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Puerto Rico

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Puerto Rico has made great strides in the development of its infrastructure and telecommunications facilities. With over U.S.\$3.8 million invested since 1974, the island, a territory currently under U.S. congressional jurisdiction, has modernized its central office systems and has built an extensive digital fiber-optic network. Puerto Rico is on a par with respect to access of telecommunications services to its population of over 3.6 million people. The local telecommunications industry is poised for major growth with the advent of new technologies and wireless services such as personal communications systems, Integrated Services Digital Network (ISDN), and frame relay.

14.1 Background

Puerto Rico lies at the eastern end of the Greater Antilles, the major island chain of the Caribbean that also includes larger and geographically more diverse Cuba, Jamaica, and Hispaniola (Haiti and the Dominican Republic). Puerto Rico, including the neighboring islands it administers, covers about 9,100 square kilometers and has a population of 3.8 million (July 1994 estimate). The island is mostly mountainous, with a coastal plain belt in the north. Although San Juan is one of the biggest and best natural harbors in the Caribbean, most of the coastline is relatively smooth and fringed by many small islands and cays, especially in the south and east. The island is roughly rectangular in shape, stretching 180 kilometers from east to west and averaging 56 kilometers north to south.

Christopher Columbus set foot in Puerto Rico in 1493 on his second voyage. Within a hundred years the occupants he encountered, the Taino, had been largely decimated by war and disease. In recognition of Puerto Rico's strategic location, the Spanish built major fortresses. The island quickly became a thriving commercial center, exporting sugar, coffee, and other agricultural products while importing finished manufactured goods from Spain and Europe. By the late 1870s the bulk of the island's trade was with its North American neighbor, the United States.

14.2 Early History

Telegraphy came early to Puerto Rico because Samuel F. B. Morse, inventor of the electromagnetic telegraph, had a daughter living on the island. In 1858 Morse connected the hacienda of his son-in-law Edward Lind to the small beach town of Arroyo. The first telegraph lines were formally registered and authorized by the Spanish colonial government on March 1, 1859. On that day Morse transmitted the prophetic lines "Puerto Rico, beautiful jewel! When you are linked with the other jewels of the Antilles in the necklace of the world's telegraph, yours will not shine less brilliantly in the crown of your Queen!"

The island's colonial ruler, Spain, was one of the first countries to introduce telephone service. In Puerto Rico, the government sought to implement service by commissioning franchise licenses to local businessmen, in much the same way as in Spain. Thus, in 1880 Alfonse XII signed guidelines and policies for establishment of concessions. These included the following: each telephone network would consist of a central station with no individual line exceeding a distance of 10 kilometers; each installation would be completed within thirty days; network operations could not start until formal recognition by a regulatory body, *Cuerpo de Telégrafo*, composed of appointees of the Spanish Crown in Puerto Rico; the board would determine rates; and the franchise owner would be responsible for the repair and maintenance of all lines and equipment. The franchises were for specific geographical areas that, in rural areas, were coterminous with haciendas.

In 1882 Preston C. Nelson, a U.S. national, approached Governor Miguel de la Vega Inclán with a plan to build an interconnected network covering the island's three largest municipalities—San Juan, Mayagüez, and Ponce. Nelson represented the West Indies Telephone and Telegraph Company, based in New Jersey and controlled by the Continental Telephone Company of Massachusetts. Nelson was so confident of the viability of the network that he proposed to have his company assume all of the construction and equipment costs. In return, the Spanish colonial government was asked to grant exclusive rights.

A major debate among members of the colonial government ensued. San Juan's newspaper, *El Buscapié* (The Firecracker), took a favorable view of the proposal, but several of the governor's advisers pointed out dangers in accepting the offer. Key among their objections was that the system would be completely under foreign control and would not be subject to any local laws or regulations, as none had been enacted. The advisers also wanted assurances of ultimate control to maintain military security.

In 1883 Vega nonetheless agreed to permit Nelson to develop a pilot network connecting San Juan with the La Marina sector of the capital. However, three months into the project, before any major work had begun, the government canceled the trial.

