

Telecommunications in North Korea: Has Orascom Made the Connection?

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Abstract

The formation of telecommunications policy poses a difficult challenge for authoritarian regimes: While improvements in telecommunications can contribute to material prosperity, they may also contribute to a loss of control. North Korean policies reveal an ambivalent attitude, driven by conflicting goals of modernization and control. This paper reviews North Korea's telecommunications infrastructure and provides a brief history of North Korean telecommunications policies in a variety of settings, paying particular attention to the recent decision to authorize Orascom, a foreign cellular provider, to provide nationwide cellular service, potentially leapfrogging from North Korea's dilapidated existing systems to a modern system.

Telecommunications are one of the basic building blocks of a modern economy. In a world of globalized competition, economic development can be hamstrung by inferior telecommunications. But the formation of telecommunications policy poses a difficult challenge for authoritarian regimes: While improvements in telecommunications can contribute to material prosperity, and by extension, political legitimacy, they may also contribute to a loss of control over information flows and enhance the ability of challengers to organize against the incumbent regime.

These opposing tendencies are manifest in contemporary North Korea. The country's dilapidated telecommunications capability lags well behind world standards. The country's physical infrastructure is lacking and decrepit, with a considerable share of the general infrastructure dating back to the Japanese colonial period. Most of the modern infrastructure installed by Soviets or based on Soviet or Chinese designs are from the 1950s and 1960s. For security purposes, much of the power and telecom transmission network is buried, hampering successful maintenance. If ever there were a country that could benefit from a telecommunications upgrade, it is the DPRK.

The country faces both external and self-imposed internal constraints on telecommunications modernization, however. Externally, North Korea is one of the few remaining socialist states and the most militarized country in the world. It is embroiled in a diplomatic conflict over its nuclear ambitions. The upshot is that it is subject to Coordinating Committee for Multilateral Export Controls (COCOM) restrictions under the Wassenaar Agreement, impeding its ability to import state-of-the-art technology.

More fundamentally, government policies reveal an ambivalent attitude, driven by conflicting goals of modernization and control. In an attempt to make a great leap

forward, the government has seized upon the promotion of information technology as a strategic priority, with P'yongyang at the top of a vertical technology hierarchy. Yet the regime repeatedly reverses field when its insecurity and instinct for control trumps development, as illustrated by the country's multiple false starts in establishing its cellular phone network, the single most frequently identified problem in doing business in North Korea in a recent survey of Chinese businesses operating there. What emerges is the primacy of political over economic concerns. Policy implicitly regards telecommunications development as a means of earning hard currency rents rather than as a tool to enhance economic efficiency and competitiveness.

This paper reviews the state of North Korea's telecommunications infrastructure, though the data invoked should be considered highly provisional. Most of the information is regarded as a state secret, and some data maintained from putatively authoritative sources (e.g., statistics reported through the United Nations system) are probably estimates or have been fabricated by reporting sources. The paper also provides a brief history of North Korean telecommunications policies in a variety of settings, paying particular attention to the recent decision to authorize yet another foreign cellular provider, in this instance the Egyptian firm Orascom Telecom, to provide nationwide cellular service, potentially leapfrogging from North Korea's dilapidated existing systems to a modern system. The theme that emerges from this review is of a government that tends to place a higher value on political control than on economic development. Attempts at modernization are subject to reversal at times of heightened insecurity over loss of control, yet the Orascom deal holds forth the prospect of things working out differently this time.

INFRASTRUCTURE

Landlines

North Korea reports having approximately 1.1 million phone lines, amounting to less than five mainlines per 100 inhabitants. Most of these are installed in government offices, collective farms, and state-owned enterprises (SOEs), with only perhaps 10 percent controlled by individuals or households. While there are perhaps 400 dedicated networks among SOEs, according to one eyewitness at least as recently as 2002 some significant facilities (in the power generation and grid network) were still using hand-cranked phones for communications (Hayes 2005).

Officials of the (North) Korea Post and Telecommunications system have enunciated a goal of having land lines in nearly every home within four or five years, and in 2003 cadres were allowed to use telephones in their homes, a privilege that was eventually extended to others (Kang 2003, Moon 2008). However, in fall 2007, North Korean authorities reportedly concerned over “information leakage” began to tighten restrictions on phone use and to disconnect the lines of households generating charges above a certain threshold on the theory that such a volume of usage signaled that the phone was being used for trading activities (Kwon 2007, Moon 2008, Good Friends 2008).

