

Pathways to Digitization in International Telecommunications

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A longstanding movement toward digitization in global communications infrastructures is rapidly accelerating. Current analog telephone facilities are being progressively replaced by faster, more flexible and powerful digital systems. This transformation, however, is not only technical, but also institutional—both in its sources and in its implications. Furthermore, it emanates not merely from a closely bounded information processing and transport sector, but from the shifting international economy as a whole.

The foundations of this digitization process lie in the innovation, in the early postwar era, of common language of digital microelectronics for both computing and, somewhat later, telecommunications. Computer companies and their customers—major business users of data processing equipment and services—began to foray into telecommunications networking to distribute data and processing power where and as needed within firms (IBM and GE experimented with microwave transmission of business data as early as 1944).⁽¹⁾ Telephone companies, on the other hand, began to computerize switching (circuit allocation) to serve growing customer-bases with greater efficiency. More recently, the telephone group also began to introduce “enhanced” information services reliant upon computer software, so as to stimulate usage of underutilized telephone plant.⁽²⁾

Technical convergence toward software-controlled digital systems led to an increasingly acute regulatory dilemma: “What length must a cable be before it

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(1) Gerald W. Brock, *The Telecommunications Industry*. Cambridge: Harvard University Press, 1981:182.

(2) The average television set in the U.S. is in use for over seven hours each day; the average telephone handset for only a small fraction of this time. Call forwarding, call waiting, telebanking and “dial-it” numbers—there were 460 million “dial-it” calls for weather, sports, pornographic messages and other services in 1985 in New York State alone—are examples of this strategy of finding new uses for telephone plant. See John Wilke, “A ‘Dream’ Business That’s Just A Phone Call Away,” *Business Week* 31, March, 1986:70.

ceases to be part of the computer and becomes a communications circuit?"⁽³⁾ In most countries, telecommunications had long been the province of government ministries of posts, telephones and telegraphs (PTTs); in the United States, though the industry remained privately owned, extensive exit, entry and price regulation by the Federal Communications Commission imposed broad public accountability obligations on the telephone industry. Data processing was, however, more strictly a private business, and largely free of government regulation and the public-interest concept from which it descended. Which model would merging computer-communications systems follow, that of the telephone industry—which presaged growing government involvement in the structure and policy guiding *both* message transport *and* information processing? Or, that of the computer industry, betokening a pervasive reduction of public control over the emerging information industry?

Since the 1960s, these questions have grown increasingly visible and urgent, as the stake of affected interests has expanded. Continuing technical innovation within a widening geographic arena, in answer to an ever-increasing variety of corporate needs, has turned the digitization of international telecommunications into a storm center of contesting interests.

By the 1980s, new digital switches could provide the controlling hubs around which systems integrating diverse message streams for voice, data and image, could be constructed. Capacious new transmission media, such as satellites and optical fibers, furnished qualitatively greater information transport capability.⁽⁴⁾ These new technologies intervened increasingly across a broad span of print-based production chains. Satellites were employed to interconnect computerized printing facilities of newspapers such as the *Wall Street Journal*, *USA Today*, the *Toronto Globe and Mail* and the *Financial Times*, and permitted them to garner advertising revenues in national and transna-

(3) Comment of the American Petroleum Institute, 6 March 1968, p. 3, in U.S. Federal Communications Commission, Docket 1979 "In the Matter of...the Interdependence of Computer and Communication Services and Facilities" (First Computer Inquiry).

(4) With about 250 times the information carrying capacity of twisted pair copper wires, and mandating reduced need of expensive amplifiers to boost attenuating signals, optical fiber cables have evolved with startling rapidity. Fiber cables available in 1985 had 36 times the capacity of their predecessors of 1979; fiber selling at \$8/meter in 1982, by 1985 sold for just 50¢/meter. See U.S. Department of Commerce, 1986 *Industrial Outlook*. Washington: USGPO, p. 29-6.

tional markets. Book publishers deployed computer-communications systems to facilitate tighter inventory control and to expedite distribution among publishers, wholesalers, retailers and libraries.⁽⁵⁾ Credit reporting and financial information services migrated to electronic delivery to subscribers; manufacturers moved to link design more closely to production via computer networks. Within the United States, of 12 million personal computers in residential households by 1985, $1\frac{1}{2}$ million were equipped with models, making them an enticing (if risky) market for electronic database vendors and information providers.⁽⁶⁾

