers—“because the incentive to favor cable over other technologies is most evident with them.”10

Exclusivity agreements. An obvious loop-hole exists in such legislation because vertical integration is not the only way to enable cable operators to raise the program costs of potential entrants. Exclusivity contracts, a commonly used business practice, is an alternative. Without ownership ties to program services, a cable operator could offer a premium price for programs (i.e., a low access charge) in exchange for the guarantee that the programming not be made available to the entrant for some specific period of time or that it be offered only on unattractive terms. Since the value to the incumbent of keeping the entrant out of the market is greater than the value to a newcomer of entry, the incumbent would be able to outbid the entrant for a range of attractive programming.

To be sure, in some cases vertical integration would facilitate foreclosure by reducing the costs of contracting between the carrier and program suppliers as discussed above. Internalized transactions en-

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7To prevent the new investment, the incumbent might seek to buy out the prospective entrant. Doing so, however, would run afoul of the antitrust laws.

8For an analysis of the strategy of raising rivals' costs, see Salop and Scheffman (1983) and Krattenmaker and Salop (1986). For a critical view of the strategy, see Brennan (1988).


10Ibid.
abled by vertical integration are also less vulnerable to antitrust scrutiny than are contracts with outside suppliers.

Nevertheless, even without vertical integration the incumbent would have an incentive to keep out prospective newcomers by using exclusivity agreements. Even if today’s cable operators were required to divest themselves of ownership interests in program supply, they would retain the potential for disadvantaging prospective newcomers.

A key policy question is whether use of exclusivity agreements is anticompetitive within the market environment treated above. The answer is not clear. As Mathewson and Winter (1987, p. 1057) conclude, “opinions expressed on the impact of exclusive dealing range from the extreme view that it is invariably anticompetitive to the view that it is always procompetitive.” Under many circumstances, exclusivity dealing enhances economic efficiency. Accordingly, Marvel (1982, p. 25) concludes that “exclusive dealing ought to be treated as legal per se.” In contrast, Comanor and Frech (1985) argue that exclusive dealing can be used as an anticompetitive tool to raise the cost of market entry to rivals, and that in those cases the practice should be prohibited. Mathewson and Winter (1987) point out that raising rivals’ costs is not a sufficient condition for disallowing exclusive dealing because raising these costs may in some cases increase rather than decrease economic efficiency. They analyze cases of rival manufacturers seeking exclusive dealing arrangements with retailers. Because manufacturers compete for the rights to exclusivity, the wholesale price would be lower than with nonexclusive dealing and a reduced wholesale price would be reflected in lower retail prices. In this situation, they observe (p. 1057) that “potential competition replaces actual competition as the disciplining force in the market.”

A detailed analysis of the economic effects of program exclusivity lies beyond the scope of this report. We conclude by emphasizing that mandatory provisions for “reasonable” access to programming raise questions not only about definitions and enforcement but, more fundamentally, about the long-run effects. Mandatory provisions for access might well free up programming in the near term for new multi-channel providers to compete with cable. But would these provisions encourage, or discourage, future program production? For example, banning or restricting exclusivity contracts with cable operators might reduce overall revenues available for future program production. At the same time program revenues generated by new multi-channel providers might more than compensate. The fact that programs once produced involve a near zero cost of use (like other forms
of intellectual property) is also relevant. These cross-currents highlight the need for further study.

**Vertical integration and program access.** In light of strong incentives by cable operators to withhold programming from LEC competitors, we return to the role of vertical integration by telephone companies as a countervailing force. By reducing transactions costs and eliminating double marginalization, ownership interests in programming would permit telephone companies greater access to programming than otherwise, thereby reducing the ability of cable operators to use the program market as a tool to thwart competitive entry. To be sure, with or without vertical integration, it is unlikely that telephone companies will compete with cable systems, as noted by Johnson and Reed (1990). But vertical integration would constitute one step in the direction of reducing hurdles that would otherwise exist to that competition.

**CROSS-SUBSIDIZATION AND NETWORK BOTTLENECKS**

We must consider the two main arguments commonly made against LEC entry into programming: the threat of cross-subsidization and the anticompetitive use of network bottlenecks.

**Cross-Subsidization**

Cross-subsidization could take two forms: (a) subsidization of video programming and (b) subsidization of the construction and operation of the video network. In both cases, costs of the subsidized activity are shifted to telephone ratepayers.

Concerns are commonly expressed that telephone companies could tap their telephone subscribers to bear costs of their video offerings. The carrier would subsidize its affiliated program suppliers by shifting some of their costs to its telephone services and, because this cost shift would be so difficult to detect, government regulators would permit hikes in telephone rates to cover these costs. In this way, the carrier could underprice cable competitors in offering attractive programming to subscribers.

This concern would have a basis only if significant elements of common costs existed between the potentially subsidized, and the subsidizing, portions of the carrier's activities (and, of course, only if the carrier has market power in the provision of telephone service). Physical facilities and labor skills for video production and packaging
are quite different from those for transmission of telephone signals. Consequen\-tly, the costs for the two activities are separable, easing the burden on regulators to detect cost shifting. Applicable here would be the elaborate set of accounting rules constructed by the FCC to deal specifically with the problem of separating costs of regulated telephone service from costs of nonregulated activities. Requiring that video programming activities be conducted within separate subsidiaries would provide an additional safeguard.

With respect to potential cross-subsidization, ownership interests in video programming would be no different from the myriad of non-telephone ventures in which some of the companies are already engaged—including ownership of cable systems outside their telephone service territories. As long as the costs associated with these ventures can be easily separated from regulated telephone services, the threat of cross-subsidization does not loom large.

