

**The Political Economy of U.S. Policy for Competition in the Communications
and Information Technology Industries**

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How should advanced economies regulate competition in the rapidly converging markets for telecommunications, broadcasting, and information services? The answers changed dramatically over the past thirty years as the predominant policy solutions migrated away from monopoly provision to competitive supply of services. The first two stages of the policy shift are complete and we now are entering a new third stage.

This paper examines the political economy and policy logic of the shifts in policy over time. It emphasizes the policy directions (and the technology, politics and economics underlying the policy) that shape the law. It does not focus on the details of competition law. Although legal precedent and the broader contours of the law set limits on policy-makers, communications law evolved radically since the mid-1970s because of shifts in the political economy and general policy direction for the market.

This paper focuses on the United States. Although the particular logic is different for each country, due to variations in political institutions and market structure, there is enough similarity among the trajectories of the advanced economies to allow the experience of the United States to serve as an instructive reference point for the current choices facing Korean policy makers.

This paper is organized in four parts. Part One begins with a brief review of the first two stages of the policy shifts in the last thirty-five years and the logic underlying those changes. Part Two focuses on the technological and market challenges and opportunities that are currently catalyzing a third shift in policy direction. It shows that a significant change in the political economy of the marketplace will shape how the precise policy equilibrium will evolve. Part Three examines the changes in the political economy of policy in this third stage and then suggests some of the policy principles that are likely to serve the public interest while being consistent with political constraints. Part Four concludes by laying out some key policy choices.

I. The First Two Changes in Policy Direction

The first change in policy introduced limited competition in “value-added” information services and in terminal equipment for the network. Previously, basic telecommunications services remained a monopoly and the national phone company consciously nurtured a national equipment supply industry to the extent possible. It also supported a large national labor force that typically received premium wages and work conditions. In theory, elaborate rules provided for cross-subsidies to promote universal phone service. This began to change as a consequence of the rise of computer networking. The debate over the terms for leasing of network capacity for the new computer networks emerging in the 1970s signaled the entry of the computer industry into the realm of telecom policy. Computer vendors and their largest corporate and government customers wanted to network expensive mainframe computers to make their utilization more effective (through cost sharing and a new class of networked information services, such as those for financial transactions). The entry of a class of major technology suppliers and large network users pushing for policy change was a key change in the market. Although contentious, the total scale of the market change was small compared to the remaining monopoly for voice services.

The second shift occurred after it became clear (by 1984 in the United States) that basic telecommunications services (initially, long distance voice services and, later, local phone services) could be made more competitive and the creation of rival network infrastructures would improve efficiency and innovation in the supply of both basic and value added services.¹ The creation of new rival networks also opened a market for an alternative set of equipment suppliers, and generated another set of supporters for policy change. This opening had diverse implications across the world. For example, in the United States the greater diversity in equipment suppliers led to a growing deficit in trade in telecommunications equipment in the late 1980s that opened the way to new export markets for countries like Korea.² At the same time, by the mid-1990s it seeded the success of a transformed equipment industry for data networking and computing in the United States that revived American competitive fortunes.

While Korea lagged the United States in the speed and scope of these policy changes it also introduced the second stage of reform. As stage two evolved, competition in basic networking opened the way to inexpensively priced networking for what became the Internet and the Worldwide Web. The new field of mobile communications exploded beyond all expectations, seriously challenging terrestrial networks by 2005. For a variety of reasons, 2nd generation wireless was deployed more quickly in many countries than the United States but the U.S. system of assigning licenses through auctions was a major policy shift that won many subsequent imitators.³

During the era of narrowband Internet a shift began in the leading edge users for the network and information technology. Large users remained the anchor but the mass consumer market started to emerge as a serious source of innovative demand. The Web made the rise of business models built around the consumer market feasible. E-commerce became a major feature of the modern economy.

The emergence of broadband networks for households became a major feature of the market starting in the late 1990s. Korea is now the world leader and, according to OECD statistics, the United States ranks 12th, in accessibility of broadband for households. Similar figures are not kept for large corporate and research center users of very large broadband, but the United States remains dominant in this market segment. Moreover, broadband also is now emerging as an option for wireless services, including mobile services.

The first two stages of the policy shift featured significant government intervention in the communications market in order to force monopolies to share their networks with new entrants

¹ Competition also forced regulators to correct some, but not all, of the pricing inefficiencies created by their own policies designed to subsidize universal phone service.

² Peter Cowhey, "Telecommunications.," in Gary Hufbauer (ed.), *Europe 1992: An American Perspective* (Washington D.C.: Brookings Institution Press, 1990).

³ The higher level of service and lower prices of the U.S. wired network reduced consumers' incentives for early adoption of wireless, especially such innovations as text messaging, which bypassed high prices for voice calls in many countries. The multiple architectures for wireless networks in the United States, a result of a major policy choice, also slowed initial deployment of a comprehensive national network.

that could not afford to duplicate all of these facilities. Some of these decisions were deliberate efforts to induce competition, particularly to give greater weight to the entrants tied to roots in the computer industry; some were reflections of pricing decisions designed for other policy purposes such as subsidizing local phone service. The revival of U.S. leadership in information technology in the early 1990s had its roots in the earlier American policy decisions to force telecom carriers to lease data transmission at cost based rates and permits users to configure the data transmission to their own technological specifications. This permitted the emergence of PC based, computer networking that ultimately became intertwined with the Internet and the Web. In contrast, Japanese policy induced Japanese industry to miss this market shift.⁴

Governments also made significant choices about how to shape the growth and kind of competition in the new wireless services industries and changing equipment industries. Some countries, like the United States, tried to adopt policies that favored new entrants but otherwise remained neutral on choosing technology. This led to the deployment of many technology architectures. Although the precise timing varied by the market segment, the cost of diverse architectures gave rise to some confusion in the marketplace and sometimes delayed deployment of features requiring mass scale. (This even happened in the computer industry.) But, after delay and duplication, reform eventually resulted in a wider range of technological innovation and experimentation with equipment, software, and service application mixes, as occurred in wireless networking.

The U.S. Government usually does not pick civilian technology champions. The diverse American economy does not easily generate a strong political consensus on a single technology path for any market serving a diverse private sector. Moreover, American policy-makers are sharply suspicious of their ability to easily readjust their direction if they choose the wrong technology path.⁵ Other countries, like Korea, tried to tilt the introduction of competition in services to an approach geared to stimulate early adoption of technologies that would lead to exports in the equipment (as in the choice to select CDMA for second generation, mobile wireless networks). However, Korea still embraced competition in cellular networking and equipment supply to improve the speed and agility of deploying these new technologies.

During the first two policy shifts perhaps the slowest change in the marketplace and policy involved broadcasting. Broadcasting traditionally embraced a totally separate structure for both its broadcast network (optimized for point-to-multi-point transmission) and its regulation. The political sensitivity of broadcast content particularly reinforced the level of arbitrary regulation. In some countries this was rationalized as the protection of national culture. In other countries, like the United States, it was done in the name of protecting the public interest

⁴ Shane Greenstein, *The Evolution of Market Structure for Internet Access in the United States*,” Draft, Northwestern University, April 2005; Robert E. Cole, ”Telecommunications Competition in World Markets: Understanding Japan’s Decline,” in John Zysman and Abe Newman (eds.), *How Revolutionary Was the Digital Revolution?* (Stanford: Stanford University Press, 2006).

⁵ Linda Cohen and Roger Noll, *The Technology Porkbarrel* (Washington, D.C.: Brookings Institution, 1991). The funding of research leading to the Internet was not an exception. No one thought of the Internet as commercial data architecture until very late in its deployment.