Deepening corporate dependence on merged computer-communications systems in turn occurred in a widening geographic arena. "(T)here really is no longer a 'domestic market' separated from international dealings," stated an AT&T executive in 1981: "Large customers increasingly expect to deal with their international telecommunications and data in a systematic, unified way. International systems solutions to communications needs are increasingly demanded."⁽⁷⁾ Global networks proliferated for data and video as well as for more traditional voice offerings. CBS, HBO and Citicorp alike looked toward satellite systems to link overseas affiliates.⁽⁸⁾ Satellite footprints spilled over national borders by deliberate policy design. Two dozen trans-border applications of "domestic satellites" launched ostensibly to provide service within the United States were approved by the FCC, for transmission between the U.S., Canada, the Caribbean and Latin America. Wide Area Telecommunications Service (WATS) sought to provide "800" numbers connecting U.S. businesses directly to customers in Canada, France, the Netherlands, Bermuda and elsewhere. This service would permit calls dialed "free" from overseas to be routed automatically to sponsoring companies in the United States, diminishing the need for foreign sales offices and literally bringing new customers into the U.S. market.

To match the needs of diversified transnational corporations, thus, telecommunications became irreversibly international and multisectoral in their contexts

(5) *Ibid.*: 27-9.

(6) In 1977 electronic database vendors found 17,000 customers; by 1984 the number had grown to 785,000. See *Ibid.*: 48-6.

(7) Quoted in Dan Schiller, *Telematics and Government*. Norwood: Ablex 1982: 104.

(8) Dan Schiller, "Intelsat: Ultimo Objetivo del Unilateralismo USA," *Telos* 1985 No. 2:106-113.

and applications. Demand for *multifunctional* digital networks correspondingly began to intensify. Corporations became acutely aware that their reliance on separate systems for voice, data, image and video was both unwieldy and expensive. Disparate power sources, diverse transmission media, incompatible equipment, and resultant difficulties in planning, coordination and training, inspired such companies to seek means of *integrating* their sprawling communications systems to achieve greater control at lower cost. Progressive innovation of digital networks which could handle combinations of voice, data and image (and ultimately perhaps even video) signals, and which could grow in scope and function to support a widening array of corporate activities, emerged as a cardinal demand. Who would supply these systems, on what terms, how rapidly, and over what geographic range?

A. Digital Visions in Conflict

Current attempts to digitize telecommunications infrastructures exist not as fixed points of reference but as dynamic and often tacit, or only half-articulated strategies. Two distinct models, loosely mirroring the earlier computer industry and telephone industry designs, respectively, may nevertheless be discerned. Both spring from the widely shared need to harmonize international telecommunications to support growth of multipurpose intra- and inter-organizational information systems. Yet each model would accommodate this need differently, in response to its own sponsors' interests.

The first model, continuing broadly on the trajectory of the computer industry, may be thought of as an inhouse transnational corporate design for digitization. It is an outgrowth and extension, as we shall see, of more than two decades of intra-organization network building within the United States. It centers on creating digital networks both *within* corporations (whose internal communications have typically comprised a majority of total corporate telecommunications expenditures), and *between* major companies and their suppliers, distributors and customers. "More and more companies," claims one analyst, "are using networks to lock up customers and suppliers and make it difficult for allegiances to go away."⁽⁹⁾ These digital bridges, it should be stressed, would be configured to correspond to specific corporate applications:

(9) Quoted in Martha Brannigan, "Custom-Made Communications," *The Asian Wall Street Journal Weekly*, 17 March 1986, Section 2:16-17.

both their geographic range and their technical capabilities would be decided in relation to private corporate objectives of a highly specific kind. They are, in short, *customized, special-purpose systems*: the information resources, program and processing capabilities, and network services that such inhouse networks would make available within each corporate complex—the character and extent of network “intelligence”—would reflect company goals and requirements.

