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THE IMPORTANCE OF TELECOMMUNICATIONS TO A MODERN LATIN AMERICA

By

Donald G. Moore

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ABSTRACT

THE IMPORTANCE OF TELECOMMUNICATIONS
TO A MODERN LATIN AMERICA

By

D. G. Moore

This thesis presents information concerning the formation and organization of social and common-carrier communications in the Caribbean, Central and South America. Underlying statistical, geographical and historical references are provided at the outset of each country section.

Along with basic tabulations of services and cognate items pertaining to telecommunications, a geographical distribution of broadcast facilities is provided, as is a section on how the electronic media function in the given country or territory. Regulatory and legislative frameworks, ownership trends, means of operation and economic support, as well as technical facilities are included. Where noteworthy programming tendencies exist, mention is duly made.

A separate section is provided for common-carrier services, including telephone and record communications, national, regional, interregional and international circuits, and specific transmission facilities. Electrical power generation capabilities are also discussed. A set of maps is included, showing broadcast concentrations and major telecoms paths.

Dedication

This thesis is dedicated to international communication, and the peace, harmony and goodwill which result from a better understanding of one's neighbors, in this the "global village."

ACKNOWLEDGEMENTS

Upon undertaking a project of substantial magnitude, one quickly finds that without the active aid and encouragement from family members, colleagues and friends, the outlook immediately becomes bleak. I count myself fortunate in being richly blessed in all three of the above categories.

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TABLE OF CONTENTS

	Page
Dedication	ii
Acknowledgements	iii
Table of Contents	iv
List of Figures (Maps)	vii
Introduction and Footnotes	1
Literature and Footnotes	19
Caribbean Introduction and Footnotes	33
Antigua and Footnotes	40
Bahamas and Footnotes	48
Barbados and Footnotes	56
Caymans and Footnotes	62
Cuba and Footnotes	68
Dominica and Footnotes	94
Dominican Republic	100
Grenada and Footnotes	110
Guadeloupe and Footnotes	115
Haiti and Footnotes	122
Jamaica and Footnotes	132
Martinique and Footnotes	141
Monsterrat and Footnotes	148
Netherlands Antilles and Footnotes	155
Puerto Rico and Footnotes	169
St. Christopher-Nevis-Anguilla (Kitts) and Footnotes	182

	Page
St. Lucia	190
St. Vincent	194
Trinidad/Tobago and Footnotes	200
Turks & Caicos and Footnotes	210
Virgin Islands, British	215
Virgin Islands, U.S.	219
Central American Introduction and Footnotes	222
Belize and Footnotes	232
Costa Rica and Footnotes	240
El Salvador and Footnotes	252
Guatemala and Footnotes	262
Honduras and Footnotes	274
Mexico and Footnotes	284
Nicaragua and Footnotes	307
Panama and Footnotes	324
South American Introduction and Footnotes	336
Argentina and Footnotes	342
Bolivia and Footnotes	361
Brazil and Footnotes	371
Chile and Footnotes	394
Colombia and Footnotes	411
Ecuador and Footnotes	424
Falklands-Malvinas and Footnotes	437
French Guiana and Footnotes	442

Page

Guyana and Footnotes 449

Suriname and Footnotes 457

Paraguay and Footnotes 466

Peru and Footnotes 481

Uruguay and Footnotes 496

Venezuela and Footnotes 510

Bibliography 524

LIST OF FIGURES (MAPS)

CARIBBEAN — Page

West Indies (Overall) 39

Map of the Bahamas 47

Map of the Cayman Islands 61

Map of Cuba 67

Map of the Dominican Republic 99

Map of Haiti 121

Map of Jamaica 131

Map of the Netherlands Antilles 154

Map of Puerto Rico 168

Map of Trinidad/Tobago 199

CENTRAL AMERICA

Map of Belize 231

Map of Costa Rica 239

Map of El Salvador 251

Map of Guatemala 261

Map of Honduras 273

Map of Mexico 283

Map of Nicaragua 306

Map of Panama 323

SOUTH AMERICA

	Page
Map of Argentina	341
Map of Bolivia	360
Map of Brazil	370
Map of Chile	394
Map of Colombia	410
Map of Ecuador	423
Map of the Falkland Islands (Malvinas)	436
Map of the Guianas	441
Map of Paraguay	465
Map of Peru	480
Map of Uruguay	495
Map of Venezuela	509

INTRODUCTION

The ability to communicate has long been recognized as one of mankind's most important talents. It is this effective management and direction of activities which permits true human understanding and development. Now, more than ever, with our world facing increasing uncertainties, the function of communication must not be overlooked.

The past decade has revealed more changes and upheavals on the international scene than most of previous history combined. Entire nations have come and gone; once powerful forces are no longer. Evils which endured for centuries in the past have been swept away overnight, and new enigmas for man to ponder have sprung up just as quickly. The analogy of "Winds of Change," applied to the African situation, may now be shared with other sections of the world. Latin America is most certainly no exception.

In the period 1970-80, world focus went from general to acute when viewing South and Central America, not forgetting the Caribe. More and more it has been realized that the consequences of today's world interdependence includes the erstwhile protectorates under the Monroe Doctrine. The reason for this remarkable change? Resources.

Resources fit into many categories. One of the most important is the same notable human talent: communication. We may also consider the widespread and enormous natural deposits of minerals; certainly not to be overlooked by a raw materials hungry world. Its agricultural potential is tremendous,

simultaneously having direct cultivation, livestock and silviculture. People: There are 290 million Latin Americans between the Rio Grande-Bravo and Cape Horn. Political Voice: A crucial factor in today's complicated and decidely unpredictable world. However, each of these tangible resources is interlinked and directed by the multi-faceted central nervous system: social and common-carrier communications.

Without an effective transfer of information, there is no possibility for intelligent and future-oriented activity. It is precisely for these reasons that the nations which comprise the Latin American region have included telecommunication as a paramount priority in long-term planning. Of course, this is no easy task. There are 44 territories and states in the area each of which has widely varying communication requirements. A system applied to one republic may be totally unsuited for even the closest neighbor.

A total land area of 21.55 million square kilometres belongs to Latin America and within this territory, an increasing number of productive enterprises are developing. Tabulations show that a combined regional Gross Product of US$ 284.75 billion is accounted for, coming from the following sources:[1]

Industry and Mining:	21.99 percent
Agriculture:	21.82 "
Commerce and Finance:	21.79 "
Services:	17.97 "

Some fourteen major agricultural product groups; 12 mineral and five industrial make up a widespread economic base throughout the Latin region.[2] It

can be seen that the countries of South and Central America are indeed quite wealthy in terms of raw materials and agrarian output. The fact that petroleum and natural gas production ranks fifth in categorical total gives special impact to the whole scene. Well-known oil fields, both terrestrial and off-shore, can be found in Venezuela, Mexico, Ecuador, Chile, and Argentina, with lesser reserves elsewhere.

The bulk of Latin trade is with the U.S.A., EEC, and other European states, as well as with Japan. In recent years, oil-related contracts with Middle-Eastern and African nations have developed. While the majority of exports from the region fall into the category of raw materials, importation from trading partners may be classified as having a technical or industrial base. Latin American nations are some of the industralized West's foremost customers, and there is no sign of a downturn in this trend.

One pecularity of today's international scene is the tendency toward group or bloc voting. Consequently, we find developing nations frequently agreeing on important issues, while countries in the process of development also often join together in expressing opinions. In recent years, Latin nations have gained a special place among the latter group, but without dissolution of traditional ties with Western Europe and North America.

The nervous system of this growing region is widespread and touches almost every point. Major common-carrier links are established by way of international satellites, microwaves in tropodiffusion, microwaves in visibility, submarine cables, HF radio, VHF/UHF radio relay, and in cases,

wireline or terrestrial cable. Masked from view from the casual onlooker is an enormous capital and manpower investment in strictly technical and operational resources. A startling outlay is necessary for even a small telecommunications network; even more so for large numbers of residential telephones or a nation-wide television system.

Have communications expanded, according to theoretical possibilities? Most certainly so. At last count, there were over 14 million telephones; 3168 radio and 297 television stations.[3] From 1961 till 1979, a steady increase in Latin broadcast media has been noted, with an overall growth rate of 71.83 percent.[4] This involves the following categorization:[5]

	Radio	Television
Caribbean:	+ 66 percent	+ 71 percent
Central America:	+ 69 "	+ 91 "
South America:	+ 58 "	+ 76 "
Overall Increase:	+ 64.33 "	+ 79.33 "

In terms of receiver distribution and listenership potential, we have the following situation:[6]

(Receiver Distribution)

	Radio	Television
Caribbean:	8.29 million	2.34 million
Central America:	21.42 "	6.48 "
South America:	56.28 "	26.53 "
Total:	85.99	35.35

With reference to receiver distribution on a per population basis, we find that there is a relatively high level involved:[7]

(Per Hundred)

	Radio	Television
Caribbean:	42.12	10.11
Central America:	22.87	5.14
South America:	24.55	11.57
Average:	29.85	8.94

Telecommunications are a complicated affair in Latin America. Owing to demographic, political, economic and other factors, the organizations which provide electronic media and channels of communication have evolved into a wide variety of structures and operating conditions. Ownership of systems varies with the country, but the "norm" is: possession of common-carrier services by the state or a regulated public service; operation of a majority of broadcast stations on a private-commerical basis, although the governments maintain some of the more powerful outlets as official voices. Religious and cultural organizations also play an important part in the region.

Broadcasting is an all-pervasive medium, reaching into almost every spot on the continents. Out of the over 3000 radio stations, there are 800 or so which could be considered as major, with a regional transmission energy of over 41 megawatts.[8] This is indeed staggering. Radio facilities are almost equally distributed between medium and short waves:[9]

Medium Waves: 813 stations, 21 MW total band power.

Tropical Short Waves: (120/90/75/60 metres): 291 stations, 1.1 MW total power.

Lower International Short Waves: (49/31/25 metres): 263 users, 12.63 MW power.

Higher International Short Waves: (19/16/13/11 metres): 57 users, 6.9 MW total power.

This break-down takes into consideration the multi-band stations which frequently change wavelengths in order to accommodate operating conditions and target areas.

FM is the fastest growing element in sound broadcasting. This is truly a worldwide trend, as the advantages of VHF for local, interference-free service have long been recognized. However, especially in areas of sparse population or large required distances, FM has little future. Consequently, in much of Latin America, this band will remain a local "frill" - mostly taken advantage of by the audiophile and music lover. There are nearly 300 FM transmitters in Central America and the Caribbean, as well as over 200 in South America.[10] In the larger cities, numbers of specialized FM stations have been appearing. Such specialization is usually cultural in nature.

Television is immensely popular throughout Latin America. There are presently some 590 transmitters in use.[11] Depending on the country, most television is carried out by commercial organizations, although the governments have been keenly interested in keeping at least a portion of the audience. This is especially the case in Argentina, Chile, Bolivia,

Colombia, Peru and Venezuela, as well as parts of the Caribbean. Most television in Central America is privately owned.

There are two main television standards in use throughout Latin America: System M (525 lines/30 frames) and System N (625 lines/25 frames). Most of the region now uses the former, although System N enjoys popularity, especially in South America. With a few minor exceptions, all channels are those used in the United States (designation "A"). As with the diversity of television standards, there are also variations in color systems utilized. While NTSC color is by far the major technique, by gross numbers, PAL and SECAM are also represented. South America proper has tended to favor PAL, especially in the cases of Brazil, Argentina, Uruguay, and Bolivia. States farther north have chosen NTSC. Most countries in the Caribbean and all Central American republics have opted for NTSC. The Republics of Cuba and Haiti, as well as French islands, are in the process of integrating the SECAM technique. Bolivia and Cuba actually use two television standards; N and M for the former; M and D for the latter. Bolivia also has the distinction of having two color systems, at least on an official basis. The government facilities supposedly will operate in PAL, while the educational stations already have NTSC.

