

Rules From Truth: Post-Convergence Policy for Access

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I. Introduction

For nothing goes for sense, or light,
That will not with old rules jump right;
As if rules were not in the schools
Derived from truth, but truth from rules.

– Samuel Butler¹

The laws and policies that govern communication have evolved over time to treat different media with distinct doctrine. The press, the post, broadcasting, and the telephone each abide by different rules, defining who can build and operate the underlying communication systems, who can use them, along what patterns, to convey what information. These various regimes evolved over time, continuously adjusted to reflect social, political, economic and technological change. Occasionally over the past century, the advent of a major new communication technology—radio, television, CATV, microwave—disrupted this system, changing the structure of incentives and thus the equilibrium of the policy environment. This prompted more than a marginal adjustment to the rules, resulting in new rules within existing categories, or the creation of new policy categories to encompass the new technology.

The current media convergence, fueled by increasingly pervasive digital technologies, represents a double disruption. First, the digitization of existing media questions the basis for many existing rules in each medium. For example, digital transmission eliminates much of the scarcity that justified past broadcasting rules. Second, once separate media now become potential substitutes. For example, telephone calls can now be offered indifferently over copper cables, TV cables, radio waves or the Internet. While the service is the same, different rules apply to its delivery in each medium, creating unanticipated incentives and unintended results. This situation begs attention to the question: Is the communication policy goal or its implementation so different in each case that we should require a different rule or even a different government agency for each device?²

To date in the United States, the dominant communication policy response to both these stresses has been deregulation, motivated by a trust that the free market's implicit rules will outperform any government's explicit rules (Horwitz, 1989; Vietor, 1994, ch. 4). This approach has helped foster

¹ From the poem *Hudibras* (Butler, 1662/1973, pt. I, c. 3, l. 1353).

² Or some state intervention involving one device, but none in others (cf. Pool, 1983).

dynamic competition and innovation in the communications industry, but has run into two principal problems: First, policy-makers have found that the creation of new markets often requires more rules, not fewer (Vogel, 1996)—e.g., to protect new embodiments of intellectual property, or to insure interconnection between competitors in a new network infrastructure. Second, in several domains established constituencies—and emerging ones—insist that deregulation not deprive them of entrenched advantage (e.g., those that receive universal service subsidies and access charges, law enforcement agencies accustomed to the ability to wiretap mediated interpersonal communication, or militaries habituated to the belief that the power to encrypt communication should be exclusively theirs).

As a result, policymakers looking to resolve convergence challenges have favored incremental adaptation of past rules rather than fundamental redesign of the policy regime. They have chosen either to treat a new medium with the policy previously applied to whatever it seemed to resemble most closely, or to adjust previous policies through the accretion of exceptions and additions. Thus, policy treats cable television as an extension of broadcast television, itself viewed as an extension of radio, and case law amends freedom of speech over time (Haiman, 1976; Thorne, Huber, & Kellogg, 1995). To be sure, bolder moves have been occasionally suggested, for example with the 1994 effort to create a new “title VII” category encompassing broadband Internet, whether provided over TV cables or telecom wires (Information Infrastructure Task Force, 1994).³ Yet, efforts to date “tend to be more statements of aspiration than realistic policies directed to achievable goals” (Melody, 1996, p. 258). If they are specific, they aspire at most to the incremental revision of existing, medium-specific rules, rather than to the development of “policy convergence” to mirror media convergence. The result reinforces and prolongs divisions between media that are rooted in past thinking about obsolete technologies. The time has come to confront the convergence challenge and aim for a more sweeping re-examination of communication policy. This paper seeks to lay the groundwork for such a re-examination.

Rather than continued withdrawal or incrementalism, the political battles surrounding media convergence today invite us to step back and revisit the underlying goals of communication policy itself, across all media.⁴ This paper will address the topic in three parts: Considering the United

³ Touted as ambitious, this effort stopped short of suggesting an overall revamping of communication policy, choosing instead to create yet another category to govern “two-way broadband, interactive, switched, digital transmission services.” Even that modest goal was apparently too ambitious as the attempt was quickly killed by telcos and cable operators who feared losing the advantages each saw in the established regimes.

⁴ That is, the fundamental “reconstitution of the communication infrastructure” invites a matching reconstitution of policy (McChesney, 1996, p. 100).

States case, we will first **(1) present a conceptual framework** for understanding the evolution of each policy regime in the U.S., considering the interaction of four factors: the underlying goal, the communication system, the technology, and the policy regime. Next, we will **(2) briefly explain the history of communication policy** within this framework as largely a history of inertia and incrementalism that led to the genesis of the policy regimes governing print, post, telephony, and broadcasting. At several pivotal times in the past, a crisis point was reached where technological change altered the incentive system, creating a new problem or a new opportunity. Thus a need for collective action to achieve an access goal neglected by existing rules became apparent. To satisfy this goal a policy regime was enacted and made to apply to a particular sector of the media environment by coupling the regime to a technological implementation. Over time, this regime became foundational—as its assumptions were codified in institutional structures and patterns, further debate occurred within a regime, not about it.⁵ The direct relationship to the original goals was then obscured by time—future policy rules in this sector were then not “derived from truth, but truth from rules.” We will finally **(3) explore possible approaches to achieving access goals** while avoiding the past problems of regulatory inertia, market failure, and the tight coupling of policy to a technological implementation that is constantly changing. In the past, a particular pattern of communication was bound to a particular platform and a particular conduit; now that these three layers are separable, articulating a policy regime in terms of the technological implementation of the conduit should be replaced by an emphasis on the platform, and the ability of all users to reconfigure it.

II. A Conceptual Model for the Policy Process

Modern communication policy in most of the world has evolved to treat different media as islands; a country may simultaneously have a distinct broadcasting policy, telecommunications policy, and even a computer policy. We distinguish four components of the policy process that create these islands: the underlying goal, the communication system, technology, and the policy regime.

Our starting point is society’s **underlying goal** with respect to communication. We view the history of communication policy as a story of state mediation between network control and network access. The policies crafted for the press, the post, the telephone, radio, and television represent government-mediated compromises between those who control communication networks and seek

⁵ This meaning of “foundational” follows Streeter’s analysis of broadcast policy (1996, p. 116).

to profit from this control, and those who want to communicate and seek access to these networks. We define “network control” as the ability to determine network layout, architecture, configuration, applications, price structure, and access conditions. Network control is the power to decide how the communication network will be used and by whom, while “network access” is the ability of citizens and economic actors to use the network according to their needs. We thus take the design of an optimal compromise, from a social as well as economic standpoint, as the underlying goal of policy.⁶

In most economic sectors, marketplace competition is the mechanism chosen to negotiate these compromises. Markets determine the equilibrium price for cars, haircuts or clothing, in effect a compromise between producers’ desire to monetize their control over a particular skill or production technology, and consumers’ desire to use these goods and services. Communication is one of the few sectors where the State traditionally has not trusted markets fully to settle such arrangements, for two reasons.

First, the particular economics of communication networks entail risks of runaway control. Features such as network externalities and increasing returns often reinforce the power of those who control a network, driving toward natural monopoly (cf. Arthur, 1994; Train, 1991). Unchecked, this can lead to pricing abuses, exclusion and censorship. Second, democratic States consider access to communication a fundamental right, a prerequisite to thriving democratic society (Meiklejohn, 1948). Unlike other goods, they believe allocation of network access according to pure economic logic would be socially sub-optimal. The underlying goal of all communication policy in the US has therefore been to protect various forms of network access from abuses of network control. All aspects of communication policy can then be read as manifestation of this access protection goal, from “universal service” policies to ensure that the economically disadvantaged may communicate, to interconnection requirements to ensure that long distance carriers are allowed reasonable access to the local distribution network, or “must-carry” rules ensuring that Cable subscribers have access to broadcast programming.⁷

This underlying goal might be considered the consensus philosophy or normative theory guiding communication policy. This notion of an underlying goal should be contrasted with the

⁶ There are other goals related to communication that are not addressed here (e.g., protection of groups from harmful communication content, be it libel or violence); in this paper, we aspire to understand communication policy in terms of access goals.

