

Telecommunications in
Central Asia and the Trans-
Caucasian Republics of the
Newly Independent States

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Chapter VI

Telecommunications in Central Asia¹

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6.1 Geopolitical Profile

The telecommunications infrastructure of the seven countries of the TransCaucasus and Central Asia, i.e. Georgia, Azerbaijan, Turkmenistan, Uzbekistan, Tajikistan, Kyrgystan, Kazakhstan and southern parts of the Russian Federation including Tatartsan is the legacy of more than seventy years of a centrally administered communist state apparatus. Much has been written and many theories advanced on the "Russian" character. Some argue it is due to is due to inter alia bleak landscape, endless winters or "swaddling" children limbs. One only has to read Tolstoy to find prevailing stereotypes confirmed in characters who manifest depression, insecurity and feeling of feelings.

Inadvertently, the above has described the political and business climate and entrepreneurs in today's Central Asia including the telecommunications sector. Indisputable is the fact that the attendant corruption and mismanagement has had an adverse impact on all aspects of national life, and has left this sector, like others, with old and outmoded analog telecom systems and electromechanical

equipment. Central Asia's and Russia's long history of despotism from Ivan the Terrible to Joseph Stalin, with the attendant corruption and mismanagement has had an adverse impact on all aspects of national life, and has left this sector, like others, with old and outmoded analog systems and equipment.

After the disintegration and collapse of the Soviet Union there were some initial encouraging signs of political reform and democratization so necessary to attract foreign investment. Regrettably, there has been a decided shift to the return of "despotic" rule by single strong men who have named themselves President for life and disbanded parliaments. To a great extent the current political leadership also displays the same subservience to the political leadership of "Moscow" bosses, as did their predecessors. In Chechnya, Georgia, Tajikistan and Uzbekistan political opposition is dealt with roughly at best.

Against the above back drop it is and was overly optimistic to expect that the region's ingrained cultural approach to business and the development of telecommunications would "change" in a few short years. Certainly any "change" has been prompted by the potential for capital investment and the structural requirements required as condition precedent for disbursement by western bankers.

Central Asia has a "Wild West" atmosphere in which it is difficult to

distinguish the legitimate from the more corrupt elements of society. This situation is aggravated by the lack of a legal framework for conducting business. Given the enormous gulf between past and present business experience in these areas and the expectations of western investors and operators the next generation of telecommunications leadership will probably be slow to understand and implement the needed Changes. A much needed framework of business laws still needs to be put in place, and this is the area where foreign assistance, diplomatic initiatives and policy formulators can provide credible support to foster the important work of developing these "market" economies . There is an enormous cultural gulf that exists between past and current business experience in these areas, and the expectations of Western investors/operators, who are the sources of capital, technical know how and profit making operational experience. The emerging generation of leadership in telecommunications development, is beginning to move in this direction and to implement the needed changes. Yet modernizing market economy must access and use the information available via telecommunications to efficiently allocate scarce resources. Hopefully, this urgent need will speed the reforms necessary for sustainable economic growth.

The area in question extends from Azerbaijan to the eastern front of

Kazakhstan, and has a population of about 60 million that is growing at around 2% annually. Between 1914 and 1924, the Soviet Union absorbed all of these presently "independent republics as part of the czarist plan for southward expansion to a warm water port.² The area remains in Russia's shadow in part due to the diverse ethnic mix, which may leave indigenous groups in the minority. Many of the transplanted nationalities lived here even before Stalin's forced resettlements, contributing to an ethnic patchwork quilt, which is most pronounced in Kazakhstan, where people of Korean, German, and Slavic origin represent more than 21 percent of the population leaving only 40 percent Kazakh and, say, 38 percent Russian. In addition, Russian is the predominant language in all of Transcaucasia and Central Asia, particularly for business, and Russia's in all cases the largest trading partner. Further, policy in Moscow is still closely watched and very often followed. This fact will continue to influence the direction and pace of reform.

All of the countries in the region (with the exception of Azerbaijan due to the civil war) wish to have economic linkages with the Russian Federation under the Commonwealth of Independent States (CIS). Russian insistence on dictating oil exports has created some friction particularly in Turkmenistan.

6.2 Evolution of Telecommunications Infrastructure and Administration

The telegraph and telephone infrastructure was not widely developed in the "Provinces" of Czarist Russia when the Russian revolution took place in 1917. European vendors, most notably L. M. Ericsson, briefly operated local telephone exchanges in Kazakhstan and Uzbekistan just prior to the Russian revolution in 1918 and the subsequent Communist expropriation. The consolidation of all private property into state-run operations produced a complex, and at times redundant bureaucracy of state enterprises and party organizations, all ultimately reporting through regional hierarchies in Moscow to state planning agencies, party conferences, and committees. The entire system was subject to oversight by the state's security apparatus. In the telecom and other sectors, committees decided the communications requirements of industry. The Party built several separate private line systems, as did security organizations and the armed forces. Secrecy surrounded every aspect of these networks, and today's planners are still handicapped by the unavailability of such items as built drawings, frequency assignments, and traffic data. There was no automated interconnection among these systems, and even today in most areas there are as many as separate networks. One reason is strictly cultural: the desire to avoid unwanted calls and callers. As one minister exclaimed when

connecting the six networks in his jurisdiction, "But then anybody could call me!" Such an attitude also keeps telephone penetration at 21 per 100, even in many urban areas. Such an attitude also keeps telephone penetration at 21 per 100, even in many urban areas, (and lead to the common businesses practice of turning fax machines off at night not only to conserve scarce fax paper resources, but also to permit monitoring the identity of the sender and terminating unwanted messages).

The failure to construct a modern telecommunications system is symptomatic of the inefficiency and corruption that brought about the formal collapse of the communist system. Typically, the Soviet economy spent 30 to 50 percent of its GNP on heavy industry. As a result, quality consumer goods, including telephone handsets, continue to be in short supply. In addition, due to chronic alcoholism and absenteeism factories typically produced 60 percent of their quotas in the last six days of the month - a practice called "storming". In 1982, party Secretary Andropov observed that "shoddy work, inactivity, and impartiality should have an immediate and unhindered effect on earnings" but in fact the rise in wages throughout the 1980s, while productivity continued to decline, demonstrates, in his words, the "inefficient utilization of the workers and their intellectual potential," and set the stage for too many rubles chasing

too few goods. Today's hyper inflation, unemployment and drop in industrial production of up to 50 percent has crippled the economy and disrupted trade. Thus, despite Gorbachev's campaign of *glasnost* and the anti-Communist revolt it inspired among ill-served Soviet consumers, an antiquated infrastructure still impedes any plans to shape a democratic market economy and a reliable communications system.

6.3 Present Infrastructure

Today the average installed base is about 8 direct exchange lines (dels) per 100. Technical interfaces have not achieved the degree of standardization that one might expect from a centrally planned economy. For example, there are over 12 different varieties of R-2 (Pulse Code Mode-Analog) used to signal between switching equipment.³ Most telephony and telex traffic/trunking has been via coax cable, with microwave utilized principally to interconnect broadcasting repeaters. The entire system is predominantly analog, although a handful of digital switches have been introduced over the last several years. Satellite transmission has been very limited, because it is so easy to intercept. Most of the central offices are still crossbar -- installed between 1920-1940.⁴ The majority of Electronic "steppers," Class 5/local offices are also equipped with

crossbar switches, which comprise about 60 percent of the total. Approximately 35% of the switches are fully digital switches while less than 3 percent are mostly at Class 1 tandem/international gateways. Although local calling is almost entirely automated, operator manual connections account for 2 to 3 percent of all local calls (much higher if you count long distance, which is still predominant - a legacy of security controls) - and may provide the only contact with the outside world for many remote areas . There is, however, a growing emphasis on direct dialing and international gateways to generate revenue in local currency and international settlements to provide badly needed hard currency. The physical plant is also largely in disastrous condition. As in most developing countries, the lack of standards, uniform central office practices and effective training and proficiency of workers comprise network reliability.

