

**Telecommunications without a Public Network:  
Seven Steps on the Road toward the Ethereal Network**

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Paper Presented at

"What is Driving and Who is Guiding  
Regulatory Restructurings"

Session of the  
23rd Annual Conference of the  
Institute of Public Utilities

Williamsburg, Virginia

December 8, 1991

***I. Introduction***

The most fundamental question for telecommunications policy, and among the least asked, is *after deregulation, what?* In light of what happened to Pan Am and other airline carriers, this is particularly appropriate. In the recent past, debates centered on the opening of telecommunications, television, and cable. Is competition sustainable? Is it advisable? Who gains? Who loses?

Regulation had been essential to the old system, partly to protect against monopoly, partly to protect the monopoly itself. In the transition to competition, what was left of regulation was seen as temporary, as shrinking reciprocally with the growth of competition. In time, it would diminish down to nothing.

At that point, what would happen? Advocates of competition were always a bit vague on

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that question, like old Bolsheviks who were not sure, as they were storming the Winter Palace, what communism might actually look like one day. And you see what happened. Based on the experience of the past decade, it is reasonable to assume that networks of various categories — long-distance, international, mobile, specialized — will proliferate, and that equipment options will become abundant. Could one expect the resultant "network of networks" to be totally self-regulating, with no role for government?

The notion of an invisible hand mechanism, the idea that out of numerous decentralized sub-optimizing actions there would emerge, without any central direction, some overall and beneficial equilibrium, is perhaps Adam Smith's major insight as a philosopher.<sup>2</sup> Its importance goes way beyond economics.<sup>3</sup> Can electronic communications function in such a fashion, optimally arranging themselves in the absence of an overall plan or direction?

The mere notion is almost incomprehensible to telecommunications traditionalists. They argue that the more complex the technology and the network become, the more necessary it is to plan it in some centralized fashion. This type of argument was countered by the Austrian economist von Hayek half a century ago, when he pointed out that, to the contrary, the more complex and advanced an economy becomes, the less it is possible to guide it centrally.<sup>4</sup>

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<sup>2</sup> Adam Smith, *An Inquiry into the Nature and Causes of The Wealth of Nations*. 2 vols. Edwin Cannan (ed.). London: Methuen & Co., Ltd., 1904.

<sup>3</sup>It has been observed for the evolution of species, as well as for the functioning of bee and ant colonies, for population migration, for organizational hierarchies, and many others. Nozick, Robert, 1974, *Anarchy, State, and Utopia*, New York,: Basic Books: p 20-21.

<sup>4</sup>Friedrich von Hayek, 1942, *The Road to Serfdom*, Chicago: University of Chicago Press.

Recent collapses in Eastern European economies seem to prove von Hayek right. Complexity is neither a necessary nor sufficient condition for justifying centralized control.

On the other hand, there is also the opposite belief, equally simplistic, that more advanced technology makes regulation unnecessary. But consider, as a counter example, nuclear power, a complex technology that is tightly regulated. Technology does not abolish negative externalities; it may in fact increase their threat by orders of magnitude.<sup>5</sup>

One should not look at telecommunications networks primarily in terms of technical facilities. It is just as much a structure of relationships, and as such is a reflection of underlying group interaction in society and economy, subject to enabling technology. In that sense, it incorporates the conflicting forces of integration and centrifugalism common to many social processes. It once made sense for subscribers to the network to congregate within one monopoly network, largely in order to reap the benefits of cost sharing and of economies of scale and scope. But over time, with the successful spread of telecommunications across society, the conflicting interests of all of its members cannot be reconciled anymore within one network. If one gives individuals the freedom of association, they will form various types of interlinkages which we call networks.

This is most apparent in the emergence of alternative transmission systems, starting after

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<sup>5</sup> Or consider air transportation, which is much more tightly regulated than horse carriages. It is often mistakenly believed that air transport has been deregulated. This is true only for entry and prices. In almost every technical and operational aspect, airlines are extremely tightly regulated.

the FCC's *Above 890* decision permitting intra-organizational microwave private lines. Physical competitors to the traditional monopoly system are only the most visible part of centrifugalism. Private networks are at least as important. Use privatization - the rapid development of private and closed-user group networks - is a quiet process of greater long-term significance. Such networks are not necessarily on separate facilities.<sup>6</sup> But they are private in the sense of being separate and not open.

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<sup>6</sup> They may be fashioned from state-owned segments (as in the ministry-run networks of the People's Republic of China), or they may be used by the state (as in the case of the US government's giant FTS-2000 system).