(e.g., demands for children’s programming) or local control of broadcasting (thus reinforcing the power of local television station owners). However, in the United States the growth of cable television networks began to fragment the broadcast markets into many specialized channels and market niches. Mass audiences began shrinking. Nonetheless, the movement toward policy convergence among the major market economies on telecommunications and information technology in this period failed to penetrate broadcasting to the same extent. Thus, broadcasting was conspicuously absent when the advanced market economies agreed on a code of regulatory principles for promoting service competition in the 1997 WTO Agreement on Basic Telecommunications Services while agreeing their national markets to foreign suppliers.⁶

II. The Context for a Third Policy Shift

A. The Technological Context – The “Deepening” of the Network

It is impossible to predict future technological choices precisely, but it is possible to project the general direction of change and some of its implications for the winners and losers in the marketplace. Part Two focuses on these technology shifts and their market implications. It argues that a “deepening” of ubiquitous broadband networks has created conditions for a third policy shift, but the precise policy equilibrium has not yet emerged.

The technology edge is changing on several dimensions: the network architecture, software design, terminals, and the communications and information technology production system. Collectively, the changes are leading more powerful networked systems to become central to a broader array of economic, environmental, and personal experiences and processes. These changes influence the economics and the political economy of network competition policy. Among other things they propel a new calculus about networking policy by the communications and information technology industries (CIT) and introduce new dynamics involving the role of leading edge users in the economics and politics of network innovation.

In network architecture the triumph of the IP protocol, packet architecture network will be complete (replacing the old circuit switched, telephone architecture).⁷ Broadband will

⁶ These principles addressed “behind the borders” barriers that had caused intense trade controversies in the 1980s and 1990s. Korea supported the introduction of this code. Peter Cowhey and John Richards, “Dialing for Dollars: The Revolution in Communications Markets,” in Jeffrey Hart and Akheem Prasash (eds.), Coping with Globalization (New York: Routledge, 2000).

⁷ Although rates and capacities for broadband vary nationally by substantial degrees, significant broadband for individual users and small and medium enterprises (SMEs) is clearly coming in all sophisticated economies. Estimates vary on the likely minimum capacity of broadband for these users, but certainly it will permit high definition video downloading (around 12 megabits/s) and significant upstream speeds in the medium term. Wireless carriers often depict 4th generation systems as capable of delivering 100 megabits/s downstream and 20 upstream. And, the search by carriers for cost efficiencies and easier customization will lead to the conversion to a true packet architecture basis for the network. Dan Bieler, Ovum, “KPN's next-generation network takes shape” estimates that the 1.5 billion Euro investment in NGN will yield several hundred

become faster and ubiquitous. Truly ultra-broadband (with 10x40 gigabit capabilities on the National LambdaRail) is being deployed on U.S. research networks.⁸ The evolution of wireless networking to hybrid systems combining mobile and fixed wireless with different technologies and on many different bands is also part of the broadband trend. The terminal will seamlessly integrate the multi-band, multi-technology network that will probably build on advanced evolutions of 3G for mobility and complementary technologies for other functions.

The “Grid” symbolizes the intersection of three other emerging trends that complement broadband networking. (1) the integration of massive and inexpensive information storage into network architecture and services, (2) the emergence of virtual computer systems that tap into various computers (including supercomputers at the high end) as needed on an integrated networked architecture, and (3) the emergence of deeply integrated networks where devices at the edge of the network can utilize multiple wireless, fiber, and cable platforms on a seamless baseless upon demand.⁹ The breakthrough in the scale and price of network data storage is perhaps the most overlooked piece of this change. Although the precise data are not available, industry rumor during 2005 suggested that Google was buying up to 15 percent of the massive data storage systems sold in the U.S. market. This took advantage of the fact that the cost of data storage per megabit was falling even much faster than the cost of computer processing power.¹⁰ Google then used its own proprietary architectures to organize the data and, of course, the data fed its search engine results (and the many applications build upon them).

The software trend is toward more open and standardized interfaces (APIs) for the modules in software code. This is true on proprietary platforms like Windows and open- source

million in operating expenses each year starting in 2010. Martin Cave, Luigi Prosperetti and Chris Doyle, “Where are we going? Technologies, markets and long-range public policy issues in European communications,” Information Economics and Policy, 18 (2006) pp 242-255.

⁸ See <http://www.nlr.net>

⁹ The Grid creates a “virtual computer” out of distributed servers and information storage linked together by broadband networks and software of smart allocation of discrete tasks. As the Financial Times reports, some estimates suggest that large companies use only 10-15 percent of the effective capacity of their computers and large firms have increased the number of powerful computers by ten fold to 1200 servers in the past twenty odd years (and some have over 12000) because they assigned a separate server to each new application. Using Grid and virtualization technology Higo Bank in Japan now integrates risk assessment, credit scoring and customer profile databases in order to cut the time and number of procedures for making a loan by fifty percent. Big financial institutions are key early adopters of the Grid. Alan Cain, Financial Times, September 20, 2006, p 8: “Silver bullet or snake oil – is grid computing a money-saver?” Alain Cain, “Virtualisation can bring an end to ‘server sprawl’,” Financial Times, September 20, 2006, p. 8

¹⁰ John Hagel III and John Seely Brown, The Only Sustainable Edge (Cambridge: Harvard Business School Press, 2005), p. 12. The intersection of ubiquitous broadband, networked storage, and integrated computing architectures permits the beginning of true networked intelligence that combines network resources through continuous feedback. Prior struggles between intelligence at the edge and at the center of the network become less important.

systems. The impact of .html and .xml is to make it more difficult to leverage control of any one piece of the software platform over other pieces of the platform. They also facilitate the growth of specialized, software supply communities. Furthermore, they propel the growth of websites that are “mashups” combining the capabilities of other websites into new, hybrid services much more quickly and inexpensively.¹¹

Terminals are also changing rapidly as they continue to plunge in price, increase in processing power, and add information storage. Significantly, these changes make it possible to let terminals become multi-purpose (the cell phone can become a rival for a personal computer and an iPod), rapidly specialized (the emergence of an iPod phone is predictable), and capable of either bridging network platforms (combined WiFi-3G phones) or altering the behavior of platforms (sophisticated recording devices for cable television that allow customers to watch television programs when and where they wish). Moreover, devices are rapidly becoming always on and capable of adding major value to the network.

The changes in terminal devices permit a *deepening* of the reach of the network by making its end and originating points much more ubiquitous and largely outside human oversight and operation. Like all technology edges, it is unclear how this will develop but the fundamental forces are identifiable and define many of the key changes expected during the next twenty years.

One key change is the growth in extremely inexpensive specialized radios. Radio frequency identification devices (RFIDs) for tagging merchandise have driven economies of scale for these micro-radios to a price of about 10 cents per unit. A price of one penny per unit is on the horizon. Although their range is limited, they can serve as feeders into the ubiquitous, backbone mobile networks of the future.¹² The second significant change is the growing number of sensors that can be placed on a single chip. For instance, air quality monitoring technology used to require \$400,000 computer stations; 10 cent computer chips will soon perform the same function. Homeland security systems, such as monitoring the atmosphere for biological terrorist weapons, are accelerating spending and deployment of this range of technologies.

The intersection of these technologies, combined with Grid-style systems, means that massive data collection, monitoring, and analysis operations can operate routinely to do

¹¹ The “Web 2.0” features mashups that use content from multiple sources to create a new service. This is easier to do with new open APIs, RSS, and asynchronous Java than old one-off programming of database and website. Examples can be found in the list at www.programmableweb.com and <http://googlemapsmania.blogspot.com>. Aline van Duyne, “The mashups will let companies get creative with data” *Financial Times*, September 5, 2006, p10.

