Introduction: Special Issue on Telecommunications Policy and Strategy

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This special number of \textit{Industrial and Corporate Change} explores issues facing telecommunications industry managers and regulators. Its publication, emblematized by the distinctive cover, initiates an ICC policy of producing one special issue per year devoted to telecommunications and marks its evolution into a regular quarterly publication.

The papers in this special issue represent research discussed at the first conference of the Consortium for Research on Telecommunications Policy, held in Ann Arbor, MI during March 1995. The Consortium sponsors research that will advance our understanding of the relationship between telecommunications policy and corporate strategy and, in turn, will help policy makers and managers make effective decisions. The Consortium has research nodes at the University of Michigan, Northwestern University, the University of Chicago and the University of California. The industry advisory board of the Consortium includes senior managers of telecommunications companies and institutions in the USA, Canada and Europe. Douglas E. Van Houwelling, Vice-Provost of the University of Michigan, chairs the Consortium. Financial sponsorship of the Consortium comes from the Ameritech Foundation and various other sources.

The papers in this special issue discuss institutional issues that affect cost and innovation in the telecommunications sector. Since the development of the telegraph and telephone in the 19th century, telecommunications technology has both aided individual consumers and contributed to economic growth. Advances in cellular, microwave, facsimile, satellite, switching, signaling, terminal equipment and other telecommunications technology are now transforming our economies, societies and polities. Several papers in
this volume discuss and quantify the impact of telecommunications investment and innovation on past economic growth.

Recent advances in wireless, fiber optic, digitization, multimedia software, interactive television, network management, broadband transmission and other technologies promise spectacular progress in our ability to communicate, exchange data and use new services throughout the world during the first decades of the 21st century. In order to realize the benefits of this, public policy and corporate strategy must undertake major institutional initiatives. The initiatives involve both regulatory approaches and organizational boundaries. In addition to discussing the impact of telecommunications innovation on economic growth, the papers address three themes: telecommunications efficiency, telecommunications access and the source of telecommunications innovation.

Themes: Efficiency, Access and Innovation

The first theme of the papers is that institutional changes to public policies and corporate boundaries must take place in response to fundamental changes in the cost structure and performance parameters of telecommunications services. Price and entry regulation of dominant firms has been the primary public policy thrust in the past. Most telecommunications services once were treated as domestic natural monopolies, under the assumption that economies of scale permitted only one or a few large national firms. Whether yesterday's assumptions were correct or not, it is now absolutely clear that technological development requires and supports a new market environment in which entry is encouraged and the domain of regulation is restricted to the bare essentials.

The core message is that the efficient provision of telecommunications services requires new entry, along with service and geographic expansion by existing firms, frequently accomplished through interfirm alliances. Corporate managers must expand their view of the telecommunications market quickly or risk being displaced by efficient competitors. Regulatory authorities must recognize the potential efficiencies provided by diversification, mergers and alliances.

The second theme concerns universal service. Ensuring that all people have access to basic telecommunications services is a long-standing public policy goal in the USA, as it is in other economically developed countries. Cross-subsidization of local services by other services provided financial support for universal service in the regulated environment. Cross-subsidization will not be viable in a competitive telecommunications market. Instead, public authorities must eliminate subsidies where possible, find other
sources of funding for necessary subsidies and provide new institutional incentives to telecommunications carriers to assist them in implementing universal service goals. The central message here is that proactive corporate decisions and enlightened public policy will be increasingly important in achieving universal service while minimizing distortions.

The third theme within this special issue concerns the source of telecommunications innovations. Complementing the first two themes, which deal primarily with existing services, several papers argue that corporate boundary changes and public policies concerning corporate boundaries are central to the ability to create new telecommunications services. Many of the emerging telecommunications services are systemic and involve disparate capabilities, which creates conflicting incentives for organizational boundaries. Systemic services involve complex interactions among multiple components. The complexity creates incentives to organize a service within a single firm, in order to manage the tacit and uncertain transactions involved. Indeed, the very ability to create a complex new service sometimes depends on the ability of a single organization to manage the uncertain and costly process of developing the linkages between components of the service. Some important telecommunications innovations will emerge only if companies in the telecommunications sector have the managerial vision and regulatory freedom to pursue what initially might appear to be diversified activities.

At the same time, however, the disparate capabilities required for many telecommunications innovations make it difficult for firms to develop many new services independently. For instance, few if any firms have leading edge skills in all the telephony, programming, computer, satellite and other technologies needed for the direct-to-home satellite broadcast of video programming. The need to bring together different skills in order to develop new systemic services has led to many alliances in the telecommunications sector. Managers in the industry need to learn how to manage alliances in order to achieve both innovation and corporate success. Regulatory authorities need to rethink their traditional view of alliances as collusive activities, and instead recognize their central role in the development process of new goods and services.

The recognition that proactive corporate strategy must adjust in real time to constantly changing competitive and technical environments is at the center of each of the three themes. The papers in this special issue develop important aspects of this message.