## Future of Network Environment

Let's start with transparent

so, in the words of that social observer, madonna, let's get physical

stage 1 pastoral

no telecommunications. Imagine: no service breakdowns. No rate hearings. No telemarketing at dinnertime. No proceedings before Judge Green. In short a true pastoral paradise. Then come along two amateurs, one a portrait painter, the other a teacher of the deaf, that didn't know that if it ain't broke don't it. So that got us to the second stage.

stage 2 POT-Bell

plain-old telephone

just "the" telephone company

Stage 3 Bell and Whistle

Proceeds seriously since 1970's

add "the" cable company

Stage 4 Multitel

other narrowbands interconnect into telephone network and IXC's, incl ALTs and cell-tels, interconnection rights such as collocation and ONA

Stage 5 Multi-cable

other networks interconnect into cable headends etc.

by contract and partial access rights. It was not so much of cable becoming a teleco itself but that it offers alternative access rather to the end user, e.g. AT & T and cell-tells.

At the same time telco pipe broadens and reaches the house.

Dual wiring.

Stage 6 Fiber FROM the home

inside wire migrates to the outside to a tele-mailbox.

Avoids duplicate wiring Basically extension inside wiring of controlled by end user.

also fiber link interconnect cell-tels

2nd cable co's, etc.

SMATV's

interconnection point shifts downstream.

Q of optimal interconnection node location is an interesting and important Q. Not in C.O. but not on desk-set either. It depends on relative cost of links. may lose some control. but q: is there going to be a reconstruction of single carrier system from the user end, to some extent.

Stage 7: Ethereal.

Numerous interconnections. Create total communication environment. Where are we? Communications "ether" Network moves from a star architecture to a matrix. and we've moved from the pastoral to the ethereal.

So much for physical architecture.

In such an environment, what does a public network mean?

elements of old public network system:

reach [universal service;

free flow and access [common carrier obligation

restriction on power [rate regulated

plus subsidiary mechanisms

franchise monopoly

quality standards

no liability

what is left of these in the tele mail box system or ethereal steps?

monopoly gone - if there is collusion among competitors, then anti-trust can deal with that  
rate regulation unnecessary

leaves as continued public policy goals :reach [universal service

free flow[c.c

reach can be assisted by direct subsidy system to users and carriers who can't continue with  
internal subsidy/can't continue with access charges otherwise unec service. phone stamps.

value added communic tax on all segments that reach home

[graph. tax each physical segment. 2 types of subsidy: low-density. use a simple formula. divide  
segment by number of lines it supports. beyond x/feet per subscriber, we pay a subsidy if we  
wish.

2. poor. tele-stamps. can be programmed into system. what services are subsidized and which  
are not.

[that leaves free flow[common carriage. is it still necessary?

will discuss later



yes. otherwise restriction. basically non-discrimination.

examples. playboy channel

unpopular groups.

give examples.

need not cover entire bandwidth. but some capacity must be there.

how would this look?

customer has his own inside/outside wire. put in by electrician, or by a carrier as a service.

tele-mailbox: customer. could be provided by a carrier. cannot be proprietary in terms of access by carrier.

links: provided by various carriers. unregulated prices. if rates of two principal carriers too high, [duopoly]interconnectors will migrate downstream towards endusers. creeping competition.

central office functions: modularized. some distributed across multiple facilities. some interstate, making local service interstate and creating jurisdictional issue. states will one day regret their obsession with that particular distinction.

some facilities will be shared and cooperative. evolution of some reciprocal representation in each others facilities maybe. devil is in the details, but need to keep regulators out of the

logistics.

who provides central office functions? could be several providers. traditional telco. rival telcos, both locally and in other areas, like new jersey. interstate. or perhaps specialized providers. pbxs, sts, . and cable cos. dont think co will be bottleneck.

carriers among themselves: need interconnection rights. otherwise such competition by interconnectors will be blocked. both main carriers have same incentives to block.

so, two main public aims requiring continued help are: common carriage access on information, and interconnection rights of carriers into each other.

not a one way street. cannot burden some carriers and not others.

basic rule: if you interconnect by cc, you must grant it also upstream on part of capacity.]

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what types of networks?

or services.

non-specialized      specialized

low use

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genral random access networks

public pocket switched networks

general vans

power guards

personal network

heavy use

self generating corporat/group netw.

internal van (affinity networks)

1.

general. random access calling. for any kind of service, such as voice or data or video: service contract with a packager. could be the telco. but also cable co. or anyone who operates as a systems integrator. 'puts together local, l.d., etc. could be operating on a least cost routing system. switch people around capacity as it becomnes available. a bit like a capacity broker. ther is probably going to be a market in capacity futures. and a spot masrket opeating in real time. the market itself will not be anywhere Dphysically, but a trading network itself. 'the network is the market.

