

**Better Telephone Service
for the Have Nots: In Whose
Interest, by Which Means,
and Who Pays?**

Tommy T. Osborne

Program on Information Resources Policy

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Project Director
Oswald H. Ganley

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Tommy T. Osborne commands Information Systems Command—Army Materiel Command and serves concurrently as AMC's first Corporate Information Officer. This work was prepared while the author was the Army Senior Fellow at Harvard University's Center for International Affairs.

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This paper is dedicated to my wife, Emma, who never lost faith or patience.

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Executive Summary

- This paper is about where, why, and how to improve telephone service, especially in developing countries.
- Telephone service quality indicators in selected nations and regional telephone density are used to contrast the four telephone-poor regions: Africa, Asia, Eastern Europe as well as the former Soviet Union, and Latin America.
- Better telephone service is important to the development of have-not nations. The developed world, as the principal donors of development funds, as sellers of telecommunications goods and services, and as the major network users, also has a stake in improving service in telephone-poor nations.
- Despite this commonality of interests, tremendous inequities in distribution and service persist, because decision makers do not believe the benefits of improved telephone service have been proven to exceed those of other sectors, such as ports, highways, and other infrastructure projects. Political, financial, and technical constraints contribute to the problem of inequities.
- Various approaches to telecommunications development were analyzed, including the Maitland Commission Recommendations. Common to all is the need for political will on the part of the governments of both developing and developed world countries, for financial resources, to restructure into business-like organizations, and to change to more flexible regulations.
- The capabilities and potentials of wireless communications as an alternative to fixed networks as well as the use of military signal sources are examined. No ideal solution is at hand. Pragmatic, flexible, open-minded strategies based on real business and economic realities seem to offer the best chances of success.
- While the West concentrates on helping the least telephone poor — Eastern Europe — primarily for geopolitical reasons, those in dire straits must continue to help principally themselves.

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CHAPTER ONE

THE TELECOMMUNICATIONS RICH AND POOR

1.1 Overview

The Missing Link. Eastern Europe: Please Stand By. “The Telecommunications Rich and Poor.”¹ Titles like these dramatize the disparities among the First, Second, and Third Worlds. Three-quarters of the world’s telephones are installed in nine countries, according to the Maitland Commission.² Although communications and computer technologies have made enormous strides, excessive waiting time for telephone installation and low call completion rates are still common inconveniences in too many nations.

This paper is about where, why, and how to improve telephone service. The first chapter examines the quality and extent of telephone service in different regions. The paper then outlines why better telephone service is vitally important to both the telephone rich and poor. Constraints that impede improvement are discussed. There follows a critique of three officially accepted means — Convincing Studies, Maitland Commission Recommendations, and Structural Adjustment or Liberalization — the last touted by the International Monetary Fund (IMF), and others. Wireless technology, self-financing, and use of military signal resources are proposed as special case approaches. Regulatory and training changes also are balanced. But, first, the paper asks, How bad is telephone service outside the favored few regions?

1.2 How Bad Is It? Where Is It That Bad?

The quality of telephone service has many components. A senior Hungarian telephone official is reported to have said: “Half of Hungary is waiting for a telephone; the other half is waiting for a dial tone.”³ A high-quality system starts with easy access to a working instrument. One also needs a fairly robust network so that calls are completed, a regular maintenance regime, and a responsive system to repair faults.

Access, or availability, is traditionally described in terms of main lines per 100 population, or density. A main line connects a telephone to the public switched network. A recent publication of the Organization for Economic Cooperation and Development (OECD) agrees that “density of telephone main lines is one of the best indicators of the quality, cost and geographical coverage of the service provided by public telecommunications operators.”⁴ A second parameter is the unsatisfied demand for telephones, and a third is the waiting time from application to installation. The fourth, but most critical, parameter is call completion rates. After all, the purpose of a telephone is to call another person (or another computer) — not to listen to a dial tone. The official compilation of worldwide data on this subject, the *Yearbook of Public Telecommunication Statistics* (hereafter *ITU Yearbook*), published by the International Telecommunication Union (ITU), reports density and demand data. Those who provide the service also provide the data, in most cases. These data are heavy on access; other quality indicators are missing. I have gathered indicators of quality shown **Table 1-1** from a variety of sources, official and unofficial.⁵

Data in **Table 1-1** are representative of low service quality in telephone-poor nations. The low number of main lines per 100 population actually serves fewer people than is apparent. Most of the population live in rural areas, while most of the telephones are installed in the cities. Nearly every nation reports a huge unsatisfied demand. Few report the waiting period between request and installation because the numbers are shocking. For example, the waiting period in Algeria, 8.5 years, is enough to discourage applicants, although longer waits, up to 27 years in Egypt, have been reported. Low completion rates of international calls indicate a poorly maintained or congested national network. They also predict internal call completions. In 1985, Hungary’s local and long distance call completion rates were 45 and 50 percent, respectively.⁶

The United States, in contrast, is representative of developed countries where population and telephone density are evenly spread between urban and rural areas; there is nearly universal service, and call completion rates are relatively high. Because a story is worth a thousand statistics, three reports, representative of quality in various parts of the globe, follow.

Table 1-1

**Telephone Service Quality Indicators in Selected Nations:
1988 or Most Current**

Country	Main Lines per 100 Population Nationwide	Percent Urban Main Lines	Percent Urban Population	Percent Rural Main Lines	Percent Rural Population	Unsatified Demand ¹ (000s)	Incoming ² Int'l Call Completion Rate (%)	Percent Connected to Automatic Switches ³
Algeria	2.88	62.29%	19.96%	37.71%	80.04%	524.20	N/A	94.90%
Zimbabwe	1.33	89.20	18.57	10.80	81.43	31.99	20.00%	99.00
Cape Verde ⁴	0.80	86.00	63.00	14.00	37.00	3.47	N/A	87.00
Nigeria ⁴	0.20	84.00	25.40	16.00	74.00	152.69	15.00	97.00
Philippines	1.02	99.96	26.12	0.04	73.88	281.95	10.00	98.90
India ⁵	0.45	34.04	3.43	65.96	96.57	1,124.57	28.00	89.60
Fiji	4.98	63.41	15.16	36.59	84.84	11.65	N/A	97.12
Bangladesh ⁶	0.21	86.53	20.00	13.47	80.00	N/A	N/A	N/A
Hungary	8.10	73.61	28.73	26.39	71.27	266.00	50.00	91.84
Czechoslovakia	13.60	46.08	20.94	53.92	79.06	170.00	35.00	99.81
Brazil	6.29	49.08	20.71	50.92	79.29	662.00	50.00	99.60
Bolivia	2.54	99.82	34.74	0.18	65.26	43.00	N/A	94.70
Dominican Republic	3.50	91.70	62.55	8.30	37.45	N/A	N/A	100.00
United States	49.33	51.90	48.90	48.10	51.90	0.00	70.00	100.00

Notes:

N/A - not available

¹ Unsatisfied Demand is reported under "Waiting List" in the *ITU Yearbook*.² Estimates for calls originating in the U.S. and from Japan to the U.S. are based on interviews with common carrier and FCC staff.³ This column represents the percentages of main lines connected to automatic switchboards.⁴ Urban and rural population and percentages of main lines for Cape Verde and Nigeria are from *The World's Telephones, 1982*.⁵ India identified four urban centers in *The World's Telephones, 1990*: Bombay, Calcutta, Delhi, and Madras. The population of these cities is estimated at 28 million.⁶ Telephone density nationwide as well as urban and rural main line percentages on telecommunications in Bangladesh are developed from the *Fourth Five-Year Plan, 1990-95*. Population percentages are set at the average for developing nations.**Sources:** *ITU Yearbook* (17th ed.); *The World's Telephones, 1989*, unless otherwise cited.

The first story is from the First World, to provide comparisons of availability and service. Although the United States of America does not have the highest density of telephone main lines, it is the nation I know best, and is the First World example.⁷ I move frequently, often between rural and urban areas. By calling ahead to the local telephone company, installation and telephone number activation are completed before my arrival. Typically, as the movers are bringing in furniture, I am able to plug my telephone into the wall socket, get an immediate dial tone, and successfully place several transcontinental calls. The United States telephone network is characterized by 49.33 main lines per 100 population, short waiting times for new and transfer installations, and a high call completion rate.⁸ Both residential and business customers are routinely offered value-added services, such as call forwarding.

In contrast, Poland has eight main line telephones per 100 population. The waiting time for new installations averages 13 years, and it commonly takes two to 15 attempts to complete a call.⁹ This is a Second World Story. The Third World is represented by Guinea, on the continent of Africa. Guinea averages 0.18 main line telephones per 100 population. In 1983, the last year such data were reported, nearly one in ten Guineans had submitted a new application for a main line. However, a study sponsored by the World Bank reported that telephone service, though improved, remains inadequate: "Telephone service is limited in Conakry and nonexistent between Conakry and the interior."¹⁰

There certainly are better and worse cases in the Second and Third Worlds, but these illustrate the disparity in availability and quality of plain old telephone service (POTS). The First World wants value-added services, which support computer-related applications, such as electronic mail. The Second World wants residential and business needs filled. But for much of the rural Third World, where densities are dramatically lower than the already low urban averages, the goal is a working telephone within "easy reach" of all. In Nigeria, that goal translates into "a telephone within five kilometers of every citizen by the year 2000."¹¹

The globe can be divided for analysis in several ways. One is between the haves and have nots, on the basis of telephone density. Aquilino M. Crovetto provides 27 main lines per 100 population as a theoretical dividing line between developed and developing countries. The statistics bear him out. All but three of the 24 OECD countries exceed this statistic. Of 150 non-OECD nations and dominions, only five small states (Cyprus, Guiana, Israel,

Monaco, and Singapore) and 12 tinier areas, mostly dependencies, meet or exceed that threshold density. Taiwan has 31 main lines per 100 population, but most international authorities, holding to a one-China policy, report density for the People's Republic of China. This paper uses Crovetto's threshold density to distinguish between the telephone rich and poor.

Crovetto also uses the tripartite division of First, Second, and Third Worlds, based on economic and population growth indicators, although he designates them Developed, Second World, and Developing Countries.¹²

Parenthetically, the ITU, which began as the International Telegraph Union in 1865, is the specialized United Nations agency responsible for functional coordination of telephone, telegraph, broadcast, and associated electronic media services, worldwide. The ITU, among its many activities, publishes technical information, recommends standards, studies international rates, and coordinates and registers radio frequency and orbital slots for satellites. Only nations vote in the ITU, but public administrations and private parties work together on an expert level.¹³ One of the Union's key missions is to help developing nations improve their telecommunications services. The ITU's highest governing body, the Plenipotentiary Conference, which met in Nairobi in 1982, codified this mission in the Convention. Among other supporting actions, the Nairobi Plenipotentiary directed that an international commission study means for worldwide telecommunications development. This commission, commonly called the "Maitland Commission" after its chairman, Sir Donald Maitland, also used an interesting method of analysis.

The Maitland Commission mixed predominantly economic divisions with the geographic, political, and economic entity of East European nonmarket economies in some analyses. Bulgaria, Czechoslovakia, the then German Democratic Republic, Hungary, Poland, Romania, and the USSR constituted this group. Yugoslavia is listed as an "upper middle income economy."¹⁴

World Statistics in Brief uses six geographic regions: Africa, Asia, South America, Europe, Oceania, and North America, while the World Bank's *1990 Annual Report* slices four ways.

For simplicity, I have adapted the *ITU Yearbook's* four-part geographical division of the world, reflected in its "Classification of Countries/Areas by Continent" tables. The adaptation subdivides Africa, Asia, Eastern Europe, and Latin America into groups of nations that are geographically similar. Eastern Europe + consolidates the following nations: the USSR, Albania, Bulgaria, Czechoslovakia, Hungary, Poland, and Romania. The reunification of Germany eliminated separate consideration of the German Democratic Republic, whose service is being addressed nationally. (Since the first draft of this paper, changes in the former Union of Soviet Socialist Republics continue to evolve, but here the republics are treated as a unity for the sake of analysis.) Following the Maitland Commission, Yugoslavia was not listed in Eastern Europe +. In my analysis, Mexico is included in Latin America, rather than in North America, as listed in the *ITU Yearbook*. This arrangement consolidates similar nations. **Table 1-2** provides regional density data.

The poor quality of telephone service for most of the world is reflected in the first two tables. **Table 1-1** details problems in distribution, unsatisfied demand, and call completion in some representative countries in each region. On average, 80 percent of citizens living in telephone-poor countries reside in rural areas with significantly less than 40 percent of the nation's telephones. Unsatisfied demand, reported in the *ITU Yearbook's* "Waiting List," is nearly as large as the number of main lines in Algeria and Nigeria, half as large in some other countries. Even numbers this high are often understated. Wellenius has reported an unrecorded demand in Santiago, Chile, three times the recorded number. Discouraged potential subscribers may surface as the network is improved; in Pakistan, for example, the waiting list nearly doubled (from 279,514 to 531,470) in four years (from 1948 to 1988) although main lines grew dramatically (from 441,100 to 636,590) within the same period.¹⁵ Expansion of telephone networks into rural areas likely will spur growth of the waiting lists. Incoming International Telephone call completion rates above 65 percent indicate an adequate metropolitan domestic network.¹⁶ The nations listed in **Table 1-1** and most telephone-poor countries do not meet this metric.