All of this is complicated by a systems architecture that resembles a 1930 Bell System, with a virtual set of low grade copper wires going to every handset. Multiplexing has been well understood since the 1950s, but again, security and ease in monitoring encouraged this wasteful, single pair to the switch-type design. For example, there were few centrexes or PBXs in hotels. Instead, each room has/had its own number, which makes leaving a message for an absent guest a nightmare as well as a horrendous waste of trunk and

subscriber lines. Overall, it is estimated that at least 20 % of lines in the region are inoperable or have been abandoned by the operating companies. Waiting lists for service range from 1 to 15 years, and "official" deposits of around \$300 to \$1000 approximate the incremental cost of adding to an already overloaded system with call completion rates of less than 50 percent, and call blocking of 80 percent at peak calling hours. Certainly, there is an urgent need for fundamental and comprehensive plans. Conduits, for example, were often filled to capacity with installed cable, leaving no room for network growth or expansion.

6.4 Laws, Regulatory Structures and Business Environment

A fundamental impediment to telecommunications development in the region is the absence of an established body of business, banking and accounting law that would provide the necessary predictability for private sector investment and the mobilization of capital. There are initiatives underway in all of the states to adopt and promote such laws, but most comprehensive pieces of legislation are limited in scope, or based on executive decree. The resulting confusion creates a wealth of opportunities for foreign accounting firms but makes it difficult to attract the capital necessary for network development. Another corollary is that

the regulatory environment in particular is still in its infancy. Currently private operators are licensed and operate under a joint-venture agreement or as know in the "Ustov", which is the document registering a joint stock company or other legal entity. Ministries of Communications (MinSvyav) need to be strengthened in order to fulfill their regulatory and other functions. They have requested bilateral and multilateral assistance and training, but little has actually taken place. Forums, seminars and diplomatic missions produce broad statements of policy, but policy in a vacuum is irrelevant without capital investment.

Figure 6-1 shows the standard operating structure for a ministry of communications, but this chart is somewhat deceptive, particularly in the all important area of wireless communications. In 1993, in Uzbekistan the NMT (Nordic Mobile Telephone) 450 MHz with limited analog capacity was been deployed with a limited degree of success. High tariffs, problems in local partnering, organized crime and political as well as technical interconnect factors has slowed growth to about 2,000 subscribers and airtime of \$ 1.00 per minute. On the other hand, Kazakhstan has two competing analog AMPS provides with almost 10,000 subscribers. Wireless systems have provided some immediate capacity, but the advent of digital wireless communications discussed

below may offer significant opportunity for the region. It is important to note that the army and its parallel generic industries (NPOs) control the all important 800-900 MHZ frequencies, which are essential to developing fixed, local wireless loop systems. Thus, the army's participation is all-important in implementing a successful high-capacity wireless communication's system.

Insert Figure 6.1

The Ministry of Communication and the operating telephone structure still await separation in the various republics, however, and while this step is currently being proposed in some soviets (parliaments), ministries desperate for funds are resisting the idea as their operating budgets are cut and are eroded by inflation.

In several of the republics, "republican centers" have been established as subparts or operating subsidiaries of the ministry. Their aim is to become private joint-stock companies, providing telecommunications value-added services such as VSAT, cellular service, and international gateways. In these former and new states as well as semi autonomous regional authorities, many ministerial personnel have had an opportunity to benefit from their new

positions and powers parlaying them into extensive international travel as the guest of operators and vendors looking for business opportunities or in heading new companies with exclusive franchises to provide services. There are also many rumored improprieties in the awarding of licenses, concessions and contracts to supply equipment. Section 6 as it is sometimes called, the KGB's successor, as well as newly established "Monopoly Committees" are starting to investigate such cases, although they are at times partners in these newly formed enterprises using former KGB frequencies and former "state owned" property. One of the most celebrated cases is Kazakhstan Wireless Communication, a cellular system built with Kazakh Government invitation and support, whose American interests were subsequently expropriated by the Kazakh Government in collusion with new "private" Kazakh interests.

As mentioned earlier, the business environment is somewhat chaotic and to the outsider may resemble the fabled, lawless wild West. Russians call this attitude *bezpredel*, "seizing anything in sight," and business customs at times have been characterized as *nazgloist* - or "brazen insolence." In the early days after the breakup of the Soviet Union, for example, the same contract may have been awarded to several different firms, payments not honored, and terms modified unilaterally or simply ignored. The situation is only worsening now

with state action in expropriating smaller owners telecom properties, and through threats, extortion and violence that often cannot be distinguished between common lawlessness and official state complicity/support. Larger operator with greater resources are often able to counter these problem through resource mobilization and distribution to decision making parties. Given current economic uncertainties, many of the less scrupulous are out to grab as much as they can, and powerful individuals and companies enforce their will only to be undone by even more powerful groups or "Mafioso" gangs that extort a piece of the action. In this environment, choosing a local partner is the most important business decision one can make, because much depends on the quality of the personal relationship. Continuity on both sides is important, and the original partner should be the one to see the project through. Retaining advisors, attorneys and accountants who have both formulating and actual experience in-country, can provide adequate counsel is also critical in executing the project. Even apparently powerful groups can be undone by bureaucratic intransigence due to corruption, lack of authority, or the failure to understand what a firm is trying to accomplish. Potential investors must also keep in mind that securing payment, convertibility, and repatriation necessitates very creative financing, from barter deals including in-kind contributions by oil companies to obtaining

switching and transmission equipment that will support their own activities. In short, this is not a market for the faint of heart, but only for those who trust their instincts and are convinced of the importance of their enterprise. Winston Churchill's famous phrase, "Russia is still an enigma inside a mystery," and trying to understand its complex interrelationships can seem to the outsider like peeling an endless onion.

6.5 Role of Private Sector

6.5.1 Operators

The mineral-rich Transcaucasian provinces, particularly Kazakhstan and Azerbaijan, offer enormous "green field" investment opportunities, especially for equipment sales. There are growing numbers of private data networks, as well as temporary links via INMARSAT that are in transition or being overtaken by private VSAT-type international gateways, landing and interconnecting with foreign PTTs. All the major firms have held vendor sales and look to foreign exchange revenue to repay their equipment purchases. US operators and vendors still account for about 80 per cent of current foreign investment, operations, and equipment sales, although Turkish firms have been making serious inroads due largely to their proximity to the region and close

cultural ties. It may be that the Turks' own experience of bridging the European and Islamic worlds may continue to serve them well in this regard. Pakistanis and Israelis too have entered the market.