In 1884, the same year Alfonse XII by royal decree ordered establishment of a telephone network under a government monopoly in Spain, the colonial governor in Puerto Rico ordered a phone network for use by the government, its dependencies, and the military. By 1885 a network of thirteen local stations and a central

station at La Fortaleza in San Juan formed one of the most advanced telecommunications infrastructures in the Spanish empire.

In 1890 the colonial government gave concessions to various entrepreneurs to set up local monopoly telephone service, as had been done in Spain in 1886. These were given to Rafael Fabián y Fabián for San Juan in the northeast, Pedro Juan Rosaly for Ponce in the south, and Alfredo L. Casals in Mayagüez on the west coast.

By 1897 lines connected San Juan, Ponce, and Mayagüez. The principal users were commercial and government entities. The island's commerce and trade expanded significantly as the advent of telecommunications services permitted easier transactions between the agricultural centers of Ponce and Mayagüez and with the civilian and military government apparatus centered in San Juan.

In 1898, as a result of the Spanish-American War, Puerto Rico was ceded to the United States. The island became a protectorate, subject to U.S. control of its government, laws, currency, and foreign policy.

In 1901 La Compañía de Ferrocarriles de Puerto Rico was given permission by the local Interior Commission to build and maintain telephone and telegraph lines along its route and to contract to provide services on behalf of local franchise holders. The company provided service between San Juan and Ponce and fifteen towns along the way, a distance of over 175 rugged kilometers, generally stringing both telegraph and telephone lines on poles placed along the railroad right-of-way.

The telecommunications industry at the beginning of the twentieth century saw the transformation of the Spanish system of franchise holders into modern corporate entities. In November 1902 the San Juan Telephone Company, established six months earlier as a New Jersey-based corporation, changed its name to Porto Rico Telephone Company, with Rafael Fabián y Fabián as president. In December, the company was awarded a franchise to build and manage a telephone network centered in San Juan and extending throughout Puerto Rico.

Three years later, the South Porto Rico Telephone Company (incorporated in Maine) was awarded a franchise to operate a network centered in Ponce in the south and providing service to various towns on the west coast. Its president, Pedro Juan Rosaly, was one of the original franchise holders for the city.

Porto Rico General Telephone Company was formed in October 1906 (as a Connecticut corporation) to purchase the Porto Rico Telephone Company, which it did the next month. This gave the new company control of the network in San Juan.

In 1907, a law was passed giving the Interior Commission the right to build, maintain, and operate telephone and telegraph systems between the cities of San Juan and Ponce. Additionally, it allowed formation of local telephone centers for the expansion of service to smaller towns and municipalities. These would be government-owned concerns under the control and jurisdiction of the Interior Commission, operating alongside the privately owned telecommunications companies.

14.2.1 The Birth of ITT

Puerto Rico is part of the beginnings of one of the largest early international conglomerates and innovators of telecommunications technology, International Telephone and Telegraph (ITT). The company's founders, the brothers Hernan and

Sosthenes Behn, were born on the Caribbean island of St. Thomas (then a Danish possession). They began experimenting with telegraph technology in 1901. In 1906 a stepfather left them extensive land holdings in San Juan in what is today a major tourist center called the Condado. The Behns immediately began to build a telegraph network and a bridge, which became known as the Puente Dos Hermanos (Two Brothers Bridge), connecting the Condado with San Juan.

In December 1906 Sosthenes Behn became president of the Porto Rico General Telephone Company. Hernan became a corporate officer in 1907. In July 1911, flush with U.S.\$25,000 in cash from the 1910 sale of their bridge to the city of San Juan, the Behns purchased the company outright. In September 1913 Sosthenes, who was the creative entrepreneur and merger genius of the two brothers, initiated a merger with South Porto Rico Telephone. The next June, the brothers formed Porto Rico Telephone Company (PRTC) as a Delaware corporation and, with the approval of the U.S. government, concluded the merger of the Ponce and San Juan-based companies. The new company had an extensive network connecting the island's major arteries of trade and commerce and approximately 1,800 telephone users. It also had formal approval to construct, manage, and maintain telecommunications services throughout the island except for a cluster of towns around the municipality of Caguas in the northeast and the islands of Culebra and Vieques, where service continued to be run by the Interior Commission.