⁷ We note that such goals do not arise independently, but rather their formulation and the struggle for their realization against other goals is rightfully the topic of another study.

final implementation of a communication policy that follows it in two ways: First, “access protection” may be far from explicit (or when explicit, far from clear) in particular policy debates or final policy implementation, obscured by the technicalities of pricing rules or buried under regulatory sediment. It is the task of the critical analyst to find these goals under girding the debate, as the debates themselves often misleadingly focus on much more ephemeral topics. Second, this underlying goal of communications policy—while at times debated—is more permanent than other parts of the policy process. In this way “goal” is meant as a far more stable and general construct than the actions of making policy—more general than legislative intent in a particular instance. Note well that while this underlying policy goal by definition has a broad consensus, it is still contestable and can change over time, though slowly.⁸

Next, we observe different manifestations of the underlying goal, access protection, in various portions of the **communication system**. This second component of our policy model refers to the material context of communication. These are the time-bound, factual circumstances of communication: who is communicating, who wishes to communicate, what is being communicated, and of central interest in the policy context, how this communication is organized institutionally. Systems of communication are considered here in three senses: First, as “...economic entities with both a direct economic role as creators of surplus value through commodity production and exchange and an indirect role...in the creation of surplus value within other sectors of commodity production.” (Garnham, 1990, p. 30). Second, as the apparatus for political information and debate required by a democratic people to effect self-government. Third, as a required tool that affords participation in normal social and economic life within a dispersed, technological society. The role of the communication system, then, is to channel policy action and adjust policy goals to real-world conditions. We believe the underlying policy goal is stable, or at least changes slowly, but in different times and contexts the material conditions of the communication system may make policy goals seem unstable: We may posit the underlying goal of protecting the ability of all citizens to participate in the dialogue required by a self-governing people, and this goal may have a stable consensus over time, but it might be relevant only to those media used for this purpose, or it might recede from awareness when this ability does not seem particularly threatened.

Then, **technology** allows particular implementations of the communications system into physical and logical networks that define a set of practical possibilities and constraints. This includes terminal devices, network infrastructures, and network management software. Their

⁸ That is, “slowly” as compared to other parts of this conceptual model.

deployment in specific configurations dictates how the communication system can be used, for example enabling private exchanges or public distribution of messages. With digital technology, the configuration of the resulting communication platform has become largely separable from the network's physical layout. In particular, configuration control doesn't require ownership of the physical facilities (Bar, 1990 #79). Different parts of the technical apparatus can assume more or less importance depending on the technological medium considered, the material context, or the policy goal in question. In particular, policymakers often can choose to focus on specific parts of the technological apparatus for the implementation of specific access objectives: for example, conditional access to video programming can be implemented either in set-top boxes or in cable network protocols.

Technology is often presented as a key driver of communication policy. Most recently for example digital technology has been credited with bringing about deregulation. In our analysis however, rather than determining the other parts of the model, changes in the available technology provide the opportunity for change by reconstituting the incentives and other relationships between actors in the material context, and by stressing those parts of policy implementations considered next that are technologically-bound.

Finally, the **policy regime** is then the implementation of a policy goal at a particular point in time within the material context of a communication system and the technical context of available technology. This encompasses laws, regulations, rationales for government intervention, interest groups, regulatory bodies and a regulatory process. While policy regimes are derived from underlying policy goals, ensuing debates tend to focus on the material conditions, technical apparatus, or the meaning, scope and implementation of the goal, rather than the goal itself—in many instances obscuring the underlying goal. These policy regimes possess three important qualities: First, they acquire inertia because they grant benefits. Second, they tend to be formulated in relation to a particular technological apparatus because of the way they evolve, as we will see below. Third, they are highly dependent on the political context exogenous to communication policy. If the underlying goal is the most ideological of the four parts, the policy regimes are the most highly politicized. A “climate of deregulation” or a foundational presumption that free market capitalism is the optimal way to allocate resources will fundamentally shape the alternatives considered when a policy regime is formulated.

The United States Policy Cycle

Against the persistent goal of access protection, the evolution of US communication systems, technology and policy regimes has progressed cyclically. Periodically, a technological innovation changes the available technology, stressing the communication system (e.g., a change in communication patterns leads to some imbalance that conflicts with the policy goal), the policy regime (e.g., a very technologically specific law is no longer able to meet the policy goal), or both. This precipitates a **critical decision point**: a decision must be made whether to incrementally change the existing regime or to create a new regime. This policy cycle then repeats.

A snapshot of US communication policy at the end of the 1990s, the outcome of a series of such cycles, maps out neatly along two dimensions: *delay* and *pattern* (see Figure 1). *Delay* refers to whether or not a message is sent and received simultaneously. Communication is either “live”, as in a phone call, or “delayed”, as in publishing – synchronous or asynchronous. The *pattern* of communication is either “interpersonal” (one-to-one like an exchange of letters) or “mass” communication (one-to-many like television broadcast) akin to concepts traditionally used in communication research (Beniger, 1987).

The matrix resulting from the juxtaposition of these two dimensions provides a useful map for the classification of traditional media forms. The oldest communication industry, that of the postal mails and package delivery—from here forward referred to as “post”—occupies the *delayed/interpersonal* quadrant. “Telephony” (and telephone’s precursor, the telegraph) fits in the quadrant *live/interpersonal*. In the quadrant *live/mass*, we find “broadcasting”—radio, broadcast television, and by extension cable and satellite delivery systems for television. Finally the last quadrant, *delayed/mass*, corresponds to “print” media—newspapers, periodicals, and (even more delayed) books.⁹ Clearly, for the sake of simplicity, this mapping focuses on the central characteristics of each medium and overlooks nuances. For example, television obviously broadcasts non-live movies, telephone callers occasionally leave “delayed” messages on answering machines, and courier services make the post seem almost synchronous. With that understanding however, and although the media descriptions here are not exhaustive, this conceptual map is complete in that any medium could be described using these categories and variables.¹⁰

⁹ Although the term “mass communication” became prevalent only in the 1930s and 40s in response to broadcasting, conceptually it is relevant to print as well.

¹⁰ Note that because this model is chiefly concerned with *systems* of telecommunication, it does not therefore deal with writing (or speech) as a communication technology or industry in and of itself, although this approach could certainly be fruitfully pursued (cf. Innis, 1950).

These four quadrants define the four communication policy “islands” we observe at the end of the 20th century in the United States. Indeed in each of the quadrants, we find distinct communication systems, different technologies, and separate policy regimes, with very limited overlap until recently. Each is characterized by a different conception of access protection. Within that neatly settled partition of the U.S. communication space, the spread of digital technologies (and the internet as its emblem) introduces a fundamental challenge: a single communication system, based on one common technological core, can support all four delay/pattern combinations. Furthermore, digital technologies increasingly make it possible to program communication platforms that support multiple combinations of communication patterns and delays, independent of the underlying physical network infrastructure. How can distinct policy regimes make sense any longer? The remainder of this paper will analyze the particular control/access bargains that undergird each quadrant’s policy and explore their lessons for the construction of a new regime.