6.5.2 Local Manufacturers

The former Soviet system was "vertically integrated," with no local producers or small-scale entrepreneurs who manufactured user-ready equipment. Research and development was centered in Moscow and St. Petersburg and was coordinated by the Institute of Telecommunications, which reported to the Ministry of Communications. The vast majority of research and very limited high tech laboratory production, however, was for military purposes. Factories in each of the republics produced components that were then shipped principally to Moscow for PCB (printed circuit board) integration. Azerbaijan, for example, produced capacitors and resistors, and Kazakhstan produced VLSI (very large scale systems integration)--boards for advanced applications such as military command and control and/or space exploration. This hierarchical manufacturing and trading system has now entirely broken down, however, creating severe shortages of finished products as well as components, and

cannibalization is the rule of the day. Only the most ingenious entrepreneur, with the ability to travel to the source with hard currency in hand, will be able to satisfy his or her system requirements.

Foreign joint venture manufacturing is centered in the Russian Federation. The most significant of these operations is Alcatel's production of the System 12 switch. AT&T has moved aggressively in Kazakhstan and will most probably set up limited assembly production for its 5ESS switch, but Alcatel enjoys two significant advantages: acceptance and official approval of its product and valuable signaling experience. Telular also promises to be a significant player with its fixed wireless terminal equipment.

Future production requirements will be met by boutique vendors responding to local needs and by foreign joint ventures that employ local assembly. Consolidated, restructured trading patterns should reemerge after the Ruble crisis has passed. Firms that create local employment opportunities will receive special incentives.

6.5.3. Joint Stock Companies and Local Investors

Indigenous companies have been slow to start up operations given the large amount of foreign capital and managerial as well as technological experience

required. In addition, local equipment is scarce and as noted earlier, spare parts are acquired by cannibalization. A few firms, however, were positioned to benefit from their joint stock company status and experience in handling installations in the telecom sector. Normally well connected with the old regimes and often made up of former senior party officials, such firms sometimes were able to profit from these affiliations and the influence they bestowed, but in other cases have found them an impediment due to personal rivalries or the envy of those in power.

The Russian saying "I'm unhappy as long as you are unhappy, but I am not happy if you are happy" reflects the feeling that there is something inherently immoral or illegal about free enterprise. In fact, recent experience bears this out, as many of today's "entrepreneurs" are Mafiosi who worked with security and party personnel to "lubricate" the former Soviet economy, particularly with specialty foods, other luxury goods, and entertainment. The rapid market transformation in Hungary and Poland was fueled in part by this class, who were viewed as crooks under communism, but heralded as entrepreneurs when the wall came down.

Local investors, however, are rare. But some calculations as much as 80% of foreign exchange reserves have been siphoned off since the revolution

via questionable commodity transactions, where hard currency goods are sold below market to trading companies and then again at a profit on the open market. Such deals were previously used to fund the international activities of the Communist Party; today monies reportedly flow directly into the overseas accounts of powerful political and business figures, rather than providing needed investment for infrastructure development such as telecommunications. Similar capital distortions exist in other parts of the world-Latin American investors, for example, typically deposit their monies in Miami or offshore banks -- Yet the rate of network expansion in Latin America today is among the highest in the world. Of course, not all of these funds were illegally derived, and there is still network expansion in the exciting and potentially massive Central Asian market. Nevertheless, the important policy changes discussed below are essential in order to create a favorable investment environment and promote telecommunications development.

6.6 Tariff Structure and Capital Mobilization

Tariffs in the former Soviet Union were historically low. Even before the breakup, the cost of a local pay phone call, for example, was 10 kopeck or roughly .01 USD (unofficial rate)-less than one twentieth the cost in the U.S.

There was no additional measured charge for local residential or business calls and long distance charges were measured in one minute increments rather than in pulses. This anomaly is apart from the rest of the world where telecommunications tariff rates vary between residential and business lines, as well as time and distance sensitive billing. Today tariffs are still very low and are constantly being eroded by inflation. For example, an international call from Tashkent/Moscow to New York costs about .30 USD if you can get a line. A private/commercial carrier, on the other hand, will charge you a "premium" rate of \$3-10 per minute for the same service.

This distorted relationship between the cost of providing telecommunication services and the revenue received from them, in fact, is the greatest obstacle to quality service. The World Bank's graph in Figure 6.2 clearly demonstrates the direct correlation between per capita income and telephone penetration: subscribers who are able to pay for service at rates that provide investors with a "fair" rate of return are more likely to receive "quality" service. A case in point is the United States, with a tremendous installed plant and an effectively guaranteed rate of return.

Insert Figure 6.2

Given the economic chaos in Central Asia and its disruptive impact on individual purchasing power, however, it is unreasonable to expect telephone rates to reach the levels necessary to finance network development on a massive scale. Former Soviet politicians trying to end subsidies on basic commodities over their constituents' objections are not about to tackle the massive increase required to bring tariffs in line with market pricing. Yes, there have been rate increases and there will be more, but it is unlikely that they will reach market levels. However, mass penetration of local telephone service will only come when there is investment in the infrastructure, and investment will only come when there is an acceptable rate of return based on risk. Figure 6.3 clearly demonstrates how investors gauge investment risk based on factors such as political instability, inconvertibility, and inflation. On this scale, investment in Central Asia demands an annualized return of 38% that pushes the "envelope" of what a well-managed telecommunications operation should yield—normally 15 to 20 percent per annum. Only a few services can provide such a rate of return, primarily premium grade services, including international gateways or other mediums for carrying international traffic, private networks via VSAT (Very Small Aperture Terminals), and to a lesser extent analog cellular service. These

are exactly the areas where there has been operator investment or equity participation by vendors.

Insert Figure 6.3

6.7 The Telecommunications Future

6.7.1 The Technology Revolution and Its Challenges

Relative to the developed world, Central Asia's installed telephone base is too small and too antiquated to meet the needs of a developing market economy.

This is true for every area from outside plant, to switching and transmission, and especially so in view of anticipated future demands on the systems.

Interfacing a modern digital network with a thirty-year-old architecturally dissimilar Soviet analog network and with over 14 different signaling variations, presents a significant technological challenge.

Figure 6.4 shows a probable global demand curve for both wireline and wireless service. It assumes a current maximum installed base of almost five million lines, 10 percent incremental growth for the wireline, and wireless growth doubling each year. These projections are based on historical experience and the increasing role of wireless communication. Buildout of

Chapter XIII

Bahrain

Table 13.1

Telecommunications Expenditures by Middle East States, Forecasts 1990-2000 (\$ Billions)

Country	Rate of Growth				
	1990	1995	2000	1990-95	1995-20
Afghanistan	21.7	34.0	46.0	9.4	6.2
Algeria	203.0	375.0	590.0	13.1	9.5
<i>Bahrain</i>	<i>33.7</i>	<i>37.8</i>	<i>56.3</i>	<i>2.3</i>	<i>8.2</i>
Cyprus	18.5	19.2	21.6	0.7	2.4
Djibouti	2.8	3.2	5.1	2.7	9.8
Egypt	280.0	521.0	750.0	13.2	7.6
Ethiopia	15.7	18.9	22.1	3.8	3.2
Iran	410.0	587.0	850.0	7.4	7.7
Iraq	283.0	339.0	550.0	3.7	10.2
Jordan	28.2	29.4	34.1	0.8	3.0
Kuwait	92.7	131.3	173.6	7.2	5.7
Lebanon	28.2	29.4	34.1	0.8	3.0
Libya	117.8	130.8	188.5	2.1	7.6
Mauritania	1.1	1.3	1.8	3.4	6.7
Morocco	37.1	44.2	50.2	3.6	2.6
Oman	8.6	8.9	10.2	0.7	2.8

Pakistan	539.6	651.0	830.0	3.8	5.0
Qatar	63.9	96.8	135.4	8.7	6.9
Saudi Arabia	770.2	885.0	1,400.0	2.8	9.6
Somalia	2.3	3.4	4.6	8.1	6.2
Sudan	12.3	13.1	17.3	1.3	5.7
Syria	158.3	211.0	300.0	5.9	7.3
Tunisia	32.0	37.2	43.7	3.1	3.3
UAE 152.3	202.0	307.0	5.8	8.7	
Yemen (Aden)	3.6	3.9	5.6	1.6	7.5
Yemen (Senaar)	9.8	12.4	15.0	4.8	3.9
Middle East (total)	3.8	5.0	7.4	6.1	8.1
World Total	112.8	133.2	184.5	3.4	6.7

Source: Middle East Economic Digest (November 10, 1989), p. IV.

