2
Egypt

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The changes experienced in the field of telecommunications since the mid-1980s have had a palpable and positive effect on the social and economic development of modern Egypt. In the 1990s, Egypt's telecommunications policy reflects its attempt to keep pace with the global revolution in communication while satisfying the specific telecommunications needs of its population. This chapter discusses Egypt's early telecommunications development in the colonial and postcolonial eras; the role and structure of the government telecommunications agency in shaping and implementing Egypt's present-day telecommunications policy; and the significant projects and challenges of Egypt's telecommunications modernization efforts in the 1990s and beyond.

2.1 History of Telecommunications in Egypt

Perhaps because of its geographic position between Europe and the Far East, Egypt has historically maintained a substantial lead over most of the Near and Middle Eastern countries in keeping pace with the rest of the world in the development of its "wired" and "wireless" communications. Telegraph traffic between Europe and the Far East in the nineteenth century, for example, although not directly involving Egypt, had to pass through the Eastern Telegraph system by way of cables in the Red Sea. As a result, the history of telecommunications in Egypt began long before the foreign intervention in the Egyptian administration in 1876 (intended to secure payment of the debts in which Khedive Ismail had drowned the country) or the British occupation of 1882. The benefits to Egypt of this early progress in telecommunications have been enormous.

Despite the absence of reliable documentation and statistics on the years before 1889, it has been established that telegraphic communication between Cairo, Alexandria, and Suez existed as early as 1856. Egypt was ruled at that time by Mohammed Ali's second successor, Said Pasha, who, like his successors, had inherited Ali's goal of modernizing Egypt along Western lines. In this period, two Englishmen obtained permission from the Sublime Porte to lay a cable from Istanbul to Alexandria. The cable expanded on the link that was already present, which

ran from Alexandria to Suez through Cairo, and ensured that all parts of the country had communications connections to the outside world. From Suez, this link was later extended to India (the exact date is unknown), though not without many technical and financial setbacks. Egypt was thus linked first to Europe and Istanbul and then to Aden and India via the Red Sea.

By 1870, there were sixty-six internal telegraph lines in Egypt, sixteen of which were in Sudan. The telephone was introduced eleven years later when the American company Edison Bell constructed the first telephone line between Cairo and Alexandria. The period that followed was one of rapid cable expansion, and England's entry into Egypt in 1882 facilitated the development of Egyptian telecommunication. Although such development had begun many years before, it was significantly furthered by the British administration's self-interested desire to link Egypt to the United Kingdom and the world.

Among the major developments of this period was the introduction by a telegraph company of the LeKlanche battery in 1883, which replaced the Minotto battery then in use. This new "Duplex System" was then used in the telegraph lines linking Egypt with Syria. In 1884, moreover, both Reuters and the French news agency Havass were allowed to send their telegrams from Alexandria to Cairo free of charge.

After taking over the telegraph lines south of upper Egypt in 1885, the British military returned these lines to the Telegraph and Telephone Authority in 1887. In the years that followed, more telegraph lines were established, which led to an increase in telegraph services and the establishment of service regulations.

The first telegraph and telephone lines in Egypt were owned by the state's Railway Authority. Trunk lines were also government owned and leased to the telephone company in return for a 70 percent share of the company's income. In 1918, the government bought all telephone and telegraph lines, save for a few small offices, and a separate independent department for telegraph and telephone was later established. Investment in telephone service rose from £E780,000 (Egyptian pounds) in 1920 to £E2 million in 1930. This was accompanied by an increase in profit in the same period from £E220,000 to £E700,000.

Automatic exchanges were installed in Cairo in 1926 and in Alexandria in 1935. This benefited not only the two cities but also the smaller governorates where the amortized telephone equipment from Cairo and Alexandria were transferred. In 1932, an underground telephone cable linking Cairo to Alexandria was introduced. The project improved communication between the two cities, reducing delays in telephone communication, for example, to five minutes at the most. Although the advent of the telephone created competition for the telegraph, for domestic business transactions the telegraph was preferred over the telephone because it offered the benefit of written documentation. Domestic telegrams were handled by telegraph offices owned by the government and operated either by railway workers or by the Delta, Fayoum, or Bahreya railway stations licensed by the Egyptian government. The telegraph was also used externally between Egypt and such Middle Eastern countries as Saudi Arabia, Yemen, Ethiopia, and Sudan. It was used additionally for communication between Egypt and Palestine, eastern

Jordan, and Syria before these countries made direct communication with Europe through the Haifa-Cyprus cable owned by the Eastern Telegraph Company, or through the Beirut Wireless Station that belonged to Radio France. International telegrams were handled by Marconi, Eastern Telegraph Company, or Radio France.