We should note that the two distinctions we observe in traditional communication policy—delay and pattern—have fundamentally different roots. Separate policies have emerged for different communication patterns because the intent of interpersonal and mass communication is fundamentally different: private conversation for the first, public dissemination for the latter. Each calls for striking its own balance between network control and network access. By contrast, policy distinctions based on delay seem mostly the consequence of different sets of material constraints attached to different technologies. For example the licensing of broadcasters and not of publishers has more to do with the technological constraints of radio and printing, than with the fact that TV is live while newspapers are delayed. Consequently, as technology changes, we expect policy distinctions based on communication patterns to be more enduring than those based on delay.

III. Inertia and Change in U.S. Policy

In each one of the communication quadrants, the policy cycle has led to a distinct compromise between control and access. In this section, we review the salient features of each one and outline the characteristics of the bargains they entail. This is not a comprehensive historical review, in any sense. We depict policy evolution in the U.S. as one of inertia and incrementalism marked by occasional crisis points where new policy frameworks could be considered. Our goal is to elucidate the underlying rationale for the control/access bargains that emerged through this evolution.

Print: Congress Shall Make no Law

In the Western World, technological developments in mass communications began with the transmission of paper from China to Europe in the 12th century, and the European realization of typography and the movable-type printing press by Gutenberg in the late 15th century (Beniger, 1986). The technological apparatus for print is distinguished by the mechanical press, the qualities of paper, and the associated techniques for reproducing type (and later, photographs).

To use the language of our framework, the press in early America provided two "communication services", books and newspapers. Both were mass communication technologies and both provided asynchronous services, although with greater delay for books than for newspapers. As to its industrial organization, the physical infrastructure of the press was predicated on private ownership and competition. Books and newspapers were important organs of democracy, giving the literate public a needed opportunity to learn about political ideas and events and, in the case of newspapers, a forum to discuss them. Architectural control of this forum—the rules governing what content would get published under which conditions—entirely rested with the owners of the physical infrastructure, who had full editorial discretion over what speech their papers and books would carry, guaranteed by the first amendment.

This fundamental policy doctrine, the basis for freedom of the press, was not seen as a limit on access to the means of communication. On the contrary, because “obtaining access to the needed resources was no strain on ingenuity,” (Pool, 1983, p. 11),¹¹ presses gave voice to those with ideas to express. The role of government was to refrain from intervening (specifically, to refrain from prior restraint of publishers). This is not to say that print was entirely free from policy intervention. Many aspects of the press came to be regulated through libel and copyright. The founding fathers also pursued what we might think of today as a universal access policy by encouraging those who would use the press through subsidy in the form reduced rate postage. While these doctrines were not debated as access policies at the time they were written, they did set limits on the powers of those who control the presses and, in the case of mail subsidy, broadened access for readers.

In our first example of inertia, this policy regime continues to distinguish print long after the initial conditions that motivated it had changed. Over time, in print, as in other media, “The ownership of the means of communication...has passed or is passing...to a kind of financial organization unknown in earlier periods, and with important resemblance to the major forms of

ownership in general industrial production,” (Williams, 1966, p. 32). This is to say, as audiences for print have increased, ownership of the material infrastructure has become increasingly concentrated and access to the means of communication (in the form of the ability to participate in production) has decreased. Print is no longer the purview of individual expression, and effective print communication now requires a large production and distribution system. Therefore while this framework was constructed in an environment where access to the means of production was relatively unconstrained, access to the production of mass print communication today is comparatively restricted, as evidenced by the consolidation of the newspaper and book publishing sectors. Yet, the weight of history makes the prospect of government policy to protect access to printing presses and publishing networks unthinkable—an unwarranted intervention by government in a sphere where it is now permanently seen as government’s job to refrain from acting. Policy makers have even gone so far as to exempt some newspaper joint operating agreements from antitrust scrutiny in an effort to preserve existing producers.

All in all for the press, the same fundamental set of policy bargains between control and access have endured over time. The owners of the material infrastructure of production and distribution have full control over the architecture of the communication platforms their books and newspapers represent, and sweeping editorial control over the messages they carry. Those with content to distribute or ideas to express have access to communication channels to the extent that they can convince infrastructure owners to carry their speech, or afford self-publication. For readers, access increases when infrastructure owners compete for content to fill their pages, when they compete for audiences and lower their prices, and when mail subsidies trim transportation costs. Overall, this system continues to rely on market competition to reach the optimal balance between control and access.

Post: Congress Shall Have the Power

Louis XI instituted what is arguably the first national postal system in 1477, *La Poste Royale* (Beniger, 1986). A monopoly was offered as an incentive to contractors who carried government mails so that higher rates for private mails carried by these same contractors could subsidize inexpensive government communication. Government monopoly later resulted from a desire to directly manage this system as a revenue source (Pool, 1983).¹² This was rationalized into

¹¹ Although some have debated this.

¹² Although the postal service stopped being a source of revenue in the United States in the 1820s—the beginning of yearly postal deficits that are the familiar mark of the present day.

a system we might recognize today with the publication of the influential Post Office Reform: Its Importance and Practicability by Rowland Hill in 1837 in the United Kingdom, directly leading to the adhesive stamp and uniform postal rates shortly thereafter (Hill & Hill, 1880).

The industrial organization of the post as one of public ownership of a government monopoly was an outgrowth of the communication services and applications that were seen as important—initially, this was government mails. Throughout history, private firms have provided ancillary and sometimes competing services with the U.S. Post Office, though some monopoly protections are enacted in law.¹³ Although the term “common carriage” arrived long after the post (Neuman, McKnight, & Solomon, 1997, chap. 2) it best describes the policy arrangement for post that has been the subject of extensive regulation. The postal system is prohibited from discriminating among messages on the basis of their content. Government ownership means that the architecture of the postal communication space is also a matter of policy, codifying tiered services offering different service speeds at different prices.

In the latter half of the 19th century, the emphasis shifted away from government convenience and revenue to universal delivery to all areas of the nation in order to promote economic growth and the diffusion of knowledge, via correspondence and commerce between individuals. This shift, arguably sparked by Hill’s treatise of 1837, can be considered one of the first “crisis points” in traditional media. Hill’s new ideas for the rationalization of the posts presented a great economic opportunity through the advancement of technologies of organization: for post, the relevant technological apparatus includes geographical zoning, routing techniques, rationalized rate structures, and stamps. At this critical period, postal policymakers of the day had the opportunity to reconsider the guiding policy regime of the sector (public ownership and common carriage). Not surprisingly, although the services and applications of the post changed radically, the fundamental structure of the sector did not change. Hill’s tract took for granted a governmental postal system, and the example of almost every other modern country in the world was no doubt influential. This reorganization of services led to the establishment of stamps in 1847, free collection (post boxes on the streets) in 1858, free delivery in 1863, then rural free delivery in 1896, but there is little evidence a restructuring of the policy principles that guide the posts was seriously considered (United States Postal Service, 1938; United States Postal Service,

¹³ For instance, the “terminal devices” (mailboxes) at each home and elsewhere are exclusively for the use of the government monopoly (18 USC 1696).

1993). If anything, the Postal Service sought to extend public ownership and government monopoly to other sectors (Postmaster-General, 1890).

Those who used the mail to communicate were given an additional form of access protection in the form of privacy protections for mail.¹⁴ Mails are no longer seen primarily as a source of state revenue, and a state monopoly is (arguably) not required to insure government correspondence.¹⁵ The regulatory system enshrined in the laws that are presently in effect, however, remains largely the same as when it was established—for revenue and government convenience. The emergence of the 19th century focus on the value of universal delivery—a “universal access” policy of the late 1800s—did not precipitate a fundamental policy shift in the organization of the post. While in many ways the form and character of the communication application changed dramatically in this period, the state-protected monopoly remained the unquestioned policy approach. While the press was seen as the domain where government should remain as uninvolved as possible, the long course of tradition and the examples of other nations showed that the posts were the domain whose business was properly and “naturally” handled by government. With government control came policies to guarantee broad access in the form of common carriage, privacy protection and subsidized rates.