The small sample in **Table 1-1** is instructive, not because it represents the worst but because it does not. Every nation in this sample, except Zimbabwe, has increased its telephone density from that recorded in 1983 (Nigeria, Bolivia, and the Dominican Republic do not have 1983 density data in the *ITU Yearbook*, 17th ed.). In nine of the 13 nations, 95

Table 1-2

Regional Telephone Density: 1988 or Most Current

Region	Main Lines	Population	Density	Nations	Density = or > 27
Africa					
Islands	225,528	12,477,336	1.81	12	0
North Africa	2,620,587	111,153,962	2.36	5	0
Sub Saharan Africa (SSA)	3,993,085	429,312,184	0.93	41	0
<i>SSA – South Africa*</i>	<i>1,324,496</i>	<i>399,260,184</i>	<i>0.33</i>	<i>40</i>	<i>0</i>
Africa Totals	6,839,200	552,943,482	1.24	56	0
Asia					
Archipelagoes (a)	2,771,268	267,116,671	1.04	4	0
Islands	162,021	5,680,965	2.85	14	0
North Asia (b)	27,906,333	2,331,928,710	1.20	18	2 (c)
Southwest Asia (SWA)	7,062,636	251,946,546	2.80	14	1 (d)
<i>SWA - Israel*</i>	<i>5,590,736</i>	<i>247,469,546</i>	<i>2.26</i>	<i>13</i>	<i>0</i>
Asia Totals	37,902,258	2,856,672,892	1.33	50	3
Eastern Europe +					
USSR (e)	33,991,100	283,000,000	12.01	1	0
Eastern Europe	12,035,314	121,853,300	9.88	7	0
<i>E. Europe – Albania*</i>	<i>13,035,314</i>	<i>118,652,300</i>	<i>10.14</i>	<i>6</i>	<i>0</i>
Eastern Europe + Totals	46,026,414	404,853,300	11.37	8	0
Latin America					
Central America	813,681	26,832,113	3.03	6	0
Mexico and South America	21,333,642	363,201,375	5.87	14	1 (f)
Islands	1,309,683	28,330,362	4.62	22	6 (g)
<i>Islands – Cuba*</i>	<i>956,383</i>	<i>17,925,462</i>	<i>5.34</i>	<i>21</i>	<i>6</i>
Latin America Totals	23,457,006	418,363,850	5.61	42	7

Notes: General: Density is main lines (lines between a telephone and a switch) per 100 population or total lines per 100 when the nation only reports total lines. Nations with densities equal to or exceeding 27 are telephone rich, all others are telephone poor.

* *Italicized data* subtract an atypical nation from a regional grouping (i.e., islands) — Cuba deletes Cuba from Latin American Island data. *Italicized data* are not included in the regional totals.

Chart excludes OECD nations Australia, Japan, and New Zealand from Asia. No other region in this table has OECD nations. Nations are countries or areas in the *ITU Yearbook*.

Legend:

- (a) Archipelagoes include Sri Lanka and island chains with more than 10 million people.
- (b) Excludes Kampuchea and Democratic Peoples Republic of Korea, whose total population of 29 million with no reported main lines would skew the results.
- (c) Singapore and Hong Kong.
- (d) Israel.
- (e) Data are based on 1988 entries in *ITU Yearbook* (17th ed.).
- (f) French Guiana.
- (g) Barbados, the Cayman Islands, the Falklands, Guadeloupe, Martinique, and the U.S. Virgin Islands.

Sources: *ITU Yearbook of Public Telecommunications Statistics*, (17th ed.) for most nations; *The World's Telephones, 1990*, for Belize, the Dominican Republic, and Namibia; *World Factbook, 1990* for Equatorial Guinea, Liberia, Lebanon, and Yemen (R.A.); Albania's population data are from *Eastern Europe: Please Stand By*. Telephone statistics are not available for Albania.

percent or more of the main lines are connected to automatic exchanges. Even these nations display low density, seriously underserved rural sectors, high unsatisfied demand, and inadequate networks.

Table 1-2 highlights interregional and intraregional similarities and differences in telephone density. First, nearly every nation and region has a density of fewer than 27 main lines per 100 population — i.e., the overwhelming majority are telephone poor. Next, the differences. The spread in density between highest and lowest within each region averages two telephones per one hundred.

Table 1-2 identifies some of the interregional disparities by displaying in **bold text** the revised data when atypical nations/areas are removed. At the top of **Table 1-2**, under Africa, for example, removing the relatively telephone-rich Union of South Africa (S. Africa in the table) reduces Sub-Saharan Africa's telephone density by two-thirds. At the bottom of the table, when Cuba's telephone poverty is subtracted from Latin American Islands, telephone density increases by 0.72 percent — nearly one per one hundred. Although Haiti and the Dominican Republic are not disaggregated from the Latin American Islands totals, these two nations differ widely enough to demonstrate local disparities. They share the same island. The Dominican Republic's 6.87 million residents outnumber Haiti's 5.5 million just slightly, yet they have six times as many telephones.

Africa continues to have the lowest regional density, followed by Asia, Latin America, and Eastern Europe +, in ascending order of density.

The OECD countries in Asia (Australia, Japan, and New Zealand) are not included because they would skew the density data. The 142 million inhabitants of these three countries share 58 million main line telephones — more than the rest of Asia's nearly three *billion* people combined.¹⁷ Melbourne, Australia, with three million citizens, has more telephones than Sub-Saharan Africa, less the Republic of South Africa.¹⁸ In absolute numbers of main lines, Africa remains last, followed by Latin America, Asia, and Eastern Europe +. The non-OECD nations and areas with a telephone density above 27 are Israel and two newly industrializing economies in Asia, French Guiana, and six islands in Latin America.

Tables 1-1 and 1-2 clearly portray a world where the majority is still waiting for either a telephone or a dial tone. The next section addresses what poor telephone access and low system quality mean to different interested parties.

CHAPTER TWO

HOW IMPORTANT ARE TELEPHONES, AND WHO CARES?

Why are telephones important? Why telephones, rather than telecommunications? Where do these instruments stand in comparison to agriculture, health, roads, energy, education? Who decides? Who cares? After first addressing the question of who cares, this paper discusses the importance of telephones.

Telecommunications is the transport of information by common carrier or private network telephone and/or telegraph (data), as well as by way of broadcast radio or television. Either system can be used in the one-to-one, one-to-many, and many-to-one mode of transmission. However, the telephone, not other systems, has the most impact in the First, Second, and Third Worlds. The landmark book *Telecommunications and Economic Development* focuses on telephone service because telecommunications in the developing world (as well as in industrialized countries) is dominated by the telephone service, and by the use of the telephone network for text, image, and data transmission; this telephone network typically accounts for more than 90 percent of telecommunications investment, traffic, and revenues.¹⁹

For the developing world, Andrew P. Hardy's correlation study reported that the telephone seemed to be a stronger factor in economic development than broadcast media. He also showed that the poorer nations received more benefits from investing in telephones than their richer cousins, and that residential telephones were economically more important than previously thought.²⁰

In 1988, switched telephone services were 80 percent of the gross revenues for international telecommunications services sold by U.S. common carriers. Meanwhile, digital public telephone networks are being used to provide value-added business services.²¹

Telephone service is the long pole in the telecommunications tent for those in telephone-poor nations, and for those in the First World who sell, supply, or consume that service in international markets. This first division, the "haves" and the "have nots," begins to address the question, Who cares? *To whom* is better telephone service important? More critically, *who* should care because their interests are at stake?

There are at least two types of stakeholders who should care: those who know their interests are at stake, and those whose interests are involved but who may be unaware. The former do care; the latter should, but do not. These are the general groups of interested parties: governments, consumers, providers, and enabling organizations. Those who have adequate national telephone service can profit by extending that service to the have nots — an opinion that, apparently, is not shared universally.

The 1982 Plenipotentiary Conference of the ITU in Nairobi resolved that the Union (as the principal enabling organization) must provide to “governments, administrations, decision-makers, economists, financial and other institutions concerned with development . . . comprehensive studies on the direct and indirect benefits of investment in telecommunications infrastructure and the relationship between . . . growth of telecommunications services and socio-economic development in general, so as to enable developing countries to better assess their own development priorities and *give necessary priority to telecommunications*”²² (emphasis added).

Thus, the ITU identified the “unaware” interested parties. Multiple studies have been conducted, many before the Nairobi Plenipotentiary. The efficacy of these studies in converting the unaware is reviewed in Chapter Three. More now on the interested parties.

Some advantages of better telephone service to interested parties in have not nations follow. Governments may increase the efficiency and effectiveness of administration, infrastructure development, and services with better telephone systems. An extensive, robust network that connects rural users supports national security, emergency management, provision of health services, and reduces migration to towns. Urban and rural consumers of telephone services can easily acquire information that leads to more efficient use of distribution systems, increased profits, and food production. Each may profit from increased tourism and export industries, which require reliable access to world markets. Because of distances and difficulties in travel, the rural user’s needs are more critical. The international consumer, business person, or tourist gets the same benefits but adds foreign exchange earnings and expanded business opportunities, directly through use of the telephone system, and indirectly as well.

For service providers, private or government, a good system can provide higher rates of return in two ways. First, more calls would be completed, including the foreign exchange earning international calls. Second, system repair costs from overuse breakdown would decline. The high rate of return (about 19 percent) on World Bank financed telephone projects in Africa, Asia, and Latin America should provide a strong incentive to governments, providers, and enabling institutions, such as banks.²³ There is also participation in a high technology enterprise whose management, maintenance, and, often, manufacture can leapfrog nations into the Information Age. **Table 2-1** lists some of the most significant studies and publications that develop these advantages, and more.

Why should the have nations care about better telephone systems for the have nots? The reason is simple: it is in their interest as the principal donors of development funds, sellers of telecommunications goods and services, and the major network users. If, indeed, improved telephone service increases social and economic development in the Second and Third Worlds, the majority of humankind would be less dependent on First World resources on concessionary terms and more self-sufficient. They would probably buy more, too. Long-term benefits could accrue to governments and to their citizens simply by internal use of the \$27 billion that the World Bank loaned recipient nations in 1990 in all categories. In the short term, providers of telephone equipment and international telephone service stand to gain market share and profit by selling to the telephone poor. Recent market studies stress the high growth potential in areas outside Western Europe and North America, although Western Europe still leads in capital expenditures.²⁴ Urban and rural users of telephone equipment and service in have nations could benefit from better equipment developed with reinvested profits. The international business and tourist users are obvious beneficiaries of a robust, global telephone system: they would be direct users. Enabling organizations, such as banks, would prize high payoff investments.

To paraphrase Brazil's experience, telephones are an "essential tool for any society to develop the political, economic, and social sectors. [This service] ... is a consumer good for the largest and neediest segments and an essential production input for the business sector."²⁵

If telephone service can bring such dramatic improvements in global wealth and welfare, why did the Nairobi ITU Plenipotentiary charge that body with converting to the "telephone

Table 2-1

Telephones and Development: Selected Principal Studies

Year	Title	Author and Findings
1963	<i>Wealth of Nations and Telephone Density</i>	A. Jipp. Strong correlation between telephone density and wealth.
1968 1976 1978	<i>Economics Studies at the National Level in the Field of Telecommunications.</i>	GAS-5, CCITT.* Implied casual link between telephone and wealth; indirect social benefits.
1976	<i>Telecommunications and Economic Development: A Model for Planning and Policy Making</i>	E.L. Bebee and E.T.W. Gilling. Telephone density and use helps other support factors improve the economy.
1978	<i>Benefits of Rural Telecommunications in Developing Countries</i>	S.N. Kaul. The large number of wasted trips by farmers can be dramatically reduced by telephone use, saving fuel and time.
1980	<i>The Role of the Telephone in Economic Development</i>	Andrew P. Hardy. Investment in telephone main lines contributes in a statistically significant manner to economic growth. Impact is greatest in poorest countries.
1983	<i>Structural Economic Analysis (Chapter 5, Telecommunications and Economic Development)</i>	Robert J. Saunders, Jeremy J. Warford, and Bjorn Wellenius. Communications is an input for every industry. Use is heaviest in service and trade sectors in both developed and developing nations.
1983	<i>Telecommunications for Development, ITU-OECD Joint Report 2</i>	ITU and OECD et al.** A 3% increase in gross national product is attributed to a 1% increase in telephone density. Underinvestment in telephones is more costly than the requisite investment in that sector. Greater distance and fewer lines indicated more benefits to rural than to urban users of telephones. Benefits 4 to 36 times cost were reported. New technology can dramatically reduce the cost of extending telephones to rural users.
1984	<i>Financing Telecommunications for Rural Development</i>	Douglas Goldschmidt. Inadequate foreign exchange financing is the primary cause of underinvestment in telecommunications in developing countries.
1984	<i>The Role of Telecommunications in the Development of Nations</i>	Bjorn Wellenius. More studies are less likely to increase investment in telecommunications than to effectively communicate what is known to decision makers.
1988	<i>Telecommunications and the National Economy</i>	ITU. For 76 market economies, growth in telephone density always leads growth in per capita gross national product (GNP). The poorer the country, the greater the contribution more telephones or more telephone calls make.
1987	<i>Financial Structures in Competitive Telecommunications: An Overview</i>	Jaak Aulik. Financial and regulatory structures for telecommunications providers in telephone-poor countries are necessarily different from those in nations with near-universal access and service-based economies.
1988	<i>The Formula is Everything: Costing and Pricing in the Telecommunications Industry</i>	Anthony G. Oettinger. Telecommunications exchange service costing and pricing is policy-based, not cost-based.