Chapter IX

Saudi Arabia

Table 9.1

Tariff Rates for the Kingdom of Saudi Arabia

(As of 1 January 1995)

	SAUDI RIYAL	U.S.DOLLARS
	(SR)	(\$US)
Subscription	360	95
Connection/Installation	500	125
Local Calls	0.125	0.033
Long Distance (100km)	0.20/min ¹	0.05/min

International²

Europe

(France)	8.00/min	2.15/min
(Netherlands)	11.00/min	3.00/min

Asia

(Japan)	11.00/min	3.00/min
(Philippines)	13.00/min	3.47/min

<i>U.S.A.</i>	8.00/min	2.15/min
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¹For national calls there is a 20% discount between 10:00 PM and 8:00 AM each day.

²The settlement rates negotiated between the kingdom and other countries are a significant factor in determining international tariffs.

networks take enormous resources, planning coordination, management supervision, and time. For the wireline network, it entails such construction issues as civil works, outside plant including extensive aerial plant, and/or installation and excavation for wireline outside plant. Wireless operators in many different countries, on the other hand, have easily doubled their subscriber base annually by adding additional cell sites and reconfiguring their frequency plans. Even so, expanding personnel resources in addition to resolving operating issues has presented significant challenges for the wireless operator. After only ten years on the market, there are already ten million cellular telephones in operation in the United States alone, but cellular growth has slowed recently due to economic constriction, pricing, ready availability of installed wireline base, including working telephones on virtually every street corner, and the recent health concerns over ERP.

Insert Figure 6.4

Both wireline and wireless operators can normally install new switching capabilities in 9 to 12 months but relatively speaking this is the easier part of network buildout. What distinguishes a good from a poor service provider is

the outside plant. A wireless system operator can eliminate much of the usual equipment by migrating to a radio-based system. This is particularly attractive to Central Asia for several reasons:

1. The region's relatively low level of installed base and the expectation that there will be sufficient demand to finance significant growth.

2. The shrinking price of high capacity digital wireless systems, which installed cost \$1,200-2400 USD per urban line depending on density. This represents a significant reduction in operating costs given the fact that there is no cabling plant to maintain.

3. Wireless can be the available system in a competitive market, capturing premium subscribers and generating significant revenues.

4. Finally, subscribers who have had no service, or have experienced high blocking and low call completion rates as well as scratchy analog channels may tolerate a clearer digital signal, but the voice quality may leave something to be desired.

Are wireless technologies ready? When do a manufacturer's promises or "vapor wares" become reality? What about the standards battle? Today's analog cellular radio is an accepted business tool but is having limited success with ordinary consumers, due to pricing and spectrum availability. Europe and

the Americas are now deploying digital wireless communications systems in major markets. Both are TDMA (Time Division Multiple Access) which creates multiple voice paths within a single spectrum or channel by assigning time slots to a voice/data activity and is about three times more efficient than a comparable analog system. If an analog system, for example, has 465 channels, 465 people could be talking at any given time, whereas with TDMA as many as 1500 people could talk over the same number of analog channels. There are also other improvements such as E-TDMA, which enhances the efficiency of analog 15-or 20-fold. It does so by using a half-rate voice coder to take advantage of pauses in conversations and assign that spectrum to other users who are actually speaking. Another innovation is CDMA (Code Division Multiple Access), a former military technology that uses power modulation to provide about 15 times the capacity of analog cellular. This type of system has received the backing of several RBOCs (Regional Bell Operating Companies) and may be deployed for alternate kinds of applications. Its future is unclear, however, for a variety of technical reasons, including lingering questions about incompatibility and interference with existing cellular systems and the fact that TDMA and E-TDMA are already on the market. The European standard GSM (Group Special Mobil) has the advantage of offering Pan European roaming and

a threefold increase capacity over analog in addition to a uniform data capability and interface/data port compatibility.

All of the above discussed systems are undergoing testing and limited deployment in Central Asia and other parts of the CIS. A variety of technical and political problems are emerging as a result. The Hughes system in Tatar Russia was the first full-scale digital wireless system successfully constructed, loaded with initially 50,000 subscribers under actual operating conditions. But at this point the TDMA system leads the pack and enjoys the significant cost and performance advantage of operating a "dual mode"- an analog/digital migration compatible with its analog predecessor. Mass market success translates to price advantage, which produces service priced for the mass market. One strategy feeds the other if the standard can become dominant, a marketing scenario that reflects the histories of VHS and Beta video cassettes.

Of the above new technologies, export licensing approval has been given to only E-TDMA, given its ability to make architectural modifications and the absence of encryption. GSM has not yet received export approval given, inter alia, its use of encryption, and CDMA also faces significant obstacles in winning COCOM (Coordinating Committee on Export Controls) and it's successor bilateral export control regulations/administrations for export

approval. This is because CDMA , although developed and well understood as a secure defense communication system, appears as "noise" on the electromagnetic spectrum, and is more difficult to monitor and is considered an encrypted signal, i.e. has tactical military or "dual use" applications. To modify these systems makes them more expensive, however, and in the case of GSM, subtracts from its main advantage of roaming. Export restrictions are not expected to be eased soon given the continuing Central Asian political instability and questions over nuclear proliferation, particularly in Kazakhstan. These trends such as increased emphasis on selling high tech Soviet military technology abroad to generate hard currency, create Western insecurity with Central Asia.

Interestingly today "roaming" provides no more than 10 to 15 percent of an operators revenues and has been very prone to fraud, while 80 percent of revenues are generated by not more then 20 percent of cellular users. In deploying GSM which is questionably a superior digital wireless system there is only a small prospect of users from other including Europe using their handsets, as currently GSM systems being built in the CIS do not include encryption and are therefore not compatible with European systems. Clearly, home market premium users are "where the action is."

Central Asian markets are also sensitive to Spectrum considerations, and developments in private mobile communications in other parts of the newly independent states (NIS) are being carefully watched by the Central Asian Republics. Under the Soviet regime, mobile communications were the exclusive domain of the armed forces and of other security personnel; only the 300 MHZ ALTAI system were available to party officials and for emergency dispatch. 450 NMT was the first cellular system fully deployed in the NIS, and in all of Central Asia. Uzbekistan alone awarded a private cellular license to a small US firm ICG in 1991 for a 450 NMT system. This sole private cellular operator a small U.S. firm named ICG that was granted the license in 1991, has had a slow start for a variety of reasons ranging from financing to operational problems. It is likely that this system will be converted to 800AMPS with a second or third license issued. The real surprise may yet be low cost "trunked radio", more commonly known as two-way or for its dispatch capabilities. Increasingly these low cost technologies are being used for special application including limited fixed wireless/local loop. Frequency allocation in the former Soviet Union, for example, did not follow many important frequency assignments made by the WARC (World Administrative Radio Committee). The 800 MHZ (AMPS) cellular frequencies were and are still being used for

aviation/navigation approach beacons, while the 900 MHZ (GSM) band is still heavily utilized for multiple military and security applications, including tactical communications and telemetry.

A US manufacturer of cellular systems for emerging markets, PLEXSYS, has successfully tested and interconnected an analog AMPS system in Moscow, Soviet Georgia and Turkmenistan. PLEXSYS which is emerging as a leader throughout the CIS is actively planning other projects. Meanwhile, Hughes Network Systems has installed as discussed above the first high-capacity 100,000 line local wireless loop system, in mineral rich Tatar. US West is operating a 450 NMT (Nordic Mobile Telephone System) in Moscow, and in February 1993 the Russian ministry awarded the company a GSM license for 8 out of the 12 major Russian cities involved. It is noteworthy, that each of these firms are working with powerful local partners who are joint stock companies, regional administrations, and or Federal Ministries in order to maintain their market position. PLEXSYS may be the most successful by virtue of its powerful local partner, an NO with strong army connections. The company, whose limited capacity analog cellular system was until recently available only on a test basis, has received licensing approval from the Russian Ministry of Communications-demonstrating the importance of working with groups who are

powerful enough to advance an important project such as wireless communications.

6.8 Creating the Climate for Investment

6.8.1 Business Laws, Accounting, Convertibility Repatriation

The overwhelming need for capital, managerial and technical investment in Central Asia's telecommunication infrastructure is going to be met in the near term only by mobilizing principally foreign resources. Foreign investment will come only when there is a perception that the risks of doing business are predictable and manageable: predictable in so far as there is an understandable framework of law under which private enterprise is accustomed to working, and manageable in so far as there is a perception that the political climate is stable enough to permit capital investment. Investors normally use an index similar to Figure 6.3 to assess risk and prioritize investment. A well-run private telecommunication operation can yield the rates of return that are indicated in the figure, although an international gateway, private data network, or cellular operation will of course yield a far higher rate of return than, for example, a local loop telephone company that without significant toll revenue generation may even show a net loss.

In order to minimize risk and promote foreign investment, then, the following legislation is needed. First, a comprehensive business law that defines such basics as private property as well as the role and the rights, duties, and responsibility of private enterprise including such legal entities as corporations. Second, a commercial code that covers sales, contracts, banking and securities. Legislation must also be drafted to answer a number of questions regarding intellectual property rights for a joint venture or an operator with a proprietary management software. How are such rights protected? Is there an independent judiciary to handle these cases, or for that matter any other claims? What is the extent of any liability? Can a firm go bankrupt? The answers to all of these questions are entirely open at present and leaving the investor with very serious reservations.

Convertibility and repatriation are difficult questions in an economy where the ruble continues to fall and hyper inflation has taken firm root. This is especially true because counter or barter trade often presents the only avenue for repatriation, despite its inefficiencies and the possibly questionable if not unlawful element it can introduce into the business equation. Only limited foreign exchange exists and licensing procedures are often lengthy and uncertain. Fraud in wire transfers has further complicated an already chaotic

situation. Despite the pressing need, however, it is unlikely that the remaining soviets (parliaments), in the region, which number up to 80 percent former Communist deputies, will undertake such reform-minded legislation in the near term. Instead, the private investor who is operating today in Central Asia relies instead on creating a private body of law within the joint venture agreement situation is far from ideal, of course, because such an agreement runs the risk of being negated by subsequent legislation that may find its "contrary to public policy." There are also limits on how much authority, a Minister of Communication, for example, has in negotiating complex issues such as tax holidays, or repatriation and convertibility. Another potential area of confusion is the articles of association that define the management of the new, private "joint stock companies." Often there is an enormous gulf between the interests and expectations of the local partner and those of the foreign investor-the principal reason many of the joint ventures fail. Given all of these legal uncertainties, hiring and maintaining a qualified and culturally sensitive staff that does not lose sight of a company's investment objectives is key to the successful development of telecommunication properties.

6.8.2 Privatization

What is the future of privatization and its options? Russian Minister Vladimir B. Bulgak announced in February 1993 that local telephone administrations would be privatized, yet the questions of whether and when remain. Even the newly enacted Law of Communication in March 95' set no timetable for privatization. Any such schedule for Central Asian republics may reflect the experiences of their neighbors but is sure to take a separate track.⁵ This is true in part because evolution of private enterprise under the Soviet system was very different than in Eastern Europe, most notably Hungary, which was permitted to experiment with limited free enterprise prior to the breakup of the soviet union and even had a legal framework for private enterprise in place, however limited.

The opening of Eastern Europe was followed by a frenzy of investment activity, but despite extensive policy discussions no former Eastern European or Soviet country has yet to actually privatize a state-owned telecommunication entity. Instead, most have allowed limited private sector participation in directly severable or "value added" areas of the network, such as cellular, private data, and international gateways. Poland was the first to capitalize on investor interest by awarding a 450 NMT cellular license, in a convoluted bidding and award process where France Telecom and Ameritech prevailed. The former

Czech/Slovak republic has also been successful in attracting investment. Hungary, which many believe to be the best telecom market, intentionally maintained a monolithic, noncompetitive single telephone structure including wireless and then proceeded with privatization, under somewhat ominous terms and in an auction that resulted in very expensive per line award to again Ameritech -- this time with German support of Deutsche Telekom. Hungary's treasury has also done well with its auctioning of a GSM license. To the East, the Baltic republics have taken a far from uniform approach to private sector involvement. Estonia has extended a cellular system operative in Sweden, for example, while Lithuania has allowed a private 450 MHZ NMT cellular operation run by Millicom and is also considering a joint venture for a high capacity digital wireless system. Lithuania, like Poland, has granted a foreign operator joint venture rights on in providing international gateway services. Belarus has also permitted the establishment of a 450 MHZ cellular system which was first operated by COMSTRUCT and then taken over by Cable & Wireless of the UK. Ukraine, has been largely dominated by AT&T, and former Ukrainian Minister of Communications Vladimir Delikatny now heads UTEL, an AT&T and Deutsche Telekom joint venture, that plans to modernize and expand the country's significant infrastructure including international

gateway and tandem switching while it explores wireless possibilities.

In the Ukraine and eastward in the euphemistically "Newly Independent States", there is also increasing activity at the oblast, i.e. local government level. The oblast's are not only trying to satisfy immediate communication needs but also to ensure their continued influence in business matters within their jurisdiction. Normally, however, communications policy, licensing and standards are determined at the "federal" level, so vendors and investors face a diplomatic quandary in trying to work at that level without offending the oblast. Unfortunately, this situation typifies the chaos that still reigns in central Asia's telecommunications administration.

6.8.3 Role of Multilateral and Bilateral Assistance

The World Bank/IFC (International Finance Corporation), EBRD (European Bank for Reconstruction & Development) and all bilateral programs have contributed surprisingly little to Central Asia, although all have conducted missions to the area. The Germans and American are leading the effort by sponsoring seminars featuring important policy discussions on such topics of regulatory reform as fundamental planning, tariffing and spectrum management. But no resources have been committed yet due to broader IMF concerns

regarding the need to meet certain economic and policy targets. The goals would create enormous hardships such as removing price subsidies on basic commodities, however, and would prove politically suicidal for the new republics. Several ministers have privately expressed their desire for help, but none is willing to support what is being asked by the IMF.