Telephony: One Nation, One Policy, Universal Service

In the next quadrant, the beginnings of a system of telephony surely lie in the development of such technologies as the “visual” telegraph conceived with the 1791 introduction of semaphore and Samuel Morse’s electromagnetic telegraph, invented in 1832 (Holzmann & Pehrson, 1995). The birth of a connected electrical system of transmitters and receivers able to convey speech is best dated to Alexander Graham Bell’s patent on the same in 1876. The technical apparatus of this sector is marked by many miles of iron and later copper wire linking terminals, electromechanical switches, and the switching, signaling, and transmission technology attendant to them.

The earliest application of the telegraph was in the control of railroad networks, but by the 1850s the dissemination of news and business communiqués came to the forefront. The telephone was initially seen as a direct replacement for the telegraph and suitable for business uses, but by 1920 “sociability” and other non-business use between individuals would come to be profitable (Fischer, 1987). Both telegraph and telephone can be characterized as initially competitive

¹⁴ The greatest protections were given from interference by other private individuals, not government agents.

¹⁵ Today, clearly the post is no longer a monopoly in most markets, e.g., overnight delivery, but it retains monopoly status in others, e.g., daily residential pickup and delivery.

industries that quickly consolidated into single networks run by a single dominant firm (Western Union, then AT&T) (Lubrano, 1997).

Little communication policy initially applied to the telegraph. As it served the same potential audience as the post, but with less delay, the development of the telegraph occasioned another policy crisis point in 1845. Should the telegraph be organized on the basis of public ownership and common carriage, as was the post, or should some new framework be developed? The question was settled when congress was reluctant to appropriate funds for the construction of early telegraph systems, and this ended the government's early involvement in an experimental, publicly owned telegraph from Washington, D.C. to Baltimore (Chandler, 1977, p.197). In other respects, however, the telegraph was clearly seen as a direct extension of the mails and later policy retained the approach of common carriage adapted from railroad regulation. The first round of government intervention was essentially a federal response to AT&T's acquisition of monopoly market power in the early 20th century. Telephony in the following period was marked by extensive regulation, beginning with the 1910 expansion of power of the Interstate Commerce Commission to include telecommunications, through the establishment of a specialist regulator, the Federal Communications Commission, in 1934. Very much at issue in early debates about telecommunications was the nature of competitiveness, cost, and interconnection in telephone markets (Vieter, 1994, esp. pp. 169-173). A monopoly, not clearly rationalized for the posts, seemed "natural" because of the extensive economies of scale to be had in the construction of the phone network and the necessity of central coordination for the network.

In practice, the evolution of telecommunications policy, somewhat unlike the previous two sectors, is best characterized by what Weare terms "disjointed incrementalism." Rapid within-sector technological change caused each wave of new policy initiatives to be "...largely reactions to problems that grew out of previous decisions." Policy in this area focuses on "narrowly defined problems," where only a "limited number of practical remedies" are considered (Weare, 1996, p. 420). While telecommunications policy may have had more change over time than, say, the posts, all decisions were still well within the range of the traditional policy regime of a government-sanctioned, privately owned monopoly, until the comparatively recent rethinking of natural monopoly and an emphasis on competition—beginning with long distance and now envisioned as realizable throughout the system to the local loop.

Counterbalancing the control of this monopoly infrastructure owner, two categories of access goals were clearly articulated for telephony as soon as the sector progressed to a broad

customer base.¹⁶ First, The protection of “open access” to the dominant firm's communication facilities, for those who would provide complementary infrastructure, was an early goal and a sustained policy effort in this quadrant. It ranged from the Kingsbury Commitment’s 1913 protection of interconnection to (as widespread competition in long distance came to seem possible with the incursion of upstart MCI) the restriction of predatory pricing, then later with requirements for unbundling and the emphasis on promoting eventual facilities-based competition in local service. Second, access to the means of communication for users emerged as an important concern, especially given telephone company arguments about the high cost of serving rural areas. This led to a variety of policies to promote “universal service” beginning in the 1960s: subsidies for poor users, subsidies from urban to rural users, as well as network penetration and investment goals (Mueller, 1997; Sawhney, 1994).

A recent crisis point in telephony policy came with the introduction of digital technologies in the 1970s. Computer technology allowed the telephone system to provide an increasing array of "information services", in addition to interpersonal voice conversations. To encourage innovative development of these new services, which seemed free from natural monopoly characteristics, policy exempted them from common carrier regulation. Crafting the appropriate regime turned out to be complex, and successive FCC "Computer Inquiries" in the 1970s and 1980s tried a range of approaches. These included attempts to distinguish "basic services" (regulated) from "enhanced services" (unregulated), and requirements that incumbents monopoly offer any non-basic services through separate subsidiaries. The current outcome, initiated by the 3rd Computer Inquiry in 1986 with the concept of Open Network Architecture (ONA) and codified in the 1996 Act, rests on the concept of network unbundling. Incumbent local exchange carriers, who still essentially own the most significant portion of the local telephone network, must offer access to unbundled network elements for any company wishing to offer services that use parts of their network.

Conceptually, this new compromise between control and access extends the spirit of the interconnection requirements established by the 1913 Kingsbury commitments. One dominant company's control over network resources (then hardware, now also software) that are essential for the provision of communication services by others needs to be offset through open access to such resources. Insofar as they follow this long tradition, ONA and the telephony provisions of the 1996 Act constitute incremental policy adjustment to new technology within the telephony quadrant of our map. But network unbundling also introduces seeds of change that reach far beyond telephony.

¹⁶ Unlike the telegraph which, though widespread, was used primarily for business.

It recognizes that, with digital networks, access to network management software features is as important as access to facilities. It underscores the fact that multiple actors can now create, on underlying facilities they do not own, software platforms that co-exist and support numerous communication patterns. In short, it acknowledges that network control is now separable from network ownership.

Broadcasting: The Use, But Not the Ownership Thereof

Turning to the final remaining quadrant, the birth of broadcasting can be traced to the birth of the two most visible broadcasting systems, radio and television: Reginald Aubrey Fessenden's first experimental radio broadcast from Brant Rock, Massachusetts dates to 1906 (Smulyan, 1994), and the introduction of the Shoenberg system of broadcasting moving images, was introduced in 1931 (Sterling & Kittross, 1990). For broadcasting, the key apparatus provided the ability to modulate the characteristics of an electromagnetic carrier frequency, and other components (such as antennas, tuning circuits, and decoders) to demodulate the carrier frequency.

The policy crisis became apparent almost immediately after the invention of the technology. It seemed as though the radio could be a wireless telephone, and subject to the same regime. A strong departure from common carriage emerged, however, after much early debate (McChesney, 1993; Smulyan, 1994). Although investment in telephone networks was expensive and should not need to be wastefully duplicated, capacity was not seen as particularly scarce. In the early consideration of radio, however, the argument of a need for change based on extreme scarcity carried the day. The resulting policy regime could be characterized as private ownership and fiduciary licensing. "The idea of the public interest also led to a very particular characterization of the relationship between broadcasters, the radio spectrum, and the government.... A license to broadcast ...involved a fiduciary responsibility to serve the public interest more than a right to broadcast or a right to ownership of a channel," (Streeter, 1996, p. 97). Although public interest obligations have devolved into a little more than an empty shell, the idea that content should (or could) be controlled in the U.S. is a surprising revelation, given past traditions.