2. group and intra-organizational networks.

may also keep shopping for links, or , more likely, let someone else do it. incl telco. then virtual network

How private networks?

membership in multiple ones

personal networks use that material

It could include

personal 800

personal 900

personal access charges (solutions for telemarketing and many other issues) people let them pay my accesses. Credit my phone account.

special rates to certain numbers

friends and faculty

personal FX. (local # calling) for someone like Wilt Chamberlain, 4 digits are probably not enough.

dialling by names, not #

personal safe computer storage

The additional step is for individualized networks, or personal networks, PNs, analogous to PC's. Before dismissing the notion of PNs as extravagant, remember that twenty years ago nobody expected personal computers PCs, and nobody expected computers to end up on everybody's lap, either.

What does a personal network mean? It means an individually tailored network arrangement that



fits an individual's communications needs. It does not mean a separate physical system, but virtual systems provided by a whole range of providers and multiple carriers, not just one, and packaged together to provide easy access to an individual's primary communications needs: friends and family; work colleagues; frequent business contacts, both domestic and foreign; data sources; transaction programs; and video publishers frequently accessed; telemetry services such as alarm companies; bulletin boards scanned etc. Contact to and from these destinations would move with the individuals, whether they are at home, at the office, or moving about.

by contract and partial access rights. Not so much cable becoming a telco itself, but that it offers alternate access paths to and users for AT&T or cell-tels at sometime telco pipe broadens. reaches the house.

dual wiring

In this environment, people would be members of several vertical networks: networks of their employer or professions

networks of their media provides their personal network

perhaps network of their personal activities, for example of top breedes,

or the boy scouts.

So where does this leave regulation?

And what does it do to competition?

Role of private network in this system

For large users and groups, network will act as representative, or agent.

Will protect them against carrier's quality, privacy, performance, & price.

What about small users? And competition?

And small users are similarly represented by the packages of their personal network, as long as they have a choice among systems integrators.

This can take care of issues presently handled by regulation, such as price or quality.

### Quality

End user can't really make intelligent decision of physical links. Can't know in chain. But networks packages can. Can move traffic around. Need minimum standards only for residential loop. Because of externality. But not in early stages. Only in 6 or 7, not before.

### Adequate Capacity?

Nobody capacity provider of last post (unless subsidized)

Will evolve to a system in which capacity can be owned by a carrier or "interruptible" like process or have to get "spot" capacity if can.

Public becomes increasingly more and more of its capacity operates "private" under different, non public rules. Private network becomes increasingly public with its users in groups

\_\_\_\_\_ [insert]

quasi-jurisdiction

Private networks assume power as users

Columbia: equip. prices control of users

(only 4) No answer machine that someone decides.

No 900#s

Could cut off service of political activists

Standard lifeline

some protections will be imposed by regulation.

At same time, as I've argued, what used to be public network becomes increasingly "private" on some or much of its capacity.

So network of networks will be collection of intermediate public/private networks

So in this system there really is no such thing as a public network.

Its a collection of interconnected carriers, with users, and user groups operating of different aggregated networks. Now not having a public network does not mean not having public interest. Public interest must and can be still protected , but just in different ways. for example, there is no such thing as a public food system. We help people in a variety of ways, without making A&P or Grand Union

But there is room for regulation

1. in interconnection

History of AT&T system, or now, BT, NTT: interconnection is key. won't be grouped willingly

Definitely up to stage 6, In fact, it's the key.

What about stage 7, the ethereal one?

even then, incentives to strategic exclusion

common interest of many carriers to restrict a maverick

so stand-by interconnectivity, modularization is likely to be needed, will be just of a stand-by variety

same for common carrier

1. unpopular information or users

2. uneconomic if different rules

that's why legal tender, commercial paper

left over : of regulatory policy



interconnect

c.c. access

subsidy

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personal private network moves around with individual.

#### **IV. INTEGRATION**

So far, we have discussed centrifugalism in the telecommunication sector and its implications. We will now turn to issues of integration in the network system that are aimed at maintaining cohesion.

To reconcile the centrifugal pressures with the needs to inter-operate and inter-communicate represents the main challenge to policymakers for the next decade. This does not mean to recreate a monopoly system, but rather to provide the system with tools of inter-operation where they are not self-generating by market forces. The past decade has been preoccupied with market liberalization and the aftermath of the AT&T divestiture. This will continue, but it will also be inevitable to move beyond this agenda and to assure the functioning of a network based on diversity. This is a unique undertaking because it has never been done before. The two critical tasks are, first to assure **physical** interconnectivity; and, second, to assure informational interconnectivity across networks. We will begin with the first issue.