Cross-subsidization is much more difficult to detect in the presence of common costs. For example, when services share the same transmission facilities, such as business private line and public telephone services, regulators face a daunting task in estimating costs of particular services.

With the distinction between separable and common costs in mind, far greater reason exists for concern about cross-subsidization between video transmission and the regulated telephone network. Common costs will be pervasive if telephone companies pursue their plans for integrated broadband networks, where all broadband and narrowband services would be carried on a single (fiber optic) network.

Consequently, those who support entry by telephone companies into video “dialtone” with no ownership interests in program supply—on grounds that programming might be subsidized by telephone ratepayers—miss the mark. If cross-subsidization is their concern, a

\[11\] NTIA (1991), fn. 887.

\[12\] These rules are set out in FCC (1987).

\[13\] However, a degree of cross-subsidization occurs through capital markets. Entry by telephone companies into risky competitive activity raises their overall cost of capital. Some of the increase is passed on to telephone customers, while the competitive activities enjoy a lower cost of capital than they would on a financial stand-alone basis. See Noll and Warren-Boulton (1990), p. 32.

\[14\] This private line example is not hypothetical. The FCC spent years during the 1970s, in its historic Docket 18128, trying to determine whether private line services were being subsidized by others, with inconclusive results. A discussion of criteria for determining the presence of subsidy is in Mitchell and Vogelsang (1991).
bigger target is potential cross-subsidization within the transmission network. If proponents of video dialtone are comfortable with whatever safeguards are in place against network cross-subsidization, they have little basis for concern in permitting telephone companies to go the next step into programming.

**The Video Network as a Bottleneck**

Of course, there is one important aspect in which video program activities differ from the other nontelephone ventures noted above. Programming is an input, with video transmission, in providing service to subscribers. A familiar argument is that telephone companies would discriminate in favor of their own program affiliates, handicap outside program suppliers who depend on the carriers' "bottleneck" network, and eventually dominate the nationwide program supply market. Such domination would make more effective the use of vertical integration and exclusivity agreements to raise rivals' costs, as discussed above.

The following illustrates a chain of events that would have an anti-competitive outcome. Carrier C serves 30 percent of the nation's households (perhaps by horizontal integration of many previously separate carriers). The remaining 70 percent is served by numerous carriers with none having more than, say, a 1 percent national market share. The programming market is competitive with numerous suppliers offering material of largely national interest. Carrier C vertically integrates with suppliers who have collectively 10 percent share of the national market—call these Group D. Carrier C proceeds to discriminate in favor of Group D.

To be sure, the common carrier would be obliged to offer nondiscriminatory access to all suppliers, within a given class, on the basis of published tariffs. But there are many subtle (and not so subtle) ways of discriminating. The flexible common carrier may seek to manipulate service classifications to the advantage of Group D. It may also provide outside suppliers with less good transmission (they complain, but only after weeks are "technical" difficulties fixed). It may place outsiders less favorably in the channel lineup, delay service to some who request it, and in other ways put these suppliers at a disadvantage. Further, government regulators may be able to respond only to the most egregious cases of discrimination. (In short, Carrier C's behavior is reminiscent of the evidence about AT&T's be-
behavior toward rival providers of long distance service that led to the
divestiture.)

Because of discriminatory treatment in the 30 percent of the na-
tional market controlled by Carrier C, many outside suppliers become
so weakened that they merge with Group D or go out of business.
With its increasing market power in national programming, Carrier C
extracts through its Group D affiliate more favorable terms from out-
side carriers who have become highly dependent on Group D for pro-
gramming.\footnote{Vertical integration would not necessarily have been required for this outcome.
Carrier C could have bargained (conspired) with an outside Group D to undertake
these actions and to share profits by agreement. But such arrangements are likely to
be harder to negotiate, coordinate, and enforce, and to be more vulnerable to antitrust
action, than would be true for the vertically integrated firm.}

However, such a scenario lacks plausibility here. To understand
why, let us consider another illustration reflecting the circumstances
that telephone companies would face if they were permitted to oper-
ate as hybrids.

Assume that with the cross-ownership ban eliminated, telephone
companies respond simply by purchasing all cable systems within
their own service territories. Thus, households continue to be served
by only one video wireline. Each Regional Bell Operating Company
(RBOC), and GTE, would have video access ranging from about 9 to
14 percent of the nation's households; numerous small independent
telephone companies would collectively account for another 7 per-
cent.\footnote{These estimates are based on the number of residential access lines of telephone
carriers that report annually to the FCC. FCC (1988/1989), pp. 153–164.} Each company then acquires ownership interests in program
suppliers, with each local LEC-owned video network limited to filling
no more than 10 percent of its active channels by its affiliated pro-
gram suppliers. Assume for the moment that no more than one tele-
phone company has an ownership interest in any given supplier.

Under these conditions, it would be most difficult for any LEC to
gain market power in the nationwide program market. If it seeks to
discriminate against outside suppliers in use of its transmission faci-
lities it faces two problems.

First, because such a large portion of its video capacity is used by
outsiders, discriminatory treatment against them would compromise
the value of offerings to subscribers, thereby reducing the telephone
company's video subscriber revenues and profits.

Second, it would be hard to "weaken" nonaffiliated suppliers by
discriminatory treatment, because other carriers would be playing the
same game. Any given supplier would be discriminated against by carriers serving perhaps 90 percent of the country, while it would be accorded favored treatment by the affiliated carrier serving perhaps 10 percent of the country. Although such broad discrimination would weaken individual suppliers (as well as weaken the video carriers), suppliers would remain about as strong relative to each other as before. Competition among carriers seeking to gain market power in the program supply market would make it difficult for any to succeed.

The key point is simply this: To make the bottleneck/program-domination scenario plausible, a carrier must cover a large portion of the nation's households, and other carriers must have only fragmented market shares and fail to prevent the first carrier from proceeding with its plans.

What about coordinated action by carriers? Especially, what is to keep the RBOCs from having joint ownership interests in program supply? This question raises the important issue of the role of horizontal integration. If carriers were to merge (i.e., two or more RBOCs combining all their operations) or, less boldly, if they were to engage in joint ownership of video programming, the conditions for successful domination of the video supply market would be more nearly met.

However, this danger would be rather easy to protect against. For example, the Department of Justice could set down antitrust guidelines stipulating that no video program supplier may be affiliated with telephone carriers that singly or collectively provide telephone service to more than, say, 15 percent of the nation's households. If this guideline were followed, no more than one RBOC (as now constituted) would have an ownership interest in any supplier, while smaller carriers would have flexibility to engage in joint programming ventures.

The Behavior of Cable Operators

Finally, it is useful to do an empirical check against the outcomes of the above hypothetical illustrations. Like the telephone companies in the preceding illustration, cable operators today own the single video wireline into the home. Apart from limits imposed by general antitrust laws, there are no specific legal restrictions on the extent to which they may acquire ownership interests in the program supply market, and the level of horizontal integration is similar to that in the
telephone industry. Given their control over bottlenecks and even greater latitude in vertically integrating, it is relevant to ask whether integrated cable operators show strong preferences for the programming of their own affiliates.

The available sketchy evidence suggests that vertically integrated cable operators exhibit some preference, but not dramatically so, for the programming of their own affiliates. Several studies have examined the comparative behavior of vertically integrated and non-integrated cable firms. Salinger (1990, p. 18) concludes from these studies that

If one narrows the focus to the four major services not aimed primarily at children, vertical integration affects the services offered. AT&T and Viacom offer the services they own more frequently and the services they do not own less frequently than unintegrated systems. Beyond that narrow focus, detecting an effect of vertical integration is much more difficult.

Mild and difficult-to-detect preferences may reflect nothing more than the responses of cable operators and their affiliates to the benefits conferred by vertical integration, as discussed above.

In any event, evidence on program preference has not been sufficiently compelling to trigger widespread demands that cable operators divest themselves of their ownership interests in program supply. This situation should not be surprising. Cable operators are under pressure to offer program packages that are most attractive to subscribers, whether or not these packages include programs supplied by affiliates. Although cable operators may have some degree of market power, competition from broadcasting stations, video cassette stores, and other sources restricts the latitude of action that they otherwise would enjoy. A local telephone company with the sole video wireline into the home would be under similar pressures.

In the preceding, we have assumed that a LEC carrier could fill a "small" percentage of its activated channels—10 percent in the examples—from affiliated program suppliers. But why not 5, 20, or some

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17The top four-firm market share of residential subscribers in 1989 was 43 percent and 52 percent in the cable and telephone industries respectively. FCC (1990b), Table III, FCC (1988/1989), pp. 153–164. However, the largest cable MSO, TCI Inc., had a much larger share, 22 percent, than did the largest RBOC (measured in residential access lines), with a 14 percent share.

18However, complaints have arisen about the preferences noted in Consumer Reports, September 1991, p. 584.

19Salinger discusses these studies in some detail with appropriate cites to the literature.
other percentage? No precise number can be established here, but even a small number may turn out not to be binding for most carriers. This outcome is suggested by the fact that, even with no legal restrictions on program affiliations, today's vertically integrated MSOs remain highly dependent on programming from nonaffiliated sources. The largest MSO, Telecommunications, Inc., has ownership interests in 23 program suppliers—sufficient to fill far less than 50 percent of the activated channels on today's most advanced cable systems. Continental, the fourth largest MSO, has ownership interests in only six program suppliers. Hundreds of smaller systems have no ownership affiliations.

A Potential Downside to Hybrid Status

Once the wall is breached between conduit and content, the line between permissible and impermissible activity would be harder to draw. One might argue that if telephone companies were permitted to engage in any programming, they could more effectively exert pressures to erode whatever anticompetitive safeguards were originally erected. For example, if prohibitions were placed on the co-ownership of programs, the affected companies might seek waivers for co-ownership of just certain kinds of programs. With those waivers in hand, the firms might then press in other directions for removal of constraints. Similarly, if the firms were permitted to offer 5 percent of their channels for programming by affiliates, they might fight to raise the number to 10 percent (if the 5 percent figure actually became binding as discussed above). Such a process of erosion would be reminiscent of the pressures brought by the RBOCs to eliminate the constraints imposed by the MFJ—pressures that have met with success in the information field, while they continue to be exerted in other directions.

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20FCC (1990b), Appendix G, Table VI.
21This is not to say that a bright line exists between control of conduit and control of content. The FCC's difficulties in its Computer I, Computer II, and Computer III inquiries attest to the ambiguities that arise in attempts to distinguish between the two. In its Further Notice of Proposed Rulemaking, the FCC proposes two levels of video dialtone, designed to keep separate the control of conduit and content. The first would consist of basic regulated services under Title II of the Communications Act. The second would permit the carrier to provide its own advanced video gateway and related nonprogramming services, consisting of enhanced and non-Title II services, which would be subject to competition with gateway and other services of other providers. FCC (1991b).
At the same time, one should ask whether the potential problems of protecting against anticompetitive behavior by the telephone companies are any different from those posed today by cable operators. The key factor that distinguishes a telephone company from a cable company in terms of potential anticompetitive conduct is the threat of cross-subsidization from telephone ratepayers. If cross-subsidization of programming is not a threat, as discussed above, the remaining source of concern is potential anticompetitive use of bottleneck facilities against nonaffiliated program suppliers. This possibility arises whether the video network is owned by a telephone company or a cable operator. If limitations on horizontal and vertical integration are warranted against telephone companies, our analysis suggests that the same limitations should also be applied against cable operators. At the same time, if it is true that cable operators do not exhibit strong, across-the-board preferences for their affiliated programming, as suggested by the above discussion, perhaps the same would hold true for telephone companies with ownership ties to programming.

CONCLUSIONS

The problem of assuring video programming under “reasonable” terms to local exchange carriers would be notable only in cases in which they threaten to compete head-to-head with local cable systems. In those cases, incumbent cable systems would have powerful incentives to use programming to discourage entry. Ownership ties between cable operators and program suppliers would facilitate this strategy. But even in the absence of vertical integration, the use of exclusivity contracts could serve the same purpose. An open question is whether government-mandated requirements for reasonable access to programming by competitors to cable would have either adverse or favorable long-run effects on program production.

LEC entry into programming would likely not lead to subsidization of programming at the expense of telephone ratepayers. The fact that costs of program production and packaging are separable from those of telephone transmission facilitates the task of designing adequate safeguards to prevent cross-subsidization. The problem of cross-subsidization looms larger between the video and telephone portions of the network because of the widespread presence of network common costs. Thus, the issue of cross-subsidization is more relevant to the question of whether the cross-ownership ban should be lifted than to
whether telephone companies should be permitted to integrate into program supply.

Hybrid status would be beneficial if (a) it reduces inefficiencies in transactions with outside program suppliers and (b) anticompetitive behavior does not arise. Reducing these inefficiencies would help to expand availability of programming to the LECs and would mitigate the potential threat of cable operators—through their vertical ties and exclusivity agreements—denying access to attractive programming.

It is unlikely that LEC-owned video facilities could be used to favor affiliated program suppliers as a tool to dominate national program markets. However, if a threat of anticompetitive behavior is deemed to exist, limiting joint ownership by telephone companies of program affiliates, and restricting the degree of horizontal integration in the telephone industry, would provide safeguards. If safeguards are needed against the LECs, the same ones would be equally appropriate for cable operators.
V. GOVERNMENT RATE REGULATION

We have yet to address the issue of how, if at all, government regulatory agencies should exercise control over rate levels set by LEC-owned video networks, aside from the governmental role of assuring nondiscriminatory access in the case of common carriage. Today, rate-of-return regulation and price cap regulation are commonly used in seeking to protect telephone customers from excessively high prices resulting from the carrier's exercise of market power.

As discussed in Sec. II, whether common carriers are rate-regulated depends on the level of competition they face. Cable operators were essentially deregulated under the Cable Act of 1984, but action has been taken to reregulate portions of the industry, as discussed below. To explore the appropriate regulatory scheme for LEC-owned video networks, let us consider two situations: In the first, safeguards are deemed to be sufficient to preclude cross-subsidization between the video network and the regulated telephone network; in the second, cross-subsidization cannot be well protected against.

NO CROSS-SUBSIDIZATION: EXPERIENCE IN THE CABLE INDUSTRY

In the first situation, where safeguards against cross-subsidization are deemed to be sufficient, no basis would exist for treating LEC-owned video networks differently from similarly situated cable networks. In either case, the degree of regulation would depend on the carrier's market power, reflecting the level of competition in local markets.

Recent experience in the cable industry is relevant. Under the Cable Act, cable systems facing "effective" competition were freed of regulation. The FCC defined effective competition to exist if viewers in the local cable service area had access to three or more unduplicated signals from television broadcasting stations. In 1991, the FCC redefined effective competition to exist if either of two conditions is met: (a) the presence of six (rather than three) broadcast television signals or (b) availability of a nonaffiliated competing multichannel video delivery service to 50 percent of the homes passed by the incumbent cable system, with at least 10 percent of the homes passed by the alternative system (within the cable system's service area)
subscribing to it.\footnote{FCC (1991a).} Local franchising authorities are empowered to impose rate regulation for those cable systems failing this test, with the requirement that cable operators be allowed to earn a “fair return” on investment.

However, under this more constraining definition of effective competition, the regulatory framework designed by the FCC is loose. First, only the basic tier of services (the tier that includes signals of local broadcasting stations) is subject to regulation. Second, cable operators are not barred from redesigning the tier as costs, demand, and the regulatory climate change. Thus, if government officials regulate the tier tightly, the operator would be free to transfer some of the nonbroadcast signals (and some of their costs) from the regulated tier to nonregulated ones. Third, as stipulated in the Cable Act, in response to general inflationary pressures cable operators are free to raise rates, without regulatory proceedings, by 5 percent annually.

This framework is looser than rate-of-return regulation (and the increasing use of price cap and other “incentive” regulation) imposed on basic telephone services. The difference reflects the fact that cable operators are judged to have less market power in video than do local exchange carriers in telephone service.

If telephone companies were permitted into video, they would face a market similar to that faced by cable operators—one in which less market power exists than is true in telephone services. In cases where telephone companies do not compete with cable operators (e.g., they own the single wireline into the home), no basis would exist for regulating them any more stringently than would be justified for cable operators facing similar market conditions. If cable systems are to be free of regulation in markets deemed to be effectively competitive—in accordance with whatever criteria are set down by the FCC, Congressional mandate, or elsewhere—LEC-owned video services would also merit nonregulated status. If a loose regulatory framework is to be applied to cable systems deemed not to be facing effective competition, the same framework should be applied to similarly situated LEC-owned systems. Thus, if only the basic tier service package offered by cable systems is to be regulated, no basis would exist to regulate anything more than the basic tier on LEC-owned systems.

However, what is meant by “basic tier” in a common carrier environment merits elaboration because carriage of broadcast signals poses a special problem. After the FCC’s “must carry” rules were
abolished, debate has persisted about whether these rules should be restored, and whether cable operators should be permitted to continue carrying local signals under compulsory license (i.e., essentially for free) or whether retransmission consent should be required. Evaluation of the alternatives goes far beyond the scope of this study. Suffice it to say that whatever solution is eventually fashioned would be no less appropriate to LEC-owned systems. Government regulation could be applied to the access charge imposed on the carriage of broadcast signals (perhaps in a different customer classification than for other programming).

This situation brings us back to the issue emphasized in Sec. III of whether the marketing function would become the bottleneck in video delivery. Even if regulators were to control carriage access charges, one or a few marketers might dominate each local market and be able to unduly raise prices to subscribers. We leave open the issue of appropriate policy responses if this situation were to arise.

CROSS-SUBSIDIZATION, COST SHIFTING, AND ACCESS CHARGES

All the above is based on the presumption that adequate safeguards exist to protect against network cross-subsidization. If safeguards are not adequate, what would be appropriate regulatory policy with respect to carrier access charges? If the LECs subsidize their video systems with revenue from their telephone services, as a way to undercut competing cable systems (with the expectation of driving them out of business), the appropriate policy response presumably would be to establish a floor rather than a ceiling on access charges or subscriber rates. The appropriate floor would depend on the degree of cross-subsidization. However, if regulators had enough information about the extent of cross-subsidization to design a floor strong enough to withstand courtroom appeals, they would probably have had enough information to prevent cross-subsidization in the first place.

If competition does not exist between LEC- and cable-owned networks, an incentive would remain to shift video costs to the telephone side and to raise rates to telephone users to increase profits in the video market (if the video market is unregulated). Regulators might seek to impose a ceiling on rates to squeeze out some of these profits. But, similar to the above, regulators would have to be able to measure the degree of cost-shifting to set an appropriate ceiling. Again, if they
had enough information to do so, they would probably have had enough to be able to forestall all the shifting of costs.

If cross-subsidization is deemed to be a serious problem, considera-
tion should be redirected to the issue of whether the cross-ownership ban should be removed. Once telephone companies enter the video market, attempts to cope with the problem by regulatory control of rates to program suppliers and to subscribers would be hampered by the same lack of information in the hands of regulators that would have permitted cross-subsidization to occur.
VI. COMMON CARRIAGE, COMPETITION, AND PUBLIC POLICY

At this point, the reader might well ask: If video common carriage is beneficial to society (as the FCC and many others conclude), why limit it only to the LECs?¹ Why not impose the same obligations on cable operators? Indeed, why not include other video providers, such as direct broadcast satellite (DBS) systems, as well? As noted in Sec. I, the analysis in this report, couched in terms of economic efficiency and information diversity, is equally applicable to cable companies and other video providers. By changing the term “LEC” to “cable operator” or to “DBS system” where appropriate, the comparisons among the common carrier, hybrid, and unconstrained models would remain as before.

In response to these questions, we first explore whether factors exist that would justify treating LECs differently from cable systems with respect to common carriage. We consider possible differences in markets served, technologies, and legal protection. Second, aside from the particular institutional mechanism for delivering video (e.g., LEC, cable, DBS), we examine the conditions—rooted in local market competitiveness—under which imposition of common carriage obligations would, and would not, be appropriate.

DIFFERENTIAL TREATMENT OF TELEPHONE COMPANIES

Differences in Markets Served

One frequently mentioned difference between the LECs and cable operators is the potential for cross-subsidization, which arises from the fact that LECs also serve a “monopoly” telephone market, while cable operators have no second monopoly market. However, our analysis suggests that the threat of cross-subsidization is relevant only to issues of whether the LECs should be permitted to deliver video at all—not to issues of carrier status. A cross-subsidy threat may indeed emerge if the LEC constructs and operates a video network. However, the magnitude of the threat would not notably be af-

¹The author is indebted to Bridger Mitchell for especially constructive comments on drafts of this section.
ected by whether the LEC operates the network as a common carrier, hybrid, or unconstrained video provider.

Another possibility exists, however, where cross-subsidization would be related to carrier status. Suppose that cross-subsidy cannot be entirely protected against so that some subsidization of video services is inevitable. In this case, we might entertain the following social contract: “We (the government) recognize that if we let you (the LEC) into video you will benefit by subsidizing the venture from your telephone revenues. As a quid pro quo for this benefit to you, but which is a harm to society, we will impose upon you profit-reducing obligations of common carriage that will benefit society.”

One has strong reason to be uncomfortable about such a contract because (a) in effect, it legitimizes cross-subsidization and encourages regulators to be less vigilant than otherwise in seeking to prevent the practice, (b) it is not based on any convincing evidence about the size of the cross-subsidy and, hence, whether the harm to society is commensurate with the benefits of common carriage, and (c) it assumes that telephone ratepayers are the appropriate source of the subsidies rather than taxpayers.