¹² A RFID’s average cost is currently 20 cents and going down to 10 cents by 2007. RFIDs allow ships and planes to be treated as moving warehouses because of precise knowledge about the time and place of inventory. The next break will occur when RFIDs are cheap enough to put on food items, for example. Also, due to less expensive information networks, featuring innovations like RFIDs, smaller firms can now run global supply chains using companies that can outsource this function. “A Survey of Logistics,” *Economist*, June 17, 2006, p. 17. We have learned about the one-cent goal in interviews.

everything from guiding environmental controls through personal medical treatments. Researchers already imagine monitoring devices in a person that yield continuous data streams that permit the creation of truly smart, individual profiles of medical conditions in a person. These profiles can both guide automatic alerts for visits to physicians or even lead to release of capsules of implanted medicines in the patient. Economists already suggest that the capacity to deploy inexpensive and powerful networked applications on this model will be critical to saving large sums of money for health care in the United States.¹³ In short, in the future complex IT solutions will be able to break out of their clustering in large office and research buildings to truly distributed purposes, such as guiding farmers in the fields when deciding on plowing and fertilizers.

A further implication is the change in network traffic. Data already constitutes a much larger use of the network than voice. Yet, much of the data usage, including the new surges in peak demand tied to peer-to-peer media applications, is tied to specific human requests for data. The implication of deepening is that machine-to-machine traffic, tied to grid computing networks and massive numbers of remote sensors, will soon become the dominant traffic flow on networks.

Changes in the global production system reinforce these technological trends in five ways.

(1) The growing importance of hardware that has proprietary technology but cannot leverage this into general control over a technology platform. This is the story increasingly associated with high-end computer servers and routers. For example, Cisco does not have a platform for Internet routers in the same way that Intel once did for integrated circuits for PCs. Cisco has scale economies, rapid innovation of types of devices that support complementary hardware communities, and brand reputation (including for customer service). The leverage from its proprietary technology (its software code) over the rest of the market is limited because the interface between the router and other network functions and servers is open and modular.

(2) Reinforcing the first trend is the even larger role for sophisticated original design manufacturers who service end system producers like Ericsson and Motorola. The Taiwanese producers of laptop computers, chips and cell phones are one example. They are adding more design capacity over time.¹⁴

¹³ Robert Litan, "Catching the Web in a Net of Neutrality," WashingtonPost.COM, May 02, 2006, found at <http://www.brookings.edu>, accessed on September 6, 2006.

¹⁴ Mobiles surpassed fixed connections in 2003 with 1.4 billion in use and selling over .5 billion units per year. Mobile operators seek more control of customer and diminish the influence of the Big 3 suppliers (Nokia, Ericsson and Motorola) in the \$70 billion market. The Big 3 were specialists who dominated complex design and mfg business but now "Original design manufacturers" are weakening this. The ODMS leaders are BenQ, Arima and Compal of Taiwan, which supply Ericsson, Motorola, Siemens-Sony and Toshiba. The market share of ODMS grew from 9 percent in 2002 to an expected 30 percent in 2005. Customized ODMS phones for Orange allowed tighter hardware-applied service integration for Orange in France and raised revenues by \$18 per month. ODMS are also giving Microsoft a way to circumvent the Symbian operating system backed by the Big 3. However, mobiles are more fashion oriented than PCs and have key open standards at the network layer. Therefore, as the Economist points out, the industry may be heading to a model like the automobile industry where a "system integrator" (Honda) combines horizontal layers of value added and there is no dominant player in any layer.

(3) A growing trend is the marriage of ever more powerful computational devices using standard packet architectures to service applications built on relatively open software standards. This is what the marriage of routers to VoIP software is already achieving. This will increase the pressure on traditional producers of network equipment, which relied on profits generated from network lock-ins, to declining role of platforms for hardware.

(4) A fourth trend is the continued growth of highly specialized, proprietary technology shops that essentially design components for systems producers and systems users. These companies do not control platforms but they control pieces of systems with fast innovation, deep intellectual property, and extreme specialization. Some of them are pure specialist firms, like Qualcomm, and others are divisions of bigger conglomerates, like Samsung's operations on large display systems.¹⁵

(5) A fifth trend is the weakening of barriers to entry to writing massive software code for large-scale applications in general use. The rise of gigantic web services like Google has opened up the economics of writing large-scale software platforms for commercial purposes as a byproduct of developing massive software programming for their specialized web functions (such as information search and storage). Until recently only those firms controlling relatively large, closed platforms (notably, Microsoft in recent years) could do so. Open source software has further reinforced this decline in entry barriers in writing massive code.

B. The Economic Context for the Third Stage

The implications of the deepening for the communications, media, and information services markets could be tremendous. There already are some early indications of the major shifts in the markets. The first shift is mentioned most often. The rise of a true IP network and broadband mean that service convergence is approaching. The major competitors in networking all are evolving single packages of wired, wireless, and video services. One consequence is an acceleration of the ease of substitution among modes of exchanging information, including email, voice, IM, and video sharing.

The advent of IP broadband networks combined with all purpose, digital appliances (whether desktop computers or cellular phones set up for television) also weakens the control of rigidly structured, terrestrial and satellite broadcast networks or cable television networks, including the assumed dominance of point (network headquarters) to multi-point distribution and content models.

Economist, "Special Report: Mobile Phones-Battling for the palm of your hand," May 4, 2004, pp 71-73.

¹⁵ Qualcomm is a purer example than Samsung because it does not also sell end product systems. Qualcomm is more like a Bell Labs that has created a successful strategy for converting technology into revenue. It combines leading edge technology with contracts for specific innovations provided to equipment system suppliers and telecom companies. It collects its revenues by licensing on standard terms to all. It further creates revenue from this knowledge and speeds up the ability to deliver innovations by building radio chip sets using the capacity of chip fabricators headquartered in Asia (especially Taiwan). These sets are sold to end system manufacturers.

Broadband IP architecture has two other implications—major changes in pricing and geographic segmentation of the market. The most immediate is the collapse of the pricing structure for traditional telephone services. The long-distance market for domestic calls is quickly becoming a residual wherever competition and government rules permit it. The marginal cost of long distance (beyond specialized billing and marketing costs) is close to zero. VoIP is one method of making this point clear. By operating as a data service VoIP arbitrages the remaining legacy costs of older telephone networks (including their marketing and labor costs) and it can avoid the various cross-subsidies included in long-distance prices that are ordered by government regulators.

Cellular phone systems in the United States already have a single bundle of local and long-distance services, and local phone services, spurred on by new deals offered by hybrid cable telephone services, are rapidly doing likewise. The impact of this further collapse of phone pricing is profound because voice remains the largest revenue generator for networks. The introduction of third generation, IP-based networks for wireless will move this pressure into the mobile wireless space. This poses a deeper crisis for older carriers and governments because margins on cellular subsidiaries were propping up the business cases for the older carriers.

The decline of the geographic segmentation of many markets is the other implication of broadband. Smart terminals are beginning to transform the media industry. For example, the TiVo, the most sophisticated digital video recorder, makes it easy to “time shift” programming and allow asynchronous viewing by recording programs for watching later. Moreover, TiVo makes it easy to eliminate commercials, thus changing standard broadcast economics in a market like the United States. When the TiVo is joined to the “SlingBox,” geographic boundaries for broadcasting also decline. The SlingBox allows a remote PC on a broadband network to download programs from any TiVo, thereby allowing a viewer in New York to watch local baseball games in San Diego. This makes many program syndication and advertising models for the media business obsolete because they rely on running the same programs and charging for separate ads in multiple geographic markets. Similarly, in the world of communications, the rise of VoIP with true global numbering will allow the provision of much of the value-added in voice telephony to be organized by global companies like Skype.