The argument for a fiduciary system again involves access: the perceived scarcity of the electromagnetic spectrum justified the intervention (whether the spectrum is indeed scarce is subject to some debate, see Pool, 1983) and it was partly a perceived need to protect access for those who

would provide content that led to a fiduciary system.¹⁷ Television set diffusion or “universal access” policies to promote transmitters in all areas, however, was never seriously considered—probably because the main “applications” offered over television were not seen, despite some early experimentation to the contrary, as essential candidates for government support for all citizens. Limited “open access” goals were pursued, however, through ownership limits and the reservation of spectrum space during the allocation process for educational purposes (chiefly through public television). The current policy compromise between control and access however gives license holders extensive editorial control.

The development of cable television is one of the best examples of an explicit crisis point forcing policy action. The development of cabled community antenna technology provided a viable alternative to over-the-air broadcasting. The FCC, however, studiously ignored cable television until 1965 (what we would term a critical decision point), when it grew large enough to threaten established broadcasting interests (Pool, 1983 p. 157). As Pool has argued, there is little technological or organizational similarity between television and cable. It is far from obvious that television rules forged upon the scarce electromagnetic spectrum should apply to plentiful cable, or that the FCC had the authority to apply regulation to cable at all. Yet, “the courts define a new technology as a special case of a familiar one. Just as telephones were defined as telegraphs, so cable television was defined as television” (p. 161). Today, with cable as with broadcast TV, license holders have quasi-absolute editorial control over who has access to their network and can provide content.

While it might be a pleasant illusion that the regulation of new technologies is based on their characteristics, cable regulation stands in spite of its technological characteristics. Which familiar policy regime was to be used as a model for cable was open for debate—many argued that cable should be regulated as print, or as a common carrier.¹⁸ Access goals are clearly in evidence, be it access to the means of production (via community access channels and now-defunct local origination rules) or access to the content produced (via must-carry rules). As with other media, these access goals were embodied in specific, technologically-dependent rules and once the initial policy regime was chosen it persisted. Even in the successive waves of cable deregulation (then

¹⁷ Although many other factors were at work, including perhaps most importantly, an overall regulatory philosophy of “corporate liberalism” (Streeter, 1996).

¹⁸ On the distinction between cable television and print, see Memorandum Opinion and Order, Docket 18397, 23 FCC 2d 825 (1969) and First Report and Order, Docket 18397, 23 FCC 2d 825 (1969). On cable as a common carrier, see the “Whitehead Report”: Cabinet Committee on Cable Communications, *Cable—Report to the President* (Washington, D.C.: GPO, 1974).

reregulation, etc.) that followed from the 1980s on, the dominant way of thinking about cable as an extension of television went largely unquestioned.

With the advent of digital television, another crisis point appears, surrounding provision of electronic program guides (EPG) and conditional access control systems. These technologies are key components of the "communication platform" constructed atop the digital TV infrastructure, because they control how programs are listed for the viewers, and implement contracts between viewers and content providers (Galperin & Bar, 1999). Thus, in this quadrant as well as in the telephony quadrant, we are entering a stage in which control over network configuration (the definition of the communication platform's architecture) is no longer hard wired in the infrastructure's hardware. As a result, a new set of access issues emerge at the interface between physical network infrastructure and communication platform.

The Internet: The modern crisis point

The internet's dramatic success epitomizes a new crisis point in communication policy. With the advent of digital communication technologies, the traditional policy mapping we have identified becomes increasingly untenable. First, the four quadrants no longer provide a neat partition of communication technologies, communication systems and industrial organization. Indeed the internet, today's central manifestation of digitization, offers applications that fit in each one of the four quadrants: from live/interpersonal chat and IP-telephony to delayed/interpersonal e-mail, from delayed/mass "web-zines" to live/mass "web-castings". As a result a single infrastructure, the internet, now offers the range of applications that once existed in distinct domains, governed by different policies reflecting different compromises between control and access. In addition, the Internet also brings about new applications that defy classification along the traditional delay/pattern axes. A variety of communication patterns is emerging between the "interpersonal" and "mass" extremes: one-to-few, few-to-one, few-to-few, narrowcasting, etc. combined with a wide variety of delays. Policy has come to understand media through the lens of four distinct quadrants and the Internet forcefully demonstrates how this understanding was an artifact.

Change has not been restricted to new applications: digital convergence has modified the technological implementations in each cell; ubiquitous computation is now the norm for every part of our table. With the technological apparatus in each quadrant becoming more and more similar, firms are no longer restricted by expertise to participating in one cell. Companies from all quadrants

are now eager to enter other quadrants, now that they can shape communication platforms that can support new communication patterns on their traditional infrastructures. For example, cable TV "broadcasters" now seek to provide telephone service, while telephone companies are eager to offer internet-based broadcasts. While firms of the past were often localized to one quadrant of the model, firm boundaries no longer match table boundaries: cross-cell participation and firm concentration across cells is now commonplace and will become more so.

As we have shown, old distinctions between traditional media have become calcified in distinct regulatory bureaus and policy regimes. Today, the ensuing regulatory apparatus continues to apply principles of the past to industries in which they make less and less sense, and for which there is less and less of a rationale: a continuation of regulation through inertia. For example, should Internet portals be liable for content because they look like newspapers? Should companies offering long distance telephone service pay access charges if they use old telephone technology, but be exempt if instead they elect IP-telephony? Does it make sense to require open access from telephone companies providing high-speed internet access through DSL technology, and not from cable operators offering the same service with cable modems, simply because one has been regulated as common carrier and the other as a broadcaster? Regulation by inertia breeds such inconsistencies. Regardless of the degree to which one might feel past systems of regulation have or have not been successful, they are no longer possible.

The disintegration of traditional boundaries between quadrants has rendered regulatory principles nonsensical, and existing regulatory structures ill-informed and ill-equipped to apply nondiscriminatory rules in a coherent fashion. Among other implications, this disintegration means that regulatory decisions about converged industries have the potential to affect all types of communication. As firms increasingly interact across traditional regulatory boundaries, as applications once distinct blur together, the opportunities for arbitrage proliferate and regulated markets create unexpected and unintended incentives. Given the heightened complexity of the policy-formation task in this environment, policymakers are reaching a modern crisis point where they must respond to the new environment, but they are not equipped to do so. The solution is to consider the goals of communication policy without resorting to policies that are technology-specific, and it is here that we turn next.

IV. Possible Approaches in a Converged Environment

The communication policy response to the crisis of convergence has so far been distinguished by two approaches. Both approaches rely on maintaining existing categories and redrawing boundary lines when technological or organizational change blurs the distinction between categories, but they differ in their approach to new media. The first approach is an ongoing effort to fit new communication services into existing categories. The *Computer Inquiries* constituted the initial example of this trend, an effort that has given us “basic,” “enhanced,” “information,” “telecommunication” and other dysfunctional distinctions meant to reconcile new communication services with old rules. Attempts to treat high-speed Internet service over cable as “programming” or IP-telephony as “enhanced service” follow that tradition.

Some have proposed a second, somewhat bolder approach, and sought to establish new categories for new services. For instance, the Clinton Administration proposed in 1994 to create a title VII of the Communication Act applying to companies that would combine cable and telephone (and other) networks to provide “broadband, interactive, switched, digital services” (Information Infrastructure Task Force, 1994).¹⁹ This was intended as an addition to, not a replacement for the existing telephone and cable policy categories and companies who offered those new services could choose whether they wanted to be ruled by the old or new regime. The 1996 Telecommunications Act in section 706 made it policy to encourage the deployment of “advanced telecommunications capability” but stopped short of setting up a specific policy category (Esbin, 1998, 118).