The Behn brothers were also given the authority to form a long-distance network and provide telephone services to local towns not under government control. The authorization provided for a twenty-year limit whereby the island's legislature retained the right to extend or terminate the agreement.

In 1914 Puerto Rico became one of the first places in the world to have coin public telephones. Operator assisted, the calls cost 5 cents. The same year, PRTC published the first telephone directory, listing all the telephone numbers in its network.

In 1917 the Jones Act gave Puerto Ricans U.S. citizenship. The same year, the island legislature passed Law 70 establishing a Public Service Commission to regulate utilities, including the telephone system. The law also reinforced the role of the local government as a direct provider of telecommunications services.

Puerto Rico was hit by a terrible earthquake in 1918. It caused devastation throughout the island, including destruction of most of the telephone and telegraph cabling. Reconstruction began quickly but was significantly hampered by materials being in short supply because of World War I. By 1920 PRTC had reestablished services and expanded its system to 6,500 users.

In 1920 the Behn brothers incorporated the International Telephone and Telegraph Corporation (ITT) in New York City. This company became their corporate flagship for expansion into Cuba and into Europe. Also in 1920, they formed a telephone company in Cuba and supervised the construction of a cable connecting Cuba with New York. The Behns acquired all the shares in *Compañía Telefónica de España*, which had just been granted the right to operate the Spanish telephone system, in 1924. Their company gained another major foothold in Europe with its purchase of American Telephone & Telegraph's European manufacturing subsidiary. This also gave ITT new muscle for its worldwide expansion.

The experience of the early mergers and the formation of PRTC had given the

Behns the experience they needed to operate a telephone company. Moreover, PRTC's rapid growth provided a revenue stream and a solid base from which to launch their global efforts.

14.2.2 Destruction Leads to Modernization and Improvement

In 1928 Puerto Rico was hit by another major natural disaster. Hurricane San Felipe wreaked havoc from Ponce in the south to the northeast, where the telephone infrastructure was most concentrated. The hurricane devastated PRTC's operations, leaving the island without telephone service for several months. San Felipe also brought great destruction to the coffee industry, already suffering from intense competition from other Latin American-based growers and a higher, U.S. dollar-based, price.

Once again, PRTC's creative efforts produced a successful reconstruction. Legions of installers went to work to rewire the island zone by zone, building by building. This task was all the more difficult because already rugged terrain was made virtually inaccessible by thousands of trees felled by the hurricane. Carrying materials in horse-drawn carts, PRTC crews worked tenaciously for long hours to get the island's phones ringing again. The 1930 decision by the Plant Department to use trucks advanced the rewiring effort and permitted the company to respond more quickly to repairs and new installations.

Destruction of the old phone system led to its modernization and improvement. For example, decaying galvanized wire gave way to more durable copper wire. In addition, the company modernized its inside plant. Over a sixteen-year period PRTC transformed Puerto Rico's telecommunications infrastructure. Long-distance service between San Juan and Ponce was improved with new cabling that passed through Arecibo and Utuado. Rural public telephone service was introduced in 1940, beginning with the town of Naranjito, located in the central mountain range. Over 19,000 telephones were in service by 1941.

In 1945 PRTC introduced its first fully automatic central office, with a capacity of 8,000 lines, in Santurce, a sector of San Juan. The company also adopted the first of a series of multiyear plans to expand central office capacity, using forecasting tools to determine the number of new subscribers.