It is sometimes said that cable operators can resort to political pressure to avoid being burdened with common carrier obligations. But the LECs have political power too. If the FCC were to succeed in imposing common carrier obligations only on the LECs, in line with its video dialtone proposal, the outcome would suggest the operation of such a suspect social contract. Alternatively, giving the LECs video hybrid or unconstrained carrier status would reduce or eliminate the asymmetry in treatment.

Differences in Technologies

Does a possible basis for treating LECs differently from cable operators lie in differences in technology? One might argue that if the

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2Reminiscent of the arguments in Sec. V, if convincing evidence were available about the size of the cross-subsidy in the social contract, the evidence would also probably have been sufficient to enable regulators to prevent cross-subsidization in the first place.

3It is sometimes argued that the distinction between taxpayers and telephone users is of no consequence, since virtually all taxpayers are telephone users and vice versa. However, this argument ignores the incidence of the subsidy payment or “tax.” If the tax is borne by telephone users, low-income households may pay a disproportionate share (measured in tax paid relative to income). A tax tied directly to incomes would probably be less regressive in its effects.
LECs control a technology that has a particularly great potential (e.g., by virtue of greater channel capacity) to offer access to information providers, imposition of common carriage obligations would have a high payoff to society. Imposition of these obligations on cable (or other video providers) is less important, as the argument goes, because the potential effects on information diversity are smaller.

This line of reasoning is implied by one analyst as follows:

The regulatory model that has best served the diversity of information sources in the U.S. is the print model, combined with common carrier delivery (e.g., magazines, newsletters, etc., delivered by mail carriers or facsimile). This model can now be adapted for television because of the rapidly increasing involvement of local telephone companies in fiber optic transmission. . . . The critical policy question is whether to accelerate the replacement of copper with fiber. . . . In view of the First Amendment benefits—video publishing over a common carrier—this report contends that such accelerated deployment (of fiber) is warranted.4

This line of reasoning is troubling for two reasons. First, it assumes that the benefits of common carriage, relative to unconstrained carriage, expand as the capacity of the network expands (or, alternatively, as the cost per channel declines). However, reductions in channel cost would encourage additional information diversity by both the common carrier and the unconstrained provider. In Table 1, Sec. III, we see immediately that if fixed and marginal costs were cut, say by one-half, all carriers would respond by offering channels at lower access charges with a consequent increase in the number of channels used. It is not obvious that common carriage would produce a greater increase in diversity in the low-cost case. But let us suppose that common carriage does produce a greater increase—which brings us to the second objection to the preceding argument. Recall that information diversity is measured in the dimensions discussed in Sec. II—the number of information sources, the differences among them, and the terms under which they are made available to potential users. Suppose that (a) values can be assigned to these dimensions, (b) the values can be added together, and (c) a quantitative measure of diversity can thus be obtained. Changes in these dimensions would result in an increase or decrease in diversity that could also be measured. Let us consider diversity, then, in “units” that can be added together to measure incremental increases

in diversity, with society being able to place a value on each increment or unit added. In Table 5, six increments of diversity of one unit each are listed on the left. The social value of each increment reflects the fact that the value of each additional unit falls as the number increases, i.e., information diversity is subject to diminishing returns (as is consumption of other goods and services). Thus, society values the first increment at $25, but the sixth increment at only $2.

We next consider two video carriers, one using coaxial cable, the other using fiber, without reference to whether the carriers are owned by LECs or cable companies. The use of fiber, let us assume, permits cost reductions so that, with other factors held constant, more channels are used than in the case of coaxial cable. With coaxial cable, the common carrier produces three units of diversity compared to only two units if the carrier is unconstrained. The social value of common carriage, which is the value of the additional diversity it produces, is equal to $15—the value of the third unit that otherwise would not be produced. With fiber, the carrier produces six units of diversity as a common carrier but only four units as an unconstrained carrier. Thus, a common carrier requirement with fiber calls forth a greater increase in diversity (two units) than it does for a coaxial network (one unit). The key point is that society values this increase with fiber at only $7 (the total for the last two increments), compared to $15 for the increase of one increment produced in a coaxial system.

This is a most interesting result, because it suggests that a common carriage requirement for today’s cable operators may be more important, in terms of yielding a greater social value of diversity, than the same requirement for tomorrow’s fiber-based LECs! In

### Table 5

<table>
<thead>
<tr>
<th>Units of Diversity</th>
<th>Value of Each Increment, $</th>
<th>Carriage of Units of Diversity</th>
<th>Fiber Network</th>
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<td></td>
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<td>Coaxial Network</td>
<td>Unconstrained Carrier</td>
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<tr>
<td></td>
<td></td>
<td>Common Carrier</td>
<td>Unconstrained Carrier</td>
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Table 5, we can visualize the cable operator as the coaxial carrier, and the LEC as the fiber-based carrier, with both operating as common carriers rather than as un constrained carriers. The cable operator produces a smaller additional amount of diversity than does the LEC. But that additional diversity is valued more highly than the increase in diversity produced by the LEC. This result arises because (a) information diversity is subject to diminishing returns and (b) the LEC would produce more diversity with fiber than with coaxial cable, whether or not it operates as a common carrier.\footnote{When comparisons are made between today's cable operators and tomorrow's LECs, an additional assumption is that the demand for diversity in the future period is the same as today's demand (i.e., the values shown in the second column of Table 5 are identical for the two time periods). One might argue that the more complex and information-based society of the future will demand a higher level of diversity than is true today. If so, the social value of imposing a common carriage requirement on tomorrow's fiber-based LEC would rise relative to the value of imposing the same requirement on today's coaxial cable operators. On the other hand, the learning from past experience by society may reduce the future demand for diversity. Conceivably, the greater social complexity on the one hand, and learning on the other, could result in an essentially constant demand for diversity. This is an important area for further research, as tabulated in Sec. VII.}

The preceding illustration might be taken to imply that only the LECs have access to fiber technology. Of course, such an implication is mistaken. Cable operators, as well and the LECs, are expanding their use of fiber to expand capacity, reduce maintenance costs, and improve the quality of service. Combined with other technological advances, such as video compression, the use of fiber by cable operators may permit a range of video services that rival those that might be offered by fiber-based LEC networks.\footnote{Johnson and Reed (1990).} Quite possibly, the fiber-based network shown in Table 5 will be in the hands of a cable operator instead of a LEC.