How is all of this variety of communications coordinated and regulated? The answer: not easily. Although there are still many examples of poor coordination throughout the world, the situation seems to be getting better. Yes, it is true that some stations still drift from their assigned frequencies. Yes, it is true that certain facilities tend to select

frequencies which have little semblance to allocated bands. Likewise, it is correct that some stations do interfere with others, and that a few broadcasters have chosen to increase transmitter powers without official sanction or without consulting with neighboring stations. However, the picture is brighter than before. Technical standards are a must for this day and age. The administrators and engineers of Latin America recognize this fact and have done much to stem abuse or misunderstandings.

Each republic or state has an official regulatory agency. The function of this office varies from country to country, as do regulations and constitutional provisions for the mass media. For the most part, telecoms administrations set the rules and police the airwaves. In certain countries, they may also be responsible for the operation of an official government voice. In the case of Cuba, European territories, and other states to an extent, the government has assumed complete responsibility for both social and common-carrier communications.

The International Telecommunication Union is the overall guarantor of worldwide harmony in the electromagnetic spectrum. At its headquarters in Geneva, an enormous amount of time and energy is devoted to assuring that communications lines are kept open and that complete havoc is not brought about. Most countries are members of the ITU, and have signed its various provisions and agreements.

Primary documents subscribed to by Western Hemisphere nations, within the framework of the ITU, include:[12]

Convention for Protection of Submarine Cables
(Paris: 1884)

Inter-American Arrangement Concerning Radiocommunications
(Havana: 1937)

Inter-American Radiocommunications Convention
(Havana: 1937)

Regional Radio Convention for Central America, Panama and the Canal Zone (Guatemala City: 1938)

Inter-American Radio Agreement
(Santiago de Chile: 1940)

Inter-American Radio Agreement
(Washington: 1949)

North American Regional Broadcasting Agreement
(Washington: 1950)

British Commonwealth Agreements
(London: 1949)

International Telecommunication Convention
(Montreaux: 1965)

Agreement Between the United States of America and the United Mexican States Concerning Radio Broadcasting in the Standard Broadcasting Band (535-1605 kHz) (Mexico, Distrito Federal: 1968)

International Telecommunication Convention
(Malaga-Torremolinos: 1973)

Telegraph Regulations
(Geneva Revision - 1958 - of the Buenos Aires Document, 1952)

Telegraph Regulations
(Paris Revision - 1949 - of the Atlantic City Document, 1947)

Telegraph Regulations
(Malaga-Torremolinos Annex of the Buenos Aires Document, of 1952, 1973)

Telephone Regulations
(Geneva: 1973)

Radio Regulations
(Geneva: 1959)

Of course, regional cooperation is a must, even with the existence of an organization such as the ITU. In Latin America, this has been a long,

drawn-out process. Regional planning, through the auspices of the ITU, has been going on for quite some time. The first major step forward was in 1955, when a proposal for an integrated regional telecommunication system was launched at the Fourth Regional Congress for Tourism in the Gulf of Mexico and the Caribbean.[13] Resulting from this action, and discussions within the engineering fraternity, two acronyms evolved for a Latin telecoms system: RITAL (RIT) - Red Interamericana de Telecomunicaciones; or LATIN (Latin American Telecommunications Network).

In late 1959, the government of Mexico made urgent suggestions to the International Telecommunication Union that a Latin network be established.[14] In the following year, the same administration brought a proposal before the OEA (Organization of American States), and a preliminary meeting of technical experts was convened in Mexico City.[15] Regional utilization of earth-orbital satellites was brought to attention at this very early stage.

At a meeting of technical personnel in 1962, presided over by the Mexican Republic, CITEL (Comision Interamericana de Telecomunicaciones), was formed.[16] This body is consequently responsible for regional telecoms guidance and development, and operates as a subsection of the Consejo Interamericana Economico y Social of the Organization of American States.[17] Technical standards and various transmission systems were considered for the future network. Circuit routes, alternate paths, and switching were also given priority. Most parties endorsed the implementation of high-capacity microwaves and radio relay, as well as submarine telephone cables.

CITEL has been officially described as: "A centre for information and consultation to prepare technical studies and to advise other organizations working in the telecommunication field. Coordinating efforts being made in this field, and providing assistance to those member states who may request it."[18] At the third extraordinary meeting of CITEL, held in Bogota, several sub-commissions were formed, including one concerned with broadcasting.[19] Others were for scientific research, administrative coordination, and technical standards.[20]

In compliance with the futuristic Declaration of the American Presidents, at Punta del Este, Uruguay, in April of 1967, CITEL accepted an expanded responsibility.[21] Through cooperation of the pre-investment fund of the Inter-American Development Bank, adequate financing was made available for studies and preparation.[22]

A Latin American Plan Committee was formed in 1959, within the scope of the CCITT (Comite Consultatif Internationale des Telegraphes et Telephones).[23] Again, this was through the urging of Mexico. This body, in association with other functions of the ITU, has overseen the development of proper legislation, tariffs, and interchange agreements - all vital for the correct functioning of an international network.

Recommendations of the CCITT have included that: "a) no two telephones in the world should have the same number; b) that there should be, correlatively, a switching and signalling plan which includes high-availability and reliability routes, adequate automatic switching and commonly applied signalling systems."[24]

At the Mexico World Plan meeting of the CCITT/ITU, in 1967, specific lists of country codes for telephone and telex were drawn up.[25] Agreements on signalling and coding systems were reached, for inclusion in the RITAL. It was also decided that country codes should be designed on the basis of a two digit combination for nations with a large proportion of subscribers, and three digit codes for countries with a small number of users.[26]

In 1968, the Inter-American Development Bank commissioned a study of South American communications and later made suggestions as to a regional network.[27] Special emphasis was placed on microwave relay and appropriate channelization. The growing number of satellite earth stations was also taken into consideration, as having tremendous trunking potential throughout the hemisphere. Further unification and execution of the RIT ideal was accomplished through the formation of the ITN Operational Group, a management committee.[28]

Since these beginnings, the nations which comprise South America have striven to integrate their respective telecommunications networks in order to form a more regional approach. The actual system is highly interesting as it is planned to involve multiple routing and safeguards. Arranged as if part of the human frame, RIT works on the "backbone" principle, with major links spanning from north to south, along the Andes cordilleras; from Colombia to Chile. A northern part joins from Colombia to Venezuela, and on to Trinidad and Tobago, from where the same continues to the Guianas. A southern part links Chile to Argentina, and also involves Paraguay and Uruguay before a major connection into Brazil is made.

Bolivia has a multi-path access into Chile, Peru, Argentina and Brazil. After traversing the immense Brazilian landmass, RIT again connects with the lines of the Guianas, completing the continental "backbone" system. Other circuits are tributary to this giant frame.

While CITEL is a regional consultative body under the auspices of the Organization of American States (OEA), and is particularly concerned with overall regional planning, COMTELCA, an organization created under agreement of member countries, is quite another matter.[29] Formed by the Telecommunications Agreement of Managua, on the 16th of April, 1966, COMTELCA has made possible the establishment of a single, unified network throughout all of Central America.[30]

In 1962, the World Bank sponsored a study for Central America, with cooperation from the United Nations Development Program.[31] Six years later, tenders were issued for actual construction.[32] The Central American Microwave Network (CAMW) is what resulted.

Spanning the distance from Mexico to Panama, the net makes use of multicarrier Hertzian waves, employing 960 channels of telephony as well as television, per carrier.[33] Main network paths run from northern Mexico to the United States; the same to Mexico City, continuing to Tapachula, near the border with Guatemala. CAMW continues on through Guatemala City, entering El Salvador, and branching off to Tegucigalpa, Honduras. The system then links with Managua, Nicaragua; passes through Costa Rica (San Jose), and runs the length of the Panamanian state, from David to Panama City, where a connection exists into RIT, via Colombia.

Naturally, a good number of well-trained professionals are required to operate and maintain a network of this size. The COMTELCA organization formed a technical school in 1968, located on the grounds of the Instituto Tecnologico Centroamericano in Santa Tecla, El Salvador.[34] The Instituto Centroamericano de Telecomunicaciones began training personnel in 1972.[35] Cooperation was received from the United Nations Development Program, as well as the individual republican telecoms administrations. The ITU was also very generous with gifts and assistance.

Some states and organizations maintain memberships within the EBU (European Broadcasting Union); the International Radio and Television Organization (OIRT); Caribbean Broadcasting Union; The Asociacion Interamericana de Radiodifusion (AIR); and the Commonwealth Broadcasting Association.[36] These are specialized, member-service groups.

A very interesting inter-regional organization is the OTI (Organizacion de la Television Iberoamericana), which links together broadcasters on both sides of the Atlantic; the common denominator being Iberian cultural ties.[37] Thus, members in Spain, Portugal, Argentina, Brazil, Chile, Colombia, Mexico, Peru and Uruguay have concluded cooperative agreements which permit a simplified interchange of news information and other program materials.[38] The satellite makes this possible, taking advantage of appropriate facilities in the member nations.

The OTI was formed in 1971, the result of a series of contacts between interested parties.[39] It is dedicated to furthering cooperation in Spanish

and Portuguese speaking states, and concerns itself mainly with transmission of current events and sports.

Two worldwide satellite organizations are also represented in the Americas. INTELSAT has a total of 46 earth stations in the Western Hemisphere, while INTERSPUTNIK has two facilities; one in Cuba and another in the United States.[40] The satellite is one of the most important developments in telecommunications history, and is reflected as such in its use throughout the world. Direct or secondary connections are possible between many locations.

In a few cases, submarine cables connect Latin states to extra-hemispheric centers. These have been negotiated on bi- or multi-lateral bases. A large cable between South America-Africa-Europe has been discussed, in order to lessen demands on the INTELSAT network, for telecoms traffic, so that valuable transponder space could be better used for broadband signals.[41]

This intricate web is one of the guarantees of the future. Latin, and in fact, all nations, can never be off course if it is one which leads toward greater communications, and hence, better understanding and information.

INTRODUCTION

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LITERATURE REVIEW

Does geographical proximity equate with avilability or easy accessibility of information? Not necessarily so. In the case of the information flow between North America and the other member states of this hemisphere, traffic has tended to be impeded and rather unidirectional when it does get through, favoring north-to-south.

Information transmission is an ongoing process, as continuous as social development and human life itself. The collection and dissemination of this knowledge, is, however, not always accomplished by "leaps and bounds," but rather, by many smaller steps; often one at a time. Such is truly the case of available literature on Latin American communications.

As with any investigation into a particular geographical region, Latin-oriented references may be categorized within a few major groups: a) Regional General: addressing the whole area, as to broadcast and common-carrier communications, taking an overall or country-by-country approach; b) Sub-regional General: related to the above entry, except for a closer scrutiny of specialization on a certain part of the overall region: c) Regional and Sub-regional Specialized: taking into account a specific or limited field of interest, either within all of Latin America or a sub-division thereof; d) National Entity Specialization: with a complete interest in the electronic communications of a specific state of dependency; e) National Entity Topical: selection of a relatively narrow field of study, within a particular nation.

This categorization permits a closer look into bibliographic availability for the subject at hand. Within the "Regional-General" group, there are several works which are included: Merrill's The Foreign Press (1964)[1], which although very much print-oriented, does include a paragraph or two in reference to broadcast media, per country. This work is one of the most comprehensive, as it not only comments on the organization of the electronic media, but also has a good selection of countries, omitting only certain Caribbean islands and lesser mainland territories. Unfortunately, situations have changed, in some cases, since the publication of this work, although it remains a useful basic reference. Some comments on internal politics of specific states are also not timely.