14.3 Telephone Service as a Universal Right

Beginning in the 1910s, Puerto Rico's phone system was operated by two entities, the private Porto Rico Telephone Company and the Interior Department, based on the 1907 law. The major cities and long-distance service were in the hands of PRTC. A Communications Authority was formed by a series of laws during 1942-45 to provide service to the cluster of towns in the eastern part of the island that were not within PRTC's franchise. These laws further formalized the dual system and provided a mandate for the government to act as a direct service provider through a subsidized phone company. The laws also transferred

the telegraph system from the Interior Department to the Communications Authority.

These laws are the root of the current telecommunications system and reflect its traditions. The Puerto Rican government recognized the need to extend telephone service as a universal right to all of its constituents and was willing to actively undertake the role of service provider to achieve that goal. These themes have played continuously over the subsequent decades as the system was nationalized and then almost privatized.

14.4 A Quantum Leap

In 1952 the U.S. Congress gave Puerto Rico free associated-state status, permitting Puerto Ricans local governance under their own constitution while remaining within the jurisdiction of U.S. federal laws that covered a broad range of areas, including trade, foreign policy, and telecommunications. (The Federal Communications Commission has authority over Puerto Rico's telecommunications, as well as radio and television.) Puerto Ricans elect local officials and have an elected official with nonvoting observer status in Congress.

Attracted by the "American dream" and pushed by the employment crisis generated by the transformation of the island from an agricultural to an industrial economy, the Puerto Ricans began a decade of great migration in the 1950s. Puerto Ricans moved to the United States by the hundreds of thousands. Nearly a third of the population left, primarily for low-wage and farm jobs in the northeastern United States that had been created by the postwar expansion. The demand for long-distance phone service between the new arrivals and their island relatives grew substantially.

The 1950s saw installation of 41,000 lines, increasing the number of lines by some 117 percent, to 76,000, by the end of 1959.

With the rapid expansion of the Puerto Rican economy in the 1960s and early 1970s, phone demand was at an all-time high. There were a number of developments to meet this demand. An underwater cable connecting Puerto Rico with Florida was constructed in 1960, and microwave links were established between San Juan and Ponce in 1961 for in-land long distance. Direct dial service (DDS) within Puerto Rico and between the island and the United States was introduced in 1968. By 1969 PRTC had over 276,000 subscribers, a 231 percent increase over 1959. Despite its expansion of lines and facilities, the company's efforts did not keep up with demand, and there was a dramatic deterioration in service.

Long waits and down time were common for those seeking new service or reporting a repair problem during the 1950s and 1960s. The island had good phone coverage in urban areas but very low penetration in rural areas. Part of this situation was inherent in a business model based on amortization of capital costs over a highly concentrated urban subscriber population. In Puerto Rico, as everywhere, populations dispersed in the countryside are expensive to reach with poles and copper wiring.

14.5 Nationalization

By 1973 PRTC had U.S.\$75 million in gross revenues and over U.S.\$6 million in earnings. It also had acquired a notorious reputation. In October 1973 the Public Service Commission slapped it with U.S.\$219,000 in fines and refused to grant any rate increases. Additionally, the company was forced to pay damage claims in excess of U.S.\$114,000 to customers. In February 1974 PRTC had a backlog of 32,000 orders, with many having waited over two years to get a phone installed. The situation affected expansion of U.S. and Puerto Rican-owned businesses, many of which found themselves without access to basic phone service.

International Telephone and Telegraph was seen as making a handsome profit from its Puerto Rico operations and milking PRTC through equipment purchases from other ITT subsidiaries. For example, ITT Caribbean Manufacturing was accused of selling obsolete equipment at extremely high prices. The company's personnel policies came under assault as well. Some non-Puerto Ricans were paid nearly four times the highest paid Puerto Rican executive, whose salary was U.S.\$30,769 in 1973. Mandated cuts by ITT in maintenance and staff training programs were seen as being at the root of PRTC's service problems.

As the situation became more chaotic, editorials called for quick action and leadership. Under Governor Rafael Hernández Colón, the commonwealth government responded with Law 25 creating the Puerto Rico Telephone Authority on May 6, 1974. Through this entity the government purchased PRTC from ITT for U.S.\$168 million. International Telephone and Telegraph remained the provider of overseas service.

