

First, there were key types of access services, in particular, certain types of call forwarding, that the voice messaging companies needed from the local exchange carrier. These services were not provided and, it was claimed by the Bell companies, could not be provided until the Bell companies themselves entered the market.

Second, in some cases, these call forwarding services were only offered bundled together with a higher-priced local service that the voice messaging companies would be forced to order to get the feature.

Third, sometimes these call forwarding functions were only offered on a central-office-by-central-office basis, and if a voice messaging company could only hook up efficiently to one central office, they would only get those functions from customers that were served by the same central office. Other customers elsewhere in the same exchange area would not have the call forwarding functions provided to enable them to use the voice messaging company.

Fourth, there were lots of problems documented of solicitation of an independent company's voice messaging customers by the local exchange company at times when their customers contact the LEC for other reasons, such as to start up local service, to handle a move, or when they had problems with their phone service. In other words, the phone companies were getting a first crack at customers. There were even cases where the telephone companies represented to their customers that only they, the Bell company, could offer voice messaging with these call forwarding functions. They claimed that other independent companies could not provide these services. Finally, there were cases where a BOC provided call forwarding functions that were suitable only for interconnection with the type of equipment that was not standard to the voice messaging industry.

Now, these cases exemplify the types of problems found in the market now, and this occurs with a service that is, relatively speaking, technologically a relatively simple information service. As you go into the future, as you try to envision what is going to happen in the most advanced parts of the telecommunications industry, you can anticipate far more serious, but subtle, types of discrimination practiced by the Bell Operating Companies. Ken mentioned that a lot of these issues are being dumped on the lap of state regulators. My observation is that state regulation is not very effective at preventing or penalizing discriminato-

ry practices. Many state commissions do not have sufficient resources to investigate and prosecute discrimination problems, particularly in cases where advanced technology is involved. The greatest concern of state regulators is still the level of local exchange rates, not the level of competition in downstream markets.

If I were to predict where things are going, I believe this country is now facing a very serious question of whether the provision of intelligence in telecommunications networks will become a competitive market or not. I think this issue is very much in doubt. There is a very strong possibility that, if certain actions are taken by Congress, by courts, or by regulators, the Bell companies will be free to exert their monopoly bottleneck over the local exchanges to preclude vigorous competition in the market for high-technology information services.

Dr. Noam: Entry issues in telecommunications started out with long-distance competition and with terminal equipment. Over time, many other entry issues were added—international service, cellular service, local service, bands, billing and collection, toll-free or "800" numbers, information service, pay phones, operator service, network equipment—to name just some. The question is whether there are some more general and generic ways to deal with the entry issues here.

It is useful to think about basic forces that apply to the evolution of the telecommunications network. Telecommunications are today shaped by two basic but conflicting tendencies: the trend towards technical integration on the one hand, and the trend towards institutional and business diversity on the other. To some extent these two are substitutes for each other. To advance technologically, one can upgrade a telecommunications systems by more powerful integration, such as through narrowband integrated services digital networks and integrated broadband networks (ISDN and IBN, respectively), and benefit from their economies of scale and scope and from their greater technical standardization and compatibility. That is, discrete, separate networks become integrated into a universal digital network that can carry everything from video to speech to text, and, perhaps in the future, gas, water, and electricity as well. This tendency toward integration is a very strong part of the self-image of traditional telecommunications organizations.

In the alternative, one can upgrade through a contradictory tendency, diversification, which in-

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troduces competitive diversity in order to benefit from its dynamism and cost-consciousness. Even with the most minimal knowledge about or experience with telecommunications, one must realize that the tradition of one company providing wall-to-wall service has changed enormously.

Generally speaking, the European monopoly PTTs stressed ISDN-style integration, whereas the U.S. mostly followed the path of diversity.¹ Diversity is the comparative advantage of American society. Perhaps not surprisingly, Japan's approach has been fairly balanced in combining a major push for both diversity and integration. Somewhere between these approaches is probably what economists call an "efficiency frontier."

Diversification is partly exemplified by the entry of traditional types of carriers such as MCI, creating a kind of "horse race" between AT&T and MCI, Cable & Wireless and British Telecom, etc. But diversification is also introduced with the development of private intra-corporate and group networks. The issue that is emerging with these networks evolves from the fact that private networks are restricted under certain conditions and are not open to everybody, whereas the public network must provide service on an open, non-discriminatory basis.

The dimension of this issue becomes clearer if we consider that, until recently, 100% of the total network investment for telephony and telegraphy came from the traditional carriers; it has now dropped to two-thirds. In other words, one-third of all capital investment in telecommunications is done outside of the traditional carriers, and that figure is increasing.

If we consider the size of some of these private networks, with size defined by access lines, we can see that they are substantial networks, with tens and even hundreds of thousands of lines.

The implications of this growth in private networks has major long-term implications.

Networks will become transnational. As the cost of transmission continues to drop, the network associations will not be organized according to national boundaries. Territoriality was based on the need for a network architecture that primarily minimized cost by minimizing transmission distance. It led to the creation of the "German network" or the "French network." This technological and economic territoriality suited governments everywhere fine because they, too, were based on territoriality of jurisdiction and could thus convey

niently exercise control and even ownership over "their" network. But things are changing. Now, networks are increasingly becoming pluralistic group affairs. Groups break off parts of their communications needs from the public network and aggregate them in their own associations. Banks, insurance agencies, airlines, automobile manufacturers, and many others communicate with each other on increasingly specialized networks. Advertising agencies, marketers, printers, and media do so similarly. Another example is automobile manufacturers, their suppliers, dealers, and financiers.

Territoriality becomes secondary. Many of these communities of interest transcend national frontiers. Their interests are continental and global, and so are their networks. When the computers of brokers and investment banks in New York are interconnected by a continuous network and interact with those in Tokyo and London to trade and clear transactions, one cannot say anymore that there is a New York or Tokyo market. There is no physical locus for the market anymore. *The network becomes the market.* Transactions are not conducted at any particular physical point.