These early telephone and telegraph facilities considerably encouraged the expansion of commerce and industry, as well as government business and private intercourse. The state, moreover, was able to make an easy profit of many thousands of pounds in royalties annually from telegraph cable fees. A glance at any cable map will show that the main cord of the Eastern Telegraph system passed through Egypt; hence, the larger portion of Egypt's annual royalty income was derived from telegraph traffic between Europe and the Far East.

Because radio services differ fundamentally from cable services with regard to transit traffic, the emergence of radio presented serious competition for cables. Radio traffic usually travels from the country of origin to the country of destination with perhaps short extensions at either end of the route. The countries over which radio signals pass naturally receive no payment, and only the terminal countries are able to demand royalties. Because cables, on the other hand, often physically pass through several countries, each state is able to charge the operating company for permission to run cable operations within its borders. As a result, while cable messages from London to India and China generated royalties for Egypt, radio services began passing free of charge.

In Egypt, wireless came to be owned by three organizations. The first was the Egyptian government, whose stations were run by the Telegraph and Telephone Authority. In addition to communicating with other parts of the country, these stations—located in Alexandria, al Kaser, al Tour, and al Arish—exchanged messages with commercial ships in the Red Sea and the Mediterranean and with airplanes entering and leaving Egypt in conjunction with stations of the Coast Guard and the Docks and Phares Authority. The second organization with radio stations in Egypt was the Suez Canal Company, which guided ships passing through the Suez Canal, and the third was the Marconi Company, which sent commercial messages to Europe, paying the Egyptian government a specified sum for every word sent.

When the service between Egypt and London was fully developed in 1932, London had links with India, Canada, Japan, South Africa, South America, Australia, and New Zealand. With the excellent trunk facilities that existed between London and most countries in Europe, it was thus possible for a subscriber in Cairo to speak to over 90 percent of the telephone users of the world.

Although the original radiotelephone service between England and America was a long wave, disabling weather conditions made this type of service impossible for Egypt. Consequently, Egypt's new radiotelephone service in this period was a short wave that consisted of two waves whose use was dictated by the time of day and season of the year. So that they would not interfere with each other, two radio transmitters were installed in Abou Zaabal and two receivers at Maadi. The receivers and transmitters were then linked by telephone lines to terminal

equipment situated in a room near a trunk exchange. Here, they were combined so that they could be connected to the main telephone system.

In addition to the Cairo-London channel, direct radio links between Cairo and Paris, Cairo and Berlin, and Cairo and Rome were later opened. With two complete transmitting and receiving installations, it was possible to keep one circuit open on a constant basis to London during the hours of service, while the other could be used to arrange any calls required over the other circuit. The cost was 150 piasters for one minute, and calls were not supposed to exceed three minutes. Prices were not fixed, however, and were subject to change at any time.

2.1.1 The Postcolonial Period

The British occupation of the Suez Canal Zone ended two years after the overthrow of the monarchy in 1952 and the subsequent military takeover by the Free Officers led by Colonel Gamal Abdel Nasser. During President Nasser's regime, Egypt's relationship with the West was not harmonious. Despite the socialist tendency of this new regime, however, there were impressive industrial gains.

The present-day electronics industry began during the Nasser regime as a group of nine private shareholding companies providing service and maintenance for electrical appliances. There were also eight cable manufacturing companies, and later three electronics assembling companies were created: Phillips, established in 1956, which assembled radio receivers on a large scale; the Arabic Transistor Radio Company, which assembled roughly the same products as Phillips; and the El Nasr Television Company, established in 1961, which assembled television sets.

To provide the electrical and electronic components required by these three assembling companies, Satron Company was created in 1969. Two research centers were also established around this time to design and develop new equipment and to solve electronics-related problems.