The Communications Authority, the second largest telephone provider and already under government control, was also put under the Telephone Authority but not merged with PRTC.

Three factors can be seen as contributing to the nationalization of PRTC. These were the company's poor service image among residential, business, and corporate customers, large and small; a new administration aggressively pursuing a public mandate to provide universal service and improve the quality of telecommunications as vital to the island's long-term economic viability; and ITT's involvement in Chile in the early 1970s.

14.5.1 PRTC as a Government Entity

With the takeover of PRTC complete, the government set its sights on turning the company around and winning back the confidence of customers. The first step was to invest in plant and network expansion. In 1974 the government created a U.S.\$500 million modernization fund. By the end of 1974 PRTC had over 241,200 telephones in service, equal to 8.3 per 100 inhabitants. The next twenty years saw a complete overhaul of PRTC, creating a major diversified telecommunications entity with state-of-the-art technology.

Independent of ITT, PRTC no longer had to depend on ITT Caribbean Manufacturing as its exclusive supplier. The company now used competitive bids, and major manufacturers, including AT&T and Northern Telecom, competed for contracts.

In 1976, PRTC inaugurated use of electronic switching systems (ESS); the same year AT&T began introducing them in the United States. With ESS, maintenance became more manageable and efficient. The company also set about augmenting its infrastructure, including building an islandwide microwave network. To provide much-needed training to its over 5,500 employees, PRTC also expanded its telecommunications school.

In 1977 the FCC ruled that the long-distance network between Puerto Rico and the United States should be converted from an international to a domestic service. Puerto Rico would thus enjoy long-distance costs comparable to domestic interstate traffic within the United States. The first impact of this ruling was a lowering of rates by nearly 73 percent across the board.

By the end of the 1970s PRTC was positioned for major growth, having overcome the service and expansion limitations it had experienced under ITT ownership. There had been success in three key areas: the growth of infrastructure able to support expansion and use of sophisticated switching systems; development of a trained Puerto Rican managerial and technical force competent in the new technologies and loyal to the PRTC mission; and creation of a diversified purchasing strategy implemented by a staff that had the ability to identify and acquire advanced technologies at competitive prices.

In 1980, after six years as a government entity, PRTC could boast that the number of lines installed had grown from 242,100 to 413,200, a 71 percent increase, and lines per 100 persons had increased from 8.3 to 12.9. To achieve this, PRTC had invested over U.S.\$500 million.

Expansion of U.S. corporations and major island-based banks fueled both the need and the demand for advanced communications during the 1980s. This demand was first addressed through expansion of PRTC's microwave network, creating line-of-sight delivery systems in the early 1980s. The company undertook digitalization quite early as well, installing its first Northern Telecom Digital Multiplexing System (DMS) 100 switches in 1981. This allowed a suite of new services, including call waiting, call forwarding, and call conferencing. Also, PRTC installed its first X.25 packet-switching equipment in 1981, although full deployment did not occur until 1989.

Keeping pace with technological advances, PRTC commenced installation of a U.S.\$1.2 billion fiber-optic network in 1984, and in 1987 it established an advanced satellite communications system interconnected with its land lines. In 1986 the FCC gave the company permission to begin cellular telephone service based on establishment of five major regional markets.

In 1984, PRTC decided to challenge ITT in the overseas calls market. The Puerto Rico Telephone Authority, the PRTC's holding company, proceeded with the incorporation of a new subsidiary called La Telefónica de Larga Distancia (TLD), which was planned to be the official overseas long-distance provider (U.S. and international calls) of the PRTC. Then AT&T purchased ITT's overseas network in 1987, including its underwater cable system, in 1986. Although AT&T continued ITT's opposition to allowing PRTC into the overseas market, the 1984 breakup of AT&T and the introduction of competition into long-distance service in the United States changed the situation significantly. The argument made by AT&T

was that allowing PRTC to be the local and in-aisland long-distance telephone monopoly while a subsidiary (TLD) was a provider of overseas calls was inappropriate. Nonetheless, in 1989 the FCC approved TLD's application. Sprint and MCI were also allowed to provide overseas long distance in 1989. The FCC required PRTC to provide the other three carriers equal access with TLD to its network.