* GAS-5, CCITT abbreviates the French name for Autonomous Study Group 5, International Consultative Committee on Telephone and Telegraph, a permanent organ of the ITU.

**The ITU-OECD study is a compilation of studies.

religion” those who would be its chief beneficiaries? If telephones are so important to all strata of society, why do tremendous inequities in distribution and service persist? There are several possible reasons. Saunders et al. list six major constraints, summarized below²⁶:

1. Inadequate organization and regulatory structure as well as organizational, management, and staffing problems (inadequate regime and human resources infrastructure)
2. Failure to quantify and specify the benefits of telecommunications in comparison with other sectors (no convincing studies)
3. Although financially profitable, telecommunications investments in developing countries only benefit elites
4. Unawareness of the significant economies of scale that increased investment could bring
5. Tariff policies that block efficient allocation of telecommunications resources
6. Inadequate financial resources.

Oswald Ganley and Gladys Ganley also suggest six reasons for underinvestment in communications and information systems in the area of development.²⁷ Two of their reasons expand on Saunders’ constraints: to his Constraint 3, they add the concern that telecommunications may not benefit the poorest of the poor; the sector’s extreme capital intensiveness makes Constraint 6 more difficult to overcome. Finally, the Ganleys point out the unpredictability of these systems’ impact on the political and social fabric (they call them “political dynamite”). This last reason helps explain the Second World’s low telephone densities: keeping telephone access and quality low appears to be a deliberate act of government to reduce challenges to the status quo.

Without disagreeing with either authority quoted above, I count these issues as key:

1. Decision makers do not believe the economic benefits of improved telephone service to developing nations have been proven. More importantly, resource allocation is a political, not a purely economic decision. Accordingly, these nations and their donors prioritize this sector after those so-called basic human needs, such as roads or agriculture, that they see as having more impact on areas of their special emphasis.
2. Dramatic and rapid changes in technological and regulatory conditions make decisions difficult to arrive at.

3. Lack of regime and human resources infrastructures to select, install, and maintain equipment designed for the urban North contribute to failure.
4. The high capital cost in scarce, hard currency of most telephone projects has worsened with the international debt crisis. High cost may help reinforce the preference of some development professionals for low technology, labor-intensive aid projects.
5. The haves and have nots cannot agree on a plan to resolve these issues. There is often equally strong disagreement among financiers, politicians, development staff, and telephone administrations in both have and have not nations.
6. The threat of political destabilization from changes in law, management, job availability, tariff structure, and wider telephone access keeps many governments from risking these costs.

These issues, the constraints listed by Saunders and others, combine to make a difficult problem, which three major efforts have attempted to resolve. First, studies were to prove the worth of telephones and the breadth of their value. Second, the Maitland Commission formulated a wide-ranging plan of action to resolve most issues and to address many constraints. And third, the International Monetary Fund proposed Structural Adjustment to improve the overall viability of developing economies. Liberalization of government monopolies, especially telephones, is a subset of Structural Adjustment, which is being applied to fix the regime and human resources infrastructures. The next chapter critiques these three Royal Roads to telephone improvement.

CHAPTER THREE

THREE ROYAL ROADS TO BETTER TELEPHONE SERVICE

Three routes have been proposed as the best means to increase telephone availability and quality. Each attacks specific causes of low quantity and quality of telephone service. Each has underlying and explicit assumptions. Perhaps the oldest route is the Convincing Studies Road. Another is the Maitland Commission Recommendations, and the third is the International Monetary Fund's Structural Adjustment. What did the first route attempt, and how far did it go? Why did it fail?

The purpose of Convincing Studies was to increase investment in telephone service by proving the benefits to decision makers. Proponents of Convincing Studies assumed that decision makers were rational actors who would buy telephones based on cost benefit tradeoffs, although politicians, investors, and ordinary citizens in developed and developing countries weigh factors other than cost benefit ratios in making decisions. A sampling of such major studies, shown in **Table 2-1**, ranges from rough correlations — which do not say which came first, telephones or development — to advanced econometric analyses and case studies — which purport to predict a given amount of economic growth per percent telephone density increase. We started down this road in 1963, with the number of studies on the socioeconomic effects of telephone service and other telecommunications increasing nearly exponentially. Were the decision makers convinced?

Yes and no. On the one hand, the World Bank, which reportedly claimed in 1979 that its investments lagged because the economic benefits of investment in telecommunications for developing countries had not been precisely proven,²⁸ in 1990 emphasized modernization and rehabilitation of the telecommunications infrastructure in Eastern Europe to facilitate that area's economic development and integration into the world economy.²⁹

On the other hand, the same organization does not mention telecommunications in its initiatives for Sub-Saharan Africa, despite multiple study conclusions that telephones contribute more to less developed countries. The World Bank has consistently funded telecommunications sector loans for Africa in the past six years, and Stryker's evaluation of Guinea's pressing need for internal telecommunications links to improve its marketing

infrastructure is an example of a generalist World Bank study that supports the indispensability of this sector.³⁰ Previous studies and Stryker's evaluation all argue that telecommunications ought to be in the World Bank's explicit initiatives for Africa.

Developing nations continue to underinvest in this sector, and, alarmingly, Academia appears to pay it less than lip service. For example, a standard course book in development, updated after most of the studies in **Table 2-1** were published, does not list telecommunications as a factor.³¹ The prestigious Harvard Institute for International Development has no public record of publications, research, or assistance in this area.³²

How could this be? Several factors contribute to decreasing the impact of hundreds of studies on telecommunications and development conducted since 1963. The purists may have been turned away by initial use of statistical regression and correlation without recognition of that method's major limitations. Correlation shows the *coexistence* of two events, not causal relations between them. The regression equation hides complex relationships. Subsequent studies expanded from macroeconomic to spatial, sector, microeconomic, and distribution analyses. There are questions, no matter the analysis technique, about the comparability of data between telephone-poor and telephone-rich nations. Although Wellenius provides an exhaustive critique of each analysis technique, his conclusions about studies are most telling:

This paper argues that more of the same will do little to help promote accelerated telecommunications investment in developing countries.... Rather, the efforts should now ... concentrate on conveying existing sector knowledge to governments and international agencies [D]espite expectations voiced in the past, none of the tools reviewed or any simple combination of these now seem to hold the promise of yielding widely applicable guidelines for resource allocation to and within the telecommunications sector.... In a sense, it could be hoped that the era of large expectations from little studies, as well as of occasional grand analytic schemes, is over.... [P]olicy analysis and applied research will in the near future be mainly directed at pricing and sector organization issues [leading to] sector conditions which facilitate the development of telecommunications essentially as a business.³³

Social science, as opposed to physical science, is descriptive, not predictive; data and analysis techniques are not advanced enough to assume that the descriptive work was also normative or prescriptive. There are two bottom lines:

1. Social studies cannot predict precisely, but the data support a positive relation between better telephone service and socio-economic betterment.
2. The studies were targeting telecommunications specialists and academics in the new field — precisely the wrong audiences. The developing nation's leaders, planning and finance ministries, as well as their counterparts in international development and banking from the First World are, as the 1982 ITU Plenipotentiary in Nairobi pointed out, the relevant audience.

As one can see from **Table 2-1**, while socio-econometric analyses continue to be published, pricing/sector organization studies are now being conducted. More current articles in general periodicals read by policy elites address issues of telecommunications and development than did those in the 1970s. There is also a significant increase in the business press of articles on the relative investment advantages of providing more telephones in telephone-poor regions. While converts to the telephone religion were being sought among general policy elites and the for profit world (but not the development gurus, it seems), another tasking from the Nairobi Plenipotentiary was being met. Resolution number 24 called for comprehensive, convincing studies. Resolution number 20 of the same conference directed the establishment of the Independent International Commission for World-Wide Telecommunications Development, commonly called the "Maitland Commission" in honor of its chairman. The next Royal Road to be judged is the Commission's recommendations in its report, *The Missing Link*.

The Maitland Commission's task was essentially political, time-constrained, and creative: to recommend new, cost-effective ways to redress the uneven distribution of telecommunications that served all interested parties, while increasing self-reliance in the developing world. The work was to be completed in one year. The Commission's seventeen members from around the world (including six from planning, political, and economic areas), chose to focus on telephones and to use existing studies, rather than create another. The Maitland Commission's recommendations apply to both developing and developed nations.³⁴ These may be grouped in seven general areas:

1. Improving international cooperation, North-South and South-South
2. Improving the choice of technology

3. Bettering organization and management
4. Meeting our training needs
5. Developing research, development and local manufacture
6. Creating a new organization for telecommunications development
7. Financing the development and expansion of telephone systems

The recommendations and observations in these seven areas pointed toward one objective: bringing “all mankind within easy reach of a telephone by the early part of the next century.”³⁵ Such an amorphous goal can be solidified by reasonable assumptions and some arithmetic. Chapter 9 of *The Missing Link* notes that \$8 billion (U.S.) was invested in developing nations’ telecommunications in 1983; it calls for a total of \$12 billion (U.S.) to be invested annually to meet the Commission’s goal. The first assumption is that the year 2020 is the early part of the next century. I also assume that technology and production volume will reduce the average cost of extending a main line from \$2000 to \$800. Given these assumptions, the Missing Link additional investment in telephones is calculated as (2020 – 1985) years × (\$12 billion – \$8 billion)/year. Simplified, we get 35 years × \$4 billion/year = \$120 billion. Dividing \$120 billion by \$800 per main line yields 150 million additional lines — more than doubling the 114 million main lines in the developing world today (computed from Table 1-2). This increase would raise the average density from 2.7 per hundred to 6 per hundred — *if* world population stabilizes at current levels. Even that rosy likelihood would still require shared use in rural areas. Since we will not know if the goal is met for years to come, it is useful to examine the recommendations and the extent of their success.

The Maitland Commission’s recommendations were approved by the ITU Administrative Council in 1985. These recommendations and some salient comments, grouped into seven major areas, are reviewed below.

Recommendation 1: Improve international cooperation by increasing United Nations Development Program funding to the ITU; increase the effectiveness of regional cooperation among developing countries.

Recommendation 2: Develop systems to serve remote areas cheaply; ITU should compile supplier and systems catalogues.

Recommendation 3: Run the telephone company like a business, whether publicly or privately owned; developing countries should pool purchases on a regional or subregional basis to reduce prices and contribute to interoperability; standardize equipment purchase contracts to include spares, training, post installation, and maintenance support.

Recommendation 4: Developing nations should define their own training needs, and use existing resources; industrialized nations and local institutes should develop additional resources for technical and management training.

Recommendation 5: Establish regional research and development institutes in the developing world to prototype appropriate technology; institute local or regional manufacture with the help of industrialized nations.

Recommendation 6: Immediately establish in 1985 a Center for Telecommunications Development to facilitate policy development, advise on system planning, and provide operational support.

Recommendation 7: Developing countries and donors should raise the priority of telecommunications and insure every project includes this sector; international satellite providers should fund earth segment for developing countries; industrialized countries should establish special insurance and financing mechanisms (the latter could include a percentage of the profits from international telephone calls between industrialized and developing nations).

These recommendations were translated into four approaches that were then seen as solutions: more money, better run systems, an organization to catalyze more effective international cooperation, and collective self-help (in needs definition and manufacture) by the telephone poor. Each approach is based on affording telecommunications a higher priority. The first and third approaches are often seen as critical, because they involve North-South resource flows. However, the Maitland Commission also called for significant efforts by the South in Recommendations 1, 3, 4, 5, and 7. Nonfinancial international organizations were heavily tasked. The second Royal Road was to be travelled by all concerned to arrive at improved telephone service for the have nots. How successful was it?