A second major shift of the deepening is the potential for very new, including niche, content markets due to lower barriers to entry for massive software, broadband, and much lower costs of information storage. The mass consumption market is an example of this phenomenon for two reasons. First, the emergence of the mass consumption market allows a new set of lead users which can co-invent digital applications. Second, it shows how the Chris Anderson’s Long Tail thesis, normally applied to marginal recording and movie properties that sell in larger numbers due to e-commerce, also applies to language pools. For example, the role of national markets with smaller language pools like Korean can change in the future. Korea has one of the largest on-line web and gaming providers.¹⁶ The quality of these software games is a rival to

¹⁶ 18 million South Korean subscribers, or 40 percent of the population, subscribe to SK Communications’ Cyworld. It is estimated that more than 90 percent of all users in their twenties are registered on Cyworld which reported sales of \$168 million (won 160 billion) and a

Hollywood movies. Although its success in other countries is uncertain, scale economies no longer make it impossible for Korea to become an exporter of this web and gaming experience to English language markets.

More fundamentally, broadband networks make alternative programming and social communities possible. On-line gaming already surpasses Hollywood movies in revenues and customers. It is an alternative to television. On-line gambling also is a growth market. Moreover, user generated content is becoming easier to share and build social networks around the content.¹⁷ The growth of web sites like YouTube is propelled by millions of viewings of amateur programming (such as home video clips and rock music videos).¹⁸ In October 2006 Google offered \$1.6 billion to purchase YouTube, a stunning indication of the power of this blend of multimedia and social networking.¹⁹

The third consequence of the deepening is the growing impact of what economists call “multi-sided” platforms. A multi-sided platform serves two or more distinct types of customers which are mutually dependent and “whose joint participation makes the platform valuable to each.”²⁰ Network externalities are direct (more users of the Palm makes it more valuable to both users and the programming community dedicated to the Palm) and indirect (cheaper computer

profit of \$21 million in 2005. It generates 80 percent of its revenue from sales of digital items used to decorate its members’ home pages. Unlike US sites it does not depend solely on ad revenues. It has already launched ventures in China (2 million subscribers since the launch in June 2005) and Japan. It is just launching in the United States and Taiwan, and has joint ventures to enter the rest of world in SEA, SA and Europe. Global expansion requires partners and customization. T-Online is its German partner. Customization of the avatars and navigation tools are necessary for U.S. market. Song Jung-a, “Korean site tackles might of MySpace,” Financial Times, September 1, 2006, p.16. Chris Anderson, The Long Tail New York: Hyperion, 2006.

¹⁷ 79 percent of US Internet users (100 million) already use social network sites, especially MyFace and Facebook. The Korean market is about saturated but US market is growing at 45 percent pa. Ibid, Song Jung-a in Financial Times, September 1, 2006.

¹⁸ YouTube had over 83 million unique visits in July 2006, an almost 2200 percent increase over July 2005. The second largest site for video was iTunes with about 56 million visits, but a much lower growth rate annually. Jonathan Birchall, “Wal-Mart sets stage for digital action,” Financial Times, September 13, 2006, p.17.

¹⁹ Moreover, even traditional television programs devote much more time to supporting user forums where community content about the show begins to become part of the value of the show. Fan magazines are not new, but the ease and scale of consumer feedback and complementary programming are radically new.

²⁰ D. Evans, A. Hagiu and R. Schmalensee. A Survey of the Economic Role of Software Platforms in Computer-Based Industries,” RIETI Discussion Paper Series, 04-E-032 (September 2004).

printers make PCs more valuable to users and more PCs expand the value of the printer market). Windows, for example, is a three-sided market because the software platform is deeply interdependent with application developers, end-users, and hardware producers. The key implication of these multi-sided platforms is that pricing is optimized across the several sides of the platform. Some pieces of the platform may be priced below cost or subsidized because it is more profitable to charge more on other segments.²¹ This strategy can increase revenues and maximize the collective value of the platform for all stakeholders.

VoIP may be provided free, or close to free, because a Web provider may find the traffic, customer base, or complementary uses of VoIP to be worth free provision of VoIP. This was the logic of eBay in buying Skype. Some speculate that Google will build free communications networks in key cities to generate first contact with broadband wireless users who can then use its various search services, such as ads tied to Google Earth. Similarly, the legacy telecom giants might find it attractive to raise the price of underlying broadband data capacity in order to allow more flexible (and cheaper) pricing of the services offered over broadband.

A fourth implication follows from the economic struggle over controlling the boundary of the network. The Grid makes information storage into part of the network, but deepening also means that the boundary between the network and the software applications on the network are blurring. As noted earlier, Cisco has VoIP ride on its routers as a software application, while IBM mainframes harness communications capacity as they provide software solutions for end customers. More modestly, companies like Salesforce.com provide networked software services and the servers used to deploy them as their core business strategy. Salesforce.com commoditizes the network and computing in order to build value around the applications layer where it is deploying a programming language to allow firms to build customized, on-demand business applications.²²

The Salesforce.com example also illustrates a fifth implication of the deepening, the new role of selective vertical integration. More modular technology in hardware and software makes it cheaper and faster for a competitor to define a vertically integrated approach to a particular market segment. Consider the case of iPod. iPod could easily be a multi-sided platform but a strategy decision has led it to be one-sided because Apple vertically integrates all of the value-added from the website through the hardware device. The purpose is to provide an end-to-end experience in a market segment that is slicker and easier than any rival using a several sided platform. This strategy is possible because of the general technology direction of this new era—broadband, inexpensive skilled makers of components, and modular software. Interestingly,

²¹ Microsoft Windows was a multi-sided platform but Windows, according to antitrust allegations, had an essential facility that gave it power over others, the incentive to exploit this advantage and an active strategy to profit from the centrality to the platform. Undoubtedly, strategic bargaining occurs in such situations. But, as with championship basketball, within some constraints it is expected that physically aggressive play (“sharp elbows”) is part of normal play. The question about Microsoft is whether it went beyond the level of “sharp elbows.” This is a fair question, but it is not the focus of this paper. The point is that the technology direction of the current era reduces the opportunity and incentive for such conduct as a general phenomenon.

²² See <http://www.salesforce.com/landing/apex.jsp>. Accessed October 9, 2006.

iPod makes its money on the hardware, not the software or services, despite the business press' assumption that hardware is just a commodity.

The corollary implication of the deepening is the fragmentation of the value propositions in a more modular technological environment. Therefore, it is difficult to extract large sustainable rents from control from any segment. The case of iPod is again instructive. This technology milieu makes it difficult for iPod to create a platform to leverage into broader dominance. There are reasonably close substitutes available that could come into play if Apple makes mistakes on pricing or product. Moreover, even while iPod's software makes it impossible for alternative formats (MP3) to interconnect and its currently dominant position creates network effects (iPod users benefit from more swapping opportunities as the iPod user pool grows) there are other on-line media experiences not dominated by the iPod world, as demonstrated by the growth of YouTube.²³ Similarly, even as the building blocks for large software become modular and open at the interface level, the power of Grid style computing allows more ambitious software solutions involving much larger databases supporting complex business simulations to reinvent business processes. These solution packages represent forms of vertical integration from enterprise data through end services that may have staying power for vendors, but whose specificity does not make them general platforms.