UNESCO published World Communications in the same year that Merrill's book appeared.[2] Beginning with a regional summary, as well as a categorized review for the print media, radio, television and cine, World Communications includes excellent graphic illustrations to portray media distribution and other factors. A country-by-country breakdown of basic statistical parameters is also provided, showing population, literacy, number of newspapers and circulation, broadcast stations and receivers, as well as a brief section on radio and television organization in each state; ownership, finance of broadcasting predominating. An updated edition was released eleven years later, basically following the general plan detailed above.[3]

Another "general category" reference is Internationales Handbuch für Rundfunk and Fernsehen, issued by the Hans Bredow-Institut, in 1967.[4]

There are extensive listings of stations and their facilities, covering all of Latin America as well as the rest of the world. Accuracy is somewhat of a problem, however, owing to often substantial changes which have taken place since publication. Radio and television broadcasters and ancillary services predominate.

The "grandfather of all references" is Lichty's World and International Broadcasting: A Bibliography.[5] Issued in 1971, extensive media-related publications, articles and ephemera are given for each of the many countries included. While this is a voluminous work, entries predate 1970, making it a fine source of information before this time. Little is included in reference to common-carrier services, and not all countries are covered in detail, dearth of information understandably making it difficult to do so. Paraguay, for example, has only two entries.

Foreign Broadcast Information Service issues Broadcast Stations of the World, the most recent edition of which was printed in 1974.[6] Although this publication covers all countries and territories, including those comprising Latin America, information, especially that of a technical nature, may lag well behind the current operating conditions.

Rickard's The Caribbean Year Book is intended for use as a resource book for businessmen and firms which might be doing or considering trade with the Caribe and adjacencies.[7] Very complete, this source analyzes each state, including a paragraph or two on the broadcast and common-carrier services, albeit in varying detail. Sections concerning the British

Caribbean and Anglophone entities are particularly well covered. Some operational information is out of date, services having been upgraded through more modern technology or practices.

In the Spring, 1978 edition of Journal of Broadcasting, Daniel Appelman presented "The Mass Media of Latin America: Selected Information Sources."[8] Combining books and periodicals on general media, film, radio and television, a far reaching bibliography is provided. Most of the sources listed are quite general in nature, or deal with the philosophical or programming aspects of broadcasting.

The World Radio TV Handbook, edited by Jens Frost, has long been a mainstay of research in international communications.[9] An excellent work in every regard, WRTH carefully lists facilities in all nations of the world. Although providing only names, addresses, frequencies and powers utilized, as well as brief programming content or schedules, the Handbook serves as a nucleus for accurate research in the field, as it is updated on a continuous basis, making use of highly sophisticated methods and having correspondents in all parts of the world.

The "general category" for common-carrier sources is not nearly as lengthy as that which has preceded. Articles and reports have been found to contain the most accurate and best presented information.

In 1960, Mr. Carlos Nuñez A. wrote an article entitled: "The Inter-American Telecommunication Network (RIT)," published in the Telecommunication Journal, official organ of the International Telecommunication

Union.[10] In his account, Nuñez explained how the ITU and other international bodies had tried for quite some time to encourage closer contacts between Latin American telecoms administrations, with a view toward standardization of operating practices and eventual expansion of services. Actual and projected circuit requirements were given, along with pertaining routing information and means of such communication. A "backbone" network evolved from such studies and is now the main pathway of common-carrier and point-to-point service in the region.

Eleven years later, another detailed article appeared in the Telecommunication Journal, this time offered by Mr. Eugenio Mendez, Secretariat for Communications and Transport of the Mexican Republic.[11] "The Telecommunications Infrastructure in Latin America" outlined much of the same historical and growth information presented by Nuñez, but acting as a report on what progress had been made since the initiation of efforts, several years earlier. Specific references to two important regional organizations, CITEL and COMTELCA were given, as well as network expansion and modernization, within a coordinated and generally harmonious framework.

As mentioned earlier, The Caribbean Year Book has included brief sections in reference to common-carrier facilities.[12] The details vary with the particular country or territory, but generally are reasonable in completeness.

Another reference to treat the matter is the National Basic Intelligence Factbook, published by the Central Intelligence Agency.[13] Besides giving

basic statistical information, such as the number of telephone instruments in service, brief descriptions as to network composition are also provided, although the brevity should be stressed.

In the realm of "Sub-regional General" and "Regional and Sub-regional Specialized," we have several major entries of note:

CIESPAL, Centro Internacional de Estudios Superiores de Periodismo para American Latina, released El Derecho Internacional y el Periodismo, in 1964, under the authorship of Manuel de Guzman Polanco.[14] Addressing itself to international law and the media, the position of the media within national legal frameworks were also explained, as well as the rights of man within the bounds of national identity and cognate areas. A very thorough historical and functional overview of the Latin media is given, along with international treaties and documents in relation to press operations and reporting, as well as free flow of information.

Two years later, CIESPAL offered La Radio y la Television Frente a la Necesidad Cultural en America Latina, a final report of a regional seminar held in Quito, Ecuador.[15] The media as it affects society and social behavior is the main topic of this publication, as well as the composition and social mission of forms of mass expression. Quite international in scope, the report offered observations as to possible betterment of communications with improved technology and management services, as well as a more fruitful interchange of news items from different countries.

Lent provided "Caribbean Mass Communications," as a bibliography submitted to the Journal of Broadcasting, in 1976.[16] Organized in a manner which is very similar to Appelman, general and more specialized sources of information are divided into segments of the Caribe, notably: "British," "French," "Netherlands," and "Spanish." A large portion of the references listed deal with overall media structure and operation, as well as advertising.

Broadcasting in the Third World (Katz and Wedell) is one of the more recent books to partially consider the social communication infrastructure in Latin America.[17] While mostly concerning developing states in general, examples are given for the region in question, with special emphasis on the republics of Brazil and Peru. Nationalism, media goals and interrelationships are also dealt with to a great extent, as is the case of the use of the United States as a broadcasting role model.

The Television Almanac, an annual publication, includes specific information of how the industry is conducted and regulated in several regional countries, including: Argentina, Brazil, Mexico and Puerto Rico.[18] Underlying governmental regulations and programming trends, as well as advertising, are major inclusions here. As the title indicates, this book is primarily concerned with the visual medium.

In terms of "sub-regional/specialized" material for common-carrier, we have the various reports issued by the International Telecommunications Union, including: Fourteenth Report by the International Telecommunications Union on Telecommunications and the Peaceful Use of Outer Space, and the

Fifteenth Report of the series.[19] Every nation employing, considering or experimenting with some form of satellite communication is mentioned, although to varying degrees. While the reports have been an annual publication of the ITU for the past twenty years, the two included here provide a "midway point" for discussion of new installations without neglecting well established services or facilities.

The Communications Satellite Corporation publishes a yearly listing of satellite stations, under the title of: COMSAT Guide to the INTELSAT, Marisat and COMSTAR Satellite Systems.[20] Very complete and comprehensive, the Guide is a good basic reference.

One can see that the primary references available are fragmentary and that a good deal of searching is required before being able to piece together the "complete picture." This is even more the case as we enter into the "National Entity" and "Topical" categories, where, although there are substantially more references available, these are in the form of scattered reports, articles clipped from a variety of journals, quotes from radio broadcasts and the like. A continuity gap is quickly discovered by the researcher investigating this field.

Since a listing of all secondary or ephemeral sources would require many pages, a brief encounter with typical references should suffice: Articles and reports in the press are frequent locations for important details on Latin systems. The International Telecommunication Union's Telecommunication Journal is always quite complete and a very reliable source.[21] As

coverage is given on a random basis, a review of several years worth of back issues may be necessitated in order to find enough details for a given state or topic. Typically, one can expect to find inclusions such as: "New Caribbean Communications Scheme;"[22] "Radio Relay Network for Paraguay;"[23] "Telecommunications in Nicaragua;"[24] "Peruvian Government Signs Telephone Agreement."[25]

The European Broadcasting Union's EBU Review is another good place to search for relevant articles.[26] Though obviously devoted to continental happenings, an occasional Latin article does slip in, offered by an associate member in this hemisphere.

The International Radio and Television Organization (OIRT) serves socialist states, and its publication, Radio and Television frequently carries useful articles on happenings in Cuba and certain other Caribbean, Central and South American republics.[27] Attention is often given to the INTERSPUTNIK network, as well. Articles might be as: "Television in Cuba;"[28] "Campaign Against Illiteracy in Cuba and the Role of Radio and Television in its Development;"[29] or "Intersputnik Taking Part in the 'Olympiad-80' Coverage."[30]

Reports and presentations from individual countries are also a primary consideration: "Telecommunications Development in the Bahamas"[31] (via the ITU); "Que es Televisa;"[32] "ICR: Instituto Cubano de Radiodifusion;"[33] or "Autoridad de Comunicaciones del Estado Libre de Puerto Rico, Informe Anual."[34]

Monitoring of direct broadcast transmissions are always a valuable, up-to-date means of gaining information, although accuracy should be checked against other sources. Frequently, useful details which may never find their way into print will appear on newscasts or actuality programs, as releases from responsible authorities or other bodies. Some international broadcasters maintain special programs intended as a "round-up" of important happenings in a certain field. It is not uncommon to find broadcast stories helpful in fitting missing details in much larger, overall projects or developments. What may be left out of an article may appear on a broadcast, or vice-versa.

Perhaps the most worthwhile and enjoyable means of data collection is through personal friendships and contacts with individuals familiar with or employed within the communications infrastructures of the various nations, or the helpful people who have taken the time to respond to the questions of someone interested. While it often requires patience in applying for information directly from the source, the long wait is always well worth any mental anguish.

In summary, the completion of useful and comprehensive information on Latin communications is no easy matter. One cannot go to even a small group of references and have in hand an integrated view. It is necessary to assemble, as with a puzzle, items as they are found, correlating until an adequate product is achieved. It is with this in mind that one should read through this thesis. It was not intended and could never be an answer to all omissions or obscure situations. It is, rather, an attempt

at filling a few more of the gaps in the never-ending quest for information.

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THE CARIBBEAN

It could be said without much chance of error that the Caribbean is a microcosm of the history of the Western Hemisphere. After all, it was on islands of this region that the first European explorers landed; save the possibility of Norse visits to Vinland. The Caribe lacks uniformity. Perhaps it is this which makes it such a worthwhile and interesting topic for so many. A short geographical distance can, in the Caribbean, represent a cultural and historical distance of continents and centuries. Twenty-two political entities exist, varying widely in composition, size, shape and direction of development.

Although there are several independent republics, many islands still maintain close relations with former colonial powers; notably the British, French and Dutch. The United States also has substantial territories in the region. Varying degrees of political awareness and conviction also mark the Caribbean; with long-standing national identities in Cuba, Dominican Republic and Haiti. A growing tendency towards regionalism is not to be overlooked.