North Korea is slowly making the transition from manual switching to automatic switching systems. In the mid-1990s, an automated exchange system based on an E-10A system produced by Alcatel joint-venture factories in China was installed in P’yongyang.

While toll calls are still mostly using manual switching, North Koreans announced in 1997 that automated switching had replaced manual switching in P'yongyang and 70 other locales (Lee 2003). The P'yongyang Telecommunications Equipment Plant began producing automatic switching gear in August 2003. A South Korean government source reports that North Korea is introducing S-1240 switchboards produced by the Alcatel Shanghai Bell joint venture. Automated exchanges have been installed in perhaps 100 cities and counties with 2,200 lower-level telephone branch stations still using manual switching systems according to the same source. Given that this estimate is several years old, presumably the situation has improved in the interim.

Many telecom developments have occurred in P'yongyang, resulting in telephone communication working reasonably well within the capital. A line in the west of the country connects P'yongyang to Sinuiju, while another extends south through Kaesong to the truce village of Panmunjom (see map). North Korean press reported in 2000 that fiber-optic cable had been extended to the port of Nampo and that North Pyeongan province had been connected with fiber-optic cable. In recent years there has also been increased use of fiber-optic cable to connect military facilities along the DMZ to headquarters in P'yongyang. However, outside the capital, telephony is much more haphazard—difficult to call out and nearly impossible to receive.

Another development allowing for greater telecom communication in P'yongyang is the agreement reached in 1990 between DPRK and UNDP to install a 300km fiber-optic cable between P'yongyang and Hamhung via the port of Wonsan. The agreement led to the opening of the P'yongyang Fiber Optic Cable Factory in 1992. By 1995, the

line was completed through the installation of 480 lines of Pulse Code Modulation (PCM) and six automatic exchange stations.

The line was subsequently extended to the Rajin-Sunbong Economic and Trade Zone (RSETZ).¹ This extension was taken up by a joint-venture company, Northeast Asia Telephone and Telegraph (NEAT&T) established with Loxley Pacific Company of Thailand (70 percent equity) and Korea Post and Telecommunications Corporation (30 percent equity), on a build-operate-transfer basis and was granted monopoly rights for 27 years beginning in 1995 (Noland and Flake 1997).² The company was also eventually given rights to operate a nationwide cellular network as discussed below.

In line with further developments in the RSETZ, Loxley planned to make a \$28 million investment to modernize telecom facilities in the zone. This included the creation of a 95km fiber-optic cable between Rajin-Sunbong and the Chinese city of Hunchun, eventually to be linked to P'yongyang via Ch'ongjin and Hamhung. One plan envisioned Loxley installing 400,000 mainlines at the cost of \$500 million. However, the zone did not take off as planned, and Loxley installed only 5000 fixed mainlines, providing the capacity for 1,200 mobile phones, 1,500 radio pager lines, and 80 public phones (Lee 2003). Loxley reduced its commitment and in recent years its vestigial presence was reportedly generating around \$1 million annually in revenues (Martin 2005).³ The company did not respond to an inquiry regarding the state of its current operations.

In 2003, the company ran afoul of restrictions on the transfer of dual-use technologies to North Korea; the devices in question were of potential use in North

¹ Originally named the Rajin-Sunbong Free Economic and Trade Zone, the word "Free" was subsequently dropped. Later the Rajin and Sunbong districts were combined as "Rason."

² Loxley Pacific itself is a joint venture between Loxley Teltech of Finland and Charungthai of Taiwan.

³ KCNA (2007) reported that NEAT&T held its annual board of directors meeting in P'yongyang in September 2007.

Korea's alleged highly enriched uranium nuclear weapons program, a charge that the company denies (Lintner 2006).

International Connections

North Korea's international communication capability has been slowly developing throughout the years. In 1986, with French assistance, North Korea established a branch of INTELSAT satellites over the Indian Ocean and is operating 35 lines of FDM and 18 lines of SCPC allowing satellite communications and television transmissions to be possible. In 2001, North Korea became a member of the International Telecommunications Satellite Organization (ITSO nee INTELSTAT). North Korea claims to be well equipped with computers to digitalize satellite communications. In 2001 (South) Korea Telecom installed such a facility in Kumho at the KEDO reactor construction site.