Consider the situation of telecom carriers which still control bottleneck local transmission facilities. Despite this control, prices of voice packages are dropping and likely will continue to do so due to substitution among modes of communications and the importance of multi-sided economics. Similarly, Google is a dominant search engine with the largest information storage resources on the Web. However, the ability to convert this into a competition problem requiring policy intervention is more doubtful in an age where modular software allows easier deployment of mash-ups with specialized search capabilities.

The potential for competition problems remains less acute, but is not entirely absent. Indeed, in the late 1980s the US cable industry locked up control for significant programming content. The FCC had to order the cable industry to make its programming available to satellite broadcasters on non-discriminatory terms in order to create a competitive broadcast infrastructure. Similarly, in 2006 the UK regulator (Ofcom) is investigating concerns that Sky TV's control over sports programming may block growth of the cable infrastructure.²⁴ (The

²³ This integration creates network effects and lock-in. Even cheating on digital rights management is easier within iPod to iPod transfer world. It will take a technological or business model shift to knock off such a dominant (80 percent of digital music in the United States) leader. Ad service, such as Universal's SpiralFrog, is one approach but you must renew downloads monthly on Universal system. MySpace is a social network model that could be another avenue for entry. Sony is using Playstation to attack through provision of a better video screen. And Asia is seeing growth of mobile phone music system that Apple may enter through the cell phone. Richard Waters: Apple's sound strategy can keep the iPod as number one" Financial Times, September 2-3, 2006, p. 7.

²⁴ I thank Robert Pepper for pointing out the parallel between the Ofcom and FCC concerns.

difference from the story of iPod's control over content is that iTunes does not have exclusive licensing rights to the original music content.)

In short, the deepening does not end competition problems, but it may temper their likelihood and their impact. The telecom network industry still has the potential for oligopolistic behavior that could harm consumer welfare, including the pace of technological innovation. This is especially true if truly competitive networks based on wireless technology do not evolve in a timely way or if they remain very restrictive in how they handle access to web sites and content. And we need to be sensitive to the possibility that the control of content may block competing infrastructures under some circumstances. Still, there is enough change in the character of the technology that much more focused and selective regulatory intervention may be possible.²⁵

III. The Political Economy of the Third Policy Shift

The direction of technological change is clear, but it is unclear who wins during the transition. This issue goes beyond the fate of commercial competitors to consumer welfare and the prospects for faster economic growth through stronger innovation. It has implications for the distribution of gains across national markets. In addition, how will the precise mix of the transition work out? Knowing that computer networking would be transformative in the 1980s would not have predicted a world of strong web portals and the collapse of the long-distance market. Regulatory policies and evolving business models have influenced the path of change.

The balance of this essay focuses on the political economy of the regulatory decisions that will influence the ways in which the deployment of networks will shape the path of change, and its distributional impacts. The goal is to explore the political economy that will influence the incentives of policy-makers, not to focus on the best policy choices. I focus on the United States to keep the analysis tractable. First, the institutional context of government decision-making in the United States is examined because institutions shape how preferences are aggregated and bargains are played out. Next the focus turns to changing positions of key interest groups. This leads to conclusions about the trajectory of policy change.

A. The Institutional Context

The U.S. political system has three features that are salient to the setting of communications policy—the division of powers, the majoritarian electoral system, and federalism.²⁶

²⁵ Joseph Farrell and Philip Weiser, "Modularity, Vertical Integration and Open Access Policies," *Harvard Journal of Law and Technology* 17 (2003); Eli Noam, "How telecom is becoming a cyclical industry, and what to do about it," Working Paper, Columbia University, June 28, 2002; Martin Cave et. al, "Where are we going?"

²⁶ Peter Cowhey and Mathew McCubbins, eds. 1995. *Structure and Policy in Japan and the United States*. Cambridge, MA: Cambridge University Press.

The division of powers in the U.S. Government was designed to make it difficult to initiate major policy changes but also difficult to undo major commitments quickly. The division between the President and Congress (as well as the division between the two chambers of Congress, one of which is based on population and the other on representing the individual states) creates many points in the decision where an initiative can be stopped (a veto point in the language of political science).²⁷ This hampers the passage of major changes in laws which have sweeping geographic consequences and a wide range of winners and losers. Thus, only two major U.S. telecommunications laws passed since 1900, the 1932 and 1996 congressional acts. This means that much of the decision-making about federal policy resides at the FCC which is charged with the implementation of the acts.

The inherent conflict between the executive and legislative branches also means that Congress is less willing to grant the kinds of discretion to executive bureaucracies that are found in parliamentary democracies (where the division between the executive and the legislature is fuzzier). In some areas Congress recognizes the need for substantial amount of expert bureaucratic authority like the FCC to deal with complicated issues where many of the detailed political costs and benefits are hard to reckon, Congress then uses a variety of devices to delegate power to the bureaucracy with specialized controls.

In the case of the FCC Congress confirms the Commissioners nominated by the President and stipulates the division of political representation of Commissioners (a 3-2 split with the President's party holding the majority and the chairmanship). This replicates the political sensibilities of the major parties within the majority voting system of the Commission. Commissioners normally have a narrower range of ideological divisions and a more technocratic mission than Congressional; they introduce an element of political sensibility into the Commission's work. Congress also is willing to threaten to use its budgetary powers to instruct the FCC on certain matters. For example, Congress instructed the FCC not to use public funds to create rules to auction communications satellite spectrum. Similarly, the Congress requires elaborate procedures to assure transparency in decision-making so that all of the key interests will have access to the decision process. It allows Congressional members to observe the process with an eye to its politics, and to attempt to influence the Commission if there is a compelling political interest.²⁸ These elaborate procedures complicate the ability of the FCC to focus on competition problems once they arise and constrain the Commission's flexibility. Thus, the FCC focuses more on writing elaborate "ex ante" rules than on ad hoc solutions once competition problems are identified.

²⁷ George Tsebellis, *Veto Players: How Political Institutions Work* (Princeton: Princeton University Press, 2002).

²⁸ A final form of control over the FCC is the division of some of its powers with other branches of the government. Here the most important is the shared power over competition policy with the Antitrust Division of the Justice Department. Given the strength of U.S. antitrust laws, both political parties are sensitive to the possibility of the rival party politicizing competition policy if it controls the federal government. As a result, the career officials in the Antitrust Division enjoy a relatively high level of protection from routine political oversight. Decisions on the general criteria for when to prosecute are subject to guidance by a political appointee, but the White House is generally circumspect on antitrust matters. The shared power of Justice and FCC over telecom mergers leads the FCC to be careful not to conflict with Justice.

The net result is a FCC that is responsive to Presidential and Congressional politics, but legally empowered to make important discretionary policy (subject to judicial review for its adherence to a reasonable reading of the underlying law) based on its analytic judgment, the evidence on the public record developed in each procedure, and an instruction to use this discretion to serve the public interest. These expert and transparent, but politically informed, decisions can shape market dynamics.

A second feature of the U.S. political institutions matters for shaping policy. The Presidential and Congressional election system is based on winner take all voting. Analysts of electoral systems have shown that this voting system builds a strong interest in “brand identity” for political parties. For all of the role of lobbying and campaign contributions, parties invest to develop a reputation by policy initiatives on broad issues that they think will mobilize elite and mass electoral support.