Both approaches suffer from similar shortcomings. They propose marginal adjustments to a system anchored in particular technological implementations of communication services, rather than starting from any fundamental purpose of communication policy. We propose to re-examine these foundations here, and explore their implications for policy-making in the post-convergence world. A questioning of the entire communication policy edifice has very limited chances to succeed politically, as it challenges too many established practices and entrenched interests. However, we believe that it can be a worthwhile exercise: even though policy adjustment will likely continue to be incremental, a more fundamental analysis can provide a guiding principle against which incremental adjustments can be checked.

As we have shown over the history of communication policy in the U.S., in each quadrant policy has consistently taken the form of a bargain struck between the unfettered control of communication by some party in a position of power and the need for some form of access

protection for others. While market structures and regulatory regimes have varied across quadrants, reflecting the characteristics of specific technology implementations, the distinction between communication patterns, mass or interpersonal, rises above particular technological differences because it contrasts two qualitatively different patterns of communication behavior.

The nature of the first pattern is given in the origin of the word publish – from the latin *publicare*: to make public. In the activity of printing and later in filming and broadcasting, of greatest concern is information intended for **public dissemination**.²⁰ To the extent that a message is produced to be made public or semi-public, and a technological medium is required for such dissemination, a certain set of access concerns are immediate: the medium has become a vehicle for public expression, and such are required for a democracy to function. Citizens must be insured the ability to participate as originators and recipients of messages. The one-to-many organization of this communication precludes all from participating as producers, therefore steps must be taken to insure that access to the means of production is protected so that (at least) a reasonable diversity of content will be produced.

Rather than publication, in the second pattern of communication described by the quadrants of telephony and post, it is the **private exchange** of messages or transactions between individuals or small groups that is of concern. Since the development of the post, systems of private exchange have been recognized as a crucial infrastructure necessary for the administration of government and commerce between private actors. Since telephony, access to systems of private exchange has become essential for participation in normal economic and social relationships. With this second type of communication, it is again necessary to grant citizens access to communication channels, yet rather than a diversity of content this kind of communication implies a concern over the integrity of communication—in particular privacy and non-discrimination by those who control the channel.

In addition to these two traditional, basic patterns, we now see an explosion of new communication patterns mediated by digital networks. They include the likes of narrow-cast specialty publications, many-to-many network-based auctions, many-to-one customized newsfeeds, seller-sponsored, buyer-advocate, or neutral electronic marketplaces, few-to-few video-conferences, along with potentially countless pattern variations that can now be programmed into the software

¹⁹ This language, from a 1994 draft, was initially intended as an amendment to S.1822, but was rejected.

²⁰ This is not to say that there are not secret books and private films; to raise this objection conflates the media apparatus with the kind of communication behavior, as was the problem of past policy.

that controls networks. Each one of these patterns demands its own set of access rights and control mechanisms: for example the ability to include guests in a 5-way video-conference and to exclude all eavesdroppers, or to broaden participation in a network-based auction while preventing individual bidders from modifying the bidding environment in their favor.

These new patterns and the many others yet to be invented, combine features of the two fundamental patterns: publication and private exchange. Yet most of them span across the two categories and could not adequately be governed under the existing regimes. What becomes increasingly important in this new world is the ability to implement a wide range of communication patterns, rather than simply the right to make use of existing ones.

In past communication policy, these questions were asked about particular technological networks—and rules were tied to particular technological implementations. As we have shown, today with the advent of convergence the configuration of a communication network is determined less by its underlying hardware infrastructure than by control software. The fading distinction between print, post, telephony, and broadcasting is a symptom of the more fundamental separability between three network components: physical hardware, control software, and communications applications (Bar, 1990)—this is described by figure 3. In the past, as indicated by the dotted line, particular communication networks exclusively served public dissemination or private exchange functions, and technology-specific regulation was feasible. Today, a single conduit can be used either for public dissemination or private exchange and communication patterns are defined within the network's control software.

We call this software layer, where network configuration is defined, the *communication platform*, to invoke several meanings of this word. Platforms allow speakers to stand above the crowd and make their message public. As used in computers, a platform includes the operating system upon which applications can be built. A platform is itself a constructed object that determines the shape of what can rest upon it. Finally, the word “platform” in the physical world is usually only given to something that is level—a meaning we might aspire to in communication policy. Examples of communication platforms can be the software that runs a telephone switch, an on-line auction, or an electronic program guide. In digital networks, this is the key layer: this is where network configuration is defined, where interconnection between separate physical networks is made possible or prevented, and where co-existence of various service providers (“open access” in the terms of current policy debates) is permitted or denied.

In past networks, the communication platform and its configuration were "hard-wired" in the specific arrangement of electro-mechanical devices that formed a particular communication network—the logical architecture of the network precisely reflected its physical architecture. One had to own the network to change that arrangement. By contrast, platform configuration in digital networks depends on ability to program the network's control software. Control over network configuration thus becomes separable from network ownership. Multiple network platforms, supporting a variety of communication patterns, can simultaneously co-exist on a single physical infrastructure. This newfound separability between a network's logical architecture and its physical layout therefore calls for a new policy bargain between control and access, that allows non-discriminatory *ability to design* the architecture of a communication platform, not only for those who own and control network infrastructures, but also for end-users or third parties.

There is a policy interest in safeguarding the ability to design, for two reasons. The first is fairness, because the architecture of communication platforms strongly shapes the interactions that occur in these spaces, making certain forms of interaction either possible or impossible (Lessig, 1999)²¹. For example, the architecture of an electronic marketplace affects the relative competitive power of market players, the architecture of a discussion forum influences participants' ability to be heard and to convince others. As network-mediated activities proliferate, participants should at least be aware of the built-in architectural biases of the spaces they frequent. At best, they should be able to influence the design of existing spaces to reflect their own needs, or to design alternative spaces that do so.

Innovation promotion is the second basis for policy interest in protecting this ability to design. Those who control communication networks tend to design communication platforms which support the patterns of interaction that further their interest. They tend to design platforms that reflect their own history and technical expertise. It is important not to foreclose exploration of other approaches, allowing those who do not control networks, such as users or third parties, to bring forth different visions of how we might communicate. The Internet has shown the power of these innovative forces. Network users invented new patterns of communication and implemented them on a network infrastructure where their ability to design was promoted by open TCP/IP standards and open access to some of the telephone network's building blocks. As we contemplate the next rounds of innovation, we ought to find ways to generalize such conditions.

²¹ Or in Lessig's words: "...the code of a cyberspace might enable or disable certain forms of life." (p. 83)

Our purpose here is not to prescribe specific policies but to establish the fundamental goals communication policy should pursue. We identify three goals, two that emerge from traditional policy regimes for mass and interpersonal communications, and an additional one that results from newfound possibilities open by digital networks. To counterbalance network control, policy ought to protect three basic access rights of the participants in communications systems. The first, the *right to publish*, requires the protection of reasonable access to a nondiscriminatory publication medium for one's ideas (or for one's product, or service). The second, the *right to private exchange*, calls for reasonable access to a nondiscriminatory channel for network users (individuals, machines, or groups of these) to exchange messages with each other. The third, the *right to design*, requires protection of reasonable, nondiscriminatory ability to design a communication platform that supports alternative communication patterns.

Ideally, protection of the right to design would be sufficient. Indeed, it would guarantee anyone's ability to design a communication environment that protects their right to publish or one that affords private interaction. However, because the transition to fully programmable, digital networks is still under way, we need to continue to consider the right to publish and the right to private exchange wherever traditional, separate networks remain in existence.