The second model, emanating mainly from the telephone industry, may be characterized as a design for ubiquitous integrated systems within and between subscribing nation-states. Sweeping “integrated services digital networks”—the name given to this model (ISDN)—would emerge from established domestic telephone networks through a series of evolutionary stages. Access to these multifunctional ISDNs would be more universal than that contemplated by the inhouse model. Integrated digital systems would progressively displace the many discrete networks currently serving voice, data, image and ultimately perhaps even video communications. The patchwork of separate systems now in use within and, increasingly, between major corporations would be reduced as firms migrate to ubiquitous ISDNs. These massive integrated systems would “favor generic and applications-independent services. ISDN proposes to create a single globally universal network to suit all with standardized access.”⁽¹⁰⁾ ISDN advocates thus favored the general reconstruction of domestic telecommunications in end-to-end digital form, centralized at both planning and operational levels under the aegis of either the telephone industry (in the U.S.), or the nation-state itself (in Western Europe). The key question of where the “intelligence” guiding the new systems—including not only programs defining network access and service availability, but also information and software program resources themselves—was to be stored, became a major point of contention in ISDN deliberations. How much of that intelligence would be located within the network and, by immediate inference, within the control of the network operator, whether telephone company or state PTT, and how much would be placed within the attached equipment of subscribing private companies?

On one side, then, the need for capacious multipurpose digital systems would be served by a series of nationally coordinated, relatively ubiquitous

(10) Edward I. Kay, “Evolving ISDN Information Transport Backbones,” *Telecommunications* November 1985, v. 19 No. 11:640-641 at 64h.

integrated systems, linked internationally, and offering generic services under the umbrella of each nation state. On the other, this same objective would be satisfied through inhouse, intra- and intercorporate digital bridges, in effect bypassing national telecommunications networks with private or shared special-purpose systems, at every level from local loop to global grid. The relative likelihood of either of these models becoming dominant can be appraised, however, only by shifting our attention from the technology to its institutional environment. We must, that is, study the context within which the technical trend toward digitization is taking place.

B. The Three Stages of Privatization

The entire technical transformation behind digital telecommunications has been and will continue to be conditioned and defined by an encompassing trend toward privatization of information technology systems and services. This secular tendency has been increasingly evident for nearly 30 years, and may be analyzed in three stages or periods each of which builds upon and extends the achievements of its predecessor(s).

The first period of privatization commenced in the late 1950s within the United States. Preeminent in the world economy as a consequence of the ravaging destruction of the Second World War, U.S. companies were expanding rapidly both in domestic and overseas markets. Private microwave networks, facilitating this growth, were authorized by the FCC, and microwave frequencies were allocated to non-common carriers. Limited initially mainly to pipelines, utilities and railroads, these private networks eventually burgeoned through diverse sectors. By 1982, they were in use in many industries and collectively depended upon some 15,000 microwave relays, while the domestic common carriers themselves operated fewer than 9,000 relays.⁽¹¹⁾ Private satellite networks extended this same development to another powerful new medium. Attachment of "foreign terminals" of many kinds, including especially computers and private branch exchanges, was then liberalized dramatically in the late 1960s. This led to the emergence of a multibillion dollar "interconnect" industry to supply the specialized instrumentation demanded by companies of every kind. Together these series of decisions

(11) Dan Schiller, "Business Users and the Telecommunications Network," *Journal of Communication*, Autumn 1982, v. 32 No. 4:84-96.

eventuated in a cumulative shift in the balance of power over network development and applications, from the publicly regulated telephone carriers to private noncarrier businesses. They facilitated rapid changes in the regulatory boundary between telecommunications and data processing, effectively both accommodating and enlarging private inhouse control of information technology systems. This outcome was clearly consonant with the desires of major business users, who insisted through ever more aggressive and well-organized lobbies that telecommunications should be available to them on the same terms as computers. Such users demanded, as the Automobile Manufacturers Association declared in 1957, "the same latitude in the use and implementation of our communications facilities that we enjoy in the use and implementation of the many thousands of other tools facilities and services necessary to the conduct of our business."⁽¹²⁾ Instead of continuing to be the province of a sole monopoly supplier with extensive public accountability obligations, telecommunications should be integrated with computing as a strictly private matter. Diminished costs, customized applications, security of planning against unpredictable rate increases or service availability problems, even investment tax credits: all were incentives for escalating bypass of the public switched telephone network. But by far the most vital source of this trend was an elemental corporate insistence that *the merger of telecommunications and the computer must diminish any public control over information while expediting maximum private mastery both of information systems and the data coursing through them*⁽¹³⁾

A second stage privatization, propelled by identical objectives and an identical agenda, followed rapidly from the first. By the later 1970s, this new initiative, bolstered by an explosively expanding computer industry, sought to introduce new opportunities for private control of telecommunications within the domestic economies of major trading partners of the U.S. With assistance from various U.S. State agencies, as well as from business user groups organized by transnational corporate telecommunications managers located in different countries, pressures were introduced throughout the OECD nations. The most spectacular success came in Great Britain, where the

(12) Comment of the Automobile Manufacturers Association, 15 March 1957, p. 850-851 in U.S. Federal Communications Commission, Docket 11866 "In the Matter of Allocation of Frequencies in the Bands Above 890 Mc."