Much of the debate revolves around maintaining the monetary supply and controlling inflation. It will be very interesting to see how the macro-economic factors impact on investor confidence, such as Kyrgyzstan's 1994 departure from the "ruble zone" and issuance of "som" local currency, which is backed by promised foreign aid. Russia continued attempts to intimidate its "Southern neighbors", and the discussion within the CIS at reintegration of economies, sounds very much like the aspirations of the Czars and the annexation/occupation by the Soviets". Also important in lowering investor risk and encouraging investment are the bilateral programs. The Europeans have been particularly active in this area, arranging trade credits for equipment sales and bringing ministerial personnel to Europe for training in technical as well as policy areas. Planning for project implementation of multilateral as well as bilateral programs will have to respond to a changing environment that can not wait for the completion of exhaustive needs and assessment studies. IFC holds

the greatest promise for private financing of market driven higher risk commercial projects. In the long run, though, the need is so great that governments' public sector contribution, whether bilateral or multilateral, is guaranteed to be of limited significance. Ultimately, the crucial role of public institutions will be to help create a favorable policy framework that encourages investment, and provides the telephones for business and government, rather than pursuing laudable social policy objectives. For this reason public sector economists and project managers need to advocate cost-based accounting and capital mobilization through subscriber deposits. As always, the challenge for multi- and bilateral donors is to ground their theoretical arguments in the market-driven investment forces that will bring in the capital necessary to construct a modern telecommunications network.

6.9 The Changing Policy Framework.

It is still impossible to predict the course of Central Asian telecommunication's policy, which as discussed above is drifting to the right and reflected the return of right wing dictatorial rule in these emerging "democracies." The battle for control and influence is clearly far from over. Learned political scientists argue that democracy is the product of abundance, or at least enough to sustain a

middle class, but for the moment this trend does not appear to be developing in the Central Asian republics. Power, influence, and economic prosperity are not spreading; instead, powerful interests are consolidating their positions amid today's confusion. This has been particularly so in the telecom sector where as discussed above small players have been forced out of the market. This concentration will dissipate over time as more licenses for joint ventures to provide "value added" services are granted.

Meanwhile, the policy for the foreseeable future will focus on improving single networks, which are more responsive to the needs of growing economies. Regulator and operator will only be separated where there is some compelling reason, such as condition precedent to disbursement of aid, the desire to maintain a state interest, the establishment of private systems for a compelling foreign exchange earner such as oil exploration and development, or a right to be transferred into private hands. Growth of these countries' GNPs will be the best indicator of a demand for services that will finally bring a change in policy.

6.10 Global Trends and Applicability to Central Asia

As noted earlier, economic and political relationships are far more important in Russia than in the rest of the world, and the verdict is still out as to whether

reform-minded administrations will carry the day. In 1995, reformers appear to be weakened and hard-liners with Communist aspirations are gaining. The last ten years have seen a pendulum policy swing towards tremendous global liberalization of telecommunications, with the United Kingdom, United States, and Japan leading the way in deregulation. Overall, there are more than 38 major privatizations underway in every continent, developed and developing countries inclusive. Conservative economic arguments for free trade and the 1980s boom fostered these developments. But the 1990's are seeing policy shift with pendulum swinging again. This may be the result of economic instability and constriction, as evidenced by changes in the capital and financial markets, increased competition, with the resultant closing of markets and erection of trade barriers, and problems within the European Community. Coupled with growing nationalism this shift may portend tighter controls over sensitive sectors such as telecommunications services and their products. The nationalization of telecom properties that occurred in Latin America in the 1960s is unlikely, however, although creeping expropriation via increased corporate social program taxation or other forms of enforced corporate contributions may well occur in markets that are not as dependent on foreign capital inflows for infrastructure development, e.g. GTE's experience in Venezuela.

6.11 Future Challenges and Changes.

It is especially difficult to predict the future when the challenges and changes facing a region are so profound. Accelerated change and technological revolution will certainly characterize telecommunications in Central Asia ten years hence, specifically, wireless local loop becomes more conceivable with the early deployment of high capacity digital systems. Overall, however, technologies that offer capacity and flexibility will be the state of the art, and services priced for the mass market will become the dominant technologies. PCS and its attendant advantages of Mobile One Number One Person communications, on the other hand, will only be available to the business sector.

All of these changes will occur rapidly in the West as the installed digital switching base, which is increasingly capable of software reloads to handle new features and interact with other systems, provides new applications and services. Central Asia's development will initially be slower, principally due to lack of investment, although private networks that generate foreign exchange and wireless technologies will be available to the powerful and influential. Telecom systems for the average citizen will not improve until worker productivity rises and wages reflect this change, probably around the turn of the century, when

the region's natural resources are more fully exploited and secondary industry provides better employment opportunities. Then, finally, the people of Central Asia, can expect to see a definitive change not only in their systems, but in their lives as a whole.

Endnotes

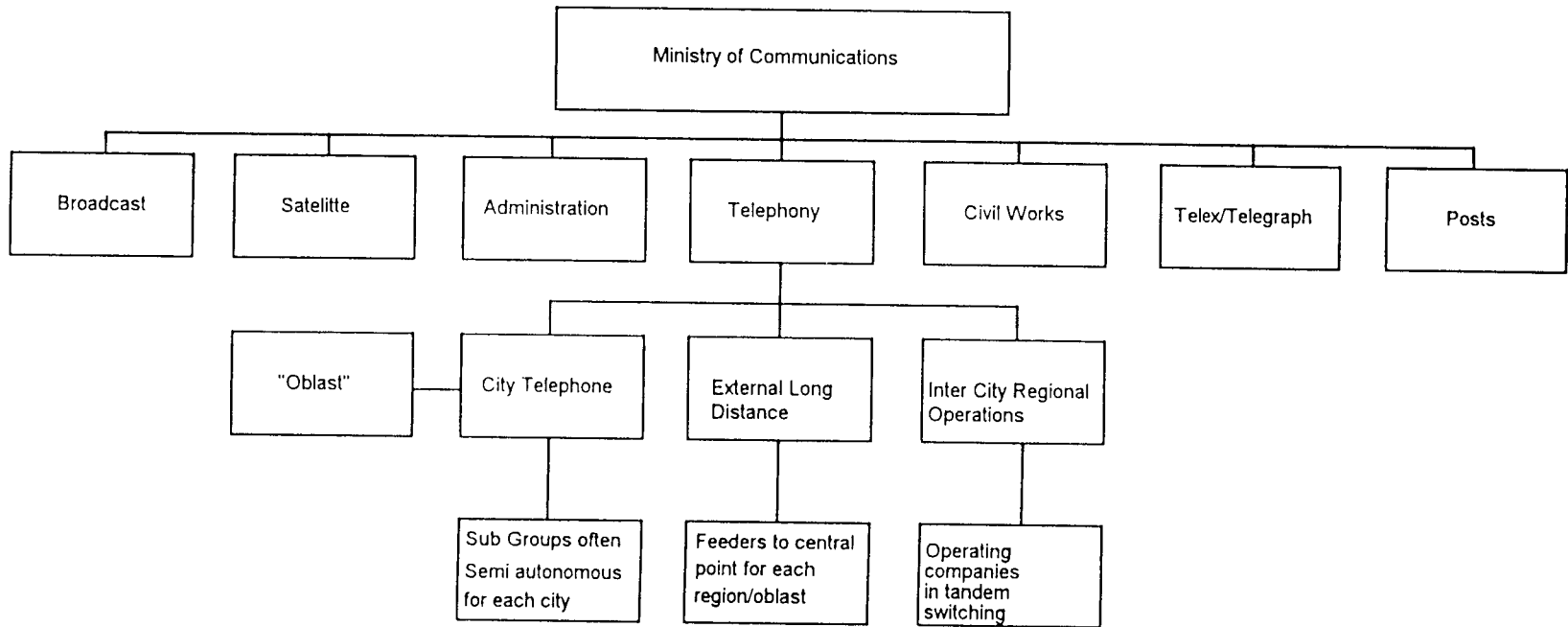
1. The basis for this work is entirely first hand in-country research in the study area. The closed nature of society and the abundance of authoritative materials necessitated using only first hand sources. Many thanks to all those who contributed their ideas and views including my colleagues at the World Bank, U.S. Government Departments of State and Commerce, Press, Private Industry, and Academia including Justin Friedman formerly of Eastern European and Former Soviet Telecom Report, B S D International, who provided unique perspective in the subsection on "local" manufacturing and Professor Keith Breclaw of Georgetown University who instructs on Communist political thought. Special thanks to my editor and longtime close associate Anita Horsey whose invaluable professional input lends clarity and focus to this the work of a non-professional writer. The opinions expressed herein are the authors best estimates and perceptions of a highly fluid and changing situation. The authors best wishes and support goes to the peoples of these Republics and their public officials in their historic experiment with "democracy".
2. This is also why more recently, Tajikistan served as the jumping off point for Soviet expansion into Afghanistan. Today Tajikistan's capital, Dushanbe, is torn by an Islamic revolution that toppled the old Communist guard only to have it reinstated with tacit as well as active support from certain neighboring countries, most notably Uzbekistan. The latter's own growing Moslem