In practice, the obvious difficulty will be to define what constitutes "reasonable, nondiscriminatory access" to the ability to design a communication platform. Past debates over "open network architecture" or "comparably efficient interconnection" in telecommunications policy foreshadow the complexity of that task. Broadly however, we can imagine two extreme cases, which mirror similar situations in past communication policy. In cases where, to use Pool's expression, "obtaining access to the needed resources [is] no strain on ingenuity", policy intervention would be unnecessary. This is the case for example with the implementation of a business-to-business platform on the internet, where multiple providers offer the necessary components and ownership of the underlying network facilities counts for little in determining the marketplace's architecture. On the other hand, if access to essential facilities (be they hardware or software) is restricted, policy intervention could be required to ensure open access to the key network components. At the very least, a weak form of such open access would be a mandatory disclosure of the network's architecture, so that biases built in the existing network platform are disclosed, and so that remedies can be sought. The current access debate surrounding high-speed cable internet is such an example (Bar et al., 2000).

V. Conclusion

We certainly are not alone in pointing out the incoherence of today's communication policy, which maintains separate media governance in the face of media convergence. Others have called for a technology-independent approach to communication policy (Esbin, 1998), exhorted policy makers to slice through the regulatory "Gordian knot" by adopting a unified Open Communication Infrastructure model (Neuman et al., 1997), or proposed new policy models for converging communication systems (van Cuilenburg & Verhoest, 1998). However, they have generally put forth technologically driven fixes (albeit driven by new rather than old technology), and stopped short of re-examining the fundamental goals of government intervention in the communication sectors.

We took the reverse approach, and chose to start from the underlying motivation for government intervention in communication activities, rather than from the tension technology creates in the current policy system.²² This inquiry singled out promotion of the ability to design communication platforms as a crucial policy objective in the new converged communication environment. Moving from policy goal to implementation, our analysis implies that policy attention ought to center on the software configuration that defines the architecture of communication platforms. This contrasts with current policy, where the focus is primarily on governing existing platforms through regulation of ownership of the underlying physical network facilities—the conduit.

Yet, this focus has some continuity with past policies. In the pre-convergence world, fundamental policy concerns stemmed from a desire to preserve access to communication platforms. They were, however, only four platforms: post, press, broadcasting and telephone. In the terms of figure 3, in each case the conduit, platform, and applications shared the same boundaries. A platform provided for communication along a distinct combination of delay and pattern characteristics while barring others, and the architecture of these platforms was determined by the physical implementation of the corresponding networking technologies, printing presses, radio waves, or twisted copper pairs. Therefore, policy naturally focused on the regulation of physical technological objects and the behavior of their owners.

In the new converged environment, multiple communication platforms can be programmed onto interchangeable digital networks. Nevertheless, the architecture of these platforms remains critical as it continues to define which communication activities are allowed and which are

excluded. This time however, the key determinant of the platforms' architecture no longer is ownership of the underlying facilities, but rather the ability to configure their logical architecture through software. It is therefore critical for policy to realize that its inherited focus on the physical objects and the behavior of their owners no longer aligns with policy goals.

²² To use Brock's formulation, this approach follows Bentham rather than Blackstone (Brock, 1994, p. 14).

Figure 1. Past communication media and their supporting technology across two dimensions

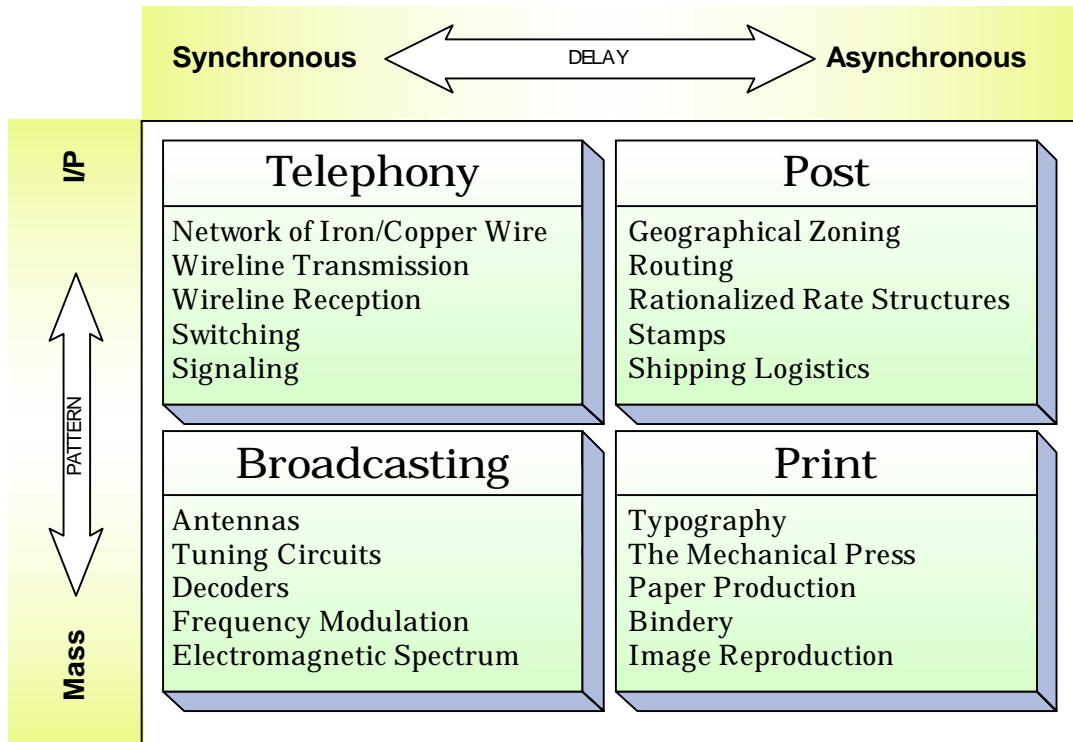


Figure 2. Policy regimes governing past communication platforms

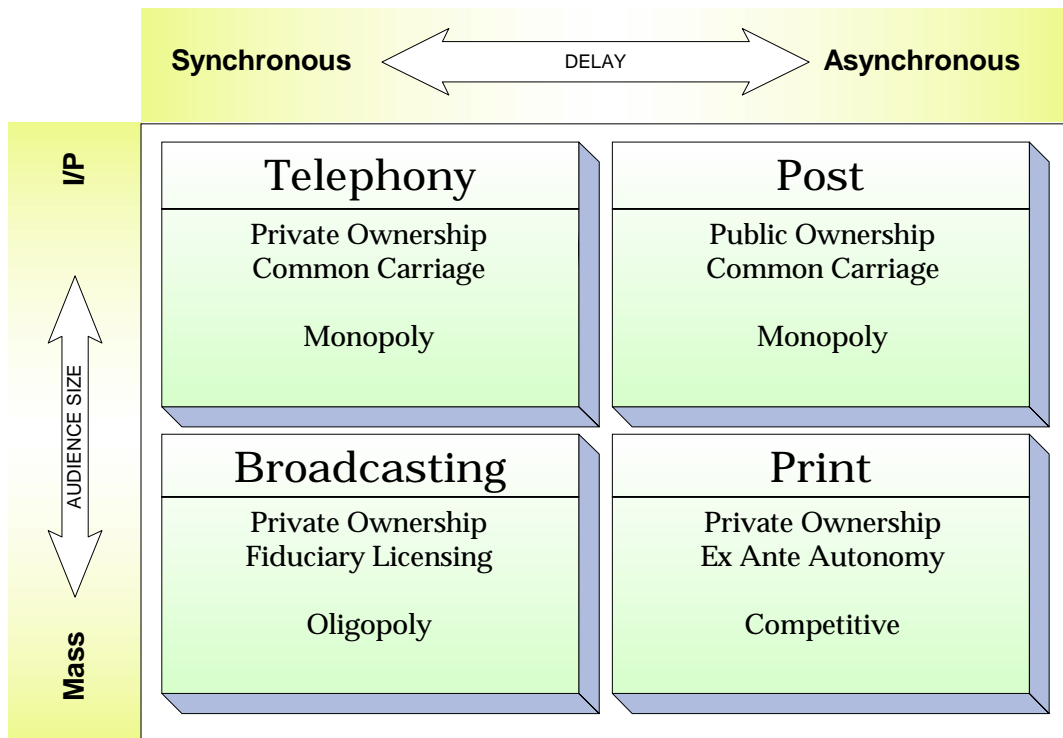
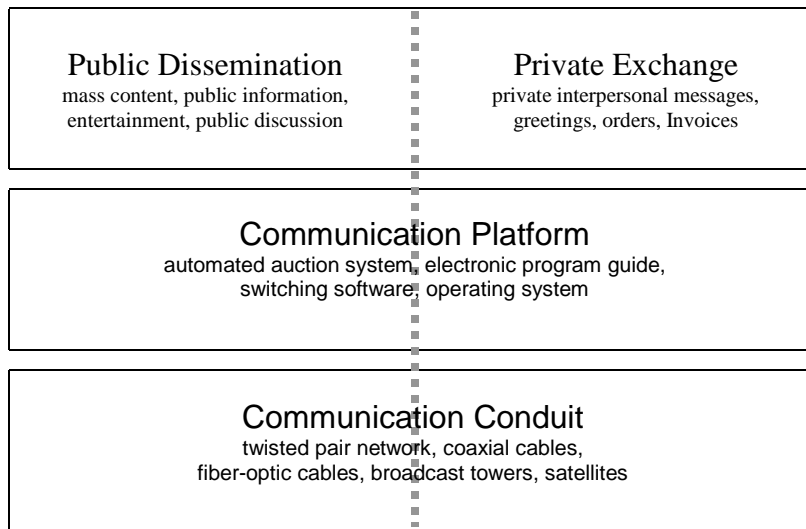