##### **Modularizing the Network**

As various discrete networks grow they must interoperate in terms of technical standards, protocols, and boundaries. Yet interconnectivity does not happen by itself; that is the lesson of decades of American experience. As part of the 1913 Kingsbury Commitment, AT&T agreed to interconnect local independent telephone companies with the Bell System long-distance network.<sup>7</sup> The antitrust suit that ended in the break-up of the Bell System centered on MCI's

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<sup>7</sup> U.S. v. AT&T, No. 6082, U.S. Dist. Ct. of Oregon, Original Petition, July 24, 1913. Nathan C. Kingsbury to James C. McReynolds, December 19, 1913 (Kingsbury Commitment).

interconnection problems with Bell-controlled local exchanges.<sup>8</sup>

This leaves a highly controversial and complex role for regulators, as they are asked to overcome barriers to interconnection.<sup>9</sup> These various interconnection arrangements establish a series of interface points and standards that create, in effect, a modularized network. This can be done in an ad hoc fashion, though this may impose over time major inefficiencies, or in a systematic fashion, though this may be too complex. Whatever the system, within each module people could do more or less whatever they wanted. But one could replace one module, and it could interact with the others and transfer into them, usually for a charge.

In the United States, steps have begun to provide tools for integration. For academics, policy makers, and industry strategists, the challenge for the future is to create such tools.<sup>10</sup>

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<sup>8</sup> *Unites States v. American Telephone and Telegraph Co.*, 552 F. Supp. 131 (D.D.C. 1982), *aff'd sub nom.*, *Maryland v. United States*, 460 U.S. 1001 (1983).

Interconnection problems also arose in the context of billing early in this century. There, a court required that telegraph companies offer the same favorable credit and billing terms to competing telegraph companies as to their other customers (*People ex rel Western Union Telegraph Co.*, 552 F. Supp. 131 (D.D.C. 1982), *aff'd sub nom.*, *Maryland v. United States*, 460 U.S. 1001 (1983)). The railroad industry faced similar issues when attempts by some carriers to exclude rivals or exploit bottleneck facilities attracted Federal scrutiny (see, for example, *Louisville & Nash. R.R. v. United States*, 238 U.S. 1 (1915) (upholding a decision finding discrimination in railroad facilities and requiring the affirmative action of interconnection); *United States v. Terminal R.R. Ass'n*, 224 U.S. 173 (1912) (requiring equal treatment of competitors).

<sup>9</sup> One recent example is the granting to interconnectors in New York State of so-called collocation rights to the public networks.

<sup>10</sup> When I was Commissioner on the New York Public Service Commission, we initiated several regulatory actions and proceedings in that direction: a multi-carrier ISDN trial; open network architecture principles and rules; common carriage rules that protect the flow of content in the federated network system; local



Thus, the pluralistic network is a modularized network. As the network becomes modular, the relation of the various modules to each other becomes paramount. Issues of interconnection include protecting technical compatibility, access charges, data privacy, service quality, and others.

To illustrate this it is helpful to graph a network schematically as a box in Figure 1. The horizontal dimension consists of hardware segments (such as inside wire, local loop, central office, etc.) and the vertical axis consists of the various layers of software.<sup>11</sup> In such a fashion we can map a network and every function in it. For example, terminal equipment (CPE) appears on the left of the upper box, while an interexchange carrier (IXC) is on the lower right, and a software module in a switch such as a voicemail box is up at the top. The entire area mapped in this box used to be the sole province of AT&T.

When rival newcomers emerged (lower box), their interconnection with the traditional network became essential. Their alternative service blocks lacked the connecting physical and software elements that are necessary for an end-to-end connection with users, and the incumbent monopolist was not about to offer such inter-connection to its rivals. Thus, while eventually the

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interconnection arrangements known as physical collocation; billing and collection arrangements that permit a better financial integration of the system; privacy rules; and the beginning of dealing with quality issues in a federated system.

<sup>11</sup>An example for modular software is the OSI hierarchy (Open Systems Interconnection). OSI is based on a hierarchy of seven layers, each of which has defined functional responsibilities. 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. The main point is that it is a hierarchy. On top of the OSI layers are software layers for economic transactions such as billing, and for content.



competitive islands will grow larger and fill the entire map, these islands can survive only if one assures the ferry service to them. This can be traced in the network map through the various interconnection arrangements that were established by regulation. For example, the *Carterfone*<sup>12</sup> decision that allowed subscriber-owned terminal equipment to connect to the network can be shown in the left center of the map. The *Execunet*<sup>13</sup> decision, which allowed long distance carriers to interconnect into the local loop of the traditional network, is shown on the bottom right. Similarly, the map can illustrate ONA<sup>14</sup>, the *Inside Wire*<sup>15</sup> decision, or New York State's collocation decision.<sup>16</sup>

The interconnection process that is mapped in this fashion will inexorably continue and will also have profound implications on Federal/state relations. In the past, states have opposed many interconnection arrangements such as those just described because they identified their

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<sup>12</sup> *Use of Carterfone Device*, 13 FCC 2d 420 (1968).