In summary, considerations of technology do not lead to the conclusion that common carriage requirements are more appropriately placed on LECs than on cable operators. Indeed, we have uncovered a set of circumstances that would more strongly justify common carriage requirements on cable operators today than on future fiber-based video networks—whether owned by LECs or by cable operators.

This is not to say that common carriage requirements should be imposed on today's cable operators. Aside from the fact that our analysis is based only on illustrative numbers, we must recall from Sec. III that no firm conclusions can be drawn from this report about whether common carriage, on balance, would generate greater infor-
mation diversity than would unconstrained carriage. The key point here is that if common carriage requirements do produce superior results, no sound basis exists for imposing these requirements only on the LECs.

**Differences in Legal Protection**

By forcing a separation between content and conduit, common carriage would abridge the rights of the carrier to speak. Do cable operators have greater First Amendment protection against an abridgement of these rights than do LECs? If they do have greater protection, this circumstance would explain why common carriage, imposed on the LECs, could not as easily be applied to cable operators. Analysis of First Amendment and other legal issues lies outside the scope of this report. Therefore, we cannot address the question of whether cable operators do enjoy greater protection under the First Amendment, but leave this as a topic for suggested future research.

**APPROPRIATE APPLICATIONS OF COMMON CARRIAGE OBLIGATIONS**

Whether imposition of common carriage obligations is an appropriate policy tool depends on the degree of competition in the local market. We concluded above that the case for common carriage is strongest when the carrier faces no competition. To illustrate, suppose that only a single video wireline provides service to the home of the future, as is the case today. Suppose, further, that competitive alternatives to the wireline weaken or do not emerge over time. For example, many broadcasting stations eventually go off the air, the rental video cassette market shrinks, and multichannel alternatives to the wireline (such as direct broadcast satellites) fail to offer significant competition. In this event, strong pressures would probably emerge to regulate the monopoly wireline supplier as a common carrier regardless of whether the facility is owned and operated by a LEC or a cable company.

This example need not be confined to wireline service. Suppose that a DBS system becomes such an attractive video delivery vehicle that it drives wireline carriers and broadcast stations out of business. With households so dependent on satellite service, demands would surely be heard that the system be operated as a common carrier.
The basic reason why DBS systems are generally not regarded as candidates for common carriage arises from the presumption (probably correct) that they will operate in a highly competitive environment.

Consistent with the above, if LECs compete side by side with cable operators, the case for common carriage would be weaker (for either the LEC or cable operator) than in the single wireline case. The LEC might be willing to enter a market in competition with cable operators only if it were relieved of the financial burden of common carrier obligations. Granting that relief would be easier to justify than in the single wireline case.

CONCLUSIONS

Aside from legal considerations left open here, no sound basis exists for singling out the LECs for common carrier treatment if they choose to enter the video market. Under plausible assumptions, a stronger basis exists for considering the imposition of common carrier requirements on today's cable operators than on future LEC-owned (or cable-operator-owned) fiber networks. The relevant considerations for deciding whether to impose such requirements relate to the costs of providing service with particular technologies and the level of competition in the local market.

Accordingly, the potential value of applying common carrier requirements:

- Is greatest if (a) homes continue to be served by a single video wireline, (b) competition from broadcasting and other sources weakens, and (c) the carriage capabilities of the wireline do not grow because of a lack of continuing technological advances.
- Is least if (a) side-by-side competition emerges between wireline carriers, (b) competition from other sources grows, and (c) the capabilities of wireline networks expand.
- Is greater for today's coaxial cable systems than for future fiber systems, if homes continue to be served by a single video wireline, and if competition from other sources does not decline.
- Is smaller for today's cable systems than for earlier cable systems that had lower channel capacities and faced less competition from broadcasting stations and video cassette suppliers.
Into the foreseeable future, the single video wireline into the home is a much more likely phenomenon than side-by-side competition. If competition from broadcasting stations and other sources weakens, the issue of common carriage will become more pressing than otherwise—regardless of whether the wireline is in the hands of a LEC or a cable operator.
VII. CONCLUSIONS AND DIRECTIONS FOR FUTURE RESEARCH

In terms of information diversity, common carriage has three advantages over the unconstrained service model:

a. More programs, and channels of programs, would be carried when they are partial substitutes for each other.
b. Published tariffs would reduce uncertainty about the terms of network access to program suppliers, possibly encouraging additional program production.
c. Prices paid by program suppliers (and subscribers) would be lower for some programs, i.e., those whose discriminatory access charges are higher than the charges under nondiscrimination.

In terms of information diversity, the unconstrained service model has one advantage:

d. Prices to some program suppliers, unable to pay a nondiscriminatory access charge, would be low enough to permit these suppliers to be accommodated.

Whether the common carrier model is better than the unconstrained model, in terms of outcomes, depends on whether the reduction in information diversity under d is more than offset by the increase in diversity under a + b + c. We cannot quantify the elements embodied in these four categories. Among the complications, the various components of diversity, discussed in Sec. II, cannot be valued and added together.