Telecommunications policy has long influenced the high technology industry and research communities. It achieved broad political salience to the voting public in two ways. First, there was continuing sensitivity to telephone pricing, and now broadband pricing, as a matter of equity. Second, it was part of the broader debates over economic policy, including the debates over “deregulating” the American economy and the creation of the “new or Internet” economy to stimulate growth. For example, the Clinton administration highlighted its telecommunications policy to polish its reputation as pro-competition and pro-innovation Democrats.²⁹ It bragged about early U.S. leadership in the world about mass adoption of the Internet. Similarly, the Bush administration worried about the potential embarrassment of America’s lagging position on deployment of broadband.

The final feature of the institutional context is federalism, the division of authority between the federal and state governments. The U.S. Constitution reserves all powers for the states that are not given explicitly to the federal government. Moreover, the U.S. Senate allots two representatives to each state. This increases the power of low-population farm and mining states at the expense of the large, urban centered states. Federalism matters for telecommunications policy directly and indirectly. It has a direct impact because the subsidy of rural communications users and providers is a powerful constraint on all regulatory policies influencing pricing and competition. It indirectly matters because federalism also provides a precedent of strong competition policy. State authorities used competition policy to shelter local competitors from national competitors that had various advantages over them. Their Senators tended to be wary of nationally dominant firms. The result was an American economy with broad geographic scope for its competitive firms and far less concentration in its key industries, including telecommunications and electronics, than its counterparts in other major countries.³⁰ As the next section explains, this had profound implications for telecommunications policy.

²⁹ Reed Hundt, You Say You Want a Revolution New Haven: Yale University Press, 2000.

³⁰ Peter Cowhey, "States and Politics" in American Foreign Economic Policy," in John Odell and Thomas Willett (eds.), Blending Economic and Political Theories (Ann Arbor: University of Michigan Press, 1990).

B. The Political Economy of Telecommunications

The first two stages of policy changes in the United States unfolded faster than in the rest of the world because economic interests and political institutions aligned to expedite a particular path of change. Briefly, there never existed a firm legal basis for the AT&T monopoly, and many smaller telecom carriers remained, especially in small states and rural areas. In addition, many electronics firms rivaled AT&T and lusted after the supply business for American telecommunications networks. The growth of computer networking provided a powerful set of motivated allies to this traditional discontent with AT&T's dominance.³¹ The "corporate competition coalition" consisted of computer companies that wanted to create customized computer networks, smaller vendors of electronics equipment, would-be resellers of basic phone service to specialized large customers (seeking volume discounts and customized service packages for internal private networks) and the large corporate clients and government agencies that were eager to take advantage of these options.³²

The path to competition allowed new winners while protecting rural constituencies. The introduction of value-added competition for computer networks, private corporate telephone networks, and terminal equipment was still a small part of the market and satisfied the competition coalition. The FCC and state regulatory commissions enforced elaborate pricing and cross-subsidy rules to assure that the changes would not distort local service pricing.

The combination of slow economic growth and high inflation in the late 1970s propelled deregulation of public utilities into the presidential and congressional political agendas. Both parties saw deregulation as a way of showing their intent to revive the American economy. Renewed antitrust action by President Jimmy Carter led to the court decision to break up AT&T. Although neither President Reagan nor Congress celebrated the decision, neither did they overturn it because it was seen as a politically risky form of favoritism to monopoly. It also quickly became obvious that the form of competition mandated by the court (long distance competition by the new AT&T and monopoly phone services for the new Bell Operating Companies) was consistent with protection of local and rural telephone service pricing. The FCC could mandate cross-subsidies from long-distance carriers to local phone monopolies while still allowing competition to lower long-distance pricing and improve services. Lower long-distance prices appealed to the middle class that tended to vote more than other Americans. And, network competition appealed to the corporate competition coalition.³³

³¹ See Cowhey in Odell. Peter Cowhey, "States and Politics" in American Foreign Economic Policy," in John Odell and Thomas Willett (eds.), Blending Economic and Political Theories (Ann Arbor: University of Michigan Press, 1990).

³², Peter Cowhey. The International Telecommunications Regime: the political roots of regimes for high technology. International Organization 1990, 44: 169-199.

³³ All of the major telecom carriers, including the new entrants, were unionized. So, a decline in employment at AT&T was partly offset by new employees at firms like MCI. This reduced the resistance of organized labor, a major constituency of the Democrats.

The introduction of 2nd generation wireless services opened an opportunity for more competition favored on a bipartisan basis. More competition promised better prices and services for consumers, a political benefit, and the largest telecom carriers and equipment suppliers were eager to have a major new national market in which they could grow. The question was, how? Policy experts in both parties favored auctions as a more efficient way of assigning spectrum licenses. But they succeeded because national spectrum auctions had the political benefits of promising to reduce the federal budget deficit by raising large sums of money.

The split between AT&T and the Bells created an impasse where, to a large extent, the Democrats lined up with the long-distance carriers and the Republicans sided with the Bells (because Republican strength was greatest in the West and the South where rural areas were important). The Internet and the Web triggered the next boom in communications and IT investment, and all of the major corporate players wanted to better position themselves.³⁴ The 1996 Act allowed the Bells fully into long distance and data once they showed they had opened their territories to competition for local services through measures like resale of their services at wholesale rates or leasing of network elements to rivals at long-run incremental costs. The Democratic FCC interpreted the Act to call for strong interconnect obligations for the Bells, provoking consternation from the Bells and the Republican Congressional delegation. Many economists also were wary of major government regulation, because they worried that the terms for interconnection could discourage investment by the Bells and perhaps induce inefficient, subsidized entry that used unrealistically priced facilities of the Bells.³⁵

When the Republicans captured the White House in 2000 they controlled both branches of government. This increased their ability to exert coordinated pressure on the FCC and to install leadership with more conservative views on economic intervention. They also explored legislation. But the Commission's considerable autonomy meant that wholesale turnarounds came slowly, especially because the Commission would have to create a public record that would stand up in court challenges to justify a change in its views. Furthermore, elements of the corporate competition coalition still strongly supported measures to maintain or increase network competition, especially the provision of new broadband wired and wireless networks. Therefore, Republican policymakers sought a synthesis that could show competition among network infrastructures was vigorous while providing relief to the Bells. They also needed a response to lagging American performance on the deployment of broadband compared to other major countries.

³⁴ Despite grumbling from the Republican Congress the FCC used its discretion to institute a new fee for telecom services to fund the establishment of Internet access to schools, libraries and hospitals. This was a deliberate decision to meet the political demands to keep service widely distributed to all areas, but the Democrats designed the subsidy so that it went as much to poor urban neighborhoods as it did to rural areas.

³⁵ Thomas Willett, "The Political Economy of Cable 'Open Access'," AEI-Brookings Joint Center Working Paper No. 00-09 (2002); Jerry A. Hausman and J. Gregory Sidak, "Dis Mandatory Unbundling Achieve its Purpose? Empirical Evidence from Five Countries," December 14, 2004, MIT Department of Economics Working Paper No. 04-40.

The new synthesis looked to technological innovation to weaken concerns over network competition. This fit both political incentives and identified some elements of network deepening. The new policy synthesis began with two established developments. The first was the strong competition in backbone fiber optic networks for long distance and the major metropolitan business centers. Predictably, there were falling prices for both long distance and large business data customers. The second was the cable television's strong entry into telephone and broadband services for households and, to some extent, SMEs in the two-thirds of American households with cable connections available. This meant that, at minimum, there was competition in business and long- distance services and a duopoly in residential broadband in most areas.³⁶

The policymakers then addressed the remaining conspicuous difficulties for any proponent of weakening interconnection obligations for the Bells. In the backbone fiber market, even for business services, the means and costs of originating and terminating traffic remained a barrier to entry controlled by the local Bell operator. In addition, the broadband market for SMEs and households was, at best, a duopoly where, according to long established theory, there was a strong temptation for suboptimal competition.