<sup>13</sup> *MCI Telecommunications Corp. v. FCC*, 561 F.2d 365 (D.C. Cir. 1977), (*Execunet I*); see also *MCI Telecommunications Corp. v. FCC*, 580 F.2d 590 (D.C. Cir.), cert. denied, 439 U.S. 980 (1978) (*Execunet II*).

<sup>14</sup> *Third Computer Inquiry*, 104 FCC 2d 958 (1986), clarified on recon., 2 FCC Red. 3035 (1987), further reconsid. denied, 3 FCC Red 1135, vacated and remanded, *California v. FCC*, 905 F.2d 1217 (9th Cir. 1990).

<sup>15</sup> *Detariffing the Installation and Maintenance of Inside Wiring* (CC Docket No. 79-105), 51 Fed. Reg. 8498 (1986), on reconsideration, 1 FCC Rcd. 1190 (1986), on further reconsideration, 3 FCC Rcd 1719 (1988), remanded sub nom., *National Assoc. of Regulatory Utility Commissioners v. FCC*, 880 F.2d 422 (D.C. Cir 1989).

<sup>16</sup> *Opinion No. 89-12, Opinion and Order Concerning Regulatory Response to Competition*, Case 29469, issued May 16, 1989, at 24-29.

interests with those of the monopoly.<sup>17</sup> As the modularization of the network increases, ever greater parts of telecommunications service will be composed of multiple blocks or modules. Notions of interstate and intrastate services will blur because the component modules of each service will cross jurisdiction:<sup>18</sup> some of them will be interstate, some of them will be intrastate, some of them will be international, and others will exist nowhere physically.<sup>19</sup>

Analogous issues exist for television media. For example, a major controversy is the

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<sup>17</sup> See *North Carolina Utilities Commission v. FCC*, 537 F.2d 787 (1976); 552 F.2d 1036 (1977).

<sup>18</sup> The traditional notion of jurisdictional separation found in the 1934 Communications Act was based on a linear, spatial concept of what a network was, borrowed from earlier railroad regulation: local was close, long distance was far, international still farther. This was based on network architecture, which was configured, within economic constraints, to minimize transmission distance. But today, transmission has become a much smaller portion of telecommunications costs and will continue to decline, making telecommunications relatively distance-insensitive. As a result, the nature of the architecture changes, which has consequences for the jurisdictional question.

<sup>19</sup> Network modularity and interconnectivity affects not only transmission, but also switching, including local switching, which traditionally was the essence of intrastate jurisdiction. The FCC's *Arco* decision, which allowed users to interconnect to the local exchange of their choice as long as it is "privately beneficial without being publicly detrimental," marked a significant step toward breaking the grip of state jurisdiction on switching. The FCC's decision, which in effect permitted one telephone company to interconnect into another telephone company's central office, suggests that just as one can plug a "Mickey Mouse" telephone or a PBX into the network, one can also plug an entire network into a network. And while in this instance it was one Texas-based local exchange company versus another (*Southwestern Bell vs. GTE*), there is no reason why interconnection on this scale could not occur across state lines. Once that happens, local switching may just as easily be interstate as intra-state.



nature of interconnection of local broadcasters and cable distributors — so-called must-carry<sup>20</sup> and syndicated exclusivity<sup>21</sup> rules — and the connection of national television networks with program production — so-called financial interest and syndication rules.<sup>22</sup>

Traditionally, the TV box and the telecom box were fairly separated. Within each box diversification and integration was taking place, but there was not much interaction between them yet. But this will radically change, and soon.

The vision that the telecommunications network of the future is often expressed as a scenario of a single super-pipe in which there is no room for alternative communications carriers, or of rival transmission media such as cable television, because they have become technically "unnecessary". Yet such a disappearance of other carriers and media is highly unlikely, given the forces of diversification discussed above.

Instead, these different media, each increasingly complex on its own, and each operating on a different set of basic rules, controls, and ownership status, will first overlap and then integrate. In terms of the graph, one can think of the telecommunications box superimposed by a television box, with all their elements becoming potentially interconnected under arrangements

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<sup>20</sup> Must carry rules, which had been codified at 47 C.F.R. §§ 76.57-76.71 (1984), were held unconstitutional. *Quincy Cable TV, Inc. v. FCC*, 768 F.2d 1434 (D.C. Cir. 1985).