population, however, is a threat to the traditionally Russian dominated "old guard". Nevertheless, with the exception of some high-profile positions, non-reform-minded Russians or their protégés dominate the nation's political, intellectual, technical, and professional leadership. Whether in the ministries or in the supreme soviets, the same old hands are busily peddling their enhanced influence for personal gain, accepting gratuities and outright payoffs, or transferring state assets to joint stock companies which they either control or participate in on an equity basis. The positive side of these developments is the creation of new for profit enterprises and accompanying employment opportunities. One of the downsides is the export of foreign exchange and raw materials so necessary to strengthen the banking sector, can be siphoned off to foreign bank accounts. Before we judge any of these Russian players too harshly, the West should reflect on its own industrial revolution and the excesses of the "Robber Barons" of the, e.g. petroleum and railroad industries.

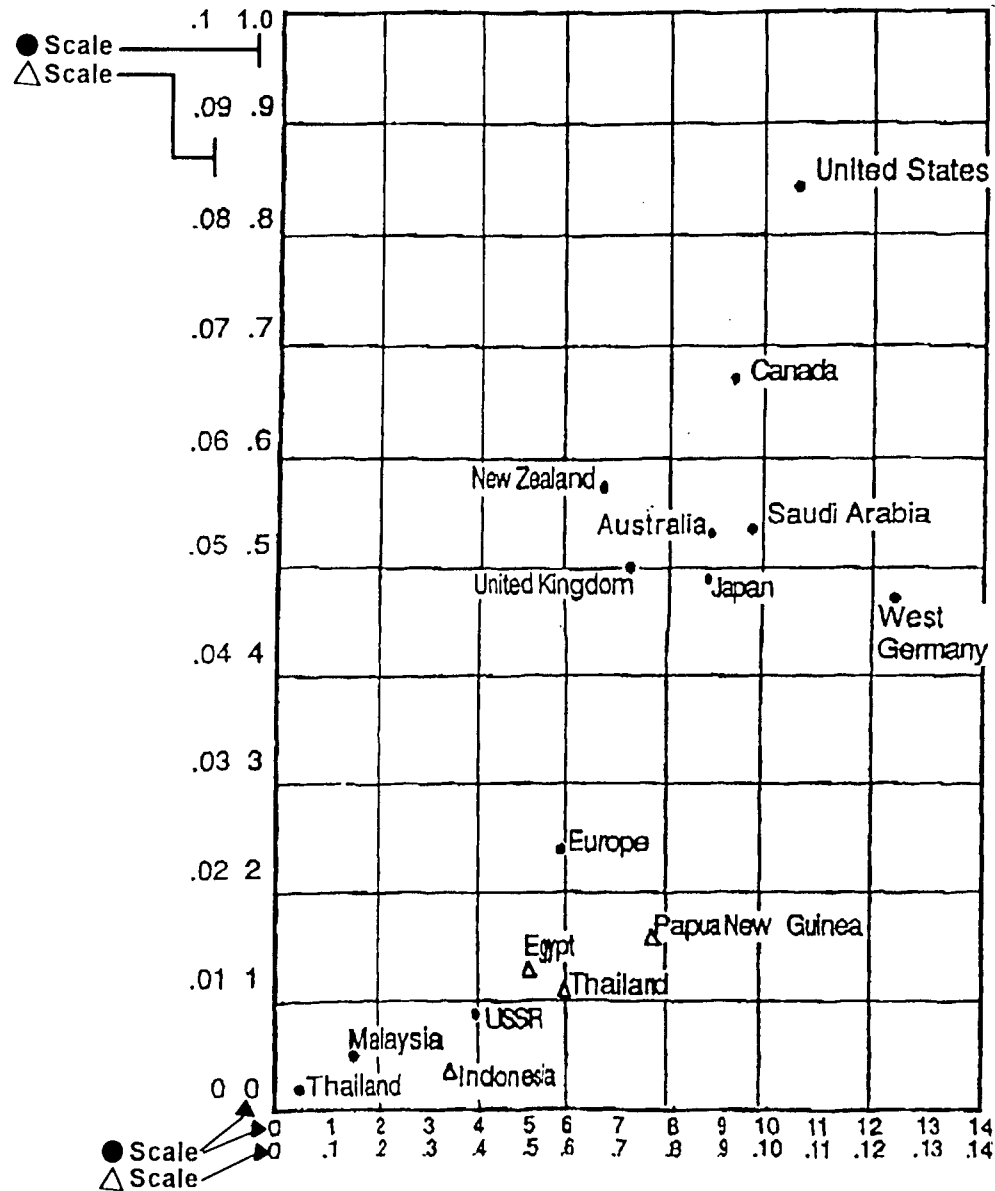
3. Alcatel recently acquired an East German firm, RFT, for their invaluable experience in dealing with signaling and other interface problems, including tasks as simple as hard-wiring terminal blocks between western switching and transmission systems.

4. These switches were originally designed by Ericsson and licensed to Nicholas Teletas for local manufacture..

5. For example Kazakhstan's separate track includes announcing in May 95 the planned privatization of Kaztelecom. Kaztelecom is the troubled state carrier headed by former Minister of Communication Igor Ulianov.