Other noteworthy telecommunications achievements of the postcolonial period included the establishment of the Wired and Wireless Telecommunication Authority (1957) and the introduction of the first coaxial cable linking governorates (1961). This was followed by the operation of the first automatic (crossbar) exchange in 1962 and the introduction of the first telex exchange in 1963.

When Anwar Sadat became president after Nasser's death in 1970, he liberalized the Egyptian economy with an "Open Door" policy to encourage the influx of Western and Arab capital and the introduction of many foreign aid programs. The telecommunications sector expanded further during this period with the opening in 1972 of the first marine cable linking Egypt and Italy (with a capacity of 480 circuits) and the introduction in 1979 of an international exchange with an initial capacity of 160 circuits. Two mobile earth stations for communication via satellites were also constructed during Sadat's presidency—one at Kobba in 1974 and the other at Maadi in 1978. With the installation of a microwave network between governorates in 1975, wireless telephones in automobiles became available to users in Cairo.

2.2 The Present

2.2.1 Institutional Structure of Telecommunications Operations and Regulations

The Arab Republic of Egypt National Telecommunications Organization (ARENTO) was established by National Assembly Law No. 153 in 1982 as an autonomous public utility organization under the direct supervision of the Ministry of Transport, Communications, and Civil Aviation (which replaced the Telecommunication Authority established in 1957). The legislation defined ARENTO's regulatory authority and role and allowed it to enter into joint ventures with other parties for the promotion of telecommunications. In 1997, a new law provided for the partial privatization of ARENTO, and for its renaming as Telecom Egypt.

With branches all over the country, ARENTO (Telecom Egypt) is Egypt's central telecommunications organization, and exclusively responsible for establishing and operating all cable and wireless communications networks on a national level. Its offices administer and maintain all establishments and equipment needed for telephone services, and its responsibilities include connecting local networks with international ones, constructing cable and wireless networks throughout Egypt, and supplying cable and wireless telephone services. Additionally, with the approval of the minister of Communication and Transportation, the company can establish joint stock corporations either alone or with other partners. As soon as such corporations are established, shares can be bought and sold, with employees receiving first priority in the purchase of shares.

2.2.2 ARENTO's Network Modernization Plans

2.2.2.1 Universal Service Goals

As formulated in Egypt's third National Five-Year Plan (1993–97), ARENTO in the mid-1990s set forth an ambitious program of network expansion and modernization. Because obsolete exchanges had a negative impact on the traffic flow and consequently reduced the operator's revenue, ARENTO ranked the replacement of this equipment as its highest priority. To this end, in the mid-1990s ARENTO began installing new electronic digital exchanges in order to increase the number of subscriber lines and hence augment the country's telephone density, which remains modest relative to international standards (see Table 2.1).

Within the framework of the Five-Year Plan, ARENTO's stated goal was to increase telephone density from less than 5 percent of the population to 7 percent, in addition to reducing the waiting time for provision of service to a maximum of four years. The number of telephone subscriber lines installed by mid-1997 was expected to be over 4.5 million.

The goal of providing universal service outlined in Egypt's Five-Year Plan also included expanding services to both rural and remote areas by (a) replacing manual exchanges with semiautomatic exchanges and (b) adding remotes to

Table 2.1. Telephone Lines

Date	Number of Lines	Density per 100 Inhabitants
1981–82	650,000	1.4
1982–83	700,000	1.5
1983–84	875,000	1.8
1984–85	1,150,000	2.4
1985–86	1,350,000	2.7
1986–87	1,600,000	3.1
1987–88	1,700,000	3.2
1988–89	1,800,000	3.5
1989–90	2,000,000	3.9
1990–91	2,350,000	4.3
1991–92	2,500,000	4.4
1992–93	3,000,000	5.0
1993–94	3,550,000	6.0

digital exchanges and connecting them to the national long distance network (see Table 2.2).

By the mid-1990s, telecommunications service had been introduced to the remote areas along the Cairo-Alexandria desert road and provision had been made for emergency telephone service using solar energy.