<sup>21</sup> *In re Cable Television Syndicated Program Exclusivity Rules, Report and Order in Docket Nos 20988 and 21284*, 79 F.C.C.2d 663 (1980) (FCC deletes its own syndicated exclusivity rules), *aff'd sub nom. Malrite T.V. of New York v. FCC*, 652 F.2d 1140 (2d Cir. 1981), *cert. denied*, 454 U.S. 1143 (1982).

<sup>22</sup> 47 C.F.R. §73.658(j). See *Network Television Broadcasting, Report and Order in Docket No. 12782*, 23 F.C.C.2d 382, *modified on recon.*, 25 F.C.C.2d 318 (1970), *aff'd sub nom., Mt. Mansfield Television, Inc. v. FCC*, 442 F.2d 470 (2d Cir. 1971).

that must still be established. And on top of that, these changes will cut across national boundaries. The pathways of change lead beyond the particular technologies they employ to a network system that might be called the "triple integrated" digital and modularized network, or ISDN. It is integrated across services (such as voice, data and video), carriers, and frontiers.

For example:

- Cable companies will carry voice and data traffic normally associated with telephone regulation over a combination of stationary and mobile communication networks;
- Telephone companies are pressing to deliver video programming, creating the likelihood that video signals in the future will be sent over upgraded telephone lines;
- The success of cellular and development of other "tetherless" telephony is leading a growing portion of local voice traffic onto the air;
- Computer-based videotext, audiotex, as well as broadcast electronic mail and broadcast fax services provide telecommunications networks with mass media functions;
- Personal computers and CD-ROMs are now being developed that will integrate video and text, putting "television" through computer networks, and permitting new forms of informational roaming;
- Video-by-demand, based on video libraries and switched service, makes some of television from a mass-medium into an individualized medium;
- Interactive computers and video create "virtual realities" of total media tailored

to the individual user;

- Libraries move from traditional concepts of storage to those of access and networking;
- Books and documents move from static and individualistic concepts to those of dynamic update and group interaction
- Computers, tele- and video-conferencing become new forms of public fora;
- Individualized fax-newsletters based on an individual's particular interests fragment the concept of the mass newspaper audience;
- In fast-packet networks, information travels across multiple simultaneous pathways, routing itself and recombining itself at the destination, thus putting into question the very concept of a communications conduit.

This, too, has major consequences, on the free flow of information just as centrifugalism has. New and "hybrid" media, with aspects drawn from many sources, will proliferate. When the drafters of the Bill of Rights guaranteed Americans freedom of speech, they could not foresee the many electronic means through which information would be carried and extended. As those media developed, different treatments of speech emerged. Broadcasting, cable television, telephony, video recordings, satellites, computer communication, and other technologies came to operate under separate regulatory regimes.

But today, as Ithiel de Sola Pool noted, "the one-to-one relationship that used to exist between a medium and its use is eroding."<sup>23</sup> Media that traditionally operated under one set of regulations will soon be carrying traffic normally associated with other regulatory schemes.

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<sup>23</sup> Ithiel de Sola Pool, *Technologies of Freedom*. Cambridge, Mass.: Harvard Univ. Press, 1983.



In a world of integrated digital networks, where voice, data and video are intermingled streams of bits that interact in an electronic realm of numerous networks, the different regulations now associated with different media will be unworkable. A bit is a bit is a bit, whatever traditional regulation says.

## VI. *NEW PRINCIPLES*

When it comes to rules, it is perhaps best to think in terms of a hierarchy, just like in the world of computers, where there exists a hierarchy of control instructions — assembly language, machine language, and programming languages. One can have *rules of detail*, such as the maximum number of seconds to get a dial tone by a subscriber, or the exact rate that can be charged by a carrier for a local call at 3 p.m.. At the other extreme, there are *fundamental societal tenets* such as freedom of speech, property rights, or freedom to travel. In between there are intermediate *rules of principle*, often codified by statutes of varying specificity.

In the U.S., rules of detail are well-developed, it being a pragmatic society. It is also surprisingly good about the fundamental tenets, a legacy from brief but creative historic periods in which big-picture issues were taken very seriously. The weak link in the hierarchy of rules is the intermediate range. In telecommunications, that means primarily the 1934 Communications Act, and the assorted state public utility statutes. These laws persist largely unchanged because various interest groups, including state regulators themselves, fear losing out by change. But self-interest is only one part of the reason. The other is that we are not really sure what such a set of intermediate rules would include, if one could write it.