(13) See Dan Schiller, *Telematics and Government*, *op. cit.*, for a more complete discussion.

national carrier, British Telecom, was privatized, and a competitive carrier, Mercury, authorized. This permitted the U.K. to offer itself as a more hospitable site for the information system operations of major firms needing access to European markets, and put additional pressure on the continental countries to revise their telecommunications policies. Denationalization likewise occurred, though in a somewhat different fashion, in Japan. Support for liberalized terminal attachment provisions, private networks and competitive carriers, and deregulation of merged computer-communications services, grew in a host of nations: Canada, the Netherlands, perhaps even—most recently—France. To be sure, these changes were uneven and were not infrequently opposed, mainly by the PTTs themselves. But there can be no question that decisive changes in favor of the inhouse model of development occurred in many countries, and the prospect by the mid-1980s was for continuing movement in this same direction. Thus, successful efforts were being made to employ antimonopoly provisions of the EEC statutes against PTTs which resisted "liberalization." Moreover, within the United States, deregulation continued to build strength, most of all through and following the break-up of AT&T. This action, resulting in the largest corporate reorganization in history, decisively transformed AT&T into a staunch advocate of privatization—with consequences still to-be-felt on the international scene.

In the mid-1980s, also, a third stage of privatization commenced, unrivaled in scope. To comprehend this phase in the planetary restructuring of information systems, we should briefly take stock of the *already-current* scale of private investment in information technology.

Spiralling research and development costs in the telecommunications equipment industry have made it impossible to recoup outlays for digital switches within any single national market. Subsequent generations of switches, making use of optoelectronics, will cost far more than the estimated \$1 billion required to produce a central office switch today. Few companies can contemplate such investments alone, and few have access to a sufficient number of national markets to make them profitable. Previous procurement arrangements enjoyed by preferred domestic equipment suppliers, tying them closely to the government PTTs whom they furnished with equipment, have therefore begun to come under great strain. Joint ventures across national borders instead have begun to supplant the earlier industry structure: AT&T-Philips; Ericsson-Honeywell; British Telecom-Mitel; Northern Telecom-Daewoo; and

possibly, GTE-Siemens. At the same time, restrictive government procurement codes have been subjected to intensifying pressure. Both computer firms and telephone company is sought partners with whom to underwrite production of whole lines of computer and communications products; this again necessarily involved them with foreign interests. By the 1980s, for example, AT&T had paired itself in diverse ways with Olivetti, Convergent Technologies, Electronic Data Systems, Goldstar, Ricoh, and Telefonica.

Business users remained the primary source of demand for information technology systems. By 1985, American Express was spending over \$500 million annually on telecommunications to support its global operations. "Among major international companies," noted an American Express vice president, "this amount is hardly atypical. In fact, for many financial services companies, communication is the second-largest expense after staffing costs."⁽¹⁴⁾ General Motors' internal corporate telecommunications system was undergoing an overhaul designed to permit interconnection of no less than 230,000 terminals through 50 digital switches. One hundred previously separate data communications networks and over 100 data centers *within the company* would be integrated and centralized to create only 18 data centers and a single digital network. In support of a strategy aimed squarely at communications, information and military electronics, GM-the classic "smokestack" corporation of the "old" industrial society bought Hughes Aircraft for over \$5 billion in 1985, and Electronic Data Systems, a leading computer-services firm, for \$2.5 billion in 1984. Within one year of its acquisition by GM, EDS-whose primary task was to coordinate the systems integration process mentioned above had tripled its revenues (to \$3.4 billion in 1985) simply by taking over "a huge influx of captive GM business."⁽¹⁵⁾ Such was the scale of

(14) Harry L. Freeman, "International Telecommunication Policy: The Critical Choices," *Telecommunications* April 1986, v. 20 No. 4:42-46 at 43.