2.2.2.2 International Network and Value-Added Services

Modernization of the international network and enhancement of value-added services were also included in ARENTO's plans for the mid-1990s and beyond. In hopes of meeting the increasing demand for international circuits and other media that represent alternatives to satellite communications, ARENTO decided to complete the implementation of the Transoceanic Fiber Optic Cable (SEA-ME-WE 2) linking Southeast Asia, the Middle East, and Western Europe. The capacity of the Cairo International Exchange was also increased to 3,680 international circuits (versus 160 in operation in 1980). In 1990, a second international gateway in Alexandria with a capacity of 1,000 circuits was put in service, bringing the total number of Egypt's international circuits to 4,680.

These projects were completed because ARENTO recognized that international traffic represented the main source of its revenues. The marked growth in interna-

Table 2.2. Growth of Telephone Service in Rural Areas

Date	Number of Subscribers (in Thousands)
1989	20
1990	50
1991	60
1992	100
1993	240
1994	310

Table 2.3. International Circuits and Traffic

Date	Circuits	Traffic
1981	800	30,000,000
1982	850	50,000,000
1983	1,700	90,000,000
1984	2,000	110,000,000
1985	2,000	135,000,000
1986	4,600	160,000,000
1987	4,500	175,000,000
1988	4,700	200,000,000
1989	5,000	230,000,000
1990	6,000	275,000,000
1991	6,000	290,000,000
1992	7,750	320,000,000
1993	7,750	400,000,000

tional traffic after 1981 shown in Table 2.3 reflects the installation of the international circuit extensions just described, as well as the enhanced efficiency of the switching and transmission facilities of both local and international networks.

In 1990, an Arabsat earth station with a capacity of 348 circuits and two television channels was placed into service, providing Egypt with better communication facilities and broadcast exchange with other Arab countries. In the same period, ARENTO sought to extend the mobile telephone network and to introduce portable mobile sets with nationwide coverage.

By the mid-1990s, mobile telephone service coverage had been extended to all cities and roads in the delta region and to the Suez Canal Zone, with a capacity of 56,000 mobile sets for Cairo alone (versus only 400 in 1981). Facsimile service was also increased from 347 sets in 1987 to over 8,000 in 1993, while paging service—with an initial capacity of 7,000 sets—was introduced in the mid-1990s for greater Cairo. In 1994, the capacity was 16,000 subscribers, mainly business and professional users. However, since the growth experienced was slower than forecasted, ARENTO decided to liberalize the Pager Equipment Market. It is hoped that the private sector's participation will spur uptake of this service. In 1994, there were 9,500 subscribers to ARENTO's paging service.

2.2.3 Development of the Telecommunications Sector

By the mid-1990s, there were indications that Egypt's telecommunications sector was progressing rapidly toward a more liberal environment and a more market-oriented approach. Originally ARENTO had claimed that the fulfillment of the present demand for basic telephone service was the focal point of its development policy. Competing with this goal, however, were the increasing demands made primarily by the business community and public agencies for value-added services such as paging services, mobile telephone services, and data network services. As these calls for changes in the national telecommunications policy developed in the

mid-1990s, the Egyptian government was faced with the challenge of providing services to specific, vital segments of the population. It was this very attempt to offer value-added services that prompted the government to liberalize the terminal market by inviting leading private-sector companies to participate actively in the marketing of these services and in the sale of the terminals to the public end users. As with the creation of the national paging system (see Table 2.4), selected companies were first evaluated by ARENTO, the terminals were type approved, and the companies were then granted the license to operate.

In the 1990s, the service requirements of Egypt's national security agencies put high demands on network performance and on the lead time required for the provision of the value-added services. To respond to these demands, ARENTO established the information network EGYNET (see Table 2.4), which boosted interagency communication considerably.

The project took two years to finish and cost £E18 million. The network's capacity started at 2,300 users. By 1994, EGYNET served over 11,000 users. The International Telecommunication Union approved the X.25 protocol for EGYNET rather than the X.75 protocol used in the international networks because of its ease of connection and its widespread use around the world. In addition to one converting station in Alexandria, several stations for converting were established in Cairo, each connected to the other by microwave, coaxial cable, and optical fibers, which can transfer data at a speed of 4.6 kilobits per second. The EGYNET network also contains two concentrators in Cairo to concentrate the messages from data of 32 lines and arrange them in a single line reaching the nearest converting unit.