The ITU Administrative Council's interim report to the Plenipotentiary Conference at Nice in 1989 rated this route a failure. This report concluded that, despite some improvement, little had changed: the growth rate was inadequate to meet the objective, and the quality of service in developing countries remained low. Instead of increasing, World Bank lending for this sector (as a percentage of total loans) dropped from a long-term average of 2.5 percent to 1.27 percent during 1981-1989.³⁶

What to do? The Administrative Council asked for a return to the first Royal Route, to "Convincing Studies," including a "World Telecommunications Development Report," and more effective regional coordination in collective specifications, procurement, research, development, and local manufacture. The Nice Plenipotentiary decided to raise the status of its development actions by establishing a permanent Bureau of Telecommunications Development (BDT). This BDT might subsume the voluntarily funded Center for Telecommunications Development, which grew from the Maitland Commission's Recommendation 6.

One of Sir Donald Maitland's more recent recommendations, not surprisingly, was not followed. At the 1986 World Telecommunications Forum in Nairobi, he proposed that in 1989, developing countries should report at Nice their compliance with *The Missing Link's* recommendations. He proposed these questions:

First, have we accepted it as a principle that none of our development programs will be balanced, properly integrated or effective unless we include in them a full and appropriate role for telecommunications?

Second, in reviewing our development plans, have we ensured that adequate priority is being given to investment in telecommunications?

Third, have we taken steps to make our network more effective and progressively self-reliant and to ensure that new technologies are exploited to our benefit?

Fourth, are we meeting our training needs?

Fifth, have we explored with our neighbors the possibilities for regional cooperation in research and development, local manufacture and procurement?

Sixth, have we established a program for extending our network into the more remote areas?

Seventh, are we taking advantage of the pre-investment services provided by the Center for Telecommunications Development?³⁷

Few telephone-poor countries could answer all those questions affirmatively, then or now.

Since the Administrative Council's despairing report came four years after *The Missing Link* was published, and because this report was partially based on a 1987 questionnaire, it is

worthwhile to look again at the four approaches against a backdrop of national priorities for telecommunications.

In 1991, senior officials agree there is no worldwide trend to treat telecommunications as a priority sector for development.³⁸ Donor agencies and nations set the tone with priority sectors for loans — the World Bank inclusion of telecommunications for Eastern Europe as a priority is a rarity. However, donor and supplier nations are serious about helping Eastern Europe, which currently has the highest regional density of the telephone poor, get more lines and better service. Major upgrades in Bangladesh, China, India, Indonesia, Pakistan, and Nigeria — the five most populous telephone poor nations in Asia and the largest African nation — are certainly positive reflections of the high priority those countries assign to telephones.

When evaluating whether this sector has received the recommended \$4 billion annual increase, one should look beyond the World Bank to sums from other multinational banks, bilateral aid, loans arranged by suppliers, and innovative debt for equity swaps. For example, an Asian Development Bank loan of \$115 million to Pakistan, reported in the December 1990 issue of *Telecommunications Journal*, is over one-fourth of the World Bank's telecommunications loans in that year to Asia (\$392 million). In fact, a review of World Bank sectoral loans would be misleading. Unlike Agriculture and Rural Development, which received loans every year from each of the World Bank regions during fiscal years 1986–1990, telecommunications is spotty, from a high of borrowing in four of the five years (Asia and Africa), to a low of one year only for Latin America.³⁹ The debt crisis is a significant reason for governments not to borrow.

There is another large source of North–South concessionary funding for telephone service — the accounting rate system for international calls. Lower prices for calls from industrialized to telephone-poor countries, with each side paying one-half the price in each direction, result in positive cash flows to the latter. Because of this system, AT&T paid more than \$1.2 billion net outflow in 1987. But there is a cost: unbalanced accounting rates run the risk of driving industrialized common carriers to shift more international traffic away from the public switched networks.⁴⁰ Other financing alternatives are discussed in Chapter Four, “Other Routes.” However, subsequent ITU analyses of funding need to be more complete

before rating the first solution, more money, as unmet.

Personal and professional experiences reinforce the evaluation that service in telephone-poor countries has not improved significantly. There are islands of betterment, just as there are countries that rate telecommunications as essential to their development, but the numbers are small. Many believe that service can be improved without infusion of outside money. Saunders et al. provided sound guidelines two years before *The Missing Link* was published.⁴¹ Francis Latapie, director of External Relations for the International Telecommunications Satellite Organization (INTELSAT), pointed out four key failures leading to continued poor service in developing nations: the failure to

- Train personnel and fund a maintenance program.
- Pay adequate salaries to retain trained personnel.
- Charge enough for services.
- Allow management to treat all subscribers equitably.⁴²

INTELSAT continues to be a leader in international organizations' support to telephone-poor nations. Their Signatory Training Program is being expanded in 1991 to include "train the trainer" courses in four regional centers (India, Kenya, Senegal, Chile) and a six-month, on-site job training for manager designees. Another program will teach common failures and methods to correct them by videodisc and distance training. INTELSAT's Assistance and Development Program helps establish ground facilities from prefeasibility to cutover — the support, about 90 days, is free. Their charter prevents financing satellite earth stations as the Maitland Commission recommended, but their strong track record in assisting telephone-poor nations speaks for itself.

Training facilities and programs have blossomed with the support of developed and developing nations. The United States's promise at the Nairobi Plenipotentiary — to provide the best telecommunications training to colleagues from developing nations *free of charge* — has been met. Since 1983, the United States Telecommunications Training Institute (USTTI) has graduated more than 2000 students, provided training materials for home country use, and conducted regional courses. More than 70 percent of the funding and support has come from the private sector. The USTTI is a true joint private-government, nonprofit venture. In

1988, USTTI's full corporate sponsors included AT&T, COMSAT, GTE, MCI, and Western Union (founders), plus Northern Telecom, Inc., Motorola, Inc., Digital Equipment Corporation, U S West, Pacific Telesis International, BellSouth Corporation, and Cable and Wireless North America. Full corporate sponsors serve on the Board of Directors, help pay the USTTI overhead, and donate free training at their business facilities. Twenty-two other private firms give gratis training or financial support. Government members of USTTI's Board of Directors in 1988 were the Director for the U.S. Information Agency, Chairman for the Federal Communications Commission, the Undersecretary of State for Security, Science, and Technology, and the Assistant Secretary of Commerce for Communications and Information. These federal organizations and other governmental/nonprofit groups also contribute cash and in-kind support. For example, industry gave \$1,870,063 in funds and other assistance, while the US Agency for International Development contributed \$300,000 for travel and living costs of students from the least developed countries.⁴³

Telecommunications professionals from around the world reported that USTTI's subject material is state-of-the-art, practical, and includes both managerial and technical foci. Spanish language courses are being developed. Exploitation of America's multilingual citizenry should facilitate instruction in nearly every language.

Slightly more than half the countries represented at Canada's Telecommunications Executive Management Institute (TEMIC) are African; all are from telephone-poor countries. TEMIC began operation in 1986. Its languages are English and French, with Spanish to be offered in 1992.⁴⁴

Africa, Asia, and the Americas also have regional and national training institutes. Eastern Europe's technical skills have always been high; management training and education offers are being accepted rapidly. This success story is too often overlooked. The opportunities to strengthen human resources are available now, more than ever before, to the telephone poor.

On the other hand, the ITU's development activities are fragmented among its four permanent organs and the Center for Telecommunications Development. The International Radio Consultative Committees (CCIR), the International Telegraph and Telephone Consultative Committee (CCITT), and the International Frequency Registration Board (IFRB)

do not focus on development, but each has activities in that area. The General Secretariat's Technical Cooperation Department (TCD) works through area representatives to develop regional networks, to strengthen technical and administrative services on national providers, to improve training, and to provide direct assistance. In 1989, TCD delivered programs costing \$32.4 million, a 3.2 percent increase over 1988. Yet, TCD's funding from the United Nations Development Program (UNDP), cost-sharing, and trust fund projects continues to be inadequate. A major training facility in Souva, in the Pacific, run by the ITU, will close because UNDP will no longer pay for regional programs. The Center for Telecommunications Development, whose establishment G.I. Warren rates as the primary Maitland Commission Recommendation, was established in 1985. The Center was to be a catalyst for public and private support to telecommunications development, in close coordination with the other organs. Despite the best of intentions and some superb work, the Center was hamstrung by politics and funding that was voluntary, fluctuating, and wholly inadequate.⁴⁵

Amid such organizational malaise, the Nice Plenipotentiary charged a High Level Committee to recommend solutions. One recommendation is to merge The Center for Telecommunications Development with the new Bureau for Telecommunications Development. It is hoped that this permanent organ will be adequately funded from the ITU budget.

So far, the updated evaluation of *The Missing Link's* success is mixed. The fourth solution area is collective self-help by the telephone poor. First, coordinated purchases by regional groups could make quantities large enough for special treatment by suppliers, reduce duplication in acquisition, and enhance interoperability among telephone systems in the region. This solution also requires the surrender of national prerogatives and the sundering of bilateral relationships, which is rarely done. INTELSAT has helped produce standard specifications for earth station antennas; The Central African Republic, Chad, and Gabon are co-owners/operators of an INTELSAT system scheduled to include six central African nations.⁴⁶ The Caribbean Community apparently makes bulk purchases from standard contracts. Few other nations do so, and bilateral aid, largely tied to purchases from the donor nation, reduces the likelihood that others will.

The second area of collective self-help referred to in the Maitland Report is the development and manufacture of telephone equipment appropriate to the physical and cultural environment. This approach promises three potential advantages: having equipment designed for the region, rather than modified to fit; building a local high-technology industry; and avoiding more foreign debt through soft currency, South-South sales.

The potential advantages of local development and manufacture remain largely unmet. Local content, local assembly, and import substitution have been used to further indigenous industry. Often, these policies amount to protection from internal as well as external competition. Many protected telephone industries reinvent wheels, rather than invent equipments especially suited to their nation's climate, state of infrastructure, social system, or literacy levels. Japan and Korea exemplify countries whose indigenous telecommunications products are aggressively developed and marketed for worldwide, rather than purely local, use. Their companies are the only equipment manufacturers outside North America and Western Europe listed in the "Telephone Titans," a 1989 tabulation of the world's top one hundred telecommunications firms.⁴⁷ Two countries, however — Brazil and India — advertise their products on the basis of local development and manufacture.

Brazil, which has been exporting telecommunications products for more than a decade, advertises that many of its equipments were developed specifically for Brazilian circumstances. For this reason, the logic goes, its industry can meet the specific needs of developing countries better than those from OECD nations. Brazil's 1987-1988 telecommunications product catalogue lists several items that are designed for tropical climates and rural use: sealed receiver and transmitter capsules for telephones that perform at high temperature and humidity; a rural community telephone system; low-capacity, stored program voice exchanges (32 subscribers); and a transportable digital switching and transmission system. The brand name of Brazil's flagship digital exchange series, TROPICO, advertises its area of intended use. However, most products in this catalogue are indistinguishable from those of other advanced nations.⁴⁸

Brazil has built a vigorous telecommunications industry of indigenous and joint venture companies, whose products include telephones, wire, optical fiber, terrestrial and satellite radio systems, and stored program switches. Michael Hobday's book, *Telecommunications in*

Developing Countries, centers on the challenges and rewards which that giant nation experienced in building nationally controlled research, development, manufacturing, and service arms. He notes that imports had been dramatically reduced, with 30 percent of equipment sold by purely indigenous firms. Hobday points out that, in 1983, most locally produced equipment cost more than the cheapest equivalent article available on the international market, not including import and freight charges.⁴⁹

Three years later, when its telecommunications equipment had a 90 percent domestic content, the Brazilian government stressed that “technological and economic cooperation between developing countries is the key to bridge the gap with industrialized countries. . . . The Brazilian Government is especially keen on sharing its telecommunications expertise, acquired over the past twenty years, with African countries.”⁵⁰

Brazil exports mainly to South America, with some consultation and equipment going to Portuguese-speaking Africa.

India’s extensive efforts at technological and industrial self-reliance, and the priority assigned to improving telephone service, is paying off. That nation designed, developed, and produced a 128-line, “rugged, unique, stand alone” Automated Rural Exchange (RAX), which is currently in service. In a rare case of potential soft currency South–South trade in indigenously developed telephone technology, RAX was offered to the USSR under an electronics counter-trade protocol, signed by the two countries in February 1991. Other Asian and African countries are reported to be interested in RAX as well. However, domestic production of this switchboard lags behind planned internal installation in 1991–1992 by 350,000 lines, leading to hard currency imports.⁵¹

Brazil, India, China, and Indonesia have internal markets large enough to support local production; so does Nigeria, where switchboard manufacture is in the planning stages. Hobday writes that 200,000 direct lines are barely enough to justify domestic production of terminal and transmission equipment.⁵² M. Laenser, while Moroccan Minister of Posts and Telecommunications, proposed a ten-nation North–West African community of 90 million, with nearly one million main lines as the right size to bargain for technology transfer, local production, and lower prices.⁵³

Zimbabwe has neither the Hobday minimum number of direct lines, nor a deep technological infrastructure, yet it has local manufacturing capability. Ericsson Group Zimbabwe began local manufacture of spares in 1974 after the onset of a worldwide trade embargo against then Southern Rhodesia. The factory contributes to local technological self-sufficiency and employment by training school dropouts to be technicians.