(15) Russell Mitchell with Todd Mason, "How General Motors Is Bringing Up Ross Perot's Baby," *Business Week* 14 April 1986:96-100; N.R. Kleinfeld, "The 'Irritant' They Call Perot," *New York Times* 27 April 1986, Section 3:1, 8-9. There is disagreement over how many separate private data networks GM operates; another estimate is 30, rather than 100. Also important is the fact that even *with* development of inhouse digital networks, major corporations will not entirely bypass the public switched telephone network. After GM's current process of systems integration and digitization is complete, states a knowledgeable official of the firm, about 60% of the company's calls will continue to be placed on through the public network. How long this "mixed system" approach will prove stable is the major question. See Lawrence

private investment in information systems.

Centralization of data centers and integration via capacious digital networks made feasible unprecedented private control of telecommunications and computing. The latter in turn not only conferred cost-economies, but likewise created a foundation for diversification into profitable new information services-as well as for a new level of computer networking across both political and organizational boundaries. In operation by 1984 were more than 1000 transnational computer-communications system, "the overwhelming majority of them established by transnational corporations from developed market economies to service their worldwide affiliate network."⁽¹⁶⁾ And, the more reliant companies became upon information technology systems internally, the more prominent grew their demand for network services connecting them with other organizations.⁽¹⁷⁾ Direct linkages between internal corporate information resources and data processing facilities, and those of suppliers, distributors and customers became a prime objective. By the mid-1980s, such interorganization networks included systems interconnecting airlines and travel agents; banks; insurance firms and agents; research institutions; medical-product suppliers and hospitals and automobile manufacturers and parts subcontractors.⁽¹⁸⁾

Indeed it thus became increasingly difficult to distinguish between communications companies and large corporations ostensibly serving entirely different markets. Far from diminished in its importance, however, the communications sector was being restructured into the crucial private infrastructure upon which all corporate enterprise directly relied. Multiproduct, multisite businesses operating in many countries rushed to acquire their own

Gasman, "The Bypass Connection," *High Technology*, May 1986 v. 6 No. 5: 21-27 at 27.

- (16) United Nations Economic and Social Council, "The Role of Transnational Corporations in Transborder Data Flows," Commission on Transnational Corporations, 10th Session, 18-27 April 1984, E/C10/1984/14.
- (17) Lewis M. Branscomb, "Electronics and Computers: An Overview," *Science* 12 February 1982, v. 215 No. 4534:755-760 at 759; and, especially, Deborah Lynn Estrin, "Access To Inter-Organization Computer Networks," Ph.D. Dissertation, Massachusetts Institute of Technology, Department of Electrical Engineering and Computer Science 1985.
- (18) Estrin *Op. Cit.* and Deborah Estrin, "Interconnection of Private Networks: A Link Between Industrial and Telecommunications Policy," paper presented at the 14th Annual Telecommunications Policy Research Conference, Airline Virginia, 27-30 April 1986.

facilities for information transport and processing. By 1984, in aggregate, corporate outlays for communications equipment, office, computing and accounting machinery, and instruments of every kind, comprised a stunning 46% of nonresidential purchases of producer's durable equipment (in constant 1972 dollars); this proportion had increased steadily since the 1940s but accelerated dramatically after the 1974-75 recession.⁽¹⁹⁾ Electronic products moved ahead of factory machinery and mobile equipment to become the largest single category of capital equipment spending.⁽²⁰⁾ This colossal continuing investment in private information technology systems formed the basis for the emerging "information economy," and was as encompassing and sectorally diverse as that economy itself. It also supplied the crucial incentive for a concerted drive to privatize the entire information sector including, especially, telecommunications, even as the process of digitization continued.

While attempts to privatize telecommunications and information resources continued unabated in the United States and, more generally, throughout the OECD nations, the current phase of privatization has even broader objectives. In a word, it is to create and defend private transnational systems for information processing and transport, not only within each nation but also between them, and not only in the developed market economies but also in the less-developed states.

To attain this goal, attempts are made to permit private ownership of truly international facilities for the first time; new media, such as transatlantic or transpacific satellite and optical fiber-based systems, were prominent objects of this endeavor. The Intelsat system, a "triumph of U.S. foreign policy," thus ironically found itself embattled as private entities such as Tel-Optik and Panamsat challenged its monopoly.⁽²¹⁾ Business users also sought actual ownership shares, called "indefeasible rights of user," in existing international facilities.

At the same time, ostensibly *international* organizations active in key areas of telecommunications were increasingly opened to greater private participation. The developed market economies had always been heavily over-represented within the crucial standards-setting agency of the International Telecom-

(19) U.S. Department of Commerce, *Survey of Current Business*, July 1985 v. 65 No. 7:24 Table 5.7.