The 1934 Communications Act was written before TV was out of the labs; before microwave; transmission before satellites; before micro-electronics; before computers; before coaxial cable; before real data communications; and before most intercontinental telecommunications. Title II of the 1934 Act, which deals with telephony, is basically the ICC's 1910 Mann-Elkins Act provisions of railroad regulatory principles, which themselves date back

to 1887.<sup>24</sup>

Its major problem is that it deals with separate transmission media differently. In other words, it is not transmission-path neutral. Entirely different regulatory models exist for the different segments of the communications system, such as common carriage, private network status, cable television regulation, or the publishing model. This was fine in the past, but it is not where technology and applications are taking us. The difference in status is sustainable only as long as the underlying media are kept apart. As they grow together and interconnect, these differing rules must be reconciled. In this new system, we need new principles. As the various transmission media grow together and interconnect; as private networks become ever more important, it is necessary to merge, to integrate also the legal principles under which they operate. What are needed therefore are some basic rules that tie together common carriage, private carriage, cable television and broadcasting status, and publishing.

In order to develop such rules, we must rethink the way we build regulatory policy. Suppose telecommunications were only an idea on the drawing board, and we were starting a network system from scratch, though with today's technology at our disposal. Do not think of the traditional "public network." Furthermore, do not think in terms of telecommunications, broadcasting, cable, wireless, etc. Instead, a variety of providers of conduit and content are likely to participate in offering content and conduit. None of us knows if he is going to be a user or provider. None of us know if he is going to be large or small. What should the principles

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<sup>24</sup> An excellent book, *A Legislative History of the Communications Act of 1934*, (Max Paglin, ed., New York: Oxford University Press, 1990), with academic experts as interpreters of various chapters of the Act, documents that there seems to have been very little in the way of principles. The Act is largely a string of provisions, with several implicit or explicit values.

that integrate across media and services look like?

1. **Freedom of content is technology neutral. Government shall not prohibit the free exercise of communications or abridge the freedom of electronic speech, or of content provided by the electronic press, or of the right of the people to peaceably assemble electronically.**

This is basic 1<sup>st</sup> Amendment, applied to electronic communications. Prof. Lawrence Tribe has recently suggested the need for a 27<sup>th</sup> Amendment to say something like that.<sup>25</sup> But it might be enough to persuade courts to read such neutrality into the 1<sup>st</sup> Amendment.

Constitutional protection directly addresses governmental restriction. It does not deal with private restriction. Here, common carriage conduits are the foundation of free speech. It means non-discriminatory conduit service, neutral as to content, users and usage. FCC Chairman Alfred Sikes' concept of the video dial tone has such a common carrier orientation.

With competition, one cannot maintain over the long run a system of "official" public networks with special rights and burdens. Or designating some new networks as public networks and not others. Alternatively, one would have to abolish all private carriage. Yet that would violate principles of property, freedom of association, and encouragement of innovation. What is needed is the establishment of a mixed private-public network system. Instead of the present system of some carriers being public and others private, a system of *partial* common carriage would apply to all carriers who participate in an interconnected network of networks. There

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<sup>25</sup> Lawrence H. Tribe, "The Constitution in Cyberspace: Law and Liberty Beyond the Electronic Frontier." Keynote address at the First Conference on Computers, Freedom & Privacy, March 26, 1991.



would be no such thing as the public network.

**2. All electrons and photons are created equal. Carriers operating as a common carrier must be neutral as to content, use, and users. The transmission of lawful communications shall not be restricted by a common carrier. Common carriers are not liable for the use to which their conduit is put.**

Now what is a common carrier?

**3. Where no competition exists in a conduit, it must be offered on a common carrier basis on at least part of the capacity.**

This would cover telephone carriers, and that part of the capacity of cable companies offered along the lines of today's "leased access" and "public access."

**4. Competitive transmission segments need not be common carriers. But if a transmission segment interconnects with or accesses other networks by taking advantage of common carrier access rights, it must offer such rights reciprocally on part of its capacity.**

A purely private network which does not demand interconnection with a common carrier may refuse to carry the signals of any user or of other network. It is not a common carrier. However, once it chooses to make use of common carrier access to another carrier, it must reciprocally open up part of its own capacity to others. Where common carriage is used in a downstream direction, it must also be offered in a upstream direction. For example, where a private carrier is connected to a common carrier, and its users have no alternative conduits, it must not abridge access to a common carrier and communications carried over it. In such a fashion, one creates common carriage "rights-of-way." Such rights-of-way would function like



public roads and highways that pass private property, or like easements that allow public passage through private land. They would permit the unimpeded transmission of content and services across the various interconnected networks and enable end-to-end connectivity, although not necessarily on the entire bandwidth of a transmission. Some rights-of-way would be quite wide superhighways, while others could be narrow but otherwise unobstructed lanes.