Technological innovation provided the solution by trying to accelerate the deployment of new broadband wireless networks.³⁷ The vehicle of choice was FCC's pioneering work on introducing "spectrum flexibility."

The spectrum policy goals were to allow more efficient allocation and assignment of spectrum to prompt more innovation in wireless and broadband networking. One goal was to increase the amount of spectrum for unlicensed services so that technologies like WiFi or WiMax could be leveraged into "bottom up" broadband networks. Another goal was, to allow more flexible use of licensed spectrum by maximizing freedom to resell spectrum releasing more spectrum for use. This would allow market forces to redeploy spectrum, choose technology freely, and select services to be provided. Finally, this policy set the stage for the political agreement to release the valuable spectrum controlled by television broadcasters for reassignment by auctions, thus speeding the build-out of broadband third generation networks.

The promise of wireless broadband allowed the FCC to argue for policies that encouraged more investment in broadband networks by the Bells. In essence, the FCC permitted the Bells to drop their interconnection obligations for fiber broadband networks (thus matching exemption granted to cable television networks used for broadband) to give them incentives

³⁶ FCC estimates showed 42.9 million broadband subscribers as of June 2005 with about 38.5 million of the total in households. Cable modem networks had a 61 percent market share. DSL accounted for all but 1.8 percent of the rest of the connections for households. Bernstein Research, "Weekend Media Blast #19: Low-Key Data on High-Speed Data," May 12, 2006

³⁷ Other technologies, such as the use of electric power lines for communications transmission, were also highlighted but had nothing like the same commercial focus as wireless.

build out faster while retaining strong interconnection obligations for traditional telephone networks. The Bells promised this would benefit broadband in low population areas.

The political economy of this policy sequence reinforced the politics of the Republican majority. It also altered the politics of the traditional corporate competition coalition after 2001 by which time the competitive local exchange carriers had mostly collapsed. It is tied to the technological direction of network deepening in two ways. First, the encouragement of new technologies and entrants using spectrum policy goes to the core of American political economy. The economics of production eases new entry into specialized technology ventures for wireless networking. The substitutability among network applications also meant that gaining entry into data was equivalent to gaining a vantage point in voice and multi-media. So, business plans could envision large end service markets served by a hybrid mixture of networks and technologies. Second, the spectrum policy rallied support for equipment vendors interested in cross-entry from the wired to the wireless markets. This was highly attractive to Cisco and Intel which invested heavily in equipment for unlicensed wireless markets.

Politically, this approach appeared to Republicans as a technological version of “supply side” economics that emphasized less government control to stimulate growth and investment. By emphasizing spectrum policy the hope was to open up new spectrum for use and make its deployment more flexible. Thus, this was more analogous to opening new territory for expansion of the network than to redistribution of advantages among well established enterprises. This political calculus appealed to the Republican administration. Spectrum policy reform appealed to Republicans who wanted to court the “geek squad” that played such an important role in American discussions about CIT. Participants in meetings on spectrum policy recognized the elements of do-it-yourself entrepreneurial energy sparked by the idea of deploying unlicensed networks guided by technology enthusiasts. The supply-side approach could be spun as the Republicans embracing market driven innovations to networking. (In 2004 these same technology entrepreneurs, recognizing that the US still lacked massive new alternative networks, often advocated network neutrality rules.)

Second, many IT industry leaders and large corporate users pulled back their support for a strong set of interconnection rules. This went beyond tacit or explicit acquiescence to the roll back of interconnect rules coming out of the 1996 Act. It further surfaced when they hedged their bets on the debate over “network neutrality” rules that proposed to require flat-rate pricing of data services to ISPs and websites. Such flat rate pricing for data transmission was a hallmark of FCC policy when dealing with dominant carriers since the advent of the computer networking era. Although there is no consensus, this suggests that many IT suppliers and large users no longer believe that control of the network infrastructure opens up opportunities for leveraging control over the applications on the networks or inflating prices.

In contrast to firms focusing on large corporate customers, companies focusing on the mass consumer market for CIT, like Google and Yahoo, remain worried that differential pricing or tiered pricing for those demanding more bandwidth will hamper the growth of the mass market. But, interestingly, they are more ambivalent about calling for reductions of the control

of mobile wireless carriers over the on-line experiences on their networks. Yahoo and Google have been signing deals with these carriers to be preferred portals or advertising partners.

Despite the shift in positions by the corporate competitive coalition there are still signs that it worries about the fundamentals of inter-networking involving the rights for “peering” (the terms on which two networks connect and exchange traffic) and what might be called rights of “value-added interconnection.” They do not want major networks to prevent non-discriminatory peering, especially on quality of service and security. They also want clear rules that forbid discrimination against interconnection to content or web sites. In addition, value-added services (e.g., network caching services for e-commerce firms using proprietary software architectures or VoIP) could not be discriminated against. They also want to guarantee the right of users to choose the appliance or devices attached to the network, a freedom that is essential to innovation led by intelligence at the edge of the network.³⁸

There is also no discernible sign of change in the U.S. commitment to technology neutrality on network development. Picking winners remains politically difficult and intellectually suspect among scholars of economic policy. Equally important is the continued strong support for national R&D policies that are deploying experimental ultra-broadband networks (like The National LambdaRail network sponsored by the National Science Foundation) and experiment with massive deployments of radio sensors. Note that U.S. expenditures on communications and information technology R&D are still much larger than other industrial nations (roughly double that of the European Union.)³⁹

Finally, content is an increasing fault line for policy and politics. Broadcast programming is one phase. Copyright management is the other.

Unlike most of Europe, broadcasting and multi-media policies in the US do not face the double burdens of divided regulatory authorities and cultural protection policies. Although U.S. spectrum policy requires coordination of the Executive Branch (on spectrum used by government agencies) with the FCC, there is no split between a telecommunications and a broadcast authority to hinder the development of spectrum and competition policies that permits coherence in the treatment of multi-media and traditional movie and broadcast content on broadband networks. The British also are well organized for this task. Moreover, the FCC has no mandate to protect American culture. Although it debates the merits of policies to encourage children’s programming, public decency, and news programs on television and radio, the Commission is indifferent to the source of programming (or languages). This reflects the dominance of English language programming internationally, but it also reflects the economics of 100 channel broadcast systems that want to provide all forms of niche programming. Because cultural

³⁸ Former Republican Chairman of the FCC, Michael Powell, set forward these goals as the “Four Freedoms” of networking. The fourth freedom was the customer’s right to obtain full information on the service plan.

³⁹ Simon Moores, “Opinion: Prepare for some 'digital tension' Europe squeezed by China and the US on IT policy,” posted on Wednesday 27 September 2006 at <http://silicon.com/management>

protection is not a major factor in broadcast policy it has not created a political platform for information services policy.⁴⁰ It would be difficult to imagine an American equivalent to the President of France declaring that the government needs to subsidize a national search engine in order to protect the order of French culture.⁴¹

The broader issue for the “deepening” is copyright and intellectual property protection. The strategic point is that the growth of “horizontal networking” where on-line user communities provide much of the original programming. For example, a significant amount of the content on “user community” networks involves elements of “remixing” fragments of content that is copyright protected. Finding a formula that allows for easy clearance of digital rights, reasonable fair use, and efficient charging and disbursement of fees for uses of copyright is especially difficult in the United States for two reasons. On the one hand, the entertainment industry is skilled at running high profile campaigns to argue copyright protection. On the other hand, the huge diversity of the US media industry has produced a major tangle of intellectual property that is hard to manage.