(20) Ralph E. Winter, "Forecast for '86 Capital Outlays Improves," *Wall Street Journal*, 30 April 1986:6.

(21) Dan Schiller, "Intelsat..." *Op. Cit.*

munication Union, the CCITT. Yet the latter's bylaws also permitted private companies to attain formal standing, and thus to exert growing influence over the vital design decision underlying any scheme for digitization. U.S. participation, in particular, is today "largely provided by the private sector not by the government."⁽²²⁾ Transnational business users themselves have recently been accommodated at the CCITT. Such users, viscerally opposed to public PTT involvement in a new generation of value-added information services, have succeeded in insinuating many of their own policy demands into the agenda. Indeed, they have already been partially successful in shifting the design of ISDN itself-the PTT-inspired model for ubiquitous integrated digital systems-toward acceptance of private third-party provision of digital bridges *within* an ISDN environment, and are struggling to ensure that placement of network intelligence within private user-based equipment is also permitted.⁽²³⁾

Similar penetration by private interests has already occurred at the recently-launched Center for Telecommunications Development-whose functions are to study and advise on telecommunications investment proposals from less-developed countries. Loosely affiliated with the ITU, the Center was created in the wake of the Maitland Commission report on telecommunications and development, and seems to have been formed chiefly to "help Western manufacturers and operators expand business to the Third World." Financed largely by private money, the Center for Telecommunications Development permits a wholly new level of explicit and direct involvement by private groups in its multilateral project deliberations. The mechanism for private participation is the Center's Advisory Board. Along with representatives from a number of national telecommunications administrations, members from the following "semiautonomous" or private firms were elected for two-year terms at the Board's first meeting in November 1985:

Teleglobe Canada, ISKRA (Yugoslavia), Alcatel Thomson (France), Detecon (West Germany), NEC (Japan), LM Ericsson (Sweden), British Telecom (UK), Victori International (Brazil), and the U.S. Telecommunications Suppliers Association, Jean-Claude Delorme, President of Teleglobe Canada, was named Chairman-indicating the substantial role which private

(22) Anthony M. Rutkowski, "The International Telecommunication Union and the United States," *Telecommunications* October 1983, v. 17 No. 10:40.

(23) Dan Schiller, "The Emerging Global Grid: Planning For What?" *Media Culture and Society* v. 7 1985:105-125.

interests can play.⁽²⁴⁾

Attempts to open up less-developed regions to private capital from the West and, particularly, from the United States, are hardly new. U.S. President Harry Truman's "Point Four" plan of the early 1950s indeed centered on developing means by which private U.S. capital might penetrate new markets by exchanging American manufactures for raw materials throughout Latin America and the disintegrating empires of the West European powers. Point Four focused on extractive industries—mining, agriculture, and so on. Today, in contrast, a directly analogous attempt is aimed at the hundred-odd independent nations which emerged over the postwar period; but it is aimed not at new markets for U.S. manufactures coupled with favorable access to raw materials, of infrastructural services previously furnished chiefly by governments. The history of "development assistance" thus itself reflects a transition from an era in which less-developed areas produced raw materials and agricultural goods in exchange for western manufactures, to a still-unfolding era in which the former may produce not only raw materials but also even manufactures, yet are still beholden to the West for crucial information products and services.⁽²⁵⁾

Telecommunications privatization is widely perceived to be a critical prerequisite of this emerging international economic relationship. In fact, some of the most vigorous recent advocates of privatization in telecommunications have been the World Bank, the International Monetary Fund and the U.S. Agency for International Development. These influential groups have elevated the doctrine of privatization into a reigning orthodoxy, a cure-all whose application will purportedly prove beneficial to a vast range of activities, from electrical power generation and water provision, to agricultural marketing boards, to health, waste disposal, education and telecommunications. In this sweeping vision, privatization becomes a "creative process designed to shift whole areas of economic activity...from the politicised, non-commercial sector to the consumer-responsive profit-making private sector."⁽²⁶⁾ The

(24) Ernest Eugster, "Report: ITU," *Telecommunications* March 1986 v. 20 No. 3:381.

(25) Herbert I. Schiller, *Who Knows: Information in the Age of the Fortune 500*. Norwood: Ablex 1981.