In 1990, the Ericsson Group opened a new factory to build a wide product line, from repair parts, to telephones, to electronic private branch exchanges. Nearby countries have placed orders, but Zimbabwe's shortage of hard currency to import raw material and machine parts is hampering expansion. Worse, two-thirds of the price for that country's five-year telephone expansion plan will be paid in foreign currency. The latest ITU Conference expressed Africa's continued need for regional production of cheap but modern terminal, transmission, and switching equipment.⁵⁴ Local investment of African publicly or privately held hard currency reserves is one way to begin meeting the need before the next ITU conference for that region.

After more than a decade of efforts, many which predate the Maitland Commission's recommendations, modern telephone equipment assembly/manufacture has begun to bloom beyond the borders of industrialized nations. It remains a fragile plant there, nurtured principally by government fiat — not market forces — by import substitution, scarce foreign currencies, and technology transfer. National assembly/manufacture provides training, jobs, some independence, and pride. Yet, the solid majority of rugged, power-line independent, climate-resistant telephone equipment has come from industrialized nations, frequently as spinoffs of military equipment. (Military telephone equipment is discussed in Chapter Four, "Other Routes"). The Soviet-Indian countertrade in electronics agreement is a rarity; most high-technology trade between developing nations is on a hard currency basis for three reasons: the shortage of hard currency, high foreign content, and inconvertibility of each side's national currency.

Six years after its publication, it is still too early to declare *The Missing Link's* Royal Road a total failure, but it is not too soon to learn from it. The world does not need another study, or a new, neutered, catalytic organization in Geneva. The telephone poor bear significant responsibility for any improvement — *The Missing Link* said this clearly, but its

message was not heard.

The first Royal Road tried educating the decision makers, the second, exhortation. The third global “solution” looks toward public sector reform and market orientation.

The Royal Road of Structural Adjustment is a superhighway to be travelled by both industrial and developing nations. Their destination promises public services that are more efficient, and private enterprise that is facilitated and more productive. Better telephone service is one of many expected results. Liberalization of government services constitutes a section of the road. Transfer of some services that were previously provided by the government to the private sector (privatization) is one lane in the Liberalization section.

Structural Adjustment began with industrial nations trying to better their economies by improving public efficiency, reforming financial systems to favor investment, opening markets, and facilitating technological innovation.⁵⁵ Many believe that structural adjustment is being used as a precondition for aid, to reduce “bloated public service providers” in developing nations and to replace government development assistance with private foreign investment. Official publications of donor and multilateral lending agencies reinforce these beliefs. The following quotes are typical:

While no uniform blueprint for market oriented reform is relevant for all centrally planned economies, the broad features of reform often include...reducing the size of the public sector and privatizing or streamlining most public enterprises.⁵⁶

The private sector, including foreign direct investment, plays a *central role* in development and can make a much greater contribution if properly encouraged to do so.⁵⁷ [Emphasis added]

The keys to attracting foreign investment are political stability and a sustainable macro-economic situation (growth economy).⁵⁸

Several business people emphasized that their nation’s support for business investment in certain countries is as important as political stability there. This home nation support helps to explain, they said, the rush to start joint ventures in Eastern Europe +, as opposed to attempts in equally tenuous political economies in transition elsewhere. Divergent U.S.

investment trends in China and in Vietnam seem to have the same political bias.

For the telephone sector, Structural Adjustment has involved liberalization, sometimes called “deregulation.” Liberalization has generally meant separating telecommunications provider and regulatory functions as well as bringing varying levels of competition to service provision and equipment markets. These changes involve political decisions, followed by enabling legislation and procedural directives or regulations. At one extreme, a restructured government operating agency provides basic or voice service. Others may offer competing value-added services. Germany in 1990 is an example. At the other extreme, in New Zealand, anyone can provide services and equipment. Government offices usually regulate competition, license service providers, approve connection of equipment to the network, set tariffs, and manage use of the radio frequency spectrum — all in the name of national interest. Privatization, with or without monopoly, occurs when governments sell their operating agency, or a license to provide a service, to private entities.

Since 1984, liberalization has gathered steam in the OECD countries, most of which attained nearly universal service under government monopolies. Industrialized nations’ equipment and service markets are not uniformly liberalized. In fact, the U.S.,⁵⁹ which opened its markets first in anticipation of reciprocity, has been disappointed with the slow pace of the telephone rich. The 1987 *European Community Green Paper on Telecommunications* established the road map for liberalization among the twelve nations. While the industrialized nations vary widely on what, how, and when to liberalize, their objectives are better, cheaper, and more responsive value-added services. Although some question whether competition has worked for OECD nations,⁶⁰ the telephone poor are being offered this third means to service sufficiency. Why? What are the prospects for liberalization?

In principle, liberalization can overcome many of Saunders’ constraints and my key issues outlined in Chapter Two. For example, explicit telecommunications legislation, clear regulations, and a structure that is separate from the operating agency to administer these regulations mitigates half of Saunders’ first constraint, inadequate regime infrastructure. These changes could also lead to more efficient tariffs and to financially autonomous operating agencies, run to respond rapidly to market and public policy demands. On the other hand, hard currency infusions without increasing foreign debt nearly always result from

foreign direct investment. Such investment may bring continual technology transfer, strong managerial skills, better human resource development, and new markets. Recognizing each of these advantages, the IMF Development Committee underscored the importance of “open markets, sectoral adjustment policies and a supportive financial environment” to attract private investment.⁶¹

Table 3-1 summarizes the potential for liberalization and privatization to overcome major roadblocks to better service for the telephone poor. Neither will convince governments to raise their priority for this sector. Market forces and profitability may make raising the government priority immaterial, so long as tariff and tax structures do not penalize telephone operators and users. This transfer of responsibility from governments alone to governments and the private sector is a new paradigm, which leaves primary responsibility for success where it began — in the governments of telephone-poor nations. Although this assertion may appear to contradict the analysis in **Table 3-1**, it does not. Government direct investment in and day-to-day management of telephone service decrease under liberalization, and these decrease even more in basic service privatization. However, governments must make significant investments in political and human capital to create and sustain an environment that fosters liberalization, while attaining national objectives.

Such an environment shares the following characteristics⁶²:

- *Revised or new policy and rules* that promise political stability/democracy, facilitate domestic markets, allow foreign participation in commerce, profit repatriation, and protect intellectual property (labor laws may require modification to liberalize management discretion in hiring and firing, while protecting employee rights; all these policies and rules are sector immaterial)
- *Legislation* to allow competition and private investment in basic and or value-added services
- *A telecommunications regulatory mechanism* to insure policy objectives are met without public ownership

The range of liberalization begins with more independence for telephone operating agencies that are publicly owned, but run in a “businesslike” manner. This range includes private sector participation in basic services via any of the following: direct investment; management contract; installation/operation subcontract; and building, operating, and

Table 3-1

**Impact of Liberalization/Privatization
on Roadblocks to Better Telephone Service**

Roadblocks	Removable by:
1. Inadequate regime infrastructure	Liberalization*
2. Inadequate human resources	Privatization*
3. No convincing studies of benefits from better telephone service	Neither
4. Belief that investment only benefits elites	Neither
5. Unawareness of economies of scale investment	Either
6. Inadequate financial resources	Privatization
7. Inefficient tariff/tax structure	Liberalization**
8. Low donor/recipient priority	Privatization
9. Rapid technological and regulatory change	Both
10. Lack of agreement on how to proceed	Neither
11. Threat of political destabilization	Neither

* Government must create an environment of liberalization and privatization in consultation with private and public stakeholders.

** Tariff and tax structure should promote better service for all, allow adequate profit, and support continued investment in the network.

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transferring to government or domestic ownership and concessionary contract. Privatization of value-added networks, rather than basic service, avoids conflict with vested interests in that operating agency, while serving a burgeoning market that can afford to pay, often in hard currency.

Variants of liberalization have been on board long enough to produce an impact among the telephone poor. Before returning to the hard problem of creating and sustaining an environment that fosters liberalization and the attainment of national objectives, I want to share some illustrative reports with you.

Harry C. Johnston, a vice-president with GTE Hawaiian Tel, speaks with pride of Micronesia Telephone, which was installed by and is operated, and managed by GTE. When

this company's new service was cutover in 1986, tourists numbered 100,000. By 1990, this number had increased by 300,000. Johnston reports that better service was a principal cause for more tourism and a stronger economy. The high school work study program Micronesia Telephone initiated is building skilled, local human resources for system operation, maintenance, and management.⁶³ His bottom line, and theirs, is not a dial tone for more telephones; rather, it is increasing self-sufficiency for this Pacific island chain.

American Telephone and Telegraph (AT&T) had avoided infrastructure improvements in developing countries in the past, despite losses caused by the inability of those countries' networks to complete international calls. Mark Epstein, AT&T International Strategic Planning and Business Development, reported a change. The corporate giant is considering supplying switching equipment as part of a joint venture, at no up-front cost. After an agreed time, during which their outlay plus profit was recouped, the equipment would revert to the local or national telephone operator. This method is especially applicable to business parks. In 1990, AT&T joined with Kokusai Denshin Denwa of Japan and the Chinese Posts and Telecommunications Ministry to link several office buildings in Beijing and Shanghai by way of digital radio and switches to a satellite earth station for international calls. Call completion rates improved. Since the calling party paid both the Chinese and foreign joint venture partners, everyone gained. This procedure is expected to draw more foreign business to China, produce hard currency, and allow the national operator to concentrate on improving telephone service to everyday citizens. Oil companies in countries like Nigeria and the host country telephone operator, Epstein hypothesized, could profit from similar arrangements.⁶⁴

William Ambrose et al. show that Latin America and Africa are at the forefront of completed privatization of telecommunications, and they span the spectrum from basic to value-added services. However, the sale of Chile's telephone system in the 1980s was "The first major privatization of government telecommunications assets in a developing country in recent history."⁶⁵ Was it successful? The Chilean experience returns us to the hard problem.

From the Chilean government's perspective, privatization began in the 1970s, with the deregulation of terminal equipment.⁶⁶ In 1977, the Telecommunications Undersecretary, Ministry of Transportation and Communications, was created to establish objectives within the

new national framework of liberalization. A year later, the Ministry's National Telecommunications Policy was approved, followed by promulgation of the General Telephone service Regulation in 1980. Enactment of the General Telecommunications Law (referred to here as "the Law") in 1982 completed the legal basis for liberalization. The Law was revised in 1987. Between 1985 and 1987, the main operating companies had sold stock to private owners. The Ministries concerned with telecommunications and development jointly formulated a five-year tariff structure. Chile had made the environment inviting to local and international investors. These investors made sizeable profits, are modernizing the plant, and have introduced packet switched networks. The government's most significant error was not establishing a regulatory agency with clear powers over private enterprise. Legal and commercial strains resulted. A second error in the Law provided for indefinite term concessions, and weakens any powers the regulator may have. In Chile's case, deregulation and privatization meant better quality and more lines for some, but not expansion of service to the poor and rural areas.

In my view, the international community should commend Chile for being first and for sharing lessons learned with us all. Liberalization may conflict with other national objectives, such as protecting local industry and universal telephone service, or assuring the availability of radio frequencies for air traffic control, emergency, and police services. In the latter case, commercial use of frequencies to support value-added services, such as cellular telephones, may conflict with reservation of radio spectrum for critical services. Byung - II Choi correctly notes two basic conflicts that arise from liberalization. The first is between universal service and value-added nets, the second between a government's perceived need to regulate and the speed with which markets and technology outpace regulation.⁶⁷

National policy, sector policy, and law are initial steps to manage these conflicts, to balance market dynamism against public policy. A regulatory regime appears to be the second step in solving the hard problem: to foster liberalization, while attaining other national objectives. The first step is to agree and codify the objectives.

Developing an independent regulatory organization with powers, rules, and standards that is peopled by technically able and business-smart folks is no small task. This is an appropriate area for government to government aid to facilitate Structural Adjustment in

telecommunications and other sectors, such as energy. Why government to government? Private actors are responsible for and best at building a profitable telephone network. Governments, on the other hand, are responsible to their publics for steps one and two above in solving the difficult problem. These steps are recursive; private and public sector input is crucial. Balance will be difficult, and government is the responsible fulcrum.

The U.S. Federal Communications Commission is assisting some nations to set up regulatory regimes. Thoughts on the people, organizations, rules, and their inter-relationships, which constitute regulatory regimes, follow. One route to compatibility and network integrity is built by regulators who need detailed expertise in the technical characteristics of their own and other networks to balance needs and innovation, cost and profit. They will conduct performance evaluations to insure quality of service to every sector, and allocate adequate radio frequency channels for public and private use on a noninterference basis. To properly execute initial liberalization and continuing business oversight, some must have a thorough understanding of different schemes for asset valuation, accounting, tariff, and taxation, and of these schemes' impact on operating rights and the willingness to invest, on obligations, and on area of investment. A legal staff, competent in local and international aspects of communications and business law, would round out the team.