New electronic neighborhoods will emerge. A few years ago, it became fashionable to speak of communications creating the "global village." There was something inspiring in this image, communal and peaceful. But there is nothing village-like in the unfolding reality. Instead, groups with shared economic interests are extending national group pluralism through the opportunity to create global interconnection with each other into the international sphere. Indeed, communications make international pluralism easier because it is easier to reach critical mass for subnetworks if one aggregates across several countries.

The new group networks do not create a global village, they create instead the world as a series of electronic neighborhoods. In the past, neighborhoods had economic and social functions. In New York for example, there are Chinatown, the Garment District, Wall Street, Madison Ave., and the Theater District. Elsewhere, there are regions with specialized production. Solingen and Sheffield for cutlery; Lyons for silk; Hollywood for films; Silicon Valley and Route 128 for microelectronics.² Production clusters create economies of aggregation that substitute for the economies of scale and scope of the giant multi-product firm. Physical proximity was a key. But now, group networks can serve many of the functions of physical proximity. They interconnect specialized producers,

suppliers, buyers, experts, and markets. They create new ways of clustering, spread around the world.

Networks will assume political power as quasi-jurisdictions. These network associations possess and acquire powers of their own. They already may link powerful entities and can bring their combined powers to bear. For example, the combined weight of the members of the SWIFT banking network got the powerful national PTT monopolies to cave in on a number of crucial issues. And there is no reason to expect the power of network combinations to be directed only at communications issues. Once groups are in constant touch, they may as well get organized on other issues, too. *The communications network becomes the political network.*

They will coordinate in the economic sphere. When it comes to the role of information, the line between competition and cartel coordination has always been a fine one. In the 1920s, various American industries established so-called fair-price bureaus that gave each member of the industry a convenient look at what its competitors were charging. This practice was outlawed in a series of antitrust cases. Imagine if one leaves, instead, information exchange to a series of artificial intelligence programs communicating internationally. One has a real problem of conceptualizing, detecting, and preventing international cartels. One person's collusion is another person's programmed trading. *The network becomes the cartel.*

The network associations are also likely to become quasi-jurisdictions themselves. They have to mediate the conflicting interests of their members. They have to establish cost shares, sometimes creating their own de facto taxing mechanism as well as redistribution. They have to determine major investments, to set standards, to decide whom to admit, and whom to expel. As a network becomes more important and complex, control over its management becomes fought over. Elections may take place. Constitutions, bylaws and regulations are passed. Arbitration mechanisms are set up. Financial assessment of members takes place. *Networks become political entities.*

Networks will exercise power toward their members. Perhaps the major antitrust and constitutional question is whether a network group can dominate its own members or be restrictive in its permission of others to join. The power of the network becomes most obvious when it is operated by a dominant entity. Examples:

- The network of a university such as Columbia or MIT can be quite restrictive toward its members. It can and does limit terminal equipment and options, charge monopolistic prices, and it could legally refuse to serve political activist groups.

- The major U.S. videotext service, Prodigy, prevents its user groups from discussing politics on the system as well as from discussing the Prodigy system itself and its competitors. When Prodigy, which provides extensive messaging service, announced that it would raise the rates for such messages, a group of subscribers posted notices in a "public area" of the system encouraging other subscribers to protest. When Prodigy removed these messages, the protesters turned to the private message feature and sought help from advertisers. Thereupon, Prodigy cancelled the subscriptions of the protesters.³

- The National Science Foundation recently urged NSF sites to remove from computer networks scanned image files of arguably pornographic images.⁴

- In 1987 a debate raged at Stanford University over a joke file on the University's computer system. Because it contained jokes offensive to some groups, the university was pressed to impose restrictions on content.

- On the public networks, too, content control emerges. Telephone companies recently sought to establish their right to restrict otherwise lawful communications if they were harmful to their image.⁵

- Employers frequently block the ability of their employees to reach certain numbers. While this is based on protections against running up telephone bills generated by dial-up services, the principle could be extended to an exclusion of messages of a type undesirable to employers, such as those of labor unions.

- In so-called intelligent buildings, landlords provide communications to occupants. These "shared-tenant services" are largely under the control of the building owners, whose interconnection decisions determine which networks tenants can reach.

Petty monopolies can thus emerge, largely unencumbered by the protections built into the public network, at least in the past, by law, custom, and regulation. The option is exit, which in a university setting may mean giving up tenure and departing to another institution.

Are there freedom of speech rights for users (in network terminology "common carriage obligations") in group networks? The scope of these rights is undefined. Constitutional First Amendment rights do not appear to exist, given the absence of state action. Regulatory impositions of such obligations are possible, but are limited by the rights of groups to substantially define their membership and the rules under which they operate, especially where a major purpose of the groups is communication, and thus the exercise of a fundamental right itself, i.e., of speech. In such circumstances group activities have protection from restrictive regulation. In other contexts the exercise of speech rights is stymied by access problems, especially to the workplace or to the shopping malls that take today the role of public gathering spaces. By analogy, the access to networks might be foreclosed, and with it their free speech potential.

Even where network groups are organized democratically, they may well be restrictive. A major function of liberties, after all, is to protect minorities from unsympathetic majorities. In the public sphere, guarantees of free speech against governments are part of constitutions. In the network environment, the granting of access and non-discriminatory content-neutrality is required of the general "public" networks by law or common carriage regulation. But common carriage does not necessarily apply to group networks. Groups may institute restrictions on the exercise of speech over their network and assert that their status is alike to publishers, with no rights of users. They can exclude certain subjects from being discussed or certain speakers from having access to the network. This could become a particular issue when telecommunications networks gain the ability to transmit video programs. It is true that individuals could form alternative networks if they are being restricted. Thus, market forces could help, but not if some of the networks control some segments of a chain of communications, or where the ability of any link in such a chain to institute content-based tests would impose transaction costs on the entire system. It is for similar reasons that society has adopted the use of the legal tender and of commercial paper to permit low-cost transactions. Common carriage has a similar rationale.

It will not be desirable or possible to extend the common carriage model all the way into the last small group network or into a broadcast-like one-way network. At the same time, it is not support-

ive of free speech to let sub-networks set restrictive policies on content, just because they are less inclusive than the public network. A three-tier system may therefore be helpful:

- (1) *Public networks*: operating as common carriers.
- (2) *Group networks holding themselves open to the public or possessing bottleneck powers*: also common carriers.
- (3) *Closed and small user groups*: can set their own rules.

Many of these issues can be framed as antitrust issues. To do so may well bring a round of new litigation on what constitutes "essential facilities," comparable to the railroad cases of an earlier era. Even if an essential facility is found, its duties would also have to be defined.

But these issues go beyond antitrust to constitutional laws and reflect a new conflict between two basic rights, made possible by the confluence of technological advances and economic imperatives. The exercise of the right to freely assemble, that is, to form new associations of people, including those communicating with each other, leads to the right to form new networks. This right of association, which, as De Tocqueville noted, is "unalienable in its nature as the rights of personal liberty," is now to some extent in conflict with the free speech rights of the users. Specifically, users do not enjoy the same rights, nor do carriers have the same common carrier obligations, that they would have in the public system.

We must thus consider that the bottleneck problem that critics often cite in opposing the entry of the Bell companies into information services is really only one aspect of a much larger issue. The real problem is not the misuse by Bell companies of their bottleneck power, but that the exercise of freedom of association may lead to group formations that restrict speech. Hence, the evolving pluralistic structure of telecommunications, with private networks like those of Columbia University or Prodigy described above, may bear the seeds for a new type of bottleneck to the free flow of information that did not exist on the traditional public network and its common carriage.

This issue of the free flow of information, in turn, is a sub-issue of the question how the various parts of the network fit together in terms of technical and content interoperability. It is useful to have a framework that shows us what the commonality of these issues is.

What is a network? The way that engineers draw networks does not lend itself easily to the conceptual framework in which it can be dealt with in terms appropriate to policy analysis. It is helpful to think of a network as consisting of hardware and software functions.⁶ In software the tendency is toward modularity.⁷ An example for modular software is the Open Systems Interconnection (OSI) hierarchy, which was adopted in 1986 by the International Standards Organization (ISO). OSI is based on a hierarchy of seven layers, each of which has defined functional responsibilities. An upper level layer is reliant on the lower layers. But they are, in principle, independent modules, and in theory one can rewrite the software protocol for any layer and replace it without having to change any of the other layers. In actuality, some layers are integrated, but this need not affect a conceptual map.⁸

The other dimension is hardware. Here, it is helpful to think of a network architecture as a sequence of physical segments, such as the subscriber terminal itself, the inside wiring from the terminal to the network termination point, or the trunk between the local office and the tandem office higher up in the switching hierarchy. In the context of defining ISDN standards, the international standards body CCITT defined the segments close to the user very carefully and separated them with demarcation points known as *R*, *S*, *T*, *U*, etc.⁹ One can use the same technique to define segments throughout the network. Now suppose we put together the software and the hardware presentations into a system of coordinates. On the horizontal axis, we have the physical segments—the periphery of the end user. On the vertical side, one has a software hierarchy.¹⁰ Each part of the network is defined by a set of coordinates for its software and hardware location, and each service element can be graphed into this map.

Almost all of the network territory used to be occupied by AT&T, but the development of the last two decades has been for other suppliers to enter, too, and most actively at the ends, where the terminal equipment is located. Alternative elements are offered by alternative vendors, in competition with the network elements of the traditional carrier. But, and this is important, the alternative service blocks that are offered usually lack the connecting physical and software elements that are necessary for an end-to-end connection with users, which the traditional carriers possess. This is why, if one wants to encourage

the supply and creation of alternative service elements, one must provide a framework of interconnection with the other elements of the network. And this is the major rationale for Open Network Architecture, an important FCC initiative carried further in particular by the New York Public Service Commission. Eventually the islands will grow larger and fill the entire map and make much of regulation unnecessary. In the meantime, however, one can establish islands of competition only if one assures the ferry service to them.

As these islands grow, they must interoperate in a sensible manner in terms of technical standards, protocols, and boundaries. This is why it is necessary to establish a network blueprint. To make an analogy: lower Manhattan is a jumble of streets because it is not based on any design but probably on the path chosen by Peter Stuyvesant's cows. Further uptown, however, there is a grid system which was put on the maps many decades before any streets were actually laid or houses built. A similar conceptual grid system must be defined for the telecommunications network. Such a grid would be based on defined vertical and horizontal coordinates, and the technical standards of interconnection and interface between them. In this fashion it would set out a system of *modularity* which would make possible an interconnecting modular network system. Within the modules people could do more or less whatever they wanted. And, of course, they could connect modules together. But one could replace one module, and it could interact with the others.

It is easiest to set the horizontal physical coordinate where segments are defined in purely spatial terms, such as "inside wiring." But for central office (CO) functions, the dividing lines are more complicated and controversial. COs combine several physical as well as software segments.¹¹ One may need some underlying operating protocol across modular lines.¹²

It is important to stress that this does not mean modules and interface points everywhere, since this would be technologically burdensome. Nor would there have to be more unbundling than before. Nor does it mean that one would have to set all points at once. Setting the specifics of interfaces is complex and need not be ahead of demand.¹³ That is a regulatory policy decision which will have to take into account cost and performance implications. This model does not advocate more unbundling and disaggregation, but rather a more systematic approach to however much disaggregation is decided upon.

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The transfer from one module to the next would not be free. There will be charges, and they can be structured to support traditional concern such as universal service and assure the viability of the core network. Modularity would enhance competition and might therefore be viewed negatively by LECs. On the other hand, it would make them much less dependent on any particular equipment manufacturers since there is likely to be more competition to supply any specialized module than to provide an entire big central office switch, which is a billion-dollar development effort where the big PTT countries with their targeted domestic procurement increasingly have the edge. The modularity of software will make carriers less dependent on the switch manufacturers and their complex multi-million-line programs.¹⁴

With modularity, this would not necessarily be the case anymore, and market niches for small hardware suppliers would open. The carriers could also encourage the development of software applications by outside suppliers, just as IBM did by opening software applications for the PC. This would enhance the LECs' flexibility. Right now, changing network capability is a very ponderous process. According to Bellcore's VP for network planning, "If you want to make a change in the network, you literally have to change every switch in it. If you have 2,000 switches, that can take five years or longer."¹⁵

Today, most computer hardware is designed to accommodate an operating system such as DOS or UNIX with applications programs such as spreadsheets and word processing. Telephone digital switches, though similar to computers, in effect mix the operating system with the applications, so that it is difficult for telephone companies or independent software companies (as opposed to switch manufacturers) to write the new applications software either because its millions of lines are impenetrable or because they cannot touch it legally. Modularity would also deal with the inevitably increasing competitive overlap between telecommunications and computer industries and assure that intelligence does not migrate into the CPE periphery of the network for purely regulatory or proprietary reasons.

This means that the future of network policy debates may be a discussion of the interrelations of modules with each other rather than a question of entry. That is, how those various parts of the network interrelate to each other becomes a much more critical question than it has been previously.¹⁶

ONA, which is now bogged down in Washington, is a key aspect of that, but it is only one aspect of the interconnection issues. One way to visualize this is to look at comparisons of various open network arrangements. The Europeans have a scheme called "open network provision," which essentially is a bundled type of upper layer service. One of its major functions is to make it possible to provide services across national frontiers. It is part of the efforts toward a harmonized market in 1992. The FCC's ONA goes further, with a far greater degree of unbundling.¹⁷ New York's ONA, together with its co-location policy, goes considerably further.

Just as there can be physical co-location, i.e., the equipment of one company (one network) located physically on the premises of another company, the next logical step is for enhanced service providers (ESPs) to ask for the right to introduce a new application module: its own private software for use only by its own customers. In effect, the ESP would be asking for inclusion of its software among the central office software functions. This could be called "software co-location." In other words, software by outsiders would be put into the central exchange, making it very difficult, if not impossible, to distinguish a private network from a public network.

Local exchange companies will shudder at the notion of software co-location, but it may not be a bad commercial deal for them, as long as it conforms with standards and protocols, does not displace LEC functions because of limited capacity, is limited to higher layer applications rather than network control functions, and of course yields them revenues. Already, some of the LECs have been developing a software interface in their (postponed) Intelligent Network/2 plans and plan to sell memory and processing as part of their business strategy. For LECs, software co-location may be more advantageous than having the ESP lodge its software functions within its collocated physical equipment that is somewhere in the central office because software co-location should be done antiseptically by electronic communication. And it could make the LECs' CO services such as Centrex much more powerful in comparison to PBXs. Thus, software co-location is really a logical and probably much more efficient way to go than physical co-location for both LECs and ESPs. This could also open up a scenario of very exciting applications.

All these circumstances described above are not exclusive to the United States. The U.S. is simply

one step ahead, but internationally things are happening that only a few years ago were neither expected nor considered possible.

For example, the British and the Japanese changed their systems. People could perhaps first dismiss these U.S.-style changes as free market exceptions in an otherwise protectionist world. Subsequently, however, the German Bundespost became more independent in status, as was the Netherlands' PTT. Even social democratic Sweden is talking about privatizing the telecommunications system, having introduced competition. And the reforms that have swept through Eastern Europe and the U.S.S.R. have brought new service providers and other dramatic changes to their otherwise poorly developed telecommunications systems.

In the last year or two, Latin America has also begun following suit. Practically every Latin American country is privatizing its telecommunications system. Privatization by itself is not the decisive step, inasmuch as it often merely yields a private monopoly. Nevertheless, privatization leads to a separation of operation and regulation. Once that distinction is made, a regulatory mechanism exists that may well decide, as it has in the United States, to permit other private companies to enter because the justifications for a private monopoly are much weaker than for a public monopoly.

Thus, the United States may be at the forefront, but things are changing everywhere. That requires us to think not just in terms of entry and liberalization (i.e., issues that were fought over in the 1980s and are essentially accepted); now we must begin thinking about how to provide this pluralistic system with ways of integration so that the various parts, or modules, can optimally interconnect and interoperate without being subject to either bottleneck power or concerted group activities to exclude others. Thus, antitrust law is likely to be a mainstay of future regulatory policy and enforcement.

Dr. Brock: After Eli's rather global approach to things, I am going to return to a much more specific one, somewhat closer to the kinds of things that Ken and Michael were talking about. The issue that I would like to discuss this afternoon is the relationship between antitrust and regulation. There has frequently been a sense that those are two different methods of dealing with industry problems. In discussions earlier today and in many cases in the past, there has been discussion

along the line that you ought to deregulate any potentially competitive sectors of an industry and then allow antitrust to work its magic on them.

I basically agree with the perspective that we have some special kind of regulatory concern for certain cases of natural monopoly, but that, in general, the antitrust laws are our current social consensus of the appropriate regulation for free market operations.

The basic point that I would like to focus on is that the FCC has been moving in the direction of antitrust standards without a general deregulation proceeding. The FCC is not free legally to fully deregulate a large amount of its industry. When the FCC went to its dominant/non-dominant dichotomy several years ago for inter-exchange carriers, in which it said that MCI, Sprint, and many other carriers would be considered non-dominant, it was a perfectly natural, obvious distinction as far as most economists, or even other casual observers, were concerned.

On the other hand, the way that was justified legally was to say: "This is for administrative convenience. We are not really deregulating. It's just that we won't get around to looking at the tariffs of the non-dominant carriers very closely." The court accepted that. But when the FCC tried to make it a little more strict and said, "Don't file the tariffs at all," it got reversed on that case.

My point is that economic analysis itself, which might show there are certain areas of the industry that ought to be deregulated, is not sufficient for deregulation. It would apparently require a new act of Congress, given the current court interpretations, in order to do a large amount of true deregulation. On the other hand, as the FCC did with non-dominant carriers, it can move a long way toward deregulation by administrative decisions.

I would like emphasize that regulation and anti-trust have many similarities in their efforts to control the abuse of monopoly power. Whereas, traditionally, the FCC and other regulatory agencies tried to keep their industries quite separate from the general range of other industries—they had special accounting rules, special ways of dealing with them, and in some ways regulated industries were treated almost like the government-owned PTTs of Europe—the FCC policy in recent years has been to move the industry toward ordinary kinds of market forces.

tion rules were written to protect customers in the regulated sector from paying for costs resulting from unregulated operations.

Under price caps, protection against cost shifting from unregulated to regulated sectors is much less of a concern because the ability to move costs into the regulated side no longer gives a company the right to raise its price. We still have to be concerned with the question of competition in the unregulated part, but that is a traditional anti-trust issue.

The current line of business restrictions was developed in the antitrust context. There is a great deal of precedent in law and economics on how to deal with the relationship between a vertically-integrated firm that may have monopoly power at one stage and competition at another stage. The existing line of business restrictions takes a very hard line on that boundary. It says simply: "We will put all of our emphasis on avoiding competitive problems. We will not give any weight at all to vertical integration advantages."

I would emphasize that there is a good deal of evidence—and I suspect Mike might argue with me on this—that there are, or at least can be, substantial advantages to vertical integration.

It is by no means true that the only reason for vertical integration is monopoly power. I would cite as good evidence for that proposition Alfred Chandler's new book on the economies of scale and scope, in which he examines U.S. development in the late 19th century and provides many examples of the efficiencies that came from vertical integration.

The issue that we have been concerned with at the FCC has been how to deal with the problems of transmission of market power between markets without losing the advantages of vertical integration. I think that, in antitrust terms, you can interpret the open network architecture approach as an anti-tying approach.

Now, as I think most of us in this room know, the general antitrust rules against tying tend to be much stricter than those against vertical integration. As long as there is monopoly power in one product, it is extremely hard, if not impossible, to prove that a tie-in between the monopolized product and a competitive product is legally justified. I think it is appropriate to view the Open Network Architecture (ONA) approach as an elaborate attempt to develop anti-tying rules within the communications industry. The ONA

rules say, in effect: "There is market power in the local exchange and we are concerned about the transmission of that market power to other sectors, but rather than prohibiting the integration of various sectors, we will allow vertical integration so long as the monopolized and competitive products are not tied together."

The ONA rules have been developed in a very elaborate form. They deal not only with simple product tying, but also with provision of information, disclosure of network interfaces, and various problems such as connection and co-location issues. The FCC and New York have taken slightly different approaches in the detailed rules, but I think the general approach of the two agencies is consistent with each other and with a movement toward the antitrust standard.

My final point is that, while the FCC has been drawing on antitrust precedent as it attempts to move the industry in a competitive direction, some of the specific FCC rules may provide guidance for issues in other industries. There has been a great deal of discussion about the importance of information, of intellectual property rights, and of intangible property. The FCC's efforts to develop rules regarding the disclosure of customer proprietary network information, network interfaces, and the interconnection of signaling points may have considerable relevance to competitive issues in other industries.

Questions & Answers

Ms. Greenwood: I will ask if the panelists would like to comment on each others' papers or if there are any questions from the audience.

Participant: This is a general question that I will address to the panel, but I think it perhaps covers the better part of today's discussions. Given the costs and risks involved in antitrust litigation, particularly private antitrust litigation, is it realistic to expect that enforcement mechanisms can deal with markets where there are dominant, formerly-regulated companies and prevent market abuses better than effective regulation?

Dr. Gordon: If you were AT&T, you would think so. I think some have done pretty well with it. Perhaps Mike should answer that.

Participant: One comment on that before Mike answers. That's fine if you are talking about a company the size of MCI, but as the telecommunications industry changes, and its competitive nature is based on smaller start-up companies

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which do not have the resources available to risk lengthy and expensive antitrust litigation against well-financed major companies, is that a realistic enforcement mechanism that we are going to be relying upon if that theory is accepted?

Dr. Gordon: As a regulator, not as an antitrust expert, let me give you two quick reactions. First, that is a general criticism of relying on private antitrust, and it surely applies in many industries other than the regulated industries. Second, MCI was a small operation when it started, and by far the largest part of its budget in the early years was an investment in antitrust litigation, an investment in creating a market opportunity which, in their case at least, appears to have paid off.

Dr. Pelcovits: Just don't look at their stock price now. I don't have a lot to say about the antitrust issue and how likely private parties are to press suits. It is much harder there than before regulatory bodies. My sense is that it is very difficult, in terms of the resources and the costs involved, for a small company to bring a complaint before a public service commission. You see it happening, but it is very tough. I have seen that with private pay phone providers, shared-tenant service providers, where many of them got buried in those proceedings and never saw the light of day. If you then take the antitrust course, with an even tougher burden for the private plaintiff, you are not going to see the small companies getting much out of the antitrust course.

MCI is, I think, an exception to this whole story. As it is, they did not get an enormous amount of money out of their antitrust suits. They ended up okay, but it wasn't such a huge pot of gold that it's worth taking a very large risk to get so that other companies will pursue the same path in the future.

Dr. Brock: Any time you have a lot of money at stake the respective parties will put a lot of money into fighting and defending the suit, whether that be before a court in the antitrust context or before a regulatory commission. In many cases a regulatory commission makes summary judgments without people putting as much effort into it, and that may look like an efficient way to proceed. The large number of somewhat routine complaints that are settled by the FCC provides a good example of efficient conflict resolution through regulation. On the other hand, when there is an issue that involves a lot of money, such as the shared network facilities (SNFA) complaints, that probably will require as much litigation cost as many

antitrust suits. I don't think that any particular jurisdiction is going to make litigation inexpensive unless you risk taking away the procedural rights of the parties and say, "We are going to have a summary judgment without any chance to fully litigate." That is an unlikely event and not one that I would encourage.

Participant: This is for Jerry. Conjecturally, can you render an opinion or let us know what you think is the most politically viable, in terms of handling cable and cable-telco issues? If cable starts providing two-way services on its networks, the option for the bureaucratic machine is to apply common carrier regulations to cable, or the telco's will have a very good case for getting out of common carrier regulation because now cable is a viable alternative. But, as I understand you, the FCC has no way to forebear or make those kinds of decisions on the telco side. If the FCC has to regulate, that implies it is going to have to start regulating cable as a common carrier once cable starts providing two-way service, which I think is right around the corner.

Dr. Brock: That may or may not be true. Cable could be declared to be a private carrier. Private carrier/common carrier distinctions are subject to some amount of administrative discretion and are used to get out of difficult situations sometimes.

But I don't see any possibility, under the current statute, of fully avoiding regulation of the telephone companies. It was our perspective while I was at the FCC that we ought to be encouraging competition both ways—that is, allowing cable to do more telephone business, telephones to do more cable business. A lot of people disagreed with both of those perspectives.

Participant: So you would just get rid of the problem by defining it conveniently enough that it's not a problem?

Dr. Noam: You may find the FCC, or whoever, not changing the status of traditional cable services such as one-way video. But for those services in which a cable company offers broadly based, traditional telecommunications service, the same rules would apply to them.

Participant: The states would do that?

Dr. Noam: Well, whatever the regulatory agency is. I am sure that the states and the FCC will joyfully join battle about that one.

Dr. Gordon: It seems to me that there is obviously a state issue here because something has to

be done with the exclusive franchise that people have to provide local access. There might be ways you could modify it, allow the access, but declare a dominant/non-dominant distinction and pretty much let them go by themselves. That is one possibility. In a way, as you allow non-wire line technologies to come in on a deregulated basis, you are essentially doing that. But, of course, you still have to face the interconnection at some point. Indeed, we have a proceeding in Maine to deal with exactly that. But there are a variety of ways you could try to basically finesse it.

Participant: You have to pursue interconnection. Does that go both ways in your opinion? I mean, obviously, you have to force the telco's to have interconnection once wireless and cable two-way systems develop. How about going the other way?

Dr. Gordon: Force the cable system to have interconnection?

Participant: Exactly. How would you vote?

Dr. Gordon: I would abstain for the moment because I haven't finished thinking it through. But my instinct is to think that, at least initially, we should not force that.

Participant: Obviously, I'm thinking now of telco's taking advantage of cable, in the sense that it can use their end-links to provide a broadband service, for example.

Dr. Gordon: Yes, non-asymmetric competition, if I can use a double negative here, would require that it go both ways

Dr. Noam: Just as a co-location arrangement between, for example, Teleport and New York Telephone, has to be both ways, I think that this arrangement can be used, and should be used, if the cable companies are smart, as an interconnecting device for their services too. But that definitely requires two-way symmetrical arrangements. I think that today, given the reality in Washington and so on, the cable industry is reluctant to move into telecommunications because it opens itself up to exactly that kind of symmetry, of competitive entry from the other side.

Participant: This is to Jerry and to Mike. You talked about the use of the average variable cost predatory pricing standard. As we all know, there has been a lot of debate over standards, particularly in technologically changing industries or in industries where strategic investment may be possible. I understand the FCC may have talked about the protection afforded by the predatory

pricing standard. But do you think a variable cost standard is appropriate?

Dr. Brock: I tend to follow what I consider the dominant strain in the economics literature, which is that predatory pricing is relatively unlikely, that there need to be special conditions in order to make it profitable, and that, therefore, you ought to have a fairly strict standard of proof in order to sustain a predatory pricing allegation. That perspective leads to advocacy at a marginal cost—or, as has been frequently used, an average variable cost—standard, which will be relatively difficult to satisfy. I will leave it to Mike to explain the other side.

I recognize that there is a valid argument on the other side, but I tend to go along with the people who say there is more danger in nuisance anti-trust suits of people trying to keep prices high by having a too-easy standard to meet than there is in true predatory pricing driving them out by having too stringent a standard.

Dr. Pelcovits: The other side. Let me first point out, as Jerry mentioned, the AVC standard and the price cap rules. Initially, that requirement was applied to AT&T. Taking AT&T's access cost as an average variable cost, you came up with a positive number, as high as 40% or 50%. That probably was a significant pricing floor for evening, night, and weekend services, where the prices are generally heavily discounted but the access charges are not. So there is some meaning to average variable cost in that context.

When you talk about a local exchange company, I don't know how you get a positive number greater than epsilon as an average variable cost. Quite frankly, if you look at telephone company cost studies, even when you take long-run incremental costs, the numbers tend to be substantially below current rates. Most of those costs are capital costs, or carrying costs of the capital, or maintenance costs necessary to keep the capacity going.

I don't know what the average variable costs of a local exchange company are. So, therefore, an average variable cost standard is absolutely no protection against anticompetitive pricing. I don't know whether you could call it predatory or not, but it is certainly strategic anticompetitive behavior on the part of local exchange companies.

Participant: If the long-run incremental cost, or whatever cost someone has figured out as relevant, whatever that is—epsilon, or even zero—then the optimal output behavior for the firm

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with that low cost is to produce a lot more, and that may be not to have competitors in the market. If that's the case, then I suppose that we must be thinking of other benefits from competitors being there, perhaps related to technical progress. If so, I wonder what people think is the evidence for that?

Dr. Pelcovits: You gave the answer in your first question, talking about strategic investment. It's a very simple matter to end up with a zero average variable cost in that part of your business facing some prospect of competition—make the investment and after the fact have no average variable cost so you have no price floor. That keeps up competition and you teach a lesson while doing it. That was done in the Centrex cost studies, where you were not really driving anyone out of the market, but at least it was a strategically useful behavior for the telephone company. You built up a lot of capacity in electronic switches and then said, "The cost to us in providing this to our Centrex customer (the opportunity cost) is close to zero because there are no other uses for all of these other 5,000 ports on our switch."

Ms. Greenwood: Roger?

Mr. Noll: I thought the question was on target. But I think the basic thrust behind the question is that it's really true that if the long-run incremental cost of something is zero to a BOC, it ought to be able to charge a price of zero because that will not hurt anything—and, in particular, that is sort of demonstrable proof that it ought to be monopolizing everything, if its long-run incremental cost is zero.

It strikes me that is correct, but it buys an enormous amount of baggage which sort of slipped right through in Jerry's talk, which is there exists a way to define the rules of the game in a regulated industry with jurisdictional separation, such that the anticompetitive dangers of things like vertical integration and predatory pricing are precisely the same as they would be if the industry were unregulated. That is the underlying premise of the defense for relaxation of a lot of business restrictions.

Notice Jerry did not go into an elaborate defense of the proposition, that there are indeed lots of economies of scope to be had through vertical integration. He didn't give a positive case for all the wonderful things that will happen in this situation. It is just an "in principle" argument that says: "We ought to make the world look like antitrust because I have a series of regulatory rules

that are going to make the system of regulated monopoly look identical to the system of unregulated firms that are engaged in vertical integration."

Why isn't that true? The first reason it is not true is Ken's talk. Ken doesn't want AT&T to build more facilities inside Maine because it will attack the fact he wants to engage in anticompetitive regulation so he can protect his cross-subsidies and his irrational price structure, which is where most of the investment is. That is problem number one. If Jerry sits back and does nothing, he leaves more of the field to Ken and, moreover, more scope for Ken to put people out of business, to engage in various kinds of state regulatory activities that expand the scope of regulation for protecting Maine. So we have in Maine this incredibly important social purpose of taxing people in New York when they call L. L. Bean so that Maine can save \$8 million in telephone bills. That is problem number one.

Problem number two is the jurisdictional separation between Ken and Jerry with regard to cost, which has nothing to do with economics; it has to do with politics. No matter how you define the accounting principles used by the FCC and used by the State of Maine, the starting point for the mechanism for making these tests of predation and so forth is going to be a political negotiation of where you chop up the switch and where you chop up the local transmission facilities to decide what part is interstate and what part is not.

So it's not a classic predatory pricing test based upon a firm where you are looking at its entire cost structure. It is exactly as Michael said before, you are talking about an "as if" circumstance, but, more than that, you are working with data from something that has been arbitrarily chopped in half, with half of it in Jerry's jurisdiction—or less than half, chopped in six-sevenths versus one-seventh, where one-seventh of the costs are in Jerry's jurisdiction, arbitrarily defined, and six-sevenths are in Ken's jurisdiction—and they are operating at cross-purposes because Ken would like to see a little predatory pricing to protect that \$8 million, whereas Jerry does not want to have it happen.

It seems to me that the final point, which I think was missed in all the presentations, is that price cap regulation increases the incentive for predatory pricing substantially over what would exist in a normal, unregulated market. Why? Because a firm has a formula for its overall prices: a weighted

sum of its prices has to equal some constant. That means if it lowers one price, it gets to raise another.

In a normal monopoly circumstance, a firm would be already charging profit-maximizing prices, so if it wanted to engage in predation, it would actually have to lose money somewhere in order to do it. Whereas, in the price cap world, as long as the price cap prevents complete monopoly exploitation of the markets, lowering the price in one market to engage in predation enables you to finance that, at least in part, by raising the prices somewhere else.

The regulated firm, even under incentive regulation, is not similarly situated to the standard firm engaged in multiple markets because of the ability to cross-subsidize the predation effort to some degree. Now, it cannot do it completely or it wasn't maximizing profits subject to the price cap before, but some significant fraction is going to be paid for out of other markets.

That strikes me as another reason to say you can't start off with the proposition that the probability of harmful effects of vertical integration and the probability of harmful effects from various kinds of other kinds of pricing schemes and investment schemes are identical in even the best of all possible regulatory worlds, which is not the case.

Dr. Brock: I would agree, Roger, with your initial summary of my talk, that I did not make a strong, positive defense of how, in order to beat Japan and so forth, these things must be integrated. But I was trying to put it in terms of constructing rules that give these companies some of the same freedoms as other companies to use whatever abilities they may have. With regard to your criticisms of it, I would respond to what I consider to be the two major points.

First, with regard to jurisdictional separations, the specific rule that I described was for AT&T. AT&T is largely unaffected by jurisdictional separations, and in fact that particular rule is not dependent upon jurisdictional separations.

Mr. Noll: My comments were directed only at the access charges of the BOCs.

Dr. Brock: That predatory pricing rule has not been applied with regard to the BOCs. The BOCs are in a more tightly structured situation because of the Part 69 rules that do take into account the jurisdictional separations and provide much tighter controls on their prices.

Dr. Pelcovits: Does that mean that you don't think that the average variable cost standard put in the price cap plan for the local exchange carriers is meaningful?

Dr. Brock: I don't think it is very meaningful because I think it is unlikely, given the Part 69 rules, that it will be challenged.

With regard to the price cap point, your comment would be correct if all services were in one basket or if the basket which had one price down toward average variable cost was at its maximum limit. The basket issue is that the price cap does not apply to a single index of all services, but is divided into groups of services generally in relationship to the competitiveness of those services.

In actual practice, AT&T has been at the cap for what is sometimes referred to as the "Grandma basket" (i.e., the basket concerned with ordinary MTS and other small-user services), but it has not filed for large price cuts in that basket.

Mr. Noll: I'm not talking about AT&T. I am talking about the BOCs. I don't have any trouble with price caps for AT&T because I don't think it has much market power. I am concerned about the BOCs because it seems to me that there is no such possibility as a basket of things in which they, in principle, have no market power.

It is true that you can divide up the services into multiple baskets, and you are correct, you cannot engage in strategic behavior across baskets, except in the discrimination route; but you sure as hell can, indeed, engage in reallocations within the basket as long as you have any market in that basket. And what is the basket in which they're going to have no market power?

Dr. Brock: Is your concern the special access services?

Mr. Noll: Yes.

Dr. Brock: Both common line and traffic-sensitive access charges are tightly constrained by the rules. Special access services do have considerably more freedom. There is not yet the experience to know whether the companies will want to price below the bands in special access services.

Mr. Noll: Your responses are not relevant to my comment. Perhaps I did not make myself clear. I am not particularly concerned about the inter-exchange carrier regulation activities of the FCC because I do not believe that the marginal social harm or social benefit of AT&T regulation is very large. I have no objection to using price caps as

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an interim strategy for dealing with AT&T, which maybe ten years from now will lead to eventual deregulation. That's fine. The concern I have is line of business restrictions justified on the grounds that ONA, CEI, and price caps will prevent any significantly greater degree of incentive for anticompetitive conduct by the BOCs than would exist by an unregulated firm such as General Motors. I think that's just wrong.

The FCC, not necessarily you—I don't want to anthropomorphize it—but the current Chairman of the FCC and the current Department of Justice have defended relaxation of the line of business restrictions on the grounds that these regulatory protections are indeed going to do the job, recognizing that you are the tail and he is the elephant. I find that whole line of argument "out-er space."

Dr. Pelcovits: I want to raise two factual points. First, as Jerry mentioned, the special access category is one basket, and Part 69 does not discuss the allocation of costs among different services within that basket. There is enormous potential for anticompetitive conduct by raising the rates of the voice-grade, single, private lines and lowering the rates for the high-capacity services.

Second, there is a single Part 69 basket for local switching which is a major part of traffic-sensitive access charges. All of the basic service element pricing under the ONA will be within that single category. The FCC hasn't figured out how to impose any discipline on the pricing of ONA services, so price caps have no effect on limiting anticompetitive pricing structures for ONA services, at least at present.

Dr. Gordon: The first point I was going to make was also on the baskets. Obviously, there is an argument over what ought to be in the basket. I'm not sure I can add anything in particular to that.

On the second point, I realize Roger was using me *sui generis* and not personally. But I have to say, if I can allow myself a personal note, that it is very frustrating to come to an issue like this and read a memorandum which is a protectionist document. My first inclination, as well as the Governor's, would be to say, "build."

But, of course, the reality is that there is a line to be walked here. If we simply allowed this to happen and even half of the worst projected case came about, we'd be back at ground zero, not just in that area but in other areas as well.

Maine has a peculiarly difficult problem because we are a one-LATA state, and there are some other things that contribute to our peculiar position as well, so we are out of line with most other states in how serious that problem would be. But that is the line that the procompetitive state regulators are trying to walk: Get as much as you can without actually sinking the ship.

Mr. Noll: You're attacking the state legislatures, not attacking New York.

Dr. Gordon: That's right. It is just a general comment. It is miraculous to see how swiftly a state legislature can act when you have done something that they think they don't like.

Mr. Noll: You ought to give them more authority.

Dr. Gordon: It is not even a question of something they wouldn't like if they understood it. It's something that they think they don't like.

Participant: Roger, were you suggesting that breaking the bottleneck with the combination of ONA interconnection requirements and price caps for incentive-based regulation is not sufficient to solve anticompetitive pricing practices? Are you suggesting sticking to the status quo? What would you do?

Mr. Noll: First, it's obvious that it is worse. In part one, I was basically addressing myself to the line of business restrictions. It seems to me there are a lot of facts about what happens in countries that have complete horizontal and vertical integration across everything. The answer is they do things like prevent fax so that telex can be perfected, which is what all but about five countries do currently.

There is absolutely no shred of evidence that the United States is impoverished in respect to anything with regard to the telecommunications sector. When we had a regulated monopoly and everybody else had a PTT, we were better off; and when everybody else started to privatize their monopoly to keep it a monopoly and we went to competition, we still stayed better off. I find these arguments about going in the opposite direction from everybody else again denying the facts. It seems to me there is a fairly good reason to have an extreme degree of skepticism about the allowance of local exchange monopolies in the competitive market.

What I would do if I were at the FCC is to allocate four or five times as much spectrum to radio telephone systems and hope that Motorola will be

a wire line carrier for basic access for a large fraction of the population sometime in the next five to ten years. If they do that, then Jerry's system is going to work for both the AT&T and the BOC sides. If it turns out that Motorola is wrong and the fiber optic vision is right, that this is going to be a ubiquitous natural monopoly which is going to be carrying everything including the water, then I think there is basically no hope.

I think Michael's point is right, that everything will be monopolized except some fraction that

they let exist simply to protect against getting divested in an antitrust suit because that basically will not happen as long as there is anybody else in the market. It's very hard to win an antitrust suit in an oligopoly.

If this competitive alternative to the BOCs is not made available and a lot of institutions are removed, what I foresee happening is everything will be either a monopoly or a very tight quasi-collusive oligopoly that exists solely at the sufferance of the BOCs.