Although AT&T had vehemently objected to PRTC competing against it, the two companies agreed to build a new underwater fiber-optic cable between the island and the United States. The cable, called the Taino-Carib, was completed in 1994.

In September 1989 Puerto Rico was hit by Hurricane Hugo. Although the island suffered major damage, telephone service was minimally disrupted and service outages were quickly restored. Most affected were the rural areas in the northeast served by the Communications Authority. This contrasts with 1928's San Felipe, which brought down the entire system for an extended period.

14.6 Privatization, Almost

On February 20, 1990, Governor Colón, in his last term, proposed the sale of the Porto Rico Telephone Company. The major reasons given were to use the proceeds to better the island's educational system and to improve the island's infrastructure. The government was well aware of the need for continued massive investment in telecommunications to meet the competition that loomed on the horizon. The sentiment of officials facing budgetary shortfalls was that for years to come such investment would drain Puerto Rico's coffers of much-needed capital that could be better used to overhaul the education system.

The sale, estimated to bring in U.S.\$2 billion, would include Telefónica Larga Distancia, the Puerto Rico Communications Authority, and the mobile cellular services unit.

The proposal created a tremendous debate and thunderous opposition from consumer groups and unions, which warned of major layoffs. On March 28, 1990, over 3,800 telephone company employees went on a one-day strike. They were joined in a march to the capitol by over 150,000 people, making it one of the largest protest rallies ever in Puerto Rico. The future of the telephone system became a regular news item and talk-show topic.

The sale never happened. In spite of a massive campaign launched by the Colón administration and the support of the business sector, the sale became a symbol of the uncertainty and reluctance of a people unwilling to forgo the benefits of a government-sanctioned monopoly. The major suitor was Bell Atlantic, one of the regional companies created by AT&T's breakup. It was represented by Miguel Lausell, PRTC president during 1985-86 and a highly respected member of one of Puerto Rico's best-known entrepreneurial families. Bell Atlantic retreated from discussions without ever making a formal offer.

The aborted sale of PRTC did not, however, stop the sale of one of the company's parts, its overseas-call subsidiary La Telefónica Larga Distancia (TLD). It was acquired by Telefónica Internacional de España, the Spanish telephone com-

pany's global arm, for U.S.\$141 million in 1992. The FCC approved the deal only after the commonwealth government convinced the commissioners that all of the infrastructure would remain owned by the Puerto Rico Telephone Authority (PRTA). This was done by the PRTA holding 20 percent of the equity in the new company. With TLD spun off, PRTC merged with the Puerto Rico Communications Corporation on May 5, 1994, finally consolidating all local service under the PRTC umbrella.

14.7 Conclusion

With an array of modern technology, highly skilled engineers and technicians, and a management well versed in the most advanced forms of telecommunications, PRTC is well positioned for future growth and expansion. In 1994 it had over 1.3 million lines in use, for a teledensity of 34.9 lines per 100 inhabitants. With over U.S.\$3.1 billion invested in plant and equipment during 1974-94, PRTC had one of the most advanced telecommunications networks in the world, including a 100 percent digital plant with a fiber-optic backbone.

In 1995 PRTC launched ISDN service for both commercial and residential customers, offering integrated delivery of voice, data, and video conferencing at speeds up to 128,000 bits per second. The company is testing video dial tone in an experiment to deliver video services to Puerto Rican households. It also is preparing to offer personal communications service (PCS), the wireless technology expected to replace cellular phones, sometime in the next five years. Deployment of these services, as well as other advanced telecommunications technologies, will continue to make PRTC one of the most advanced telecommunications companies in the Caribbean and Latin America.