Another route, based on market-derived industry standards, is cooperation between providers and user groups, which runs the risk of working as poorly, some say, as has the quest for open computer systems. In theory, customers and suppliers would cooperate to bring interchangeable software, hardware, and peripherals to the market, replacing proprietary systems. The cover story in a recent edition of *Business Week* states that "buyers now face so many choices" (read different, noninterchangeable standards), that procurement is down.⁶⁸ Many believe that this is no way to run a telephone network. New Zealand's approach to liberalization belies this belief.

In the United States, theory has it that regulators propose, implement, and interpret regulations within the bounds of national objectives and law. The American ideal calls for a politically independent regulatory body, with salaries nearly parallel to those of their peers in industry to retain staff and avoid corruption. Great numbers of individuals and organizations still struggle to bring the real world closer to this ideal. Developing nations may find that a

combination of a minimum term of service after training, generous benefits, and reasonably high salaries both attracts and retains employees. The expense of operating the regulatory regime above that of other government bodies could be funded from license, concessions, or tariff fees.⁶⁹ Setup costs may be available through IMF Structural Adjustment grants or bilateral aid.

This paper does not advocate grafting, as the ideal, the regulatory system of the U.S., U.K., or any other nation into every state. Rather, regulatory systems should be developed from close consultation between the host and advisor nations. This consultation must begin with what the host wants the regulatory system to achieve, then proceed to the national liberalization framework, current political–legal system, general regulatory and tax environment, and development goals. Parts of each may need adjustment; each will impact the other. Local markets and regional and global regulatory systems must be taken into account. For some nations, regional operating and regulatory authorities may provide economies of scale if common ends and means can be agreed on. Finally, the regime’s desired characteristics must be factored in. For example, some U.S. desired characteristics are transparency of decision making, full access, due process, accountability of public and private actors, and heavy legal involvement — all of which reflect our political economy. Minimum regulation to insure systems integrity and fair competition, on the other hand, are probably universally applicable. Beginning with ends, then considering the operating environment before crafting means, is highly recommended.⁷⁰

Liberalization promises to bring private sector skills, new technology, and money to bear on the global problems of poor telephone service and low density. At a minimum, it can make public telephone operating agencies more businesslike — that is, responsive to customer demand at lower costs. Privatization lets the business sector provide value-added services now, while public networks use requirements, tariffs, and taxes to funnel some of the profits back into improving basic service.

Liberalization is a concept that should be exploited, but it is no panacea. Under a pure profit paradigm, rural and poorer users are unlikely to be better served unless these specific markets are the ones privatized, as in Hungary and Bangladesh. Nations without promising market economies, stable governments, or the will and strong support of donor states to attain

that status need not apply. Those who qualify need a strong, competent regulatory regime to reap all the benefits. Some may feel that the regulatory regime proposed in the previous paragraph is too large. The effects of limited regulation in New Zealand's liberalization merit further study to see how much less is enough. Knowledgeable technical, managerial, and legal personnel to staff regulatory regimes are scarce in industrialized countries, and extremely rare in the developing world. There are other costs. Workers made redundant by more efficient procedures or new technology can be politically destabilizing, as illustrated by the events of 1990-1991 in Eastern Europe. Liberalization is a dramatic shift in power; any change in power relationships will be contested by the losers. Leaders must invest large amounts of political capital in getting this policy adopted. Near term gains are required to keep public support.

The Royal Routes are not universally effective. Each has some successes. Convincing Studies helped many nonspecialists realize the importance of good telephone service. Yet, we have already seen that Convincing Studies did not convince a majority of decision makers to raise the priority of investment in telephones. These studies provided data for the wide ranging *The Missing Link*, whose recommendations brought a focal point for development. However, the Maitland Commission Recommendations on special funding arrangements, integration of telecommunications into all development projects and self-help by the telephone poor, were followed by few. Structural Adjustment, under the route names of liberalization and privatization, requires a positive business environment and strong government regulation. The first invites competition, the second is a watchdog for equity, quality, and network integrity. Both are costs some nations are not prepared to pay. There are no Royal Roads to universal telephone service. But for some countries, there are Other Routes.

CHAPTER FOUR

OTHER ROUTES

The Royal Routes are thoroughfares that were thought to have global application. Some smaller, less universal approaches are examined below. Each may help those for whom it is most applicable to bridge the broadening gap between the telephone rich and telephone poor.

Wireless telephony, an appealing solution, replaces costly copper from central switchboards to user locations with radio links. Extensive radio links can be replaced with distance-insensitive satellite hops. Two broad proposals, terrestrial cellular radio and satellite systems, show promise; however, each requires an operational wired network. Cellular radio refers to the division of areas into subareas, or "cells," and the systems that allow mobile telephones to dial someone and allow the caller to continue the conversation as one or both move from cell to cell. Even in the rural segments of developing countries, more than 90 percent of cellular calls are between mobile and wired subscribers. Cellular may replace the wired network in small cities. In fact, the president of International Mobile Machines, a U.S. company, maintained that his digital cellular system could replace such networks. A line of radio repeaters would support rural callers along the route. Alternatively, rural and urban cellular users' long distance calls could be linked by way of satellite.

Taiwan's innovative use of call-by-call demand assignment technology and very small aperture satellite terminals connects rural users to the wired network cheaply. Hughes Network Systems developed the technology. Taiwan also has installed a cellular system at one-fourth the cost of wired telephones, not counting the cost of cellular telephones.⁷¹

Guinea could extend reliable communication to its interior using Taiwan's satellite application. Each distant site could support public call offices and private lines. Guinea is scheduled to join a regional INTELSAT consortium. The INMARSAT M multichannel portable telephone can provide instant access for about \$10,000 in capital costs, but the per-call cost is so high that this solution should be applied where the impact is great, or where money is no object.

Wireless systems are best able to extend a fairly good wired system. Even Motorola's

proposed Iridium, and other proposed low-orbit satellite cellular systems, plan to use the terrestrial wired switched networks for total access. Their next best use is to provide distance-independent thin route links rapidly. Neither the cellular nor satellite system is cheap, but equipment and space segment prices are dropping. Before cellular systems can fulfill their bright promise, problems of standardization in frequency band allocation and modulation technology, capacity limitations, and cost per call must be solved. For the present, wireless can supplement, but not replace, wired switched networks.

Unless developing nations build regional autarky in the manufacture of telecommunications products and develop South-South international trade using local currencies, they will continue spending scarce foreign exchange to improve telephone service.⁷² Acquiring these funds without raiding government reserves, increasing foreign debt, or losing some independence of action through tied aid, manufacturer's loans, or direct foreign investment — that is the problem. Aid may be tied to equipment purchase from the donor/lender or to the adoption of a policy, such as Structural Adjustment. Restated, the problem is financial dependence. For some countries, self-investment or repatriation of flight capital may help.

Flight capital, hard currency assets held outside the country by private sector residents, is a significant pool that grew from 1977 to 1987. In 1988, a *J.P. Morgan World Financial Markets* article estimated the amount of that pool, including reinvested interest, at nearly \$300 billion for the "Baker 15" middle income developing nations. Two hundred and forty billion dollars came from Latin America: Nigeria led Africa with \$20 billion, followed by Morocco with \$3 billion. The same report showed \$23 billion in Filipino private hands, and that \$6 billion came from Yugoslavia. More current, conservative data on cross-border bank credits substantiate the range, if not the exact amounts. China, India, and Poland join the ranks of telephone poor, but flight capital rich.⁷³ It is reasonable to invite the professional and business classes to invest in their own nation's telephone systems, perhaps starting with international gateways, which earn hard currency. However, those who would invite flight capital back must begin by attacking the reasons it left: uncertainty about domestic politics and financial policy, the need for hard currency reserves readily available for import/export business, and policies inimical to commerce. Chile Mexico, and, to an extent, Venezuela have successfully repatriated flight capital through Structural Adjustment. Some returning

dollars fund telephone liberalization.

This paper's tacit premise is that the public sector should not attempt what the private sector can do equally as well. Private provision of both basic and value-added telecommunications service can be appropriate. Yet, there are hard-to-reach, low-density regions that national security and a sense of equity dictate must be serviced. When direct and indirect means cannot interest business to support this area, the government has four alternatives. The first alternative, status quo, is unsatisfactory. A nonvoice system, such as Geostar's radio determination satellite service, or RDSS (which allows two-way exchange of short, typed messages⁷⁴), provides a cheaper, but not inexpensive, second alternative. Also, RDSS messages presume a literacy level. Third, the government may provide this service using commercial systems. Most commercial transmission and switching equipment relies on economies of scale to drive their per circuit cost down. Environmental units, commercial power and buildings, which could be shared in urban settings, must be procured for the rural population. This raises the total cost. The fourth alternative, which is applicable in limited circumstances, is the military option.

The military option envisions a nation's soldiers providing local service and extending it to the nearest public switched interconnection. The Cold War's demise and conventional arms reduction has old enemies in Europe trying, with difficulty, to beat swords into plowshares. Tanks make extremely poor tractors, our Soviet colleagues have found. The newly united Germany has a disposal problem with inherited Warsaw Pact arms. But beating military telephones into civilian telephones is an easy way of making good use of dual-use equipment. The nation's military would be visibly involved in nation building. Government would provide service, rather than promises. Military aid donors, the ITU, and the United Nations Development Fund might join together under a banner reading "Green phones, not Guns." In a less flippant vein, this would be a true Peace Dividend of more development from dual-use weapons support systems. Action to remove military telephones from restricted munitions lists may be required to facilitate sale or donation for civil use.

Colin Billowes, head of the Canadian International Development Agency's Telecommunication Sector, has extensive experience with installing low-density rural systems. He counsels that most commercial equipment has capacity and features that far exceed local

needs.⁷⁵ Tactical/transportable military telephone systems (switch, transmission, and terminal equipment) are designed to be installed and removed by minimally skilled personnel more quickly than their commercial counterparts, in nontemperate environments. Most western sets are easy to diagnose and repair. The switchboard capacities mirror the needs mentioned by Billowes. From the stackable automatic switchboards with 30, 60, or 90 subscribers connected by field cable, operating under a tent on battery power to the more sophisticated 3000-line, truck mounted, power intensive boards, the military can fill a niche. Additionally, nations like the U.S., who serve globally and interface with multiple civilian systems, can meet nearly every signalling and modulation standard through software or hardware modification.⁷⁶ U.S. Army Signal Corps soldiers have a long history of training others to use Army equipment. So do other services and other nations.

Military switchboards have had wider uses. An older GTE computerized Army switchboard, the AN/TTC-38, was converted to an international gateway, called Electronic Telecommunications Switching System (ETSS), and installed in Abu Dhabi. The system supported CCITT standards. One week's revenue paid for the modified AN/TTC-38. Spain, Sweden, Israel, Mauritius, and U.S. firms, such as Atlantic Richfield and Georgia Power, among others, have purchased this system.⁷⁷ Finally, independent military-owned and operated switched networks, common in Eastern Europe and some other areas, can provide limited circuits for public use, either end-to-end or as gateways to the civil system. Transportable military equipment is expensive. Although not designed for continuous operation, it has done so admirably in many locales. The military solution should be adopted only if the total cost is less than that of comparable civil systems, and if it is available sooner, with training and a repair parts supply. Appropriate U.N. agencies, such as the new Bureau of Telecommunications Development, could be staffed with military communicators to assist donor and user nations in evaluating this alternative.

A temporary bridge of military communications now is far better than a permanent link that no one can afford.

CHAPTER FIVE

SHALL THE LAST STAY LAST?

The Maitland Commission identifies least-developed countries as needing special help to bridge the "missing link" of low accessibility and poor quality telephone service. Africa was the least developed in 1985, at the time the study was published. It remains the most telephone-poor region, followed in ascending order by Asia, Latin America, and Eastern Europe. Africa, in this chapter, is a surrogate for itself and for other desperately telephone-poor areas like Burma and Vietnam, where bridging the missing link does not appear to be an international priority. Many fear that recent dramatic changes in Eastern Europe are shifting aid and business interests from Africa's democratizing markets to the less needy Developing Market Economies in Eastern Europe and the Union of Soviet Socialist Republics.⁷⁸ They have a right to be concerned.

The United States's interest in better telecommunications on the telephone-poorest continent had been ceded to Europeans because of their past colonial ties. Canada is the only North American nation to display a continuing competitive interest in developing commercial, as well as aid relationships, in Africa. With the Cold War ended, Western Europe feels duty bound to help Eastern Europe integrate into the world economy. Those nations' proximity and similarities, and the potential for catastrophe if democracy fails, demand the Continent's attention. The high level of telephone infrastructure rebuilding required may also absorb funds that may have gone South in Cold War days. For instance, Deutsche Bundespost estimates it will cost \$30 billion dollars to upgrade East Germany's telephones over the next seven years.⁷⁹ The United States and Japan have strategic and market interests in a stable Eastern Europe +.