The Impact of Telecommunications Innovation

Shane Greenstein and Pablo Spiller measure the impact of telecommunications infrastructure investment by 101 local exchange companies on economic
activity in manufacturing and in financial insurance and real estate services between 1986 and 1992. The authors use deployment of fiber optic cable as a measure of telecommunications modernization. Greenstein and Spiller find that the modernization of the telephone network leads to more service activity in a local region. The results suggest that service sector growth depends on availability of a sophisticated telecommunications infrastructure.

William Read and Jan Youtie argue that governments that want to attract telecommunications investment must develop new approaches rather than use incentive packages developed for other industries. The authors summarize five case studies that describe successful and unsuccessful efforts to use telecommunications investment as the basis of economic development. They argue that successful efforts require high level vision, specific political strategies, hands-on technological executives to implement the strategies and network applications suited to economic growth.

Telecommunications Efficiency

Sanford Berg and Dean Foreman review price cap policies. The authors suggest that price caps can provide regulatory mechanisms to facilitate the movement from monopoly to competitive markets for local telecommunications exchange services. A key issue is to ensure that local exchange carriers have sufficient incentives and resources both to respond to competitive entry in their core markets and to explore diversification in emerging markets. Thus, they argue that regulators must consider price cap policies jointly with policies concerning market entry and diversification.

Willie Grieve and Stanford Levin argue that local network interconnection and network component unbundling are prerequisites for local exchange competition. Carriers offering both complementary and substitute services must be able to achieve interconnection in order to provide seamless communication for consumers. Customers must be able to connect calls with customers of all providers and gain access to services of all providers. The authors argue that telecommunications companies must unbundle services and make essential facilities available to competitors so that full interconnected services will be available. They define essential facilities as facilities that a firm requires in order to provide a telecommunications service but which the firm cannot economically or technically duplicate. Access to essential facilities will both promote competition in existing services and encourage innovation of new services. Regulators must determine what telecommunications facilities are essential and then set access prices that are low enough to allow efficient usage of the facilities. At the same time, the
prices must be high enough to reward successful investment and encourage investment in new facilities.

Kulwant Singh describes the successful development of telecommunications infrastructure in Singapore. He argues that three factors underlie Singapore's success. First, the government recognized the economic importance of telecommunications early. Second, a massive reconstruction of the nation's telecommunications infrastructure took place. Third, the country's small size allowed the reconstruction to take place at a relatively low cost and allowed centralized direction to be effective. Broad communications policies, including public support, competitive pricing and controlled market deregulation, have guided the development. At the same time, Singapore Telecom has implemented effective strategy, including investment horizons, efficiency standards, technical advance, service expansion, global expansion and alliances. Future challenges include developing new technical skills, maintaining growth and dealing with competition. Singh suggests that the successful development of telecommunications infrastructure requires both effective policy and capable corporate action.

Meheroo Jussawalla describes the growth of the telecommunications industry in the Pacific Asian region. China, Thailand, Indonesia, Malaysia, the Philippines and other countries in the region are moving rapidly to encourage competition in previously protected markets. Telecommunications investment is essential for economic growth in the region. Established telecommunications companies are playing major roles in creating new telecommunications services in the growing markets, often in joint ventures with local firms.

**Telecommunications Access**

John Panzar and Steven Wildman analyze the incentives for competing telecommunications companies to provide basic telephone services to low income households. The authors argue that companies have incentives to connect low income subscribers who are unable to pay connection costs if high income subscribers value the availability of a larger network. They suggest that market forces can provide at least a portion of socially efficient universal service without public support payments, so long as high income consumers value connectivity with low income consumers. In addition, when achieving universal service requires public support, such as the use of vouchers, the subsidy will be less costly if regulators allow carriers to charge different prices to low and high income households.

Michael Einhorn discusses the provision of universal service. He argues that universal service should encompass local telephone service, operator
services, repair services, interexchange access and telecommunications relay. He adds that sources of taxes used to subsidize universal services should be non-distorting, in order to avoid fragmentation and inefficient deployment of the telecommunications network.

Denise Anderson and Jorge Reina Schement claim that the telecommunications infrastructure involves interactions between politics, economics, technology and society. The authors argue that universal service requires private industry effort in a competitive market, coupled with a government role to monitor and maintain the integrity of access to services. They recommend gradual deregulation, re-evaluation of current universal service subsidies, re-evaluation of what constitutes universal service, development of interconnection standards and proactive cooperation between government agencies and private firms.

The Sources of Telecommunications Innovation

Cristiano Antonelli suggests that technological change in the telecommunications sector is endogenous to the structure of the industry and to the action of firms. Changes in industrial structure influence strategic actions of companies, which affect how technology changes. Industry structure, in turn, is an outcome of the technological, market and regulatory environments in which firms operate. Antonelli argues that a new industry structure is now emerging in the telecommunications sector. The past actions of firms operating in the telecommunications industry and related sectors have produced new telecommunications technologies, which in turn have created the need for firms with new skills. Market demands for efficiency based on volume economies and for effectiveness based on technological specialization are causing the formation of complex competing networks of firms with complementary capabilities. Regulators throughout the world are struggling to interpret and react to these changes. Antonelli argues that regulatory decisions that affect industrial organization will have long-lasting effects on innovation. He believes that regulators need to change their emphasis. In the past, the primary regulatory emphasis was on the price of services. Regulators now need to place increasing emphasis on the interconnection standards for services across competing networks. Antonelli suggests that greater interconnection will enhance further technological change.

Charlene Nicholls-Nixon and Dale Jasinski discuss why different firms respond differently to industrial change, such as the blurring of industry boundaries that is now taking place in the telecommunications sector. Technical advances such as digitization, fiber optic cable and wireless technologies have attracted new firms and entrants from previously distinct
industries. Business boundaries are changing through expansion, mergers and alliances. Nicholls-Nixon and Jasinski argue that the potential for such entry and boundary changes arises in response to changes in the industry-level techno-economic paradigms. At the same time, firms vary as to when they enter or expand within the changing industry, what services they offer, how they enter or expand and how much they invest. The differences arise because corporate managers must assess the changed industrial environment in the context of their businesses’ capabilities. From a policy perspective, the model suggests that firms with different industrial backgrounds will respond differently to regulatory initiatives. Thus, public officials must consider the background of the firms offering telecommunications as well as the regulatory goals when designing regulatory policy.

Thomas Lyon and Haizhou Huang discuss the impact of asymmetric regulation on innovation. Asymmetric regulation places competitors under different levels of regulatory restraint. The authors argue that asymmetric regulation creates an environment in which more lightly regulated firms might find it most profitable to innovate. Tighter regulation of established firms may slow innovation by industry incumbents. Conversely, less stringently regulated rivals may invest more in innovative activities because tightly regulated companies will have little incentive to respond to innovations. Lyon and Huang argue that asymmetric regulation may have a desirable impact on efficiency if a new technology offers dramatic reductions in costs, because volume economies will increase if fewer firms adopt the innovation. Conversely, an implication of the argument is that asymmetric regulation may have undesirable impacts on innovation and ultimately on efficiency if the asymmetry inhibits experimentation by firms with different capabilities.

Michael Dowling discusses the emergence of complex relationships among firms that are competitors in some markets and partners in others. The relationships create challenges both for regulators and for managers. Regulators must revise their traditional suspicion of interfirm relationships as tolls for collusion. Dowling argues that managers must learn to compartmentalize their competitive and cooperative relationships.

In the final paper, Gregory Rosston and David Teece argue that local exchange service has ceased to be a natural monopoly. Technological advances in transmission and switching have lowered local exchange costs. Firms with different capabilities and backgrounds are undertaking different entry strategies in the local exchange markets. Some entrants, such as cable television companies and wireless carriers, are using new technology to enter local exchange markets. In addition, other entrants, such as interexchange carriers and competitive access providers, are using established technology to
introduce local exchange services. Interconnection and unbundling provide the basis for effective competitive entry in telecommunications, much as they did for natural gas and electricity. This appears to be the way that telecommunications deregulation is proceeding in the USA.

*The Future: Ongoing Institutional Change*

Most of the technical barriers to massive telecommunications innovation have disappeared. The central message of the papers to this special issue of *Industrial and Corporate Change* is that the challenge now is to overcome the institutional barriers. Converging technological trajectories in telephony, computers, media, fiber optics and other industries are creating rich networks of expanded firms and alliances to develop new telecommunications services. The telecommunications industry as we know it is being buried under a plethora of new arrangements designed to bring forward the bandwidth-hungry technologies of tomorrow. The shape and identity of the players in the industry will continue to change dramatically.

The institutional demands in the telecommunications sector create huge managerial and regulatory challenges. Managers must learn to operate within complex and rapidly changing webs of competing and cooperating firms in new product markets and new geographic markets. Management in this uncertain environment will often be an incremental process of using yesterday’s successes and failures as the source of today’s profits or losses and the basis for deciding what to do tomorrow. Regulators must provide policy guidelines that will encourage efficient provision of telecommunications services and ensure universal access to basic services. At the same time, regulators must recognize that telecommunications innovation depends on the rapid evolution of corporate activities and organizational boundaries. Few if any managers can predict the evolution beyond the very short term. Even the most capable and well-meaning regulators can be no more farsighted. Almost invariably, public policies are both long in gestation and slow to change. Because of the rapid changes that are taking place in the telecommunications sector, regulatory attempts to micromanage telecommunications innovation will be out of step with the telecommunications environment. Effective public policies in the telecommunications sector will set broad guidelines, deal with specific issues as they arise, and encourage ongoing competition and cooperation between firms with many capabilities.