(26) Madsen Pirie and Peter Young, "Public and Private Responsibilities in Privatization" Agency for International Development, International Conference On Privatization, 17-19 February 1986, Washington, D.C., Briefing Book Tab I:13-14.

enthusiasm of the World Bank, the IMF and AID for "raising LDC interest in privatization" through a variety of tactics has already begun to bear fruit. A U.S. Department of Treasury inquiry of all Embassies and Missions in April 1985, reported that all but four of the nearly sixty replies received indicated that divestment and privatization of state-owned industries and services was of concern to their governments.⁽²⁷⁾

Because telecommunications service has tended to be a relatively reliable revenue source, financially strapped 3d world governments have been understandably reluctant to relinquish it; thus, privatization is by no means an assured outcome in any given case. Yet what one analyst terms "gradual reform" in the direction of competition or actual private ownership, "to make telecommunications entities more flexible, commercial and efficient" can be clearly identified. Internal reorganization to enhance cost-efficiency by cutting PTT employment; creation of more autonomous and, perhaps, pliant, government entities to replace full-fledged telecommunications ministries; joint-ventures and management contracts with private suppliers; and permissions to "major competitors and users to create alternative systems and interconnect them to the public network" are under consideration in various nations.⁽²⁸⁾ All would tend to increase Western information technology equipment sales while further opening up the less-developed countries to the inhouse model of telecommunications development. Plans are also underway for actual divestment of national telecommunications systems to private entities in both Thailand and Malaysia. Yet again, a private teleport furnishing satellite services "to a limited number of special customers" as rates undercutting Intelsat's (the nonprofit international satellite consortium), was planned for start-up in late 1986 within the Montego Bay (Jamaica) Export Free Zone.⁽²⁹⁾

The major development agencies have turned to the international debt crisis as a prime lever in accomplishing global privatization. The sale of state-owned enterprises thus is heralded as a way to find immediate cash income (and scarce foreign exchange if divestment is to foreign investors), as well as to "settle foreign debt" by encouraging banks "to convert part of their debt owed by LDCs into equity" in newly privatized businesses.⁽³⁰⁾ If the takeover

(27) L. Gray Cowan, "An Overview," *Ibid.*: 16 and 4.

(28) Gabriel Roth, "Privatization of Public Services," *Ibid.*: Tab F:8.

(29) *Ibid.*: 17. See also Wong Kokkeong, "High Tech and Singapore's Industrial Development," Temple University May 1986, unpublished manuscript.

(30) Ted M. Ohashi, "Marketing of SOEs: Capital Markets and Marketing

of nationalized concerns by foreign interests "is not a viable option," divestment can be to domestic private interests; "Wherever possible," one analyst elaborates, "it is wise to give affected parties a *stake* in privatization."⁽³¹⁾ In either case, it is agreed by such writers, direct monetary aid and technical assistance to less developed countries "should be conditioned to a greater extent on their economic policies...When aid is given for specific development projects, private sector involvement should be urged, and in so far as possible made a condition of development aid. For example, aid to contract and operate irrigation networks, roads, or electricity generation facilities could be given on the condition that these are privately built and operated."⁽³²⁾

This entire process is itself seen as potentially lucrative for the expanding services sector of the developed market economies. Western investment banks, management consultants, accountancy firms, and advertising agencies "should handle LDC privatization" from the initial valuation and issuance of stock to the mandatory campaign needed to sell it off.⁽³³⁾

Corporate capital flight in a period of aggravated debt crisis is the threat being employed to induce privatization on an encompassing scale. Privatization thus is held to be "the logical alternative" to bypass of entire domestic telecommunications systems by transnational companies seeking "more efficient private systems."⁽³⁴⁾

The intended benefits of privatization are also explicit. Once a government enterprise is sold, the state "can no longer exert control or interference." Although the conditions of divestment may alleviate its subsequent impact *if* ameliorative provisions can be written in at the outset, "(the) new management will be expected to make far reaching changes, notably in the financial structure and in operations, aimed exclusively at profitability." Put frankly, "(t)his will eliminate the former social overhead objectives," including both concerns for public employment and the more general notion of public accountability.⁽³⁵⁾

Devices," AID International Conference On Privatization Briefing Book *Op. Cit.* Tab G:2; Pirie and Young, *Op. Cit.*: 13; and Charles Taylor, "Policy Environments and Privatization," *Op. Cit.*: 1.

(31) Robert Poole, "The Politics of Privatization," *Op. Cit.*: Tab D:12.

(32) Pirie and Young, *Op. Cit.*: 1.

(33) *Ibid.*: 12.