With EGYNET, users in Egypt can send or receive data through specially leased lines at 4.6 kilobits per second or through general telephone lines at 1.2 kilobits per second. Data can also be transferred throughout Egypt and abroad through telex lines via the network. The network is already connected with TRT American gateway, which gives EGYNET users direct access to all data networks in the United States, Germany, and Spain. The network is also connected to the TRANSPAC French network and the universal transit station ITL in Paris. In 1994 ARENTO was reviewing plans to invite private-sector participation in EGYNET through

Table 2.4. Subscribers

Date	Mobile Telephones	Paging Service	EGYNET
1985	—	—	—
1986	600	—	—
1987	2,100	—	—
1988	2,700	—	—
1989	3,300	400	120
1990	4,400	3,000	320
1991	5,500	4,400	600
1992	5,800	5,000	840
1993	7,000	8,000	1,040
1994	7,700	9,600	11,160

"qualified service providers." If these plans are approved, investors will be allowed to invest in an electronic mail service on a nationwide basis.

In the midst of these developments in Egypt's telecommunications, there was a growing recognition in the mid-1990s that a new legal framework was needed to address liberalization and deregulation. Toward this end, an ongoing process for restructuring ARENTO was begun, with emphasis placed on the organization continuing to develop administratively in order to efficiently meet the increasing and diversified demand for services. In the mid-1990s, there were also reports that ARENTO was involved in preparing a long-term national policy for the telecommunications sector that would attempt to secure a balance between the interests of the private investors and the public.

2.2.4 Egypt's Telecommunications and Electronic Equipment Market

Since 1961, Egypt's public telecommunications agency has been involved in the establishment of a national public telecommunications industry for crossbar exchange equipment. By the mid-1990s, ARENTO was manufacturing, through its subsidiary companies, digital public exchanges, PABX equipment, and network material.

Nevertheless, ARENTO continued to rely on foreign suppliers for the implementation of its numerous projects, all of which were deemed essential for the development of Egypt's national telecommunications network. The organization bases its purchasing policy and selection criteria for world suppliers and manufacturers of telecommunications equipment on a technical evaluation of the supplier's system and equipment in addition to the associated commercial terms. Project financing, based on governmental credit facilities or their equivalent, also plays a central role in ARENTO's selection process. In such cases where the financing offer requires that the equipment be supplied out by the home suppliers of the country offering financing, ARENTO tendered the projects to the selected national suppliers and awarded the projects on the basis of competition. While financing offers have been made by numerous countries, including France, Germany, and the United States, the Egyptian government has required ARENTO to reimburse the loan's principal and interest at the prevailing commercial interest rates.

2.2.5 Financial Health and Independence of Telecommunications

Although ARENTO's funds were public, its budget was made according to internal regulations and, with the exception of five-year development programs, it did not adhere to the laws and regulations stipulated in the governmental budget. The organization had its own independent bank accounts to which its profits are channeled, and its fiscal year starts and ended with the government's.

The Egyptian government allocated investments for ARENTO as a source of funding for the latter's projects. The funds came from gifts, loans, and self-finance. Although ARENTO's service charges were below the actual cost of providing service, income from local and international services was ARENTO's main

source for covering its expenses. ARENTO (and subsequently Telecom Egypt) considered the following actions as a means to generate revenue:

- Raising installation fees.
- Introducing time limits for local calls.
- Charging business users significantly higher subscription fees.
- Introducing a priority fee for subscribers requesting immediate service.

2.2.6 Quality of Service

Due to an extreme deterioration of service during the 70s and 80s, in the 1990s, ARENTO developed a scheme for assessing the indicators of quality for various telecommunications offerings. Among the criteria were service availability and call processing for local and international calls. These indicators presumably reflect detected service impairments, the impact of fault repair measures, and network performance as a whole. Examples of these indicators—usually compiled on a zone basis all over the national network—are:

- Outstanding faults per month.
- Average fault reported per day (over a month).
- Average fault repair per day (over a month).
- Outstanding faults at the end of the month.
- Percentage of outstanding faults out of the number of lines in operation.
- Percentage of unsuccessful local, national, and international calls out of total calls made.