International fixed line connections consist of a network connecting P'yongyang to Beijing and Moscow, and Ch'ongjin to Vladivostok. Since joining INTERSPUTNIK in 1984, North Korea has operated 22 lines of frequency-division multiplexing and 10 lines of single channel per carrier for communication with Eastern Europe (Yoon and Lee 2001). To connect to Hong Kong and Singapore, North Korea uses a microwave network.

DPRK depends on satellite networks to connect to Japan and the United States. According to Yoon and Lee (2001), in November 1990 an agreement was reached between North Korea and Japan to open 3 phone lines, 10 telex lines, and 1 telegram line, plus additional microwave and cable network lines. Communication is also possible with

Japan through INTELSAT. In 1995, AT&T arranged a direct telecommunication link between North Korea and the United States. Some foreign residents of P'yongyang have access to international direct dialing (IDD) lines, which can be used for both voice and data connections.

Communications were opened with South Korea in 2000. There are 56 communications lines between North and South Korea: 29 direct and the remainder through third-country relay networks. The direct lines are used mainly for government-to-government communications and the indirect lines for non-official business and commerce. The direct lines are composed of two fixed lines for the Red Cross, 18 lines for ministerial talks, one line for economic talks, one line for the South-North Coordinating Committee (SNCC) and four hotlines across the Joint Security Area of the DMZ. Three direct lines were installed between flight control centers, one via AsiaSat II. The indirect communications system includes 16 lines for the KEDO light water nuclear reactor construction project (since suspended), eight lines for the Mount Kumgang tourism project operated by Hyundai Asan, and three lines for the construction of P'yongyang stadium.

Developments between North Korea and South Korea are continuously unfolding. The inter-Korean network for the Mount Kumgang tourism area was set up through Japan by a South Korean consortium—Hyundai Electronics (now Hynix), Korea Telecom, and Onse Telecom—and a North Korean counterpart. Onse has announced that it is installing a combined wired and wireless switching system of 4,000 lines to provide mobile service in the zone.

In a June 2004 meeting North and South Korean officials agreed to extend a fiber-optic cable from Munsan in South Korea to the newly established Kaesong Industrial Complex (KIC) via the existing North Korean telecom bureau in Kaesong. Initial plans called for 100 fixed lines, with an additional 10,000 future lines contemplated. Service was initiated in December 2005 with one source indicating that 303 lines were available (Lim 2007). This figure has probably since risen with the considerable growth of activities at the KIC. An optical line for video conferencing was connected in July 2005, and has since been used for video reunions of separated families.

Today North Korea appears to have direct links to about 10 countries and most of the world through relay network systems. Yet North Korea continues to exhibit sensitivity over access to international connections outside state control. In 2005, the government reportedly moved aggressively to reduce the number of functioning international connections (Choi and Lee 2005). The NGO Good Friends reported that a plant manager was publicly executed in October 2007, in part for making unauthorized international phone calls (Good Friends 2007).⁴ Other reports indicated that while an unauthorized call to China could elicit a significant money fine, a call to South Korea could lead to long-term incarceration in a political detention facility (Han 2007a, 2007b). It has also been reported that in response to such concerns in June 2008, North Korean authorities disabled most IDD connections (NKNet 2008).

⁴ Although widely reported, Good Friends is the sole source for this account, and the organization has declined to reveal the source of its information.

Wireless

North Korea's development of wireless capabilities has been affected both by its own policies and those of foreign governments. Its initial approach to South Korea during the Kim Young-sam government was rebuffed. It then turned to Loxley Pacific in the Rajin-Sunbong area, and in 1998 the North Korean Ministry of Post and Communication entered into an agreement with Lancelot Holdings of Hong Kong to promote mobile phones in P'yongyang and Nampo.

South Korean policy changed under Kim Dae-jung, and plans by SK Telecom and KT Telecom were made to introduce a Code Division Multiple Access (CDMA) system together with handset makers Samsung Electronics and LG Electronics. According to a statement by the South Korean Ministry of Information and Communication, a consortium was formed to hedge the risk of doing business in North Korea.