Figure 3. Three conceptual layers of technological communication media



Sources Cited

- Arthur, W. B. (1994). *Increasing returns and path dependence in the economy*. Ann Arbor, MI: University of Michigan Press.
- Bar, F. (1990). *Configuring the telecommunications infrastructure for the computer age: The economics of network control* (PhD Dissertation). Berkeley, CA.
- Bar, F., Cohen, S., Cowhey, P., DeLong, B., Kleeman, M., & Zysman, J. (2000). Access and innovation policy for the third-generation Internet. *Telecommunications Policy*, 24(6/7).
- Beniger, J. R. (1986). *The control revolution: Technological and economic origins of the information society*. Cambridge, Mass.: Harvard University Press.
- Beniger, J. R. (1987). Personalization of mass media and the growth of pseudo-community. *Communication Research*, 14(3), 352-371.
- Brock, G. W. (1994). *Telecommunication policy for the information age*. Cambridge, MA: Harvard University Press.
- Butler, S. (1973). *Hudibras and selected other writings* (John Wilders & Hugh de Quehen, Trans.). Oxford: Clarendon Press [originally published 1662].
- Chandler, A. D. (1977). *The visible hand: The managerial revolution in American business*. Cambridge: Belknap Press.
- Esbin, B. (1998). *Internet over cable: Defining the future in terms of the past* (OPP Working Paper Series 30). Washington, D.C.: Federal Communications Commission.

- Fischer, C. (1987). 'Touch someone': The telephone industry discovers sociability. *Technology and Culture*, 29(1), 32-61.
- Galperin, H., & Bar, F. (1999). Reforming TV Regulation for the Digital Era: An International/Cross-Industry Perspective. *Presented at the 27th TPRC, Washington D.C.*
- Garnham, N. (1990). *Capitalism and communication: global culture and the economics of information*. London; Newbury Park: Sage Publications.
- Haiman, F. S. (1976). *Freedom of speech*. Skokie, Ill.: National Textbook Co.
- Hill, R. S., & Hill, G. B. N. (1880). *The life of Sir Rowland Hill and the history of penny postage*. London: T. De La Rue & Co.
- Holzmann, G. J., & Pehrson, B. (1995). *The early history of data networks*. Los Alamitos, CA: IEEE Computer Society Press.
- Horwitz, R. B. (1989). *The irony of regulatory reform: The deregulation of American telecommunications*. New York: Oxford University Press.
- Information Infrastructure Task Force. (1994). *Administration White Paper on Communications Act Reforms*. Washington, D.C.: Department of Commerce.
- Innis, H. A. (1950). *Empire and communications*. Oxford: Clarendon Press.
- Lessig, L. (1999). *Code and other laws of cyberspace*. New York: Basic Books.
- Lubrano, A. (1997). *The telegraph: How technology innovation caused social change*. New York: Garland.
- McChesney, R. (1993). *Telecommunications, mass media, and democracy: The battle for the control of U.S. broadcasting, 1928-1935*. New York: Oxford University Press.
- McChesney, R. W. (1996). The Internet and U.S. Communication Policy-Making in Historical and Critical Perspective. .
- Meiklejohn, A. (1948). *Political Freedom*. New York: Harper & Row.
- Melody, W. H. (1996). Toward a framework for designing information society policies. *Telecommunications Policy*, 20(4), 243-259.
- Mueller, M. (1997). *Universal service: Competition, interconnection, and monopoly in the making of the American telephone system*. Cambridge, MA: MIT Press.
- Neuman, W. R., McKnight, L. W., & Solomon, R. J. (1997). *The Gordian Knot: political gridlock on the information highway*. Cambridge, Mass.: MIT Press.
- Pool, I. d. S. (1983). *Technologies of freedom*. Cambridge, Mass.: Belknap Press.

- Postmaster-General, T. (1890). *An argument in support of the limited post and telegraph by the Postmaster-General together with certain appendices relating to postal telegraphy*. Washington, D.C.: Government Printing Office.
- Sawhney, H. (1994). Universal service: Prosaic motives and great ideals. *Journal of Broadcasting and Electronic Media*, 38(4), 375-395.
- Smulyan, S. (1994). *Selling radio: the commercialization of American broadcasting, 1920-1934*. Washington, D.C.: Smithsonian Institution Press.
- Sterling, C. H., & Kittross, J. M. (1990). *Stay tuned: a concise history of American broadcasting*. (2nd ed.). Belmont, Calif.: Wadsworth Pub. Co.
- Streeter, T. (1996). *Selling the air: A critique of the policy of commercial broadcasting*. Chicago: University of Chicago Press.
- Thorne, J., Huber, P. W., & Kellogg, M. K. (1995). *Federal broadband law*. New York: Little, Brown & Co.
- Train, K. (1991). *Optimal regulation: The economic theory of natural monopoly*. Cambridge, MA: MIT Press.
- United States Postal Service. (1938). *A brief history of the United States Postal Service*. Washington, D.C.: Government Printing Office.
- United States Postal Service. (1993). *History of the United States Postal Service, 1775-1993* (Publication 100). Washington, D.C.: The Service.
- van Cuilenburg, J., & Verhoest, P. (1998). Free and equal access: In search of policy models for converging communication systems. *Telecommunications Policy*, 22(3), 171-181.
- Vietor, R. H. K. (1994). *Contrived competition: regulation and deregulation in America*. Cambridge, Mass.: Belknap Press of Harvard University Press.
- Vogel, S. K. (1996). *Freer markets, more rules: Regulatory reform in advanced industrial countries*. Ithaca, NY: Cornell University Press.
- Weare, C. (1996). The illusion of reform: The dilemma of structural telecommunications policy. *Telecommunications Policy*, 20(6), 415-427.
- Willams, R. (1966). *Communications*. London: Chatto & Windus Ltd.