IV. Policy Conclusions

The U.S. is going through a period of policy change because the technological and political economic bases for policy are in transition. This section notes a few of the directions of the policy debate and it speculates about some of the ways that they may be resolved.

The deepening of the network means that everyone is looking for ways to bring networked applications into a broader part of personal, business and social processes. In the United States this will be done by a variety of competitive networks and network architectures (e.g., different bets on how to store information and provide networked services) even though broadband packet systems with more open interfaces are the common denominator of the varied approaches. These dynamics mean that at least five issues will be critical—how to deploy ubiquitous broadband, how to set terms for interconnection and peering among networks, how to

⁴⁰: EU Parliament is reacting to broadcast on the Net with alarm. There is worry about impact on Audiovisual Media Services directive. Television without Frontiers directive of 1989 was good way to ensure free flow of programs and broadcast while protecting consumers. New proposal may include online gaming and deliver of content to mobiles. Ofcom thinks that may include video-blogging and content on YouTube. May be heading to day of ads as downloadable specialized programs (cooking shows downloaded from food company website) but this directive would ban it. Kelvin Mackenzie, “A truly nonsensical law for television” Financial Times, September 6, 2006, p. 15

⁴¹: The Google plan to put English books on line was last straw for France’s President Chirac. He told his Culture Minister and the head of the national library to create a similar project for French books with a new search engine that rejects Google premise of ranking by popularity. Google currently has 74 percent of French market. The French effort will rely on a committee of experts for guiding search links. Economist “Google a la francaise” April 2, 2005, p. 45-46.

define rights of functional interconnection, how to deal with new forms of vertical integration, and how to set the management of intellectual property rights for networked content.

The deployment of ubiquitous (and inexpensive) broadband has already been the subject of extensive policy clashes. As noted previously, the Republicans have opted for a mix of trying to stimulate innovations in wireless networking and regulatory relief for the incumbent Bell Operating Companies. Whether or not this approach works initially, it may not achieve all that technology entrepreneurs seek. The deepening opens vast opportunities. If broadband extends everywhere and networked computing and information storage is powerful and cheap, then it is feasible to have so that personal medical applications and systematic monitoring of key infrastructures and environments anywhere. This goal is much more demanding than simply getting fairly slow (less than one megabit) broadband to all urban and rural residences. The deepening also will reward network attributes other than speed. Flexibility of the architecture, cost, quality of service, and expandability of capacity may also prove valuable.

A failure to stimulate rapid build-out will provoke another round of debate, especially if Democrats take Congress or the White House. This might result in an effort to create a public fund for build-out of network infrastructure that would be available for public bidding. Alternatively, it might strengthen pressure to find innovative ways to release more spectrum on more flexible terms. Here the divisions among IT firms may matter. For example, Intel has become much more interested in promoting flexible use of licensed bands (with the use of auctions to assign licenses) because its favored technology for integration with its chip architecture, WiMax, works best in the licensed bands.⁴² In contrast, purer content firms (like Google, Yahoo and Microsoft) favor unlicensed bands in order to reduce the cost and business complexity of using spectrum for new applications. This division may lead to a tendency for the lower spectrum bands (2.5 GHz and below) to still be dominated by licensed applications on a technologically neutral basis while the push for more unlicensed technology largely becomes focused on higher bands.

The logic of the deepening and the vast array of technology start-ups in the networking technology field will also certainly reinforce pressures to make sure that industry and government arrangements for designing networks of the future, such as standard setting procedures, assure freedom of technological choice. Thus, greater variety of inter-networked systems is likely a minimum feature of any consensus on future policies in the US. The logic of the deepening is that the competitive advantage of U.S. competitors is more likely to come from flexible combinations of the technological changes converging in the deepening.

Even assuming broadband deployment, there will be issues of interconnection and peering. Interconnection at a minimum addresses the terms on which networks may share network economies (e.g., the terms on which a competitor may lease capacity from a rival's network). Residual problems of oligopoly suggest that some level of regulatory oversight needs to continue. Peering goes beyond interconnect to the terms for exchanging traffic between networks. The importance of peering will increase with the deepening of networks because

⁴² Eric Sylvers, "European WiMAX-3G spectrum war brewing," International Herald Tribune, October 10, 2006, Accessed at <http://www.ihf.com> on 10/10/06.

networks will be used for more and more applications tied into everyday lives of people. The kinds of security and quality controls used by large corporate networks will not apply, but they will be desired. Thus, peering will go beyond issues of reciprocal compensation among networks for exchanging traffic to issues of which networks to exchange traffic with based on their meeting standards of security and quality of service. The challenges of peering rapidly become complex, and they are subject to strategic manipulation. For example, governments could use the rationale of security to impose requirements for disclosure of commercially valuable secrets related to network security or they might impose standards for security that are not competitively neutral. Or, a large telecommunications carrier might try to penalize a new carrier by arguing that it did not meet quality of service standards.

There is also an important continuing issue of what networks will permit in the way of functional interconnection. As a rule of thumb, the major wired broadband networks are more open to functional interconnection than are wireless networks.⁴³ It will be a continuing point of policy debate over the terms of this interconnection. As Part Three argued, however, there is strong demand by all segments of the information technology industry for rules that would guarantee non-discrimination on adding value to networks (such as VoIP or caching services), access to websites and content, and the connection of equipment to the network.

While interconnection and peering lead us to think about the intersection of two or more independent networks, the logic of the deepening is that it is easier and profitable to produce customized vertical integration for certain applications. More modular and powerful independent production and design systems facilitate the emergence of iPods. The logic of multi-sided platforms—how to jointly maximize the value of several different stakeholders in a platform---may lead to a firm turning to vertical integration to speed up innovation and produce a tightly integrated design. When such a product dominates a market segment, do we think about it having market power in the same way that we thought about the market power of IBM or NTT in the 1970s, or of Windows and Intel in the 1990s? The logic of the deepening is that proprietary technology or vertically integrated systems have much less leverage over related markets than in prior technology eras. But leveraging is harder, not impossible. And the political economy question of how leverage influences the interests of competitors will remain a major issue. This is especially the case because there are indications that countries outside of the U.S. are very sensitive to the fact that American firms, operating in a flexible market rewarding fast early adoption, often control these kinds of technologies.

Finally, the logic of the deepening is that networked information services will become more central to all parts of our lives. The combination of information and applications raises huge questions about intellectual property that is only in its earliest stages of political resolution. The strengthening of traditional intellectual property in the copyrighted media was one short-run reaction to challenges of greater opportunities for impinging on intellectual property in a digital world. But this also posed problems of making the creative re-use and adaptation of intellectual property even harder and more expensive. Clearly, neither the pricing nor the transaction systems for intellectual property markets are efficient. Right now, the common interest of the

⁴³ Tanja Storsul and Pal Sorgaard, US Mobile Operators and their Content Services, Research and Development Note 12/2005, Telenor.

CIT industry in protecting its intellectual property makes it tread carefully on undermining the claims of pure content companies. But the CIT industry's interest in creating new application markets that fuel expanded demands for CIT products and services is very strong in the long-run. Therefore, this will continue as one of the biggest issues on the policy agenda.

In conclusion, the United States is moving to a third policy era. Its outlines are not yet clear. There are both major analytic issues to be resolved and issues of political economic bargaining that remain very much unsettled. But the disruptive impact of the technological changes involved in network deepening mean that there will be a strong push for policy to permit a more flexible world of networking and information services. Government will still play a significant role in the markets, but the common denominator of all of the policy positions is to facilitate more experimentation with the convergence of these technology innovations.