The US government objected on the grounds that the CDMA system was more amenable to encryption (and hence more difficult to monitor) than the Global System for Mobile (GSM) system and that the CDMA system uses American satellite navigation systems to synchronize the mobile phone base changes. The United States was able to effectively block the deal in 2002 because at the time the sole CDMA technology was patented by a US firm Qualcomm, and could be subject to COCOM export restrictions under the Wassenaar Agreement. (Later generations of CDMA technology would circumvent the Qualcomm patent.) The United States could not block the installation of a GSM system based on nonproprietary technology, however (Banks 2005).

In 2002, radio pagers and mobile phones were introduced in Rajin-Sunbong and the Mount Kumgang tourism enclave. Progress continued to be slow, but mobile phones

were eventually launched in P'yongyang in 2003. In the border regions, the use of Chinese phones has increased. Fifty relay towers have been set up in cities and along certain highways. Service was reportedly available in most urban areas, though the mountainous terrain makes coverage far from complete.

By 2004, the number of cell phones in North Korea reportedly reached 20,000, and (North) Korean Post and Telecommunications Corporation officials stated a goal of having mobile service available throughout the country by 2007.⁵ Using wireless capability in North Korea is an expensive luxury. Press reports put the cost of a phone anywhere from \$300–500 plus a start-up fee of up to \$750, with higher fees (\$2000) charged to foreigners. There are additional charges to make and receive calls.

However in 2003 Chinese firms began building relay towers along the China-North Korea border leading to an explosion in the use of prepaid phones on the North Korean side. This development was set back following the April 2004 railway explosion at Ryongchon when cell phone use was prohibited and registered cell phones were seized without compensation. (It was rumored that the explosion was a cell phone-triggered assassination attempt against the head of government, Kim Jong-il. Some press reports also referred to concerns about loss of information control.) Despite these policies and periodic crackdowns in the Chinese border region the use of cell phones operating via the Chinese network has continued, though Chinese businessmen complain about interference by North Korean officials with their legally authorized use. Indeed, restrictions on cell phone use were the most frequently heard complaint, cited by 84

⁵ Lee (2005) puts the digital share at less than 5 percent, but this estimate is dated and probably underestimates the degree of digital penetration today.

percent of respondents, in a recent survey of 303 Chinese enterprises operating in North Korea.

Negotiations have dragged on for years about allowing cell phone use in the KIC and Mt. Kumgang areas. An agreement reached during the 7th Defense Ministerial Talks included language providing for the use of the internet and cell phones within these cooperation projects. North Korean authorities have at times temporarily allowed visitors to use their phones such as at the Arirang festival. In April 2008, it was reported that the government was lifting the ban on cell phone use in stages, presumably in anticipation of the initiation of services under the agreement with Orascom Telecommunications discussed below (Yonhap 2008). Foreign residents in P'yongyang complain that service is expensive and spotty, though it is hoped that at least the quality of service will improve with Orascom's investment.

Other forms of wireless technology do not have a major presence. Use of satellite phones is limited to some foreign humanitarian aid NGOs and there is limited use of GPS.

Information technology

International Internet access is via a fiber-optic cable connecting P'yongyang with Dandong, China via Sinuiju, and via satellite. Initially, access had been restricted to government officials and, with official permission, the staff of international organizations, and foreign tourists. Through at least one server in North Korea, as well as servers in Japan and China, DPRK currently operates seven official Internet sites. North

Korean enterprises and trading firms are using email in business and an intranet to market their wares. The government is also encouraging the development of an intra-DPRK Internet network. It has been claimed that one of these intranets links 1,300 organizations nationwide (Lee 2003). However it was reported that in 2005, the government at least temporarily disabled both international internet and domestic intranet connections (Choi and Lee 2005).

North Korea's first Internet café, restricted to foreigners, was opened in P'yongyang in May 2002 by Hoonnet, a South Korean firm. Reportedly another such café in P'yongyang was opened by an ethnic Korean Chinese in 2003. North Korea established its first Internet café (networked with the DPRK internal intranet and available to North Koreans) in P'yongyang in April 2004. The café reportedly uses 100 Mbps optic cable and telephone lines for transmission. There are conflicting reports as to the price, possibly due to the ongoing inflation and repeated devaluations of the North Korean won. However, an article in South Korea's semi-official news agency Yonhap put the price at 500 won per hour at the time, about one-quarter of the monthly salary of the average worker (Yonhap 2004). However, a subsequent report described a crackdown by security services, which considered these a threat to society (Reuters 2007).

Reflecting these concerns about spiritual pollution, North Korea is working with China to develop firewall systems that would permit less-restricted access to the World Wide Web while allowing officials to proscribe content. A German affiliate of the North Korean government computer center has reportedly also been contracted to provide such services. It is likely that private access will gradually expand subject to this firewall, perhaps with commercially oriented services in the KIC forming the leading edge.

The DPRK government has a long history of engaging in varied and illicit commerce. Some have expressed concerns that as its Internet capability expands, the DPRK may become a location for servers hosting child pornography websites as a way of making money, as well as increasing its capabilities in cyberwarfare (Brown 2004, Lee 2005).

DÉJÀ VU ALL OVER AGAIN?

The Orascom conglomerate is a kind of Egyptian chaebol: Founded in 1950 by Onsi Sawiris, his three sons run the group's three principal divisions, Orascom Construction, Orascom Telecommunication, and Orascom Hotels and Development, respectively. Orascom Telecommunication has earned a reputation for making money in challenging environments, and is one of the leading cell phone service providers in sub-Saharan Africa.

In July 2007 Orascom Construction announced what is likely the largest non-Chinese or South Korean investment in North Korea, a \$117 million investment in Sangwon Cement, anticipating a building boom that would accompany a relaxation in diplomatic tensions between North Korea and other countries. Part of the deal was the provision of North Korean labor to work on Orascom Construction projects in the Middle East (Griggs and Fidler 2007).

This was followed in January 2008 by the announcement by Orascom Telecommunication that a joint-venture subsidiary, CHEO Technology, 75 percent owned by Orascom Telecommunications and 25 percent by the state-owned Korea Post

and Telecommunications Corporation, had been granted a 25 year license to operate a nationwide GSM cell phone network, with an initial exclusivity period of four years, begging the question of the status of North Korea's prior agreements.⁶ Orascom announced that it would invest up to \$400 million in the venture, \$200 million over the first year, and \$100 million in each of the succeeding two years. If actualized, this would represent a huge investment in the North Korean economy, approaching the cumulative private investment in the KIC to date. The company indicated that it expected to sign up 100,000 subscribers in the three cities where it would begin initial operations and then assess the situation. In May 2008 it launched its first services. The group was granted access to the 105-story Ryugyong Hotel and has installed telecommunications antennas in its upper floors.

The obvious question is whether the project will succeed where past attempts have failed. Presumably, there is considerable repressed demand for telecommunications services in North Korea; one can identify at least four distinct potential markets.

First, there is the state itself. North Korea is extraordinarily militarized, and given the Korean Peoples Army's privileged position in the economy, the KPA is probably the single most important user of telecom equipment and services. Following the military, the next largest current users are most likely government and Korean Workers Party organs.

A second high-margin constituency is foreigners, though the resident foreign community is quite small, probably numbering in the hundreds. Under an aid agreement reached in the spring of 2008, the United Nations World Food Program and officially sanctioned NGOs will be allowed to station nearly 70 expatriates in country, and the rest

⁶ It was later specified that the network would employ wideband CDMA (W-CDMA) technology not subject to the Qualcomm patent.

of the UN system may have a similar number in total. There are also foreign embassies and NGOs, mostly European, with a semi-permanent presence, and a few foreign businessmen or investors in residence. North Korea has seen a steady increase in international trade in the last several years, resulting in the increase of the number of visiting foreign traders and businessmen (mostly Chinese). Their counterparts are in emerging trading companies and new businesses.

North-South economic cooperation projects, most prominently KIC, would be another source of demand. Beyond Kaesong, under the right conditions one could imagine light manufacturing and mining operations expanding. Perhaps most interestingly, there are the beginnings of labor-intensive/information-intensive businesses in North Korea, notably software development, information processing, and commercial graphics. A private South Korean firm, Korea Telecom Freetel (KTF), has been in discussions with Orascom about initiating a North-South roaming service, which would allow South Koreans to use their cell phones seamlessly in the North (Shim 2008, Kim 2008).

Lastly, since bottoming out in 1998, the North Korean economy has experienced a decade of slow, uneven growth, accompanied by widening income inequality. These trends imply that there is presumably rising demand for equipment and services among the nouveau riche. Yoon and Lee (2001) provide some illustrative projections.

In short, one can identify potential consumers who would benefit from improved telecommunications. But a recurring leitmotif in this discussion has been the capriciousness of North Korean policy, and its penchant for expropriating, directly or indirectly, investors. In game-theoretic terms, the issue is whether sufficient incentives

exist to encourage the North Korean government to maintain its commitments to Orascom, and not defect from the agreement, explicitly or implicitly. The interests of consumers who stand to benefit is one channel of influence, but if past history is a guide, that is probably not sufficient.

In addition to the potential benefits of cooperation, there may be enough ties binding the North Korean government and Orascom to discourage defection from the agreement. First, Orascom Telecoms has hedged its bet, committing only half of its investment at the outset and making additional investment conditional on its assessment of conditions going forward. Second, presumably they have some turnkey mechanism such as specialized equipment or technicians that, if withdrawn, would greatly reduce the value of the network to North Korea. Third, Orascom may have spread the wealth informally, creating beneficiaries within the decision-making apparatus who would stand to lose if the agreement failed. Finally, Orascom Construction holds hostages in a near-literal sense. The workers that North Korea has sent to their projects in the Middle East generate earnings for the North Korean state. Disruption of the telecoms contract could jeopardize this earnings stream (as well as potentially stranding thousands of North Koreans outside construction projects in the Middle East).

Moreover, if the deal were to succeed, it might improve the likelihood of other infrastructural investments such as trans-Korean pipelines or railways being implemented. A reduction in tensions through successful conclusion of the Six Party Talks would reduce North Korea's insecurity externally and perhaps encourage a more relaxed attitude in its internal practices.

So one can build a case that things may be different this time: that there are enough internal players that stand to benefit, the deal is structured in such a way that there are real penalties associated with defection, and changes in the external environment could alter the parameters of the regime's calculus in a cooperative direction.

CONCLUSIONS

Telecommunications are universally acknowledged as a major contributor to economic development. But they represent a double-edged sword for authoritarian regimes: The economic benefits associated with telecommunications can be a source of legitimacy, while telecommunications can also facilitate opposition.

A recurring leitmotif in this review of North Korean telecommunications is the tendency of the regime to act capriciously, prioritizing political over economic objectives, and treating telecommunications development as an easy way to skim rents, rather than as a building block of economic development. For example, in its negotiations over telecommunications services in the KIC, the North insisted on emphasizing links between Seoul and P'yongyang over linking KIC tenants to the South (Lim 2007). It also appears to regard telecoms less as a means of boosting productivity, efficiency, and competitiveness than as an easy way to extract hard currency rents for the central government, without significantly altering existing practices, a stance that North Korea has exhibited on a range of issues. Lim (2007), in the context of an otherwise-upbeat depiction of the KIC, describes how in the name of "communications sovereignty"

P'yongyang insisted on controlling the KIC communications network in order to force South Korean firms to place calls to the South through an international third party (and thus garnering higher fees for the North Korean government), a tactic that they replicated at Mt. Kumgang. The problems are not limited to KIC: In a recent survey of Chinese businesses operating in North Korea, the ban on cell phones, weak infrastructure, and changing rules were the three most frequently cited obstacles to doing business there.

Yet the regime continues to signal interest in technological upgrading, exploring the possibility of international exchange and cooperation in the telecoms field (Yim 2008). Whether these moves constitute another attempt to solve policy problems with technology or whether they indicate a serious re-think of the country's approach to telecommunications remains to be seen. North Korea recently entered into a deal with Orascom Telecoms to provide nationwide cell phone service. If fully realized, the Orascom venture would represent a major foreign investment in the North Korean economy, yet given North Korea's past opportunistic policies it is reasonable to wonder whether this initiative will also come a cropper. There is at least a plausible case to be made that this time things will work out differently: Improvements in the country's telecommunications are badly needed, Orascom may have woven a sufficient web to bind the North Koreans to the agreement, and in the context of generally favorable trends in external relations, a successful outcome could have a favorable knock-on precedential effect with respect to future infrastructural deals.

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