These same indicators are used to assess the quality of service of the telex, the junction network, long distance lines, and the like.

Although ARENTO is not bound by any legal obligations to compensate subscribers for any impairment of service quality or service interruptions, it has invested in network operation and maintenance through the creation of a number of fault repair centers in large metropolitan parts of Cairo and Alexandria in order to process fault reporting, repair, and follow-up.

Under the auspices of the national five-year plan (1993–97), ARENTO had the following service goals:

- To increase telephone density to 7 percent.
- To reduce waiting time for provision of service to a maximum of four years (in 1992, the average waiting time was 6.1 years).
- To improve the quality and level of service in rural areas.

2.3 Future Outlook

During the 1980s and 1990s, technological developments in Egypt's telecommunications led to substantial advancements in the utilization of space stations, optical fiber cables, and electronic computers, as well as in the transition to digital systems. In 1994, 59 percent of the system was digital. The next decade, however,

will also bring with it some equally important developments. New services will be available, the telecommunications system will be completely transformed into digital technology, and, as a result, integrated service networks can be constructed, allowing information to be exchanged at much higher speeds than were achieved previously.

The national telecommunications organization attempted to anticipate future telecommunications trends: the underlying assumption of all ARENTO's studies on the development plans of the 1990s has been the transition to digital systems; the manufacture of electronic digital exchange equipment in Egypt began at the end of 1990; and ARENTO's program for the 1990s includes the creation of optical fiber networks between governorates and the extension of new telecommunications services. For example, in 1992, ARENTO introduced fiber optics to the Cairo metropolitan areas and soon awarded a U.S.$1 million contract to Northern Telecom for a 140 Mbits/s optical fiber link connecting the Assait area of Upper Egypt.

In the meantime, ARENTO was faced with the challenge of maintaining the telecommunications system's efficiency and performance during the 1990s. It had to sustain the current initiative to digitize the network while fulfilling the existing demand and reducing backlog—a task that will prove especially difficult in light of Egypt's rapid population growth.

Also, ARENTO had to continually raise the efficiency and technical competence of the telecommunications workforce (engineers, technicians, and laborers) through training on the latest technology in the field. The goal was complete reliance on trained local labor for the installation, operation, and maintenance of telecommunications equipment, as well as for the manufacture of electronic digital exchanges.

Providing basic services remained the priority of ARENTO's development goals. It continued in the mid-1990s to seek to strengthen the role played by the private sector in expanding services to a wider portion of the public. Because private enterprises can mobilize large amounts of resources in a competitive environment, they can have a positive impact on the development of services while simultaneously creating a new source of revenue. In hopes of tapping this potential, the government, beginning in the mid-1990s, sought to award licenses to selected operators who provided value-added services through the network infrastructure, such as mobile telephones and EGYNET.

Telecom Egypt set ambitious development goals given the backlog in demand. Egypt had a total number of telephone subscribers of six phones per 100 habitants. If Telecom Egypt is to achieve its four-year plan, five million telephone lines will have to be installed by the year 2002, or one million per year. The initial major contractor for this upgrade project was Siemens of Germany.

In 1997, Egypt awarded the first mobile license to MobiNil, a consortium of France Telecom, Motorola, and several Egyptian partners. A second cellular license was awarded to a consortium led by Vodaphone of the UK. A group led by France Telecom won a license for pay phones. Next, the government took on the privatization of ARENTO. Yet the state kept 80 percent of the firm, renamed Telecom Egypt, selling only a minority share to private investors. But it also loosened restrictions on other operators for the future.

Increasing demand for special and advanced telecommunications services, as well as the continuing trend toward technological development, has made changes in Egypt's existing telecommunications and related regulatory legislation imperative. A process of review must include the building of popular support in favor of deregulation and the associated privatization schemes. Only through deregulation, privatization, and continuing technological modernization can Egypt hope to keep up with the global revolution in communications technology and adapt from it what is suitable for her needs.

Bibliography

Saba, Belkais El Said. 1994. Public Telecommunications in Egypt: Planning and Development. Paper presented at Africom 1994 Conference.

TELEC240.308, ARENTO. 1994. "Study of the Development of Telecommunications in Egypt."