Where is the priority? The World Bank continues to loan money to the most telephone-poor regions. Since 1986, Africa, and Asia have received World Bank loans for telecommunications in four of the past five years. World Bank emphasis on bettering telecommunications infrastructure in Eastern Europe may cause a shift in funding, but regional banks retain regional priorities. In terms of business interest in poor nations outside Eastern Europe, Asia and Latin America rank 1 or 2, depending on the respondent. Americans tend toward Latin America, as much because of prior ties as because of real

progress in democracy and Structural Adjustment. Asian nations remain a hot target because they have implemented reforms (for other reasons, see note 24).

Of ten senior government, legal, and business personnel interviewed on background, only one rated Africa's priority for telecommunications support from the respondent's firm or agency above last. Each cited political instability and civil war as well as policy uncertainty and lack of strategic importance. Some reflected on the corruption that made it difficult to do business there and harder to make a profit. A minority felt the money would be better invested in basic human needs. Japan typically opts to retain market presence in Africa. Its burgeoning official development assistance funds will help. India, too, may assist, as it has in the past. Aid to Africa is also an arena where the two Chinas are competing. But these are the priorities of others. What are Africa's?

If development is important to that region, and to others in similar straits, then means will be found by her people to bring flight capital home in an attempt to drive down the appropriate Royal Road or alternate route to minimum service. The funds, technology, educational facilities, and interest are still available for Africa and for the other nations she represents in the above argument. Structural adjustment of business and political systems may be Africa's Royal Road. It may not. Her leaders and her people are responsible for their destiny. It is their priorities that count most.

CHAPTER SIX

IN WHOSE INTEREST, BY WHICH MEANS, AND WHO PAYS?

The principal conclusion for the real stakeholders takes us back to the beginning. Better telephone service is in your interest and that of your costakeholders on spaceship Earth. A variety of technical, political, and business strategies are available to define and attain better service. Each has costs. Pick the ones that you are willing to pay for.

Notes

1. The First, Second, and Third Worlds were defined by French Economist Alfred Sauvy to refer, in order, to the capitalist, socialist, and developing nations. See Dreano, Bernard, "Implications of Changes in Eastern Europe and the USSR for the Third World: Five Views," *Peace and Democracy News* 5, no. 1 (Fall 1990), 17. The relevance of this tripartite split is more historical than current. Sauvy's designations are used in this report where appropriate; telephone rich and telephone poor are more operational designations.

The titles are from these recent publications:

The Missing Link: Report of the Independent Commission for World-Wide Telecommunications Development (Geneva: International Telecommunication Union, 1985) (hereafter, *The Missing Link*).

Eastern Europe: Please Stand By. Report of the Task Force on Telecommunications and Broadcasting in Eastern Europe (Washington, D.C.: U.S. Department of State, 1990).

Hills, Jill, "The Telecommunications Rich and Poor," *Third World Quarterly* 12, no. 2 (April 1990), 71-90.

2. The International Telecommunication Union (ITU) Independent Commission for World Wide Telecommunications Development is referred to as the Maitland Commission in honor of its chairman, Sir Donald Maitland. See *The Missing Link*, 3.

3. *Eastern Europe: Please Standby*, 29.

4. Committee for Information, Computer and Communications Policy, Organization for Economic Cooperation and Development, *Communications Outlook 1990* (Paris: OECD Publications Service, 1990), 39.

5. *Ibid.*, 19. OECD notes that few public telephone operators are required to publish the quality of service indicators. No reporting or selective reporting without regulatory oversight are common; both fail to inform.

6. Waiting List and internal call completion data are from: Ambrose, William W., Paul R. Hennemeyer, and Jean-Paul Chapon, *Privatizing Telecommunications Systems: Business Opportunities in Developing Countries*, International Finance Corporation Discussion Paper Number 10, (Washington, D.C.: World Bank, 1990), Tables 2 and 4 (hereafter, *Privatizing Telecommunications Systems*).

7. The World Penetration Rate Chart (*Communications Outlook 1990*, 29) lists the U.S. with 49.33 main lines per one hundred population. Sweden has the highest density, followed in declining order by Switzerland, Finland, The Channel Islands, Monaco, and the U.S.

8. *Communications Outlook 1990*, 29, 18.

9. For density and installation waiting times, see *Eastern Europe: Please Stand By*, A-26.

Call completion attempts are reported in Clarence A. Robinson, "National Economies Revolve Around Telecommunications," *Signal* (October 1990), 94.

10. For main lines per one hundred population, see *Communications Outlook 1990*, 29.

New applications for 578,000 main lines from a population of 5,412,000 are reported in *International Telecommunication Union (ITU) Yearbook of Public Telecommunication Statistics*, 17th ed. (Geneva: ITU, 1990), 168-69 (hereafter, *ITU Yearbook*).

The evaluation and quote are from J. Dirck Stryker, "Adjustment in West Africa: The Guinea Perspective," in *Second Global Prospects Conference, Background Papers: Problems of Developing Countries in the 1990's*, vol. 2, *Country Studies*, ed. F. Desmond McCarthy (Washington, D.C.: The World Bank, 1990), 193.

11. The goal of "easy reach" comes from the ITU Maitland Commission's report, discussed in chapter 3, "The Royal Roads to Better Telephone Service." Nigeria's goal is reported by Martin Rushmere in "TELECOM 90 in Review," *Africa Communications* 2, no. 1 (January/February 1991), 9.

12. Aquilino Morcillo Crovetto, "Financial Aspects in Telecommunications in Developing Countries," in ITU, *Bridging the Missing Link, World Telecommunications Forum Special Session. Africa TELECOM 86 Speakers Papers*, (Nairobi: ITU, 1986) (hereafter, *Bridging the Missing Link*). The break point between "developed" and "developing" is discussed on p. 356, and Crovetto's three worlds are addressed on p. 354. By his standards, the Second World telephone density would lump them in the developing world. The argument that 27 main lines per one hundred population is too costly a goal worldwide, which he makes, will not be addressed here. The issue is equivalent service versus minimum service required. An easy reference to OECD and non-OECD telephone densities is on p. 29 (foldout) of *Communications Outlook 1990*.

13. For more information on the International Telecommunication Union, see Coddling, Jr., George A., and Anthony Rutkowski, *The International Telecommunication Union in a Changing World*, (Dedham, Mass.: ARTECK, 1982). One social scientists' analysis of how the ITU and the other players worked to create an "international cartel" (in the authors' words) is discussed by Peter F. Cowhey in "The International Telecommunications Regime: the Political Roots of Regimes for High Technology," *International Organization* 44, no. 2 (Spring 1990), 169-99. This article contrasts ITU and the International Telecommunications Satellite Organization (INTELSAT), and points out potential regime change from General Agreement on Tariffs and Trade (GATT) involvement in telecommunications services.

14. Divisions are reflected in *The Missing Link*, Appendices 3-5.

15. Wellenius, Bjorn, "Hidden Residential Connections Demand in the Presence of Severe Supply Shortage," *IEEE Transactions on Communications Technology*, June 1969.

The Pakistan data from 1984 to 1988 are listed in *ITU Yearbook*, 17th ed., 276.

16. del Fiol, Raul, "Development of Telecommunications: The Brazilian Experience," in *Telecommunications for Development, World Communications Year. Seminar/Meeting, San Jose, Costa Rica, Speakers Notes*, (Geneva: ITU, 1983). Chart 9 shows completion percentages in 1982 ranging from 17.9 for Portugal to 69.9 for Japan.

Interviews with Mark Epstein and Frank Torme of American Telephone and Telegraph Company International in February 1991 confirm that low completion rates continue to indicate inadequate domestic facilities in the called country.

Tadashi Nishimoto says that international business call completion ratios from Japan to some nations in Asia are being reduced by inadequate domestic networks in the called

country, as contrasted to Europe. See his article, "The Accessibility of International Telecommunications Networks to Business," *Pacific Telecommunications Council, 13th Annual Conference Proceedings*, eds. Dan J. Wedemeyer and Mark D. Lofstrom (Honolulu: Pacific Telecommunications Council, 1991), 549, 551, and 554.

17. Population and main line data for all Asian nations are listed in *ITU Yearbook*, 17th ed., 414.

18. Total access or main lines for Australia's principal cities is found in American Telephone and Telegraph Company International Marketing Department, *The World's Telephones: A Statistical Compilation as of January 1, 1989* (New York: American Telephone and Telegraph Co., 1990), 111 (hereafter, *The World's Telephones*).

19. Saunders, Robert J., Jeremy J. Warford, and Bjorn Wellenius, *Telecommunications and Economic Development* (Washington: World Bank, 1983); the importance of telephones is argued on pp. 27-28, while the role of more "innovative services," such as computer teleconferences, is discussed in note 37, pp. 30-31.

For other views on the impact of the growing integration of computer and telecommunications technology on developing nations, see *The Informatics Revolution and The Developing Countries*, ed. Khadija Haq (Islamabad: North South Roundtable, 1986).

20. Hardy, Andrew P., "The Role of the Telephone in Economic Development," *Telecommunications Policy*, December 1980. See also an excellent analysis of his work in Hudson, Heather E., "The Role of Telecommunications in Economic Development," *Telecommunications for Development, World Communications Year. Seminar/Meeting, Lome, Togo, Speakers Notes* (Geneva: ITU, 1983), 4-6.

21. See U.S. Department of Commerce, *U.S. Telecommunications in a Global Economy: Competitiveness at the Crossroads* (Washington: USGPO, 1990), pp. 228-33 for telephone service preponderance, pp. 56-57 on large revenues from value-added services and data processing. Digitalization of public switched telephone systems to support value-added services is noted in *Communications Outlook 1990*, 30-33, 37.

22. Extracted from Resolution No. 24: Telecommunications Infrastructure and Socio-Economic Development, ITU Plenipotentiary Conference, Nairobi, 1982.

23. The average rate of return is from a speech given by Mr. D. Westendorpf on October 1, 1990, in Prague. Westendorpf is executive director, ITU Center for Telecommunications Development.

24. For projections of growth and actual expenditure by geographical area, see Grabhorn, Edgar A., and Kenneth S. Hoyt, "500 Million Lines in 1989," *1989/90 Telecommunications Engineer & Management Directory*, (Chicago: Edgell Communications, 1990), 584-86.

Communications Outlook 1990, 49, also affirms that growth in penetration rates (density) is faster outside the OECD, but points out that telecommunications equipment exports to non-OECD nations dropped from 57 to 37 percent between 1978 and 1979. This decrease may be based on Europe's higher capital expenditure per line than non-European nations and market liberalization in the OECD. Grabhorn and Hoyt project that Asia's capital expenditures will soon surpass those in Europe because of faster growth (*ibid.*, 586).

25. Ministry of Communications, *Telecommunications in Brazil* (Brasilia: Ministry of Communications, 1986), 7.
26. *Telecommunications and Economic Development*, 25.
27. Ganley, Oswald H., and Gladys D. Ganley, *To Inform or Control? The New Communications Networks*, 2nd ed. (Norwood, N.J.: Ablex Publishing Corporation, 1988), 105-11.
28. *Ibid.*, 107.
29. World Bank, *World Bank Annual Report 1990* (Washington, D.C: World Bank, 1990), 49.
30. Stryker, "Adjustment in West Africa," 193.
31. Meier, Gerald M., *Leading Issues in Economic Development*, 4th ed. (New York: Oxford University Press, 1984).
32. Based on a review of the following publications by Harvard Institute for International Development (HIID): *HIID Development Discussion Papers, 1974-1990*, October 1990; *HIID 1987-1989 Biennial Report*.
33. Quoted from Wellenius, Bjorn, "On the Role of Telecommunications in Development," *Telecommunications Policy* (March 1984), 59 (author's abstract), 65. For his critique of analyses, see Table 1, 60-62.
34. For a full description of the Maitland Commission's work and of the underlying documents, see *The Missing Link*. The recommendations are coherently summarized in Press Release ITU/85-1, January 18, 1985, "The Missing Link with Executive Summary" (Geneva: International Telecommunication Union, 1984).
35. *The Missing Link*, 5.
36. See Section 5.1, *Report of the Administrative Council to the Plenipotentiary Conference, Nice 1989*, for a detailed status of *The Missing Link's* recommendations. This evaluation is also based on *Report on the Activities of the International Telecommunication Union in 1989* (Geneva: ITU, 1989), 176-80. In a review of my manuscript, Diane Landau, President of Global Resources, pointed out that four years is often too soon to expect improvement, because the time from contract proposal to installed lines can be at least four to six years. In her view, the evaluation should have been made later. Personal correspondence between Ms. Landau and Anthony G. Oettinger, 26 March 1992.
37. Maitland, Sir Donald, "Bridging the Missing Link," in *Bridging the Missing Link*, 14.
38. Interviews with the author, January 1991. Mario Pachajoa, Inter American Telecommunications Conference, Organization of American States; G.I. Warren, Director General of International Relations, Department of Communications, Canada and Chairman ITU High Level Committee; background discussions with Asian, African, and Latin American politicians, and Telecommunications and Planning Ministers, September 1990-April 1991.