As a geographical zone, the Caribbean Islands total 238,298 kM^2, and have just under 30 million inhabitants.[1] Other statistics of note follow:[2]

Average Population Density: 121.7 per kM^2
Total Regional GNP: US$ 30.47 billion
Average Per-Capita-Income: US$ 1,051
Average Literacy: 81 percent
Total Number of Radio Broadcast Stations: 288
" " " " Receivers: 8.29 million
" " " " " per hundred: 42.12
" " " Television Stations: 38
" " " " Receivers: 2.34 million
" " " " " per hundred: 10.11
" " " Telephones: 1,231,300
" " " " per hundred: 9.74
Total Electrical Generation Capacity: 4,735,307 kW
Areas With 30 hZ Power Systems: 45 percent
" " 60 hZ " " : 50 "
" " Both 50 and 60 hZ Systems: 5 percent
" " System M/MONO/NTSC/SECAM Television Systems: 55 percent
" " " N/MONO/NTSC Television Systems: 9 percent
" " " K-1/SECAM Television Systems: 9 percent
" " Systems M (MONO) and D-SECAM Television Systems: 4 percent
" Without Television: 23 percent

Radio is the dominant vehicle in Caribbean social communications. It can overcome the geographical, and even cultural barriers. In all instances, radio has become a factor of national integration and development, permitting education, information and socialization. Television is rapidly growing in importance, although it does not yet compare in reach with the radio. The cost of receivers makes TV less universal, and will probably continue to do so in the future. In several instances, television of the Caribbean has been employed as an "electronic blackboard" for didactic, educational and cultural growth.

Above and beyond the role of sound broadcasting for national integration, we must not overlook the important function as an international and interregional courier. In an area of such great importance, there is an ever-increasing need for constant information; taking into

account the variety of world-views and eventualities. Programming schedules of international broadcasters do not neglect the Caribe; reaching audiences not only in major European languages, but regional dialects as well. The use of French-Creole by some major international broadcasters is an excellent example of addressing the "man in the street" in his own language. Also, the construction of relay sites in the Caribbean by European broadcasters tends to underscore the political and economic importance of the region. What started with Trans World Radio, as early as 1964, was followed by Radio Nederland; BBC-Deutsche Welle; and now, Radio Moscow. The lands bordering the Caribe are indeed attractive target areas, for international opinion-makers.

A situation which fascinates the communicator is that while radio broadcasting has long been highly influential and widespread throughout the Caribbean basin, common-carrier links have often been sporadic or difficult to establish. There were, until quite recently, instances where broadcasters on one particular island could be easily heard in other areas, although it would have been nearly impossible to set up telephone calls between the two locations. As late as the early 1970's, very old telegraphic submarine cables interconnected many points; using outdated signaling technology and having no real hope of expansion of capacity, let alone providing voice circuits. Starting in the 1920's, radiotelephone came into widespread use, for inter-island and isle-to-mainland paths. Almost all telephone traffic was carried in this way, until the installation of high-capacity cables, in the 1950's and 1960's.

The first underwater telephone cable of any distance was, in fact, laid in the Caribbean. Put into service in 1950, between Key West, Florida and Havana, Cuba, 24 voice channels were provided for.[3] This particular project served as testing ground for the trans-Atlantic cable to be constructed, a few years later. Some 16 high-capacity submarine cables cross the Caribbean today, and others are under consideration.[4] In addition, the remarkable "island-hopper" network of microwave and troposcatter links has taken communications out of the water. This is especially true in the case of the Eastern Caribbean; Windwards and Leewards, where inter-island distances are not extreme. Satellite has also brought a world of change to the Caribe; simplifying earlier communications difficulties and providing flexible trunking for intra- and inter-regional paths. At last count, there were eight earth stations on the islands.

It is the opinion of the writer that modern developments in communications have helped to bring the islands of the Caribbean closer together; in a sense of regional "good neighborliness." Examples which are particularly interesting are the links between the various islands of the Leewards and Windwards; which are primarily under the operation of Cable & Wireless, Ltd., a British international common carrier. Islands of various political, cultural and linguistic backgrounds have been effectively interconnected through the miracle of Hertzian waves.

At the same time that communications systems bring together people, choices in technologies have been greatly influenced by political or

cultural considerations. Hence, we find that while most islands employ the System M television standard, with either monochrome or NTSC operation, we have three other standards present. We must note the choice of SECAM color by Cuba and Haiti; the first owing to friendship with the USSR and Eastern Europe, and the second - by linguistic-cultural-economic relations with France. The French possessions themselves, of course, employ the SECAM technique. Some British territories have opted for a compromise: 625 line European television, using 6 mHz American channels. This is the well-known System N. Satellite communications have also been molded by international realities. The Republic of Cuba is a member of both INTELSAT and INTERSPUTNIK, joining the former at the time of the Non-Aligned Conference, held in Havana during 1979. All other stations operate with INTELSAT, exclusively.[5]

Further emphasis on regionalization, within the framework of the Western Hemisphere, has been realized by the inclusion of several islands in the North American telephone system. Besides Canada, the U.S.A., and Mexico, there are the islands of Puerto Rico, Dominican Republic, Jamaica, Antigua, Bahamas, Barbados, British West Indies (some), and the Virgin Islands. Direct STD dialing is possible, through the use of Area Code 809, and standardization of telephone numbering systems.

THE CARIBBEAN

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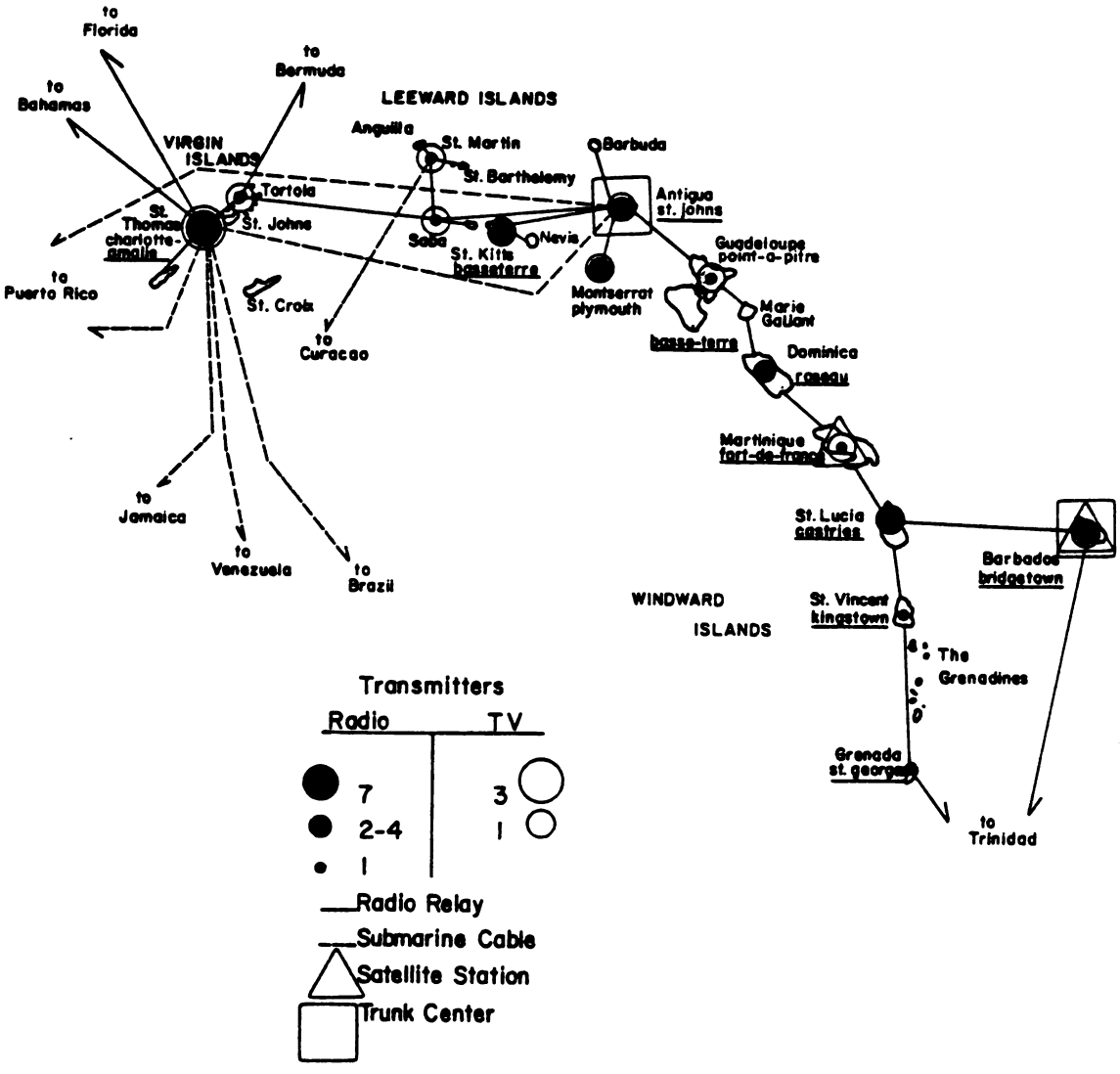
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FIGURE 1


Communication Networks
in
WEST INDIES
to Florida
to Bermuda
to Bahamas
LEEWARD ISLANDS
Anguilla
St. Martin
Barbuda
VIRGIN ISLANDS
St. Barthelemy
Tortola
Antigua st. johns
St. Thomas charlotte-amalie
St. Johns
Saba
Nevis
St. Kitts basseterre
Guadeloupe point-a-pitre
to Puerto Rico
St. Croix
Montserrat plymouth
Marie Galiant
to Curacao
basse-terre
Dominica roseau
Martinique fort-de-france
to Jamaica
St. Lucia castries
Barbados bridgetown
to Venezuela
to Brazil
WINDWARD ISLANDS
St. Vincent kingstown
The Grenadines
Grenada st. georges
to Trinidad
Transmitters
Radio
TV
7
2-4
1
3
1
Radio Relay
Submarine Cable
Satellite Station
Trunk Center

ANTIGUA

(State of Antigua)

Basic Information:[1]

Area: 443 kM^2
Population: 78,000 (1977)
Population Density: 257.1 per kM^2
Capital: St. Johns
Major Cities: St. Johns
Language: English
Religions: Church of England, other Protestant, Roman Catholic
Gross National Product: US$ 51 million (1974)
Per Capita Income: US$ 708
Literacy: 80%

Geographical Summary:[2]

Located in the Leeward Islands, Antigua is approximately 400 kM from Puerto Rico. Adjacent islands include St. Kitts, Nevis, Montserrat and Guadeloupe. Terrain is both hilly and level, in different areas with intensive agriculture practiced on suitable ground. The tropical climate is often unpredictable.

Basic National Review:[3]

Antigua, along with other islands, was given self-governing status by the United Kingdom, in the late 1960's. As an Associated State, Antigua enjoys prosperity within the Commonwealth, with the U.K. being responsible for defense and international relations. Agricultural exports of cotton, sugar, and various fruits are important, as are re-exports of petroleum products, aircraft and parts.

Telecommunications Overview:[4]

Number of Radio Broadcast Stations: 4
" " " Receivers: 16,100
" " " " per hundred: 21.46
" " Television Stations: 1
" " " Receivers: 15,500
" " " " per hundred: 20.66
" " Telephones: 3,500
" " " per hundred: 4.66
Electrical Generation Capacity: 23,000 kW
" Service: 60 hZ, 120 volts
Television Standard: System M, presently monochrome
Satellite Earth Stations: None
International Communications: Via microwave/radio relay to neighboring islands; submarine cables and HF radio. Access to satellite stations on Barbados and Trinidad.
Ownership of Communications Media: Both government and private.

Domestic Broadcasting:[5]

Antigua is served by three local broadcasting stations, as well as a joint BBC-Deutsche Welle relay site. The Antigua Broadcasting Service, operated by the island government, transmits from St. Johns on 620 kHz, with 5 kW. Programs are generally from 0900-0400, with news relays from the BBC and AFRTS. A coeval organization, the Antigua and Barbuda Broadcasting Services, operates the only television station (ABS-TV) on Channel 10. The transmitter is located atop Boggy Peak (405 metres), and works with a power of 22/4.5 kW, ERP, horizontal polarization. A repeater station is fed on Montserrat (Channel 7, 1 kW ERP). System M is used, with no color at present. Programs run for some five hours each day, serving close to 16,000 television sets in the islands.

Radio ZDK is a privately owned, commercial broadcaster, with 10 kW power on 1100 kHz, as well as 99.0 mHz, Fm. The daily schedule is 0956 to

0504, with relays of the BBC and AFRTS news. ZDK hopes to increase its power to 50 kW, as well as to add stereo capability to their FM station.

The Caribbean Radio Lighthouse, a religious organization, also operates from Antigua. Working on 1165 kHz with 10 kW, as well as a 10 watt FM transmitter (90 mHz), the station broadcasts spiritual programming to the Eastern Caribbean from 1000-0215. English is the only language used, and the BBC World Service has been frequently relayed.

Joint BBC-Deutsche Welle shortwave relay facilities have been installed on Antigua, for retransmission of international programs to the Western Hemisphere. Four Marconi 250 kW transmitters are available, along with 18 curtain antenna arrays. Transmissions concentrate on areas between 160 and 340 degrees, from North. Programs are fed via a multi-channel receiving station, located approximately 7 kM from the transmitter site. The antenna systems are of exceptionally durable construction, owing to strong winds present in the area.[6]

Common Carrier Services:

Automatic telephone service is provided on the island by Cable & Wireless, Ltd., which also maintains external connections.[7] The Antigua trunk exchange is equipped with 108 international circuits; 77 inter-island trunks to Tortola, St. Kitts, Montserrat, St. Maarten, San Juan (Puerto Rico) and Guadeloupe.[8] Some 40 lines extend from this center to the St. Johns automatic local exchange. Antigua center connects with corresponding trunk exchanges on Barbados and Trinidad, from where access

may be provided to INTELSAT stations.[9] Circuits to St. Lucia, after which continuing to Barbados and Trinidad, are provided over a 350 kM troposcatter link, working on 990 mHz.[10] The Antigua-Tortola circuits are also via tropo, but on 2 gHz.[11] Eighty voice channels are possible on both routes, in duplex.[12] An 80 channel coaxial submarine cable connects Antigua to St. Thomas, Virgin Islands, and older VHF radio inter-island links are maintained as backup.[13] Provisions have been made for adding more channels to the microwave system.

Antigua is now part of the North American telephone network, belonging to Area Code 809. As such, direct access is provided to U.S./Canada/ Mexico telephones, as well as trunked circuits.

A submarine cable, belonging to the U.S. Government, links Antigua with the Turks & Caicos Islands, and the Bahamas. This cable is used in conjunction with NASA space mission tracking operations, with sixty voice channels.[14]

Electrical services are provided by the Antigua Public Utilities Authority. Major generating plants are: Coolidge Airfield - 450 kW, diesel; Friars Hill - 9 MW, diesel and steam turbine; Crabbes Peninsula - 8.2 MW, in conjunction with a desalinization plant. Electricity is provided at 120/230/400 volts, 50 hZ, poly-phase. Almost every part of the island is served by the electrical grid.[15]

Overall Analysis:

Antigua has a very high availability of radio and television receivers, as well as a good media choice. Besides broadcast stations on the island itself, signals from other Caribbean, Latin and North American stations are also received. Telephone service is adequate, with very good inter-island connections. Calls to the rest of the world may be sent via the Barbados or Trinidad earth stations, or through other Cable and Wireless facilities.

VOA established a relay station on Antigua, in 1981, using 1580 kHz with a power of 50 kW. This is intended to serve the English-speaking Caribbean.[16]

ANTIGUA

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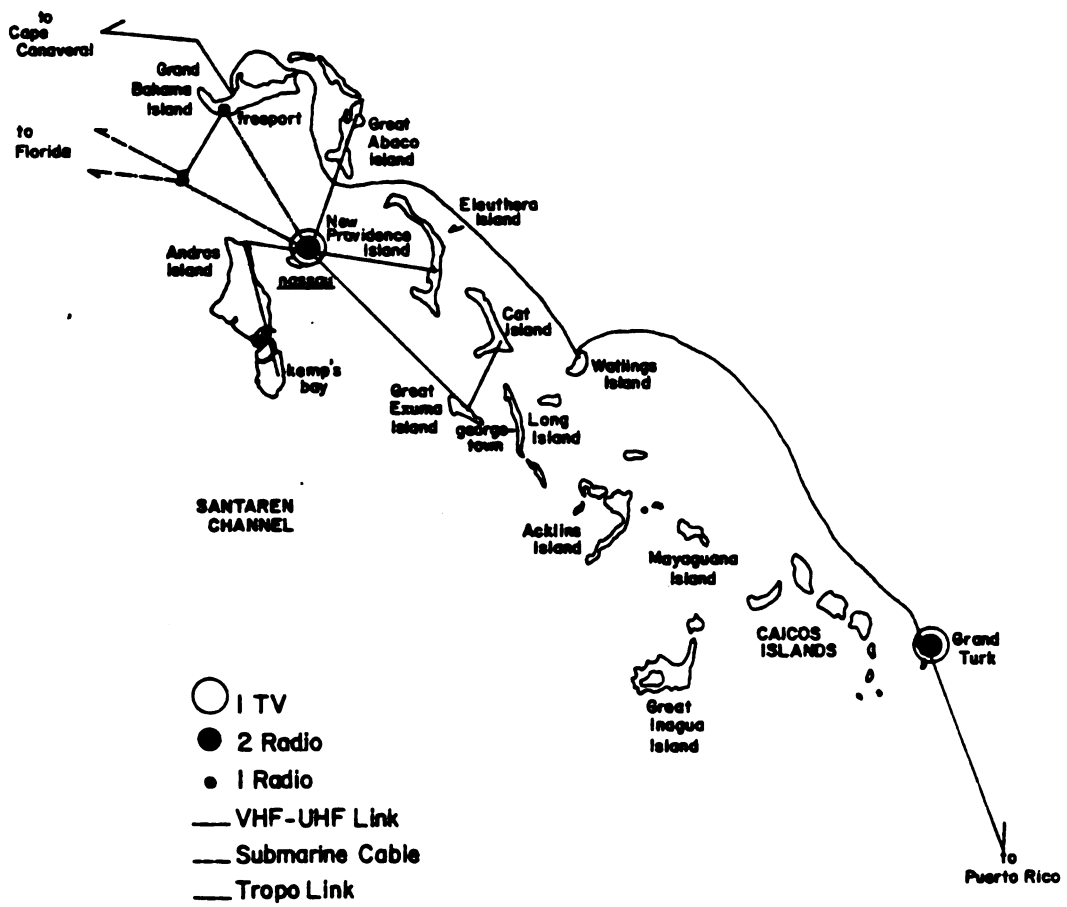
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14. Jack E. Cole, George S. Li, The World's Submarine Telephone Cable Systems (Washington, D.C.: U.S., Department of Commerce, 1975 , pp. 116-117.

15. The Caribbean Year Book 1977-78, s.v. "Antigua."

16. Glenn Hauser, "DX Listening," Popular Electronics September 1981: 97.

FIGURE 2


Communication Networks
in
BAHAMAS
to
Cape
Canaveral
Grand
Bahama
Island
Freeport
to
Florida
Great
Abaco
Island
Eleuthera
Island
New
Providence
Island
Andros
Island
Nassau
Cat
Island
Kemp's
bay
Great
Exuma
Island
George-
town
Long
Island
Watlings
Island
SANTAREN
CHANNEL
Acklins
Island
Mayaguana
Island
CAICOS
ISLANDS
Grand
Turk
Great
Inagua
Island
to
Puerto Rico
1 TV
2 Radio
1 Radio
VHF-UHF Link
Submarine Cable
Tropo Link

BAHAMAS

(Commonwealth of the Bahamas)

Basic Information:[1]

Area: 13,935 kM^2
Population: 230,000 (1978)
" Density: 16.5 per kM^2
Capital: Nassau
Major Cities: Nassau, Freeport, Governor's Harbour, George Town
Language: English
Religions: Protestant, Roman Catholic
Gross National Product: US$ 700 million (1974)
Per Capita Income: US$ 3,343
Literacy: 93 percent

Geographical Summary:[2]

An archipelago of some 700 islands, the Bahamas are located just east of Florida, and to the north-northeast of Cuba. The chain runs for more than 1200 kM, northwest to southeast. Only a few islands are actually inhabited; the most important being New Providence (Nassau), Grand Bahama, Abaco, Eleuthra, Cat, Andros, Crooked and San Salvador. The islands are flat, with elevations less than 60 metres. Most people live on New Providence, where the capital is located.

Basic National Review:[3]

Settled by the British as early as 1547, and a colony since 1783, the Bahamas received internal self-rule in 1964. A black prime minister was elected in 1967, and independence within the framework of Commonwealth membership came about in 1973. The government has pursued a policy of greater involvement in economic development. Tourism, international finance, tropical agriculture

and sea products are all important to the Bahamian economy. A convenient location in respect to the United States attracts North American tourists.

Telecommunications Overview:[4]

Number of Radio Broadcast Stations: 3
" " " Receivers: 98,000
" " " " per hundred: 42.6
" " Television Stations: 1
" " " Receivers: 35,000
" " " " per hundred: 15.22
" " Telephones: 58,033 (1977)
" " " per hundred: 25.23
Electrical Generation Capacity: 250,000 kW
" Service: 60 hZ, 110/200 volts
Satellite Earth Stations: None
International Communications: Troposcatter, submarine cables & HF radio
Ownership of Communications Media: Government
Television Standard: System M, NTSC color
Telecommunications Administration: Bahamas Telecommunications Corporation (Nassau)

Domestic Broadcasting:[5]

(RADIO)

Location	Station	Frequency	(kW) Power
Nassau	R. Bahamas	1540 kHz 107.1 mHz	20
	R. New Providence	1240 kHz 107.9 mHz	1
Freeport	R. Bahamas (Northern Service)	810 kHz	10
(planned)	R. Bahamas	970 kHz	10
(planned)	R. Bahamas	1070 kHz	1

(TELEVISION)

Location	Station	Channel	(kW/ERP) Power
Nassau	ZNS - Bahamas TV	13	50

Trends in Broadcasting:

Communications in the Bahamas are no easy feat, considering the geographical situation, as well as powerful neighbors which dominate the airwaves. Formerly a British colony, the Bahamas have tried to develop a national image since independence, with radio and television playing important roles. Broadcasting is a state enterprise, although it operates on a limited commercial basis. Three distinct radio stations exist, and while all are owned by the Broadcasting Corporation of the Bahamas, they are designed to serve different island groups.[6] Radio Bahamas' coverage extends to 1600 kM, and is frequently heard along the U.S. seaboard.[7] An extensive weather-alert system is in operation, with a number of receivers tuned to the Nassau station.[8] This helps to save lives in an area where tropical storms are not uncommon. Broadcasting equipment is quite modern, comparable with larger U.S. stations.

Television was recently introduced into the islands, transmitting from Nassau, and using system M-NTSC. There are some 31,000 television receivers in the Bahamas.[9] Nassau TV signals reach out for approximately 120 kM, and it is also possible to pick up stations from the U.S. mainland and Cuba, although reliability does vary.[10] In the past, experiments were conducted with a tethered kytoon, in order to extend television coverage.[11] Programs on Bahamas TV have been broadcast for approximately six hours per day.[12]

Common Carrier Services:

Communications in the Bahamas are in a state of rapid development, especially considering the tourist trade. The new nation opted to become part of the North American telephone system, being placed within Area Code 809, and thus

is an integral part of the U.S./Canada/Mexico network.[13] The Bahamas Telecommunications Corporation operates a combination of submarine cable, troposcatter, microwaves in visibility and radio relay, with provides interconnection between principal islands - and with outside points.[14]

Main routes go from Nassau to Eight Mile Rock, and on to Florida, with principal trunk switching centers at both locations. Other important routes are from Nassau to Freeport, and to George Town, as well as links to Governor's Harbour, Fresh Creek and Marsh Harbour.[15] Domestic telephony is mostly automatic, using step-by-step, X-Y and crossbar equipment of different manufacture. Some local-battery manual exchanges still exist on the smaller islands.[16] STD is available from many locations, and to/from the North American mainland.

Telegraph and telex services are routed via TRT - Tropical Radio Telegraph, in Miami, and Cable & Wireless, in Kingston, Jamaica.[17] International voice-grade traffic uses the Miami gateway, in conjunction with ATT - American Telephone and Telegraph.[18] A Nassau-Miami tropo link exists, equipped with 132 voice channels. Two HF circuits are kept in reserve.[19] The route from Nassau to Freeport uses 60 channels, and those to other main points have 12 or 18 channels on VHF or UHF radio.[20] Much use is made of lower capacity VHF radio for circuits to lesser populated islands.[21]

The Bahamas are served by the following submarine cables:[22]

Cable Route	Cable Type	Number of Circuits
W. Palm Beach (Florida) - Eight Mile Rock	Coaxial	1380
Eight Mile Rock - Nassau	"	1380
Turk/Caicos Islands & Antigua, via San Salvador	"	60
Cape Kennedy - Grand Turk, via San Salvador	"	330

The Bahamas Electricity Corporation, under guidance of the Ministry of Works, is responsible for utility services.[23] A great deal of modernization and integration has been necessary, in order to provide reliable facilities. The insular nature of the Bahamas makes any form of electrical grid very difficult, consequently requiring a large number of independent generating plants. Recent projects of the Corporation have included a new 5.4 MW facility on North Bimini; unification of systems on Eleuthera; the provision of a 40 MW diesel generating plant on Rock Sound, as well as re-orientation of the New Providence network.[24] In Nassau, four major stations provide electricity. Throughout the islands, a combination of diesel, steam and gas turbines are used for generation.[25]

Overall Analysis:

Considering the present socio-economic situation of the Bahamas, domestic and international communications services are satisfactory for the present time. Overseas connections are mostly via the U.S., which ensures high transmission quality. The Bahamas Telecommunications Corporation has attempted to modernize remaining out-of-date sections of the island nation, basing the network on a logical and straight-forward plan.

The presence of the Bahamas within the 809 North American Area Code serves as a definite benefit for tourism, as a call home is a simple matter. Not all parts of the Bahamas are adequately covered by television and radio services. In recent years, consideration has been given to the establishment of a shortwave service, and experiments have been carried out in this regard.

BAHAMAS

1. Information Please Almamac, 1979, 33rd ed., s.v. "Countries, Territories, and Dependencies - Bahamas;" U.S., Central Intelligence Agency, National Basic Intelligence Factbook, 1980 (Washington, D.C.: Government Printing Office, 1980), p. 11; Reader's Digest 1980 Almanac and Yearbook, s.v. "Nations of the World - Bahamas;" The Caribbean Year Book 1977-78, 48th ed., s.v. "Bahamas;" The People's Almanac #2, s.v. "Nations and their Rulers - Bahamas;" The World Almanac and Book of Facts 1979, s.v. "Nations of the World - Bahamas."

2. Ibid.

3. Ibid.

4. Information Please Almanac, 1979, 33rd ed., s.v. "Countries, Territories, and Dependencies - Bahamas;" U.S., Central Intelligence Agency, National Basic Intelligence Factbook, 1980 (Washington, D.C.: Government Printing Office, 1980), p. 11; Reader's Digest 1980 Almanac and Yearbook, s.v. "Nations of the World - Bahamas;" The Caribbean Year Book 1977-78, 48th ed., s.v. "Bahamas;" The People's Almanac #2, s.v. "Nations and their Rulers - Bahamas;" The World Almanac and Book of Facts 1979, s.v. "Nations of the World - Bahamas;" J.M. Frost, ed., World Radio TV Handbook (Hvidovre, Denmark: Billboard Publications, Inc. 1979) pp. 289, 411.

5. Frost, World Radio TV Handbook, pp. 289, 411.

6. Ibid., p. 289.

7. The Caribbean Year Book 1977-78, s.v. "Bahamas."

8. Ibid.

9. Frost, World Radio TV Handbook, p. 411.

10. The Caribbean Year Book 1977-78, s.v. "Bahamas."

11. Worldmark Encyclopedia of the Nations, 5th ed., s.v. "Bahamas."

12. Frost, World Radio TV Handbook, p. 411.

13. "Telecommunications Development in the Bahamas," Telecommunication Journal 40 (March 1973): 142-150.

14. Ibid.

15. Ibid.

16. Ibid.

17. The Caribbean Year Book 1977-78, s.v. "Bahamas."

18. Ibid.

19. Ibid.

20. Ibid.

21. Ibid.

22. Jack E. Cole, George S. Li, The World's Submarine Telephone Cable Systems (Washington, D.C.: Department of Commerce, 1975), pp. 116-117, 146-147, 204-205.

23. The Caribbean Year Book 1977-78, s.v. "Bahamas."

24. Ibid.

25. Ibid.

BARBADOS

(Barbados)

Basic Information:[1]

Area: 431 kM^2
Population: 260,000 (1977)
Population Density: 603 per kM^2
Capital: Bridgetown
Major Cities: Bridgetown
Language: English
Religions: Anglican, Methodist, Roman Catholic
Gross National Product: US$ 380 million (1976)
Per Capita Income: US$ 1,460
Literacy: 98 percent

Geographical Summary:[2]

Located approximately 480 kM northeast of Venezuela, Barbados is the most easterly of any Caribbean island. Formed from coral, the elevation gradually rises, with a maximum of 337 metres (Mt. Hillaby). There are many beaches and plateaus. A small nation, Barbados is only 34 kM long and 23 kM at the widest point.

Basic National Review:[3]

Settled by the British, Barbados developed a thriving sugar-based economy, using imported African labor. Home rule came about and was followed by full independence, in 1966. Barbados is a member of CARIFTA and CARIBCOM, and maintains relations with Cuba. Close contacts are kept with European nations, as well. Agriculture is still the economic mainstay, with sugar and the subproducts of rum and molasses predominating. Light industry also is important.

Telecommunications Overview:[4]

International Prefix: 8PA-8PZ
Number of Radio Broadcast Stations: 2
" " " Receivers: 130,500
" " " " per hundred: 50.2
" " Television Stations: 1
" " " Receivers: 49,000
" " " " per hundred: 18.85
" " Telephones: 44,049
" " " per hundred: 16.94
Electrical Generation Capacity: 107,000 kW
Electrical Service: 50 hZ, 110/220 volts
Satellite Earth Stations: INTELSAT earth station, approximately 16 kM north of Bridgetown
International Communications: Via satellite, HF radio, troposcatter and VHF/UHF radio links to nearby islands. Also, two submarine cables.
Ownership of Communications Media: Government-controlled, also private (common-carrier)
Television Standard: System N, NTSC color

Domestic Broadcasting:[5]

Electronic media on Barbados operates under the auspices of the Caribbean Broadcasting Corporation and Barbados Rediffusion Service, Ltd., both of which are, in turn, regulated by the Ministry of Tourism, Information and Public Relations. The CBC is a statutory body, and is responsible by law for the day-to-day operations of radio and television on the island. Radio Barbados, part of the corporation, operates a 10 kW transmitter on 900 kHz, and an FM outlet, on 98.1 mHz, in a domestic service. Approximately 18 hours of programming is sent out each day. The Barbados Rediffusion system is a public utility, and maintains a wired broadcast network, programmed from Bridgetown. Extensive use of BBC relays is made. CBC Television uses system N, NTSC color, on U.S. channel 3. Transmitter power is 60/30 kW, ERP. Information on hand states that all but one hour of productions, per diem, are recorded;

that is to say, bicycled in. While there is no license necessary for radio, television does require payment. In 1978, the fee was US$ 20 for a monochrome set, or US$ 30 for a color receiver.

Common Carrier Services:

There are some 44,000 telephones on the island, using an automatic network operated by Barbados Telephone Company.[6] Eight exchanges are used in the system. An international telephone center is located at Bridgetown, which connects with Guyana, Grenada, St. Lucia, Dominica and St. Vincent, as well as satellite and trunked connections.[7] UHF radio links Barbados with St. Vincent and St. Lucia. Troposcatter connects the island with Trinidad.[8] Two submarine telegraphic cables (Cable & Wireless) extend to diverse points in the C&W network.[9] The Barbados satellite station operates with INTELSAT Atlantic Ocean units, providing paths to the United States, U.K., Canada and Jamaica.[10] This facility is one of three important Cable and Wireless stations in the Caribbean, and not only services Barbados, but neighboring states as well.

Barbados is part of the North American telephone network, belonging to Area Code 809.[11]

Electricity is provided by the Barbados Light and Power Company, with services reaching over 90 percent of the territory.[12] A total generating capacity of 107,000 kW permits flexibility in national development.[13] Steam turbines account for most of the output, and two recent

additions have notably modernized the production system.[14] Commercial service is provided at 50 hZ, poly-phase.

Overall Analysis:

Considering its present state of development, Barbados has a highly advanced telecommunications system; both social and common carrier. In fact, there are many larger nations with much less in this regard, than has Barbados. The island is also an interesting case in terms of broadcast practice, as the government owns the stations, but commercial airtime supports them.

BARBADOS

1. Information Please Almanac, 1979, 33rd ed., s.v. "Countries, Territories, and Dependencies - Barbados;" U.S., Central Intelligence Agency, National Basic Intelligence Factbook, 1980 (Eashington, D.C.: Government Printing Office, 1980), p. 14; Reader's Digest 1980 Almanac and Yearbook, s.v. "Nations of the World - Barbados;" The Caribbean Year Book 1977-78, 48th ed., s.v. "Barbados;" The People's Almanac #2, s.v. "Nations and their Rulers - Barbados;" The World Almanac and Book of Facts 1979, s.v. "Nations of the World - Barbados."

2. Ibid.

3. Ibid.

4. Information Please Almanac, 1979, 33rd ed., s.v. "Countries, Territories, and Dependenceis - Barbados;" U.S., Central Intelligence Agency, National Basic Intelligence Factbook, 1980 (Washington, D.C.: Government Printing Office, 1980), p. 14; Reader's Digest 1980 Almanac and Yearbook, s.v. "Nations of the World - Barbados;" The Caribbean Year Book 1977-78, 48th ed., s.v. "Barbados;" The People's Almanac #2, s.v. "Nations and their Rulers - Barbados;" The World Almanac and Book of Facts 1979, s.v. "Nations of the World - Barbados." J. M. Frost, ed., World Radio TV Handbook (Hvidovre, Denmark: Billboard Publications, Inc., 1979) pp. 289. 411.

5. Frost, World Radio TV Handbook, pp. 289, 411; The Caribbean Year Book 1977-78, s.v. "Barbados."

6. Central Intelligence Agency, National Basic Intelligence Factbook, 1980, p. 14.

7. "New International Switching Centres to be Installed in West Indies," Telecommunication Journal 37 (March 1970): 137.

8. "Tropo...in the Caribbees," Telecommunication Journal 32 (August 1965): vii.

9. "New Caribbean Communications Scheme," Telecommunication Journal 31 (April 1964): 90.

10. "New International Switching Centres to be Installed in West Indies," Telecommunication Journal: 137.

11. American Telephone and Telegraph Company, Personal International Directory (New York: American Telephone and Telegraph Company, 1979), p. 4.

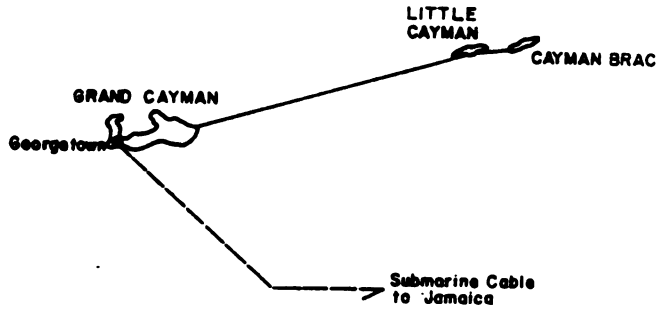
12. The Caribbean Year Book 1977-78, s.v. "Barbados."

13. Ibid.

14. Ibid.

FIGURE 3

Communication Networks in CAYMAN ISLANDS



● 2 Radio

—— VHF Link

CAYMAN ISLANDS

(U.K. Dependency)

Basic Information:[1]

Area: 259 kM^2
Population: 11,363
Population Density: 44 per kM^2
Capital: Georgetown
Major Cities: Georgetown
Languages: English, some Spanish
Religion: Protestant, Roman Catholic
Gross Domestic Product: US$ 8.86 million (1972)
Per Capita Income: US$ 780
Literacy: 80 percent

Geographical Summary:[2]

Sitting approximately 280 kM west of Jamaica, and south of Cuba, the Caymans are composed of three islands: Grand Cayman, Little Cayman and Cayman Brac. Grand Cayman, the main isle, is mountainous, encircled by protecting coral reefs. Throughout, the climate is tropical and very humid. The Cayman's location ensures good communications with neighboring and regional territories.

Basic National Review:[3]

A possession of Britain since the days of sailing vessels and piracy, the Caymans still retain a maritime livelihood. Money earned by the fishing fleet accounts for a sizeable portion of total income. Georgetown is a free port, and international finance has become more and more attractive in the islands. The main export is a variety of turtle extracts and products.

Telecommunications Overview:[4]

Number of Radio Broadcast Stations: 2
" " " Receivers: 9,000
" " " " per hundred: 79.20
" " Television Stations: None
" " " Receivers: None
" " Telephones: 3,200
" " " per hundred: 28.16
Electrical Generation Capacity: 4,000 kW
Electrical Service: 60 hZ, 110/200 volts
Satellite Earth Stations: Cable & Wireless, at Georgetown
International Communications: Submarine cable to Jamaica, HF radio
Ownership of Communications Media: Both Government and private

Trends in Broadcasting:[5]

The Cayman Islands are served by two domestic broadcast stations. Radio Cayman, a commercial operation, which programs in English and Spanish for approximately 12 hours daily, uses two medium-wave and one FM transmitters. Frequencies of 1205 (10 kW) and 1555 kHz (10 kW), as well as 105.3 mHz (250 watts) are employed. Programs carried are mostly local in nature.

Radio ICCI (International College of the Cayman Islands) also is on the air, operating from Newlands, Grand Cayman. The stations' purpose is the transmission of educational and culturally edifying material, in association with the college. FM is utilized, on 101.1 mHz, 250 watts, having a stereophonic capability. Radio ICCI maintains a schedule for six hours daily.

Powerful broadcast stations from neighboring islands and mainland nations are regularly heard in the Caymans. This is especially true of Cuban broadcasters.

Common Carrier Services:

Cable & Wireless, Ltd., provides an automatic telephone system for the Caymans, consisting of over 3,000 instruments.[6] Grand Cayman, Little Cayman and Cayman Brac are interconnected via VHF radio relay, equipped for direct dialling.[7] Crossbar switching exchanges are maintained on the islands.[8] These centers are of British manufacture, and are easily expanded for further service.[9] A submarine cable, with 160 voice circuits, links Georgetown to Prospect Pen, Jamaica, and with the extensive Cable & Wireless network.[10] Some 21 repeaters are used for the 602 kM distance.[11] Access is also provided to the INTELSAT facility on Jamaica. HF radiotelephone is held in reserve.[12]

Caribbean Utilities Company, Ltd., provides electricity on Grand Cayman, while Cayman Brac Light & Power, Ltd., is responsible for Cayman Brac service.[13] Diesel generators are utilized, with a total capacity of approximately 4,000 kW.[14] Voltage is 110/200 volts, AC, at a line frequency of 60 hZ. Grand Cayman is extensively wired, with power available everywhere. Poly-phase supply may be arranged, as required.[15]

Overall Analysis:

The three islands making up the Cayman group are well interconnected, via radio relay. Radio broadcast services are also adequate, and cover the needed distances. External links are also excellent, thanks to the modern coaxial, submarine cable which extends to Jamaica, and into the Cable & Wireless network. A satellite station was recently installed in the Caymans. Using an 11 metre dish, 16 voice circuits are provided as back-up to the submarine cable.[16]

CAYMAN ISLANDS

1. Information Please Almanac, 1979, 33rd ed., s.v. "Countries, Territories, and Dependencies - Dependencies of the United Kingdom, Cayman Islands;" U.S., Central Intelligence Agency, National Basic Intelligence Factbook, 1980 (Washington, D.C.: Government Printing Office, 1980), p. 27; Reader's Digest 1980 Almanac and Yearbook, s.v. "Nations of the World - British Dependencies - Cayman Islands;" The Caribbean Year Book 1977-78, 48th ed., s.v. "Cayman Islands;" The People's Almanac #2, s.v. "Nations and their Rulers - Cayman Islands;" The World Almanac and Book of Facts 1979, s.v. "Nations of the World - United Kingdom - British West Indies."

2. Ibid.

3. Ibid.

4. Information Please Almanac, 1979, 33rd ed., s.v. "Countries, Territories, and Dependencies - Dependencies of the United Kingdom, Cayman Islands;" U.S., Central Intelligence Agency, National Basic Intelligence Factbook, 1980 (Washington, D.C.: Government Printing Office, 1980), p. 27; Reader's Digest 1980 Almanac and Yearbook, s.v. "Nations of the World - British Dependencies - Cayman Islands;" The Caribbean Year Book 1977-78, 48th ed., s.v. "Cayman Islands;" The People's Almanac #2, s.v. Nations and their Rulers - Cayman Islands;" The World Almanac and Book of Facts 1979, s.v. "Nations of the World - United Kingdom - British West Indies;" J.M. Frost, ed., World Radio TV Handbook (Hvidovre, Denmark: Billboard Publications, Inc., 1979), p. 290.

5. Frost, World Radio TV Handbook, p. 290.

6. The Caribbean Year Book 1977-78, s.v. "Cayman Islands."

7. Ibid.

8. Ibid.

9. Ibid.

10. Jack E. Cole, George S. Li, The World's Submarine Telephone Cable Systems (Washington, D.C.: Department of Commerce, 1975), p. 190.

11. Ibid.

12. The Caribbean Year Book 1977-78, s.v. "Cayman Islands."

13. Ibid.

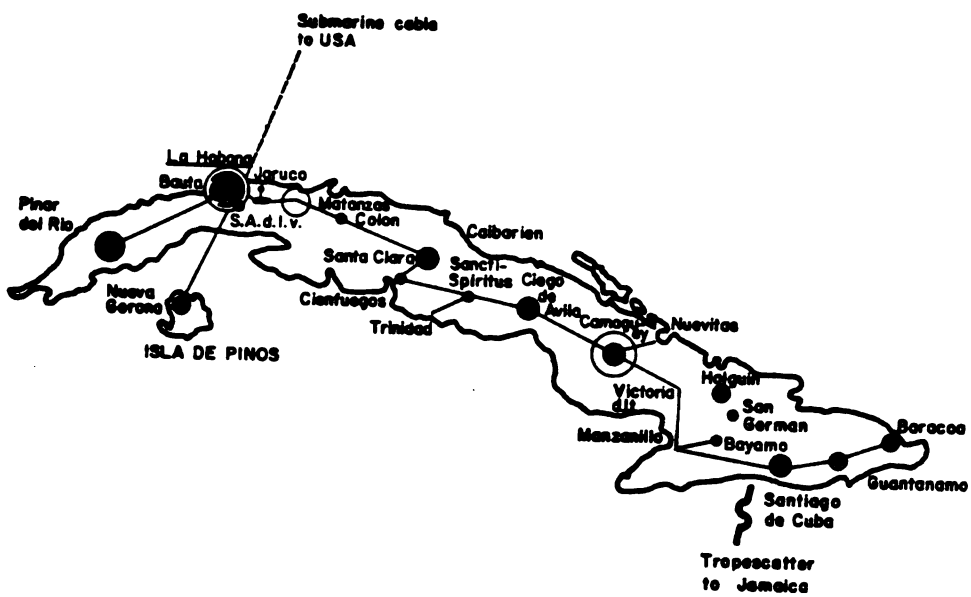
14. Central Intelligence Agency, National Basic Intelligence Factbook, 1980, p. 27.

15. The Caribbean Year Book 1977-78, s.v. "Cayman Islands."

16. "Installation of Earth Stations . . . in Cayman Islands," Telecommunication Journal 47 (January 1980): 37.

FIGURE 4

Communication Networks in CUBA



Transmitters

Radio	TV
● 10	4 ◯
● 7-8	3 ○
• 1-5	1-2 o

⊥ Satellite Station

___Main Route

note: Santiago de Cuba has one TV station

CUBA

(Republica de Cuba)

Basic Information:[1]

Area: 114,524 kM^2
Population: 9.59 million (1977)
Population Density: 83.73 per kM^2
Capital: La Habana
Major Cities: La Habana, Santiago de Cuba, Camaguey, Holguin
Guantanamo, Santa Clara
Language: Spanish
Religion: Roman Catholic
Gross National Product: US$ 8.1 billion (1977)
Per Capita Income: US$ 845
Literacy: 83%

Geographical Summary:[2]

Cuba is both the largest island in the Caribbean and the most westerly, only 144 kM to the south of Florida. Much of the country is made up of flat or slightly hilly land, having many fertile valleys. What does not fit into this category is principally mountainous. Some 60 percent of Cubans live in urban areas, and large cities dot the island. With the exception of very mountainous zones, Cuba has few communications difficulties. Its geographical location also makes reception of signals from neighboring states relatively simple.

Basic National Review:[3]

Discovered by Columbus, in 1492, Cuba long remained under the Spanish crown. An independence movement, led by Jose Marti, was undertaken in the late 19th century. After the Spanish-American War (1898), the U.S.

assumed responsibility for the island, and a republic was proclaimed. From 1934 until 1959, Cuban politics were dominated by a former Army sergeant, Fulgencio Batista, who established a dictatorial regime. Increasing dislike for Batista resulted in a guerrilla war, and the overthrow of the government, by forces led by Fidel Castro, in 1959. After a brief period of transition, and hard feelings with the U.S., Castro began a nationalist program, including the expropriation of most business properties and foreign-owned enterprises.

The new government announced that it would begin transformation to socialism, and opt for closer relations with the USSR and Eastern Europe. In 1961, some 1,400 Cubans, with the support of the CIA, attempted an invasion of the island, but were unsuccessful. This was followed, in 1962, by the news that Soviet tactical missiles had been installed. Communication between the U.S. and Soviet governments resulted in the removal of the armaments.

The Organization of American States voted in 1962 to impose a hemisphere-wide blockade of Cuba. This prevented a wide assortment of supplies and equipment from reaching the island. Relations with the U.S.A. improved in the late 1970's, but were cooled when Cuban forces participated in the Angolan Civil War, as well as other actions in Africa.

Over half of all Cubans are employed in agriculture, which accounts for more than 90 percent of exports. Sugar-cane, tobacco, coffee, cacao, fruits, vegetables and rice are important crops. Iron, manganese,

copper, chrome and nickel are mined. Cuba manufactures processed foodstuffs, various beverages, tobacco products, salt, cement, sponges, hides and leather, printed materials and dairy products. The government has attempted to foster an increase in the electronics and data processing industries.

Telecommunications Overview:[4]

International Prefixes: CLA-CMZ, COA-COZ
Number of Radio Broadcast Stations: 47
" " " Receivers: 2.11 million
" " " " per hundred: 22.0
" " Television Stations: 3 (networks)
" " " Receivers: 660,000
" " " " per hundred: 6.88
" " Telephones: 289,000
" " " per hundred: 3.01
Electrical Generation Capacity: 1,779,600 kW
" Service: 60 hZ, 115 and 120 volts - converting to 220 volts
Satellite Earth Stations: INTERSPUTNIK and INTELSAT stations at Jaruco. east of La Habana
International Communications: Via satellite, HF radio, submarine cable and troposcatter
Ownership of Communications Media: Government
Television Standard: System M (monochrome) and system D, SECAM color
Telecommunications Administration: Ministerio de Comunicaciones
Direccion General de Telecomunicaciones (La Habana)

Domestic Broadcasting:[5]

(MEDIUM AND SHORT WAVES)

City	Number of Transmitters	Networks	(kW) Combined Power
Bauta (La Habana)	8	RHC	420
S. Antonio de las Vegas	1	RR(LV)	150
S. German	1	RR(LV)	150
La Habana	10	RL(LV),PROG, RRJ,MUS	143.5
Santa Clara	7	RR(LV), RL,PROG, RRJ,W,MUS	101.5
Pinar del Rio	7	RR(LV),RL,PROG, RRJ,GUAMA	93.25
Camaguey	7	RR(LV),RL,PROG, RRJ,AG,MUS	58
S. Pedro de Cacocum	1	PROG	50
Colon	1	RR(LV)	30
Holguin	5	RL,RRJ,REV,MUS	27
Baracoa	3	RR(LV),REV	11
Isla de la Juventud	2	RRJ	11
Central Espana	2	26, REV	10.25
Guane	1	GUAMA	10
Las Mercedes	2	RL,REV	10
Guantanamo	5	RR(LV),RL,RRJ REV	6.75
Santiago de Cuba	8	RR,RL,PROG,RRJ, REV,MUS	6.75
Ciego de Avila	7	RR(LV),RL,PROG, RRJ,AG,MUS	5
Cienfuegos	4	PROG,RRJ,W,MUS	4
Bayamo	4	PROG,RRJ,REV	3.25
Sancti-Spiritus	4	PROG,W,MUS	3.25
Central Australia	1	26	3
Moa	3	RR,PROG,REV	3

Networks:

RHC:	Radio Habana Cuba	MUS:	Radio Musical Nacional
RR:	Radio Rebelde	W:	Dobleve-La Frecuencia del Azucar
LV:	La Voz de Cuba	GUAMA:	Radio Guama (Pinar del Rio Prov.)
RL:	Radio Liberacion	AG:	Candena Agramonte (Camaguey Prov.)
PROG:	Radio Progreso	REV:	Radio Revolucion (Orienta Prov.)
RRJ:	Radio Reloj Nacional	26:	Radio Ventiseis (26) (Matanzas Prov.)

(FM)[6]

There are FM transmitters in Artemisa, Camaguey, Ciego de Avila, La Habana, Holguin, Matanzas, Pinar del Rio, Punto Boniato, Santa Clara, and Santiago. Quite frequently, these facilities are utilized for STL relays.

Television:[7]

City	Channels	Networks
La Habana	2,6,8,10	2,6
Camaguey	2,4,6,7	2,6
Pinar del Rio	7,9,12	2,6
Las Villas	2,3,5	2,6
Isla de la Juventud	8,10	2,6
Matanzas	9,11,13	2,6
Oriente*	2,3,5,7,8, 10,12,13	5,6

Networks:

Television Nacional-2: (Monochrome)
Television Nacional-6: (Monochrome and SECAM color)
*Tele-Rebelde-5: (Monochrome) Oriente Province Network, with transmitters in Santiago de Cuba, Holguin, Santa Clara, Baracoa, San Cristobal, and Guantanamo

Trends in Broadcasting:

Before the 1959 revolution in Cuba, broadcasting was conducted much as in the United States; privately-owned stations. After the change in

governments, the media were remolded so as to better serve the interests of the new order. Pre-revolutionary trends had emphasized large radio stations with comprehensive relay networks. Consequently, the new Cuba had substantial communications resources at its disposal. From the old CMQ, Union Radio, Radio Progreso, Radio Reloj and other systems, five new national and five provincial networks were formed. Television stations were also integrated, with those having the better relay capabilities coming out on top.[8]

Eventually, all broadcasting was centralized under the ICR-Instituto Cubano de Radiodifusion; recently adapted to ICRT-Instituto Cubano de Radio y Television, taking into consideration TV aspects. One of the first priorities for Cuban broadcasting has been educational and literacy related programming. Only two years after the revolution, 1961 was declared "Year of Education," the media were firmly engaged in this process.[9] Havana's TV channel six transmitted a regular program "Study, Work and Defence."[10] "The Popular University" was carried on stations, as well, emphasizing work-related training.[11] Broadcasts destined for agricultural and industrial workers were also sent out; under the auspices of the Ministry of Education.[12]

Radio has traditionally been the primary means of social communication in Cuba, with various facilities reaching every corner of the island. Television, while most certainly developing, does not yet have the impact of its counterpart. In recent years, broadcasting has added a more political tone, acquainting the Cuban people with the ideology and

mechanics of Marxism-Leninism, as well as state affairs. Five national radio services, as well as regional and local stations serve the island.[13] The major networks are: Radio Rebelde, Radio Liberacion and Radio Progreso - which may be considered as general services; Radio Reloj Nacional- a 24 hour news and information station; as well as Radio Musical Nacional- devoted to sending out classical and popular music.[14] In addition, certain transmitters on the main networks are used for an all-night service, "La Voz de Cuba," which frequently compiles programs produced by other stations, into a magazine format. Television is operated on the basis of two national networks, as well as one regional system. Television Nacional 2 and 6 emanate from La Habana; the first broadcasting cultural, educational and entertainment materials, while the latter is more or less reserved for educational tasks.[15] Tele-Rebelde, serving the Oriente part of Cuba, makes use of facilities once held by TN-2.[16]

Since Cuba's change in political directions, television has been extensively utilized for education. A study conducted by UNESCO found that the nation had the greatest number of didactic programs in Latin America; accounting for approximately 80 percent of total air time.[17] Culture is also on Cuban airwaves. In collaboration with the National Cultural Council, ballet, theatrical performances, and dance are videotaped and later presented to national television audiences. Most often broadcast is the Ballet Nacional de Cuba. Symphonic concerts are carried over Radio Musical Nacional, which broadcasts live from Havana theatres and concert halls. "Teatro ICR" brings drama and literary works to Cuban homes.[18] Authors such as Brecht, Shakespeare, Carlos Romero, Ricardo Dantes, Consuelito Vidal and Enrique Santisteban are featured.[19]

Children's programs are very specially attended to on the Cuban media. Quoting from available information in translation: "Inspired in an imaginary fantastic forest, reflecting the Cuban baroque - in between trees and flowers, a girl-harlequin, 'Caritas', induces our little televiewers to good habits, and tells the best stories of children's literature, in between singing and rounds.[20] 'Caritas' is accompanied by actors, puppets, marionettes, children, illustrations and many other attractions; which entertain the littlest ones in the family of children, from age six."[21]

Television receivers have been placed in schools and "Pioneer Camps," where access can be guaranteed for students. Some productions for children are also imported from the TV centers of other socialist states, including the USSR, Poland and Czechoslovakia.

Radio drama is quite popular in Cuba, and the ICRT has provided a good selection. "Alegrias de Sobre Mesa," with music and humor stemming from the day-to-day happenings in an apartment block, and the interactions between neighbors.[22] "Habia Una Vez...," which tells half-hour stories to the nation's children; "Teatro RL," (Radio Liberacion), presents the best literary works, via radio; and "La Novela de las Dos," with nearly thirty years of existence, dealing with love, women and romance.[23] Many different literary works have been adapted for this program.

At the time of the Cuban Revolution, most broadcasting equipment was of U.S. manufacture, having been acquired during the 1950's. Until comparatively recently, this same apparatus was still the industry backbone.

Starting in the late 1960's, reconstruction of the mass media was undertaken. New transmitters were purchased from Eastern Europe, and interconnections were upgraded. Additional production facilities were also ordered. At the time of writing, Cuba's five year plan has included augmentation of the national radio networks, and expanding regional systems to 14, in keeping with new political subdivisions.[24] Some 40 new transmitters of 1 to 10 kW are being installed, and TV re-organization is underway.[25] Television will be expanded, or extended to: Pinar del Rio, Isla de Juventud, Sancti-Spiritus, Trinidad, Pilon, Moa, Nicaro, Guantamano and Baracoa.[26]

In the summer of 1978, Havana hosted the World Festival of Youth. Consequently, special preparations were made to air related events to the rest of the world. Television studios and control areas were reconstructed, using Soviet equipment, and color facilities were provided, on the SECAM standard.[27] The Television Nacional-6 network was temporarily dedicated as "TV-Cubana/Canal del Festival," with appropriate multi-lingual programming and presentations. Interconnection with other countries was via INTERSPUTNIK, using the Jaruco earth station.[28] In addition, it was decided to expand the TN-6 network to color capacity, throughout the island.[29] Underway are projects including: installation of 31 new television transmitters, capable of bringing visual images to 90 percent of the territory; a new microwave relay system, 1100 kM in length and capable of bi-directional transmission of two color TV signals, radio programs and 960 telephone channels.[30]

The manufacture of radio and television sets, as well as other technical goods, takes place in Cuba. Much of this work is in association with vocational institutes.[31] Students routinely assemble receivers, such as "Taino 74," which are produced by the Lenin Vocational School.[32] "Caribe 416" television sets are put together by students at the "Jose Antonio Echeverria Technical Institute."[33] Even yagi antennas for distant TV reception are produced, apparently intended for use in rural zones.

Film production is also a major part of Cuban media operations, under the auspices of ICAIC (Instituto Cubano del Arte e Industria Cinematografica).[34] Newsreels, documentaries, and socially-related features tend to dominate the production schedule. Historical flashbacks to the "bad old days" are frequent, portrayed by such films as: "Memorias del Subdesarrollo" (Memories of Underdevelopment); La Primera Carga al Machete" (At the First Charge of the Machete); and others.[35] Documentaries concerning the 1973 Chilean coup and fighting in Angola ("La Batalla de Chile," and "La Guerra de Angola" respectively) have brought international attention to Cuba cine.[36] Education is also addressed by film-makers. A series of special documentaries entitled: "Enciclopedia Popular" inform about natural phenomena, social studies and other matters.[37] ICAIC maintains its own studios, animation facilities and technical laboratories.[38]

Foreign Services:[39]

Radio Habana Cuba broadcasts to worldwide audiences in Spanish, English, French, Creole, Guarani, Quechua, Portuguese and Arabic. A total of 114 hours, 20 minutes of daily transmissions are aired, broken down into the

following language segments:

Spanish:	85 hours, 15 minutes
English:	16 " , 35 "
Portuguese:	3 "
Creole:	2 "
Quechua:	1 hour, 50 minutes
Guarani:	1 "
Arabic:	1 "

Target audiences are generally in the Western Hemisphere, although programs are beamed to other areas.[40] From its Havana studios and eight powerful shortwave transmitters, located at Bauta, some 37 kM west of the capital, RHC serves as the voice of the only Marