

Regulatory Priorities
for the Information Age

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Nothing ever stands still. I realized last week just how much the telecommunications world is moving when even my own mother changed her complaint. Now she goes: you never call; you never write; you never fax....

So there is change. And that also goes for the issues before us. What I want to do with you today is to discuss nine issues I see at the forefront of information age issues in the next decade.

But first, let's get a bit of the context. And by context I don't mean Judge Green, MFJ, Computer III, and other inside-the-beltway phenomena, but rather the basic forces that lead to them.

I. THE TRANSFORMATION OF THE NETWORK

For several decades two opposing forces have been transforming the traditional world of telecommunications. One force is technological in nature, is unifying and integrative. ISDN, the integrated super pipe, and broadband networks are examples. The second force is social and economic in nature, and is fragmenting, is diversifying, and tends to split things apart. The growth of extensive private networks and distributed network intelligence are examples of this force.

Telecommunications are only one instance of the wide-spread ascendancy, in recent years, of centrifugalism in previously shared

arrangements. Wherever you look, people are breaking up all kinds of societal networks of interaction and forming new ones.

In telecommunications, we are rapidly moving from the one large monolithic network towards a decentralized and segmented federation of public, private and semi-public networks. In effect, a network of networks -- domestic and multi-national, hardware and software, specialized and general, private and public. It's a very untidy affair, and it makes people nervous who like things well-organized and compartmentalized. I like to use the term the pluralistic network to describe the new environment. It is the latest stage in the development of communications networks. These changes are usually seen as supply side phenomena, in other words as caused by the entry of new suppliers such as MCI. But I find it useful to think of them also as demand side events, of exit rather than entry. Without going into any historical detail here, the stages of network evolution, in the United States but also elsewhere in the world, can be described as follows:

1. The network as a cost-sharing arrangement.

Expansion of the network, at this stage, is based the logic of spreading fixed costs across many participants, and increasing the value of telephone interconnectivity. This period of telephony, in the United States, lasted through the 1920's.

2. The redistributive network.

At the next stage, the network grows politically through transfers from some users to others, particularly to newcomers to the network. This period lasted into the sixties.

3. The pluralistic network

In the current phase, the uniformity of the network is breaking apart because the interests of its numerous participants cannot be reconciled, and a federation of sub-networks is emerging.

It is important to understand that these trends have a certain logical progression. At first the network expands because it makes economic and technical sense. Later, because it makes political sense. But as the network provider succeeds in providing full service to every household, it also undermines the foundation of its exclusivity.

New coalitions of users are thus emerging. People who have been part of the old coalition -- the public network -- are packing up and leaving, and establishing new affiliations.

Examples are large private intra-organization networks, shared tenant services, local area networks, wide area networks, and other specialized services.

These groupings of users need not be territorial. The idea of telecommunications as consisting of interconnected national systems is about to change, as specialized transnational networks emerge. And this means that the notion of regional telephone companies, of

territorial franchises, of state and even national regulation will become outdated.

THE NEXT TEN YEARS

Where does all this leave future US policy? A first observation is that it would be naive to expect fewer regulatory tasks, even in a more deregulated, liberalized, and competitive . Many disputes become less intramural and more public. There are many new players, new situation, and many new gray-zones. Anybody who thinks that the complexity of the past few years is just a transitory phase to clean up behind the divestiture is in for a big disappointment. Things will only get more complex, just like the tax code.

What does this mean for regulation? Soon after I got appointed to the PSC, I asked, following the principles I was teaching as a business school professor, for staff to come up with a plan for regulatory priorities. I asked, in effect: what are we trying to accomplish in the next three years? This went over like a lead balloon. Staff just wasn't thinking this way, and what they produced was either too specific and immediate -- like introducing a new bill format-- or too general -- like increasing efficiency. After some trying, I gave up. Or so it seemed. But it so happened that I had just published an article in the Journal of Communication on a related question, which I could now pull out. And so I established to myself a plan of priorities for policymaking that I've been pursuing on the Commission for those

past two years, and I've made progress on most of them, in Albany and Washington, though now I'm running out of time as I prepare myself to leave state regulation and return to the considerably more real world of academia.

These priorities benefited from the advice of various good and well-informed people. I will discuss the ten that require the greatest attention in the intermediate and long term. For the short term you don't need me, you understand the issues probably better than state commissioners.

1. Protection of a balance between standardization and diversity.

I have said earlier that technical integration and institutional diversification are two basic forces in the network environment. To some extent these two are substitutes for each other. To advance technologically, one can upgrade a network by more powerful integration, such as through ISDN or IBN. (Chart) Or one can bet on the impact of more competitive diversity.

The chart shows schematically the different strategies of several countries over the past few years. The European monopoly PTTs stress ISDN and integration. The US mostly follows the path of diversity, which has been a traditional strength of its society in general. Japan, not surprisingly, is the most balanced in combining a major push both in diversity and integration. Recent policy initiatives, such as ONA-type unbundling, are for the United States one way of increasing diversity. But they don't do much for

integration. In fact, they will accelerate the centrifugal forces in the network. It will make it harder than ever to have compatibility in an environment where the integrated long-range planning of the old Ma Bell has not been replaced.

This is no criticism of ONA. I have been writing articles for almost five years arguing that something like ONA is both necessary and unavoidable. But I'm also coming increasingly to recognize that if you do something for diversity, you also have to do something for the integration of all those pieces. Otherwise the system will become disjointed and less innovative than it could be.

Diversity can lead to innovation, but it can also retard innovation where there are many independent parts of a system which must interact. Then, change can become much harder.

Take the English language as an example. Its spelling-- which is a form of a standard or protocol-- is weird, to say the least, and yet it is almost impossible to do anything about it, because nobody is in charge, and nobody can afford to be incompatible, with the exception of a few eccentric poets.

The implication is not to recreate a monopoly system but rather to keep in mind that diversity must be balanced with integration. Policy makers must act in a forward-looking manner and to provide the system with tools of integration.

Now standards and protocols are enormously complicated matters, and there is no reason to expect that government has the expertise to do it. But it could be a catalyst, a promoter, and

maybe an arbitrator. Various industry participants have worked reasonably well together in ANSI and its T-1 and X-3 committees, and in IILC on ONA issues.

But experience, as well as the theoretical economic literature on standard setting and game theory shows that standards do not necessarily evolve optimally, nor smoothly, nor speedily, in a purely voluntary setting.

Furthermore, the rest of the world does not play by laissez-faire rules, so the choice may not really be between Washington and the market, but between the United States and Tokyo and Brussels.

This suggests to me that the best institutional setup would be an energetic public-private collaboration. Industry should do most of the expert negotiation and staffing through such established organizations such as Bellcore, Bell Labs, and GE Labs. But it is also important to bring the smaller competitors into the process. And government should set the framework, establish a time schedule, and provide arbitration. Furthermore, the federal government should lend its considerable weight as a procurer of telecommunications, for example through the next stage of its FTS-2000 network.

Clearly, there are a lot of things to think about. Therefore, now that we finally have a new FCC and NTIA in place, they should appoint some task force --and one that is heavier on technologists than on lawyers--to look into long-range strategy of network evolution and technical compatibility.

Now where are the states in this? While the states have a role, they should not contest the FCC's predominance, but rather put forward their position in a cooperative way. It would be a truly terrible idea if states were to have differing technical requirements. This is not to say that there could be no regional variations--for we don't want a lock-step approach either--but that variation must be compatible with the national whole. Otherwise we'd be establishing technological fragmentation as the principle just as the Europeans are moving full force into the opposite direction.

2. Protection of interconnection and access.

The tension between the integrative and pluralistic forces is most pronounced on the front where they intersect: the rules of interconnection of the multiple hardware and software sub-networks and their access into the integrated whole. In coming years policy makers must structure ways in which network interconnection is granted, defined, priced, and harmonized.

It is critical to have rules of the road that all members of the network family can live with. These rules of interconnection now are being debated at the state and federal level under the rubric of Open Network Architecture. New York state, for example, just passed a set of ONA principles in a larger proceeding, which I recommend to your reading.

Unfortunately, a lot of people have lost sight of the big picture when they think about ONA. They see it as a wrinkle of

Computer III, instead of recognizing both as an inevitable evolution of the network, and a manifestation of the growing diversity of its participants. Perhaps it is helpful to look at the network in a graphic and very schematic way. Think of it as consisting of hardware and software segments. An example for software segments is the OSI hierarchy of seven layers, each of which has defined functional responsibilities. In hardware, it is helpful to think of a network architecture as a sequence of physical segments.

Now suppose we put together the software and the hardware segments into a system of coordinates. Then we can graph the network schematically. 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 this territory used to be occupied by AT&T, but the development of the last two decades has been for others suppliers to enter, too. The alternatives are schematically graphed in the chart.

As these rival islands grow and proliferate, it is essential that they all can all interrelate in a sensible manner in terms of technical standards, protocols, and boundaries. This is why it should be a policy priority to establish some form of a network blueprint of network interconnection points and standards.

To draw 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, and it is a pretty good plan. Can you imagine Manhattan traffic if all of its streets were laid out like in the Wall Street area? And there would certainly be no Central Park.

What in my view must be done is for a similar system of key interconnect points and standards be defined for the telecommunications network. This does not mean, and this is important to stress, that there are more modules, and interface points everywhere, or ahead of demand, since this would be technologically and economically burdensome. But what it does mean is that there will be a more systematic approach to however much disaggregation is decided upon, and that we don't have a collection of ad hoc decisions that ends up with a network that proudly proclaims: Rube Goldberg was here.

Such an approach would make the service providers and LECs much less dependent on any particular equipment manufacturers, because there is likely to be more competition to supply any particular specialized network module than to provide an entire big system such as a central office switch. It will also make carriers less dependent on the switch manufacturers and their complex multi-million line programs, and encourage instead the development of software applications by outside suppliers, just as IBM did by opening software applications for the PC. This also assures that intelligence does not migrate into the CPE periphery of the network for purely regulatory reasons.

3. The role of telecommunications policy as economic development policy.

The global competitiveness of U.S. business is directly related to the state of its communications. Other nations are ceaselessly active in making economic inroads, using telecommunications as a strategic tool. Given their economic advantages in manufacturing, the only way to keep up with them is to stay ahead in information content, process intelligence, and innovation.

In telecommunications, the American network is still the best in the world. But the question is whether it can optimally create and absorb change for the future. One cannot coast on the accomplishments of the past.

Other industrialized countries have essentially completed the expansion of their basic networks. Universal service is something they've reached only in the past few years. But now they have begun to turn their monopoly networks and their symbiotic equipment industries with full speed into more advanced activities, and they are making progress.

Planning horizons in telecommunications are very long. We may be ahead right now, but what about the first derivative, the trend?

Thus, network policy must be seen in the context of America's declining international position in advanced electronics technology. In just six years the trade deficit in electronics

has turned from a \$6 bil surplus to a huge \$15 bil deficit. In telecommunications, the balance moved from a positive \$800 mil to a negative \$2.7 bil. This is likely to get even worse, judging from the figures for newly registered terminal equipment.

In network equipment, in a few years, according to one scary study cited by NTIA, the BOCs will be buying 58% of their equipment from abroad.

What can state regulators do about this, if at all? One way is to encourage the upgrading of the network, or at least not to be a roadblock. I will mention briefly two such upgrades, ISDN and the intelligent network. But we should think in terms of a doubly integrated digital network, or IISDN. It is integrated not only among the various types of services such as voice and data, which is what engineers dream about at night. But it is also integrated among BOCs, independent telcos, interexchange carriers, other networks such as metropolitan systems, etc etc, rather than a strategy to raise barriers to entry.

We have made an effort in that direction in New York by initiating an ISDN proceeding that is aimed at such an interconnected approach to ISDN.

A second direction for integration is the concept of the intelligent network which has been advanced by the local exchange companies as their vision of the future. Now whoever came up with the name did a brilliant job. How can anyone be against an intelligent network? Can you see a commissioner or a legislator denouncing the idea, calling instead for a dumb network? Or for a

remedial network? Therefore, I propose another network concept, which I call the "kinder, gentler, but smarter intelligent network." What does this mean?

We know that communications are becoming intelligent in multiple ways, such as through smart terminals, smart PBXs, smart interconnecting networks, etc. So the question is not whether the network, broadly defined, will be more intelligent. But rather the questions involve the appropriate role and effects of the local exchange companies in all of this.

One must differentiate between two kinds of intelligent network strategies. The first can be called the hegemonial intelligent network. This is the use of the upgrade as a strategy to raise barriers to the entrance of competitors. It is unlikely that there will be much dancing in the street by regulators to help subsidize that particular strategy.

The second form of intelligent network is a genuinely upgraded network with an open intelligence. This is a different story. Here, there may be a question of how much is not enough, and how much is too much. But basically a non-exclusive intelligent network with software interfaces, as envisioned in some of the IN-2 plans, (and which would permit such novelties as software collocation, which will be one of the telephone companies major money-makers once they get over their initial distaste) deserves support.

4. Regulatory treatment of telephone carriers in their capacity as mass media.

The upgrading of the telephone network toward broadband capability and its use for video, data, and text transmission will bring telephone transmission ever-closer to mass media. Audio mass announcement services have already exploded.

States have viewed mass announcement services such as "gablines," dial-it, audiotex, etc. merely as cash-cows to help subsidize basic exchange service. This lacks an understanding that what we are witnessing is the emergence of the telephone network as a mass medium, and that all this is likely to be the precursor to a time when the telephone network will have video capabilities.

And we have seen claims by network operators to possess the status of "broadcasters" or "publishers" of information, or at least the arbiter of what fits their corporate image, with the concomitant right to select the information carried over their network. This undercutting of its own common carrier foundation is a very short-sighted policy for an industry that argues in Washington to be admitted to distributing and providing information and video services. You simply cannot have it both ways. You cannot be a player, and at the same time claim the right to be the umpire over lawful content based on corporate image.

In the common law tradition, carriers and other businesses affected with the public interest had an obligation to provide service to all indiscriminately. They provided transport or

transmission function, with no influence or responsibility over the content of transmissions.

It is probably fair to say that this common carrier system has served most ar even all telecommunications users well:

- it permitted society to entrust its vital highways of information to for-profit companies, without the specter of discrimination and censorship by government or private monopolies;
- it was an important element in establishing a free flow of information, neutral as to its content;
- it reduced the administrative cost and the burden of liability of the network operator, since it needed not inquire as to a user's background (beyond credit-worthiness) and intent;
- and it protected the telephone industry from various pressure groups who would have it otherwise not deal with their targets of protest or competition.

As an institutional arrangement, it did for the transportation and communication sectors what free speech did for the press, limited liability did for corporations, legal tender did for currency, and negotiable instruments did for commercial transactions. It has probably resulted in a broader, more useful and more profitable network system than would have developed without common carriage principles.

However, in the rush to protect minors some companies, regulators, and legislators have lost perspective on these issues, and have begun to institute distinction on otherwise lawful communications flows based on content, when there are other ways available to create protection . This is asking for a lot of trouble in the future. I doubt that carriers are anxious to become censors with responsibility for the transmissions over their systems. Surely they would not like to be held legally responsible for content, which they could not avoid once they got into the content screening business. Just think of the potential liability for the transmission of the latest computer virus.

This is not the place to deal with common carriage in much detail, except to mention that in May we initiated a proceeding in New York in which we try to clarify the nature of the common carrier principles. We have received comments in the first round, and will in about two weeks release revised rules for a second round.

5. The prevention of oligopolistic behavior and of cyclical instability.

A decentralized and pluralistic network system is less efficient in terms of minimizing resources, and there is likely to be excess capacity. There is nothing unusual about this. Almost every industry has excess productive capacity, and the competitive effect is usually beneficial for customers. In the telecommunications field, with its low marginal costs, we have to

expect that the competition will cause periodic price instability. One of the functions of future regulation will therefore be to moderate the worst effects of price volatility and at the same time prevent industry efforts at collusion.

6. Protecting the Viability of the Core Network.

Clearly, an expanded, upgraded and enhanced network utilizing the best technology requires significant capital investment. The task is further complicated because the separation of regulated and unregulated investments.

It is likely that in the near future the requirements of capital construction will exceed internally generated funds, even if regulators revise depreciation schedules. Thus, telcos may be active again in the capital markets seeking funds. Yet it is not clear that traditional tools to raise capital are suited to such "mixed investments" which result in regulated and unregulated profits. One of the challenges is to develop new approaches to the need for hybrid investment vehicles.

Another problem is how to let the parent companies be active in the debt markets without affecting the high debt rating of the regulated entities. And even when it comes to those, as we move gradually from the rate-of return approach of regulation to that of price regulation, we enter an environment where earnings are more volatile than under the old regime. Just ask New York Tel about that. And that, too, affects debt ratings. In order to deal with that volatility, such price cap mechanisms are likely to have

an increasing number of safeguards and floors and ceilings built in, and by the time one is finished, and has accounted for all the potential problems, the new system will be as complicated as the old one. The incentives will be set better, but those who seek a simple system will be disappointed to discover that once one opts for regulation, there is no neat and easy solution. Since the upgrade of the network I mentioned above and the expansion of what constitutes core services is likely to require a good amount of investments in the future, the ability to finance them is obviously a key issue.

7. Establishing new mechanisms of redistribution.

The pluralistic network will also make it increasingly difficult to maintain the traditional system of internal transfers from one class of users to another.

But this does not spell the end of transfers as such. There is still ample possibility and opportunity to subsidize some categories of service for reasons of social policy or regional development, or for the positive benefits that new subscribers provide to existing users.

One such support mechanism are "lifeline" programs to insure access by the poor. In New York, we have a 1-dollar per month lifeline plan, with installation spread over a year to be 2 dollars per month. The philosophy behind this is not to subsidize everyone, including the comfortable middle class, but to the contrary, it targets the needy and provides a social safety net so

that the network evolution can be dealt with energetically and without the political fear of pushing the poor off the network.

Another mechanism to finance desired subsidies would end the primary reliance on the LECs and their customers and establish instead a "universal service fund" by all network providers. For example, I see no reason why Teleport in New York should receive an equality of competitive opportunities without a concomitant sharing of the burdens.

8. Monitoring and Maintaining Service Quality

Quality issues are becoming more important as regulation moves from rate of return to price regulation. Generally speaking, there are more incentives to cut corners as a hidden way of increasing prices, and as society becomes ever-more dependent on communications streams to the point of great vulnerability. Right now, quality standards are set by regulators in numerous ways, often heavy-handed, and nearly always unconnected to other standards or to economic incentives. This needs to be improved. We should establish mechanisms which protect overall service quality while giving companies flexibility in the details of how to reach it. And one should link quality performance to economic rewards, so as to provide incentives, and this should become part of a price formula, just as inflation and productivity are. This is something I've started working on in New York.

9. Establishment of global arrangements to match the
global scope of networks.

The openness of the evolving network system will not stop at the national frontiers. In the long run, telecommunications will transcend the territorial concept, and the notion of each country having full territorial control over electronic communications will become anachronistic. Communications are becoming distance-insensitive. Rerouting, arbitrage, and the establishment of communications "havens" become easily possible. This undermines attempts to administratively set rules for prices and service conditions. No country can be truly an island anymore. The more interrelated countries and economic activities are, the less likely are there stable solutions to separate policies. And where instabilities exist in one country, they affect the entire system. It becomes increasingly difficult to control all of the elements in such a complex matrix of interrelations.

It will be difficult enough in such an environment to formulate a United States policy and make it stick. How the states still fit into all this is a real question.

CONCLUSION

These issues will, no doubt, lead to significant regulatory controversies, and occupy policy makers in the US and elsewhere for a long time. None of the tasks is beyond our grasp in terms of complexity or political feasibility. But they require us to

end the nostalgia for the simplicity of the golden age, and to imagine a very different network environment.

It suggests that we look forward, and do not plan, like generals, for the last war. Unfortunately, regulators tend to work out of their in-boxes and to be reactive rather than pro-active. Nor does the industry often show much evidence that it knows where it is going. It would be good if many policy participants would be able to provide some intellectual leadership that goes beyond incantations of competition. Competition is critical. But there are lots of problems that cannot be analyzed along the dimension regulation-deregulation. What we need to do is to expand our vision, and deal with inevitable evolution of the network, with its greater role in the economy, and with the role of the United States in the world.