Various price structures might be adopted by the common carrier to reduce the severity of the problem under d. Distinctions could be established between customer classes (e.g., educational users and commercial users) with each paying a different access charge. Other possibilities are two-part tariffs, volume discounts, revenue sharing,
and per-subscriber charges. Perhaps a combination of pricing approaches, including both per-channel and per-subscriber elements, would be superior to any of these approaches adopted singly.

Similar ambiguity exists with respect to economic efficiency. Common carriage would suffer the same disadvantage under d and, in some cases, would suffer a disadvantage under a. When programs are partial substitutes for each other, and other conditions are met, common carriage would encourage excessive program diversity in terms of economic efficiency.

In other dimensions, the common carrier does at least as well as the cable service provider. Rate structures under common carriage might be manipulated to control content. Other bottlenecks to access, such as in marketing, may arise even if common carrier arrangements work well. But the outcomes, at the extreme, would be no different from those of cable service.

In the hybrid model, it is not likely that the LECs would be able to subsidize video programming from telephone revenues. The costs of program production and packaging are separable from those of telephone signal transmission, easing the task of designing safeguards against cross-subsidization. More of a problem is cross-subsidization between the video and the telephone portions of the network, because of pervasive elements of common cost within integrated transmission systems.

Hybrid status would be beneficial to the extent that it reduces inefficiencies in transactions with outside program suppliers. Reduction in these inefficiencies would help to expand availability of programming to the LECs, and mitigate the potential threat of cable operators—through their vertical ties and exclusivity agreements—denying competing LECs access to attractive programming.

It is unlikely that LEC-owned video facilities could be used to favor affiliated program suppliers as a tool to dominate national program markets. However, if the threat of anticompetitive behavior is deemed to exist, limiting joint ownership by telephone companies of program affiliates, and restricting the degree of horizontal integration in the telephone industry, would provide safeguards. If safeguards are needed against the LECs, the same ones would be equally appropriate for cable operators.

Any government rate regulation of LEC-owned video facilities (aside from assurance of nondiscriminatory access in accordance with common carriage obligations) should be similar to whatever regulatory scheme is in place for cable systems. In either case, the degree of regulation would depend on the carrier’s market power, reflecting the
level of competition in the local market. If only a loose form of regulation is imposed on those cable systems deemed not to be subject to effective competition, in accordance with a recent FCC decision, no basis would exist for treating similarly situated LEC-owned systems any differently.

If subsidization of video services by telephone services were deemed to be a serious problem, consideration should be redirected to the prior issue of whether the cross-ownership ban should be removed. Once LECs enter the video market, attempts to cope with the problem of cross-subsidization by regulatory control of access charges and subscriber rates would be doomed by the same lack of information in the hands of regulators that would have led to the threat of cross-subsidization in the first place.

Aside from legal considerations left open here, no sound basis exists for singling out the LECs for common carrier treatment if they choose to enter the video market. Under plausible assumptions, a stronger basis exists for considering the imposition of common carrier requirements on today's cable operators than on future LEC-owned fiber networks. The relevant considerations for deciding whether to impose such requirements relate to the costs of providing service with particular technologies and the level of competition in the local market.

Into the foreseeable future, the single video wireline into the home is a much more likely phenomenon than side-by-side competition. If competition from broadcasting stations and other sources weakens, the issue of common carriage will become more pressing than otherwise, regardless of whether the wireline is in the hands of a LEC or a cable operator.

As emphasized at the outset, the complex subject of this report deserves more research than can be accomplished here. Seven areas have been identified that especially merit further analysis.

- **Optimal Broadband Pricing.** Analysis is needed of alternative pricing schemes to reduce the inefficiencies caused by disparities between average and marginal cost. Among the factors meritng investigation are mixtures of per-channel and per-subscriber offerings, including consideration of demands for service by time of day.

- **Effects of Substitutability Among Programs.** Further examination is needed to (a) identify the conditions under which, with partial substitutability among programs, common carriage would lead to excessive diversity in terms of economic
efficiency and (b) to determine the extent to which these conditions are likely to exist in the real world.

- *Economics of Exclusivity Contracts.* Included here are the effects of exclusivity agreements on the production of programming and its availability to competitors and implications for economic efficiency and information diversity.

- *Information Diversity.* More research is needed on the nature of information diversity and how the demand for it is affected by societal evolution. Is it possible to place values on the dimensions of information diversity treated in this study? Are there other dimensions? Can a value be attached to changes in diversity over time? How is the need for diversity affected as population and incomes grow and as the nature of economic, social, and political activity changes? These are among the most challenging questions identified in this report.

- *Marketing as a Bottleneck.* This involves examination of how marketing would be combined with common carrier delivery, focusing on the economies of consolidated marketing of many channels and assessing the prospects for the marketing function to emerge as a bottleneck to network access by outside program suppliers.

- *Vertical Integration and Coordination.* Investigation is needed to determine whether the costs of coordination among nonaffiliated firms in video markets are different from (and possibly much higher than) those in voice and data markets. The need for bundling programs and for designing tiers most attractive to subscribers may impose more severe coordination requirements than is true elsewhere. If so, the justification for vertical integration would be stronger in video markets than in conventional telephone services.

- *Legal Issues.* An assessment is needed of any legal constraints that exist to adopting options suggested in this study. For example, would any of the pricing strategies identified in Sec. III (such as revenue sharing) encounter any special legal difficulties when applied to common carriers? What considerations flowing from First Amendment concerns would affect the conclusions in this study?
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