**MODEL OF MINISTRY OF COMMUNICATION HIERARCHY
FIGURE 6-4**



TELEPHONE DENSITY VS GNP PER CAPITA
 FIGURE 0-2

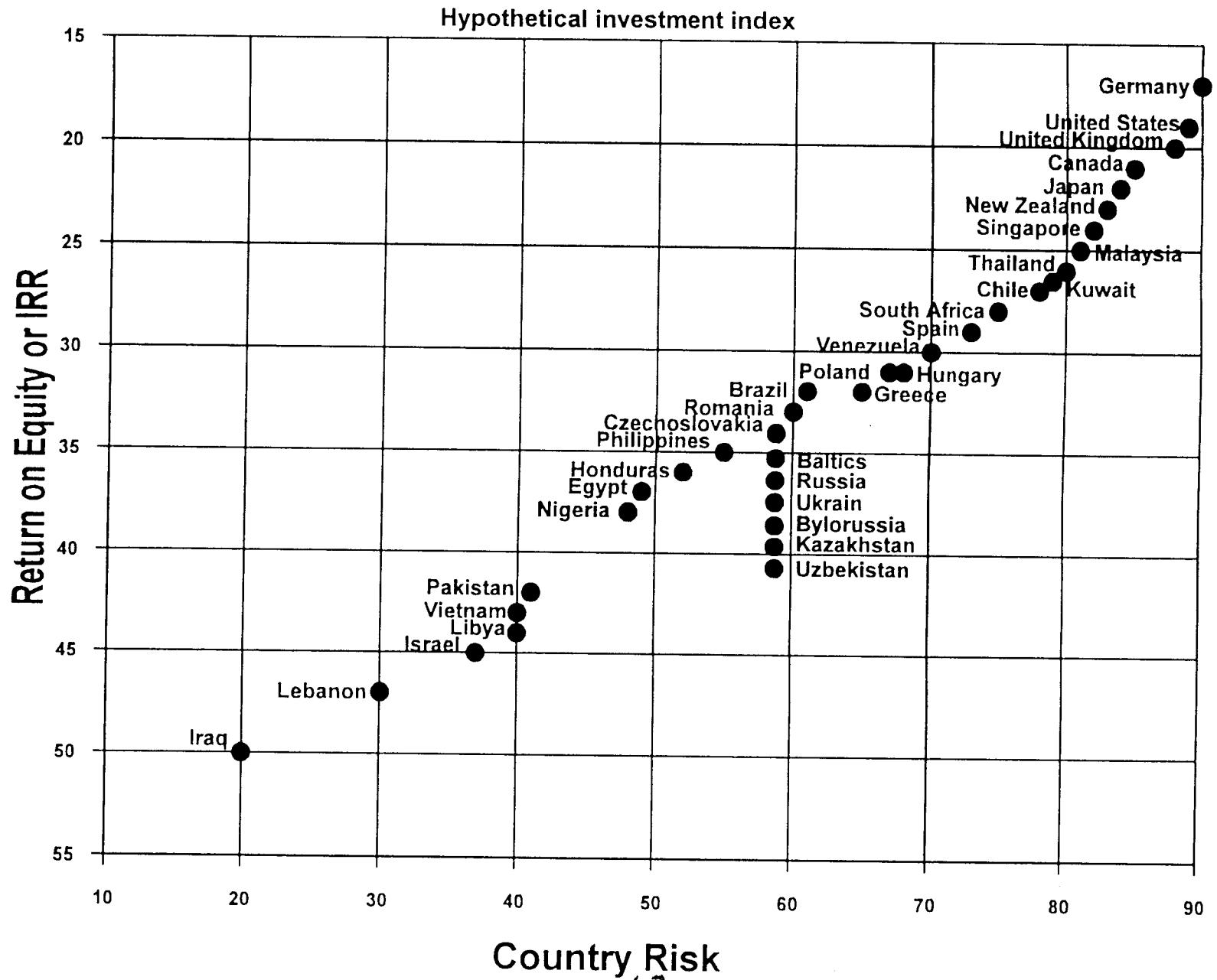


Figure 6-3

Wireline/Wireless growth

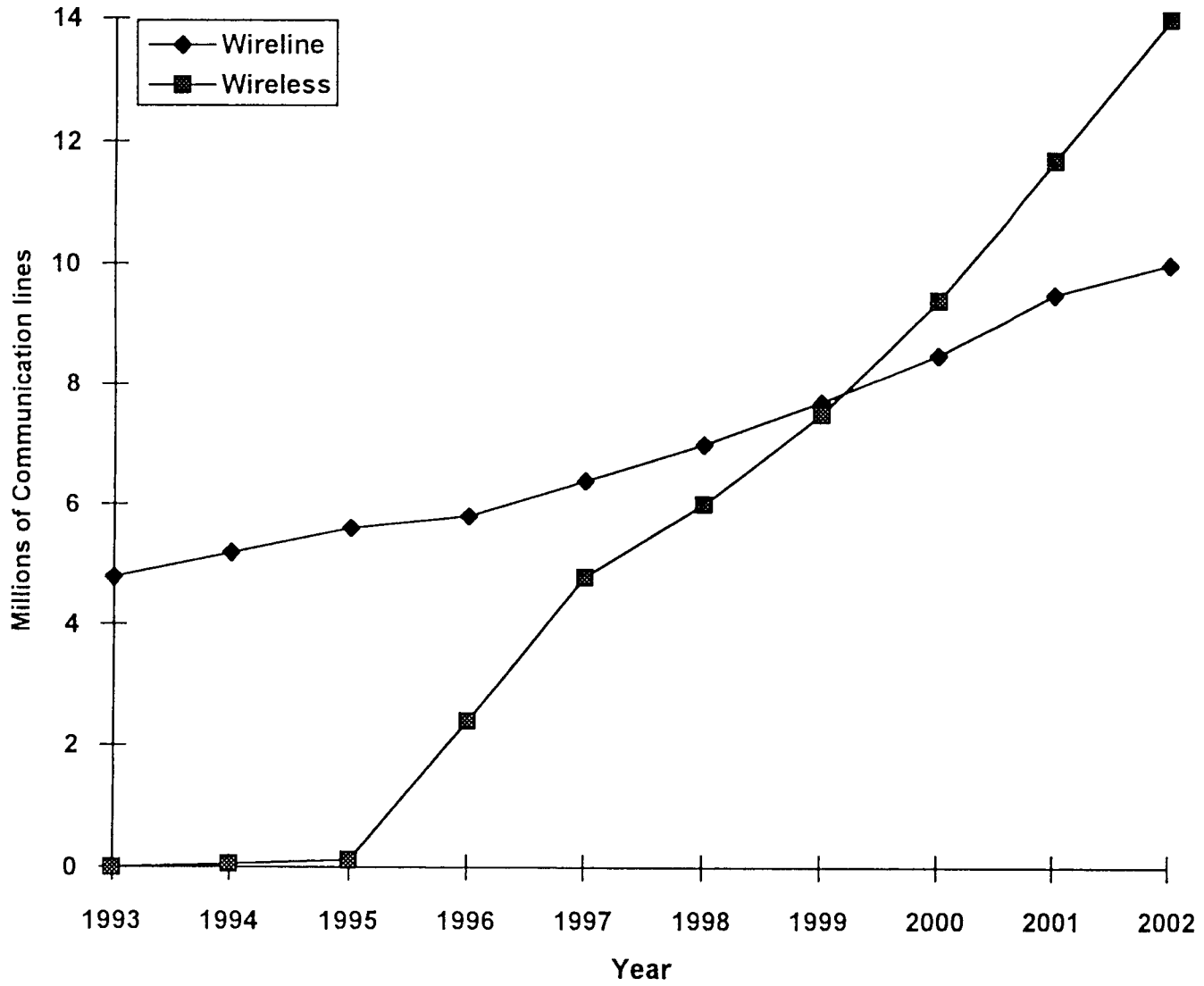


FIGURE 6-1