(34) L. Gray Cowan, *Op. Cit.*: 9.

(35) Jean De la Giroday, "Development of a Country Privatization Strategy," *Op. Cit.*: Tab P:15.

Privatization is frequently justified, ironically, in the name of economic development by way of modernization of national telecommunications infrastructures.⁽³⁶⁾ The claims now made for telecommunications as a contributor to economic development recall an earlier, and equally dubious and self-serving call for introduction of commercial mass media as a path to modernization in the 1950s and 1960s—often by the same development agencies. Yet the stakes are now far greater.

The costs of digitization are astronomical. Even in the United States, where less than 25% of local access lines were to become digital by the end of 1986, observers worried that the economics of digital systems would preclude such service outside major metropolitan areas. "What remains to be seen," one analyst concluded,

is how quickly digital-access and transport facilities and, subsequently, ISDN can become a reality in the second-and third-tier urban areas in the USA. Only then will there be a majority end-to-end digital network with ISDN services available ubiquitously.⁽³⁷⁾

If access to digital services will be uneven within the United States, with its massive existing telecommunications infrastructure, what assurances can be given that the awesome expenditures required by digital systems will in fact contribute to dispelling ravaging urban-rural inequalities long characteristic of less developed countries?

The historical commitment of most nations to state-run telecommunications networks is under siege. The inhouse private model of digitization bids fair today to become globally dominant. What are the implications of this fact?⁽³⁸⁾

No matter how much they may differ on other accounts, merged computer-communications systems seek to integrate both data processing and message transport. The extent of this integration and its pace are, as we saw, major

(36) Numerous articles have appeared over the last several years touting the contributions of telecommunications to economic development. The World Bank has been in the forefront of such discussions.

(37) Martin P. Pykkonen, "ISDN: It Is On The Way, But What Exactly Is It?" *Telecommunications* November 1985, v. 19 No. 11:48e-48f.

(38) Configurations will of course continue to vary across distinct national settings. In addition, the role of public telecommunications networks seems unlikely to disappear, at least over the near-term, owing to the entrenched corporate need for desultory or low-level communication with a host of parties—insufficient to justify inhouse system links. See note 15.

issues of contention. Yet the all-important question of where the "intelligence" required to service, maintain and manage digital systems, including databases shaping access to information services themselves, is of paramount importance for *both* variants of the digitization process. It is both technically feasible and, as we found, far less costly to centralize network intelligence in a few locations, rather than to build in redundant facilities at each site. The consequences of such an architecture, however, will be profound—in *either* the private inhouse *or* the more ubiquitous integrated system design. The ability to centralize control over the configuration and accessibility of network intelligence will be especially problematic for the less developed country "that stores its network control and maintenance intelligence elsewhere in the network"

International boundaries will be nonexistent; databanks located within certain countries will service the entire network and contain information on all users. The intelligence required to control the network within one country may, in fact, be located in another.⁽³⁹⁾

Particularly within the impoverished nations, privatization of national telecommunications systems will make dramatic contributions to the ability of private capital to skew control over network intelligence—precisely to the extent that it eliminates any "social overhead objectives" from the telecommunications sector. Privatization in this sense is the indispensable prerequisite for the triumph of the inhouse model of digitization. And, in turn, centralized network intelligence will vastly magnify the opportunities for transnational companies to dictate the terms of trade with the less developed nations across the whole range of information products and services that will be provided over the network.

One comment on the implications of the convergence of computers with telecommunications in a key area where this merger has *already* become an operational reality—the international monetary system—demonstrates what is at stake. Walter Wriston, retired chairman of Citicorp, believes that computer-communications systems have already created a new international monetary system, "the Information Standard":

The global market makes and publishes judgments about each currency

(39) Captain John R. Thomas, "Intelligence Ownership: Problems Ahead for the ISDN," *Telecommunications* November 1983, v. 17 No. 11:34, 33.

in the world every minute and hour of each day. It used to be that political and economic follies played to a local audience, and their results could be contained. This is no longer true. This state of affairs does not sit too well with many sovereign governments because they correctly perceive the new Information Standard as an attack on the very nature of sovereign power.⁽⁴⁰⁾

If left unhindered to pursue their mutually intertwined development, privatization and digitization in international telecommunications may make this "attack" well-nigh irresistible.

(40) Walter Wriston, "In Search of a Monetary Standard: We Have One: It Comes In A Tube," *Wall Street Journal* 12 November 1985:28.