39. *World Bank Annual Report, 1990*, Section Six.
40. See Ergas, Henry, and Paul Paterson, "International Telecommunications Settlement Arrangements," *Telecommunications Policy*, February 1991, especially pp. 34–42. The authors provide a good overview of the settlement system that has come back to bite its parent, AT&T, and may totally kill the concept of a seamless skein of public switched networks.
41. *Telecommunications and Economic Development*, Chapter 3.
42. Interview with Francis Latapie, Director, External Relations, International Telecommunications Satellite Organization (INTELSAT), March 1991. This interview is the source of subsequent information about INTELSAT's development activities.
43. Most data are based on United States Telecommunications Training Institute, *1989 Course Catalog/Annual Report*, (Washington, DC: USTTI, 1989). Total graduates are reported in June 1991 correspondence from Kenneth W. Bleakley, Senior Deputy U.S. Coordinator and Director, Bureau of International Communications and Information Policy, U.S. Department of State.
44. See Stahmer, Anna, and Lyndsay Green, *Evaluation of the Telecommunications Executive Management Institute of Canada (TEMIC)*, vol. 1 (Toronto: Anna Stahmer, 1990), under contract for the Canadian Departments of Communications and External Affairs.
45. See *Report on the Activities of the International Telecommunication Union in 1989* (Geneva: ITU, 1989); ITU Center for Telecommunications Development, *Teleefficiency Reference List 2* (Geneva: ITU, 1990) for detailed project descriptions.
Richard J. Barber, Executive Director, Pacific Telecommunications Union, reported the Souva training center funding loss during an interview with the author in January 1991.
46. Rushmere, Martin, "TELECOM 90 in Review," *Africa Communications* 2, no. 1 (November/December 1990), 9.
47. "Telephone Titans," *Financial World* 158, no. 8 (18 April 1989). Reproduced in *U.S. Telecommunications in a Global Economy: Competitiveness at a Crossroads* (Washington, D.C.: U.S. Department of Commerce, 1990), Appendix C.
48. *Brazilian Telecommunications Products 87/88*, ed. Fundacao Visconde de Cabo Frio (Brasilia: Escopo Editoria Comercio e Industria S.A., 1988).
49. Hobday, Michael, *Telecommunications in Developing Countries: The Challenge from Brazil* (New York: Routledge, 1990). Chapters 5 through 7 show the results of research, assertion of national control of multinational corporations, and growth of a local industry. Hobday assumes continued monopoly of telephone service at the national level; the effects of liberalization on protected industries are not addressed. His comparison of costs between locally and internationally available equipments (see pp. 182–86) neglects the high price of foreign currency for the latter, especially during the debt crisis.
50. Furtado, R. V., "The Value of Inter-regional Cooperation," in *Bridging the Missing Link*, Section I, 25–26.

51. Dr. J.P. Gupta, Science Counselor, Embassy of India to the United States, pointed out steady gains toward time constrained goals of improved telephone service for India and the morale boost development of RAX gave India's engineers. Interview with author, January 9, 1991.

"C-DOT Offers Soviet Union Rural Telephone Exchanges," *India News* 30, no. 4 (February 16-28, 1991), 1.

Gupta, Surajeet Das, "Opening Up DOT to Import Exchanges," *India Today* (March 15, 1991), 59.

52. *Telecommunications in Developing Countries: The Challenge from Brazil*, 76-77. Hobday rightly is concerned with the technological capacity of nations to perform microelectronic telecommunications production as well as with the ability to absorb its products.

53. Laenser, Mohand, "The Future of Telecommunications: Regional Cooperation," in *Bridging the Missing Link*, 341-42. In constructing a fictional grouping that needs an additional 400,000 lines annually, Laenser builds a much stronger market than the 20,000 yearly growth foreseen by Hobday as the entry level for economically feasible local production.

54. Wilderson, Fawn E., "Ericsson Group Zimbabwe Commended," *Africa Communications* 2, no. 1 (January/February 1991), 12-14.

Martin Rushmere speaks to national development plans and concerns discussed in a conference/exhibition jointly sponsored by Zimbabwe Posts and Telecommunications Corporation and ITU. See his article, "TELECOM '90 in Review," *Africa Communications* 2, no. 1 (January/February 1991), 9.

55. Structural adjustment definition from the International Monetary Fund, *Annual Report of the Executive Board for the Financial Year ended April 30, 1990* (Washington, D.C.: IMF, 1990), Box 3, 13 (hereafter, *IMF Annual Report 1989/90*).

56. *Ibid.*, 20.

57. Wheeler, Joseph C., *Development Co-operation in the 1990s: Efforts and Policies of the Members of the Development Assistance Committee* (Paris: OECD, 1989), 79 (hereafter, *Development Co-operation in the 1990s*).

58. *Problems of Developing Countries in the 1990s: Second Global Prospects Conference*, ed. F. Desmond McCarthy (Washington, D.C.: The World Bank, 1990), 29 (hereafter, *Problems of Developing Countries in the 1990s*).

59. For a summary of recent and projected telecommunications sector liberalization in OECD nations, see *Communications Outlook 1990*, especially pp. 6, 11, 17, 19, 21, 23, 27, 31, 33, 37, 41, 43, and 47.

U.S. Telecommunications in a Global Economy: Competitiveness At a Crossroads addresses the effects of different levels of liberalization on America's trade deficit in telecommunications.

Slow progress in reconciling U.S., Japanese, and European Community views on liberalization is chronicled in "ITUAJ TELECOM Forum Delights International Audience," *New Breeze* (Spring 1991), 7-8.

60. "Measuring Monopolies," *The Economist* (October 13, 1990), 75. Using an OECD report that there is no correlation between introducing competition and lower prices, the author concludes that liberalization has not worked. Public monopolies are also disparaged in this piece, which highlights the need for strong, insightful quality control and regulation.

On the other hand, lowered cost, better service, and significant innovation are the American experience that Ambassador Bradley P. Holmes described to the World Leaders Telecommunications Conference in Honolulu, January 17, 1991. Ambassador Holmes is Coordinator and Director, Bureau of International Communications and Information Policy, U.S. Department of State.

61. *IMF Annual Report 1989/90*, 117.

62. Several recent publications outline the steps to privatization and the pitfalls along the way. Among the most detailed general papers are:

Miller, Nicholas P., "Privatizing the National Telephone Company: How Do You Do It?" *Pacific Telecommunications Council, 13th Annual Conference Proceedings*, ed. Dan J. Wedemeyer and Mark D. Lofstrom (Honolulu: Pacific Telecommunications Council, 1991), 12-16 (hereafter, *PTC 13th Annual Conference Proceedings*).

Ambrose et al., *Privatizing Telecommunications Systems*, particularly Chapters 3, 5, 7, and 8.

63. Harry C. Johnston, International and Federal Vice President, GTE Hawaiian Tel, interview with the author, January 1991; facsimile from Johnston, May 1991.

64. Marc Epstein, AT&T International Strategic Planning and Business Development, interview with the author, February 6, 1991.

The two-city joint venture in China is described in Nishimoto, Tadashi, "The Accessibility of International Telecommunications Networks to Business," *PTC 13th Annual Conference Proceedings*, 552-58.

65. *Privatizing Telecommunications Systems*, 37. The appendices provide a wide-ranging review of current and planned privatization in every region of our globe.

66. This paragraph portrays the Chilean perspective as reported in "Telecommunications Privatization: The Chilean Experience," by Roberto P. Vasquez, Telecommunications Undersecretary and Chief of the Chilean Telecommunications Administration; the text is also based on the discussion of this paper at the 13 Annual PTC Conference, January 1991. For a more upbeat analysis of progress and promise, see *Privatizing Telecommunications Systems*, 37-38.

67. Choi, Byung - II, "The Role of Telecommunications in Trade and Services in the Pacific during the 1990's," *PTC 13th Annual Conference Proceedings*, 17-20.

68. Verity, John W. et al., "Computer Confusion," *Business Week* (June 10, 1991), 34-39. The quotation is from the cover page.

69. Much of these thoughts are based on a January 1991 interview with Judith O'Neil, Esq., whose experience in building regulatory regimes says governments do a better job of preparing other governments for this role than does industry. I am including concepts, selected from a presentation at the 13th Annual Pacific Telecommunications Council

Conference by Nicholas P. Miller, Partner, Miller and Holbrooke, titled "Privatizing the National Telephone Company: How Do You Do It?" The Conference was held in Honolulu in January 1991.

70. For a strong refutation of the U.S. Federal Communications Commission as universal model, see Armstrong, Mark, "Access to Decision Making About Communications: Form and Substance in the Australian Experience," *PTC 13th Annual Conference Proceedings*, 114-19.

71. The use of call-by-call demand assignment and single channel per carrier technology with v-sats, very small aperture ground satellite terminals, is described in Montgomery, Rob, and Allison Welles, "Satellite Made Affordable for Remote Regions," *TE&M's TELECOM ASIA* (Winter 1990), 30-32.

Table 5 in *Privatizing Telecommunications Systems* shows \$772 per cellular subscriber for a 22,000 person system in Taiwan is much cheaper than \$2000 per wire line subscriber and dramatically less costly than the per-subscriber costs of smaller cellular networks. The authors point out that cellular operator licenses cost millions of dollars. Cellular capital costs do not include terminal instruments; land line costs do. Cellular telephone costs are dropping (*ibid.*, 22-23).

72. The Asian Clearing Union helps central banks exchange local currencies in trade between member states, rather than the usual practice of conversion to an industrialized nation's currency. For an analysis of multilateral money management, see Haas, Michael, *The Asian Way to Peace: A History of Regional Co-operation* (New York: Praeger, 1989), 182-203.

73. Flight capital outflows from the "Baker 15" most indebted middle income developing nations are reported in Tables 7 and 8, "LDC Debt Reduction: A Critical Appraisal," *J.P. Morgan World Financial Markets*, issue 7 (December 30, 1988), 9.

See Bureau of Statistics, International Monetary Fund, *International Financial Statistics* (Washington, D.C.: International Financial Statistics Publication Services, 1991), 54-56, for cross-border bank credit to nonbanks. The 1989 data are close to what J.P. Morgan reported.

74. RDSS was recommended as an alternative to telephone systems in an article by Samara, N.A., "Telecommunications Development and the Private Industry," in *Bridging the Missing Link*, 246-49.

75. Colin Billowes, head, Telecommunications Sector, Canadian International Development Agency, interview with the author, March 4, 1991.

76. I am indebted to Eugene Risler and his colleagues at GTE Government Systems for the general descriptions on equipment flexibility and for specifications. Personal experience with the SB 3614 cordless switchboard reinforces my belief in its utility.

Commercial systems, such as ALASCOM's transportable satellite terminal and REDCOM Laboratories' portable switches, share some military equipment characteristics. What they lack is a single training facility for management, integration, installation, and maintenance of all component systems. The military has this capability.

In six months of off-the-record discussions with very senior telecommunications, development, military, trade, foreign affairs, and business officials from North America and other regions, the majority disliked the military option. It was disparaged as too expensive, and too likely to use scarce facilities that would not be replaced. However, one general officer, three businessmen, and two directors of emergency communications thought it was an

idea whose time had come.

77. Reported by Clayton J. Dillon, director, Related MSE Programs, GTE Government Systems Mobile Subscriber Computer (MSE) Division, June 1991.

78. See especially, Lone, Salim, "Africa: Drifting Off the Map of the World's Concerns," *International Herald Tribune*, August 24, 1990. Lone is Editor in Chief of the U.N. publication *Africa Recovery*.

79. McLelland, Stephen, "The Two Faces of German Telecommunications," *Telecommunications* (International Edition), July 1990, 58-62.

Acronyms

BDT	Bureau of Telecommunications Development
CCIR	International Radio Consultative Committees (ITU)
CCITT	International Telegraph and Telephone Consultative Committee (ITU)
ETSS	Electronic Telecommunications Switching System
GATT	General Agreement on Tariffs and Trade
IFRB	International Frequency Regulation Board (ITU)
IMF	International Monetary Fund
INTELSAT	International Telecommunications Satellite Organization
ITU	International Telecommunication Union
OECD	Organization for Economic Cooperation and Development
POTS	plain old telephone service
RAX	Automated Rural Exchange (India)
RDSS	radio determination satellite service (Geostar)
TCD	Technical Cooperation Department (ITU)
TEMIC	Telecommunications Executive Management Institute of Canada
TROPICO	Brazil's flagship digital series
UNDP	United Nations Development Program
USTTI	U.S. Telecommunications Training Institute