**5. Any party complying with a conduit's reasonable technical specification may interconnect into, access, or exit any common carrier conduit segments at interface points, which must be provided at technologically and economically reasonable intervals.**

This is, in effect, an open network interconnection provision. It creates a modularity in the network. The FCC recently opened a proceeding on modularity.

**6. A conduit may offer carriage of any type of service over its conduit, and interconnect with any type of carrier. Monopolistic conduit segments can be accessed by their own content services only where adequate capacity is available for common carrier access and subject to antitrust principles.**

This provision provides for open entry and a level playing field.

**7. Government shall make no law establishing a network privileged in terms of territory, function, or national origin (as long as there is reciprocity). Nor shall it burden any network more than its competitors, except with compensation.**

This provision removes barriers between carriers based on assignment for particular tasks. It also protects against restrictiveness by carriers.

**8. Financial support for some users (e.g., universal service), and to content providers, content, or technologies, where instituted by government, must be generated and allocated**

explicitly, and the burden of such support be placed on general revenue or equally on all competitors.

This is one of the more sensitive issues. At present, redistribution operates inside the public network, across its customers. But this system cannot be stable over time. Instead, any subsidies would have to be generated explicitly by a tax, or a charge on all forms of telephone service.

9. **Information must move freely across interstate and international borders, without unreasonable burdens by state or national jurisdictions. No content or carrier should be treated in a country more restrictively than domestic providers are. But the right to equivalent treatment in another country requires reciprocity at home.**

10. **The federal jurisdiction sets basic national telecommunications policy where it deems national solutions to be clearly necessary. It may delegate flexibility in application and implementation to lower-level governmental bodies, who may also set policy for functions of clearly local nature.**

This is the jurisdictional.

None of these principles is especially earth-shaking. But in the aggregate, they provide a framework that integrates common carriage with private carriage and carriers such as cable television, and then do so without the used for an official public network.<sup>26</sup>

## **VII. CONCLUSION**

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<sup>26</sup> These principles need not be strictly read, but more in the nature of rebuttable presumptions, subject to differing applications depending on circumstances. Furthermore, we obviously do not start with a clean slate. Established interests exist. It would not be fair to change the rules on some people in mid-stream.

The task of constructing a post-deregulatory policy will be a much harder task than the initial revolution of liberalization. We have already noted several trends in telecommunications that such a policy must address. First, the success of the public network in creating broad-based communications undermines its own foundation by creating forces of centrifugalism. These forces both allow and encourage network pluralism — the growth of diverse private networks outside the bounds of the traditional public network. Second, the exercise of that pluralism, while creating greater diversity, undermines the traditional openness of telecommunications that network users have come to expect. Third, traditionally separate networks for telephony, video and data will merge technologically. And fourth, in response to these conflicting trends, network architecture will have to become more modularized to permit interoperability.

In this environment, one needs a compass, and "competition," as successful a policy as it has been, is not enough of a direction finder anymore, just as a magnetic compass does not help much when one reaches far north. The new lodestar for government is to remember the need to keep the network system together — to become the **national systems-integrator** of last resort. In this spirit, the FCC has initiated a new proceeding on network modularity.

Similarly, deregulation, conventionally understood as a reduction of rules of detail, is unidimensional. Traditionally, it is believed that if one had 20 little rules, and now only 10, that is deregulation. But it may be more useful to think of deregulation as moving *up* the hierarchy of rules — from details towards principles.

As a consequence, after deregulation there will still be regulation. That is, the liberalization of entry will not eliminate all need for government. Competition will take care of many of the problems that led to regulation — especially on prices and entry. But because



telecommunications is a network system, it gains from interoperability, access, and information flows. Hence, telecommunication regulation will not likely go away any more than it did for airlines. But it will be a different type of involvement, and it will require individuals and institutions who can think in an integrative fashion across services, media and frontiers.

The success of deregulation and liberalized entry, and the technological and economic trends it has unleashed, demand that we establish coherent principles of interconnection and informational free flow as an effort to reconcile the forces of integration and diversification. In the past decade, policy was correctly focused on creating *openness* by reducing barriers and permitting entry. Now, with fragmentation of the network environment proceeding apace, the primary issue is to create points and rules for *interconnection* that permit the continued interoperability of a "network of networks." If properly accomplished, the result will be the network of the future — pluralistic, modularized, flexible, and transnational.

Telecommunications will operate as an invisible hand mechanism only on a foundation of a set of basic rules of the road. As communications media merge, the invisible hand must ultimately be connected to a body of law. We need a superstructure to the infrastructure. However, while there may be an invisible hand in the future, in Washington there are a lot of very sensitive toes in the present. But sooner or later we will have it, the brand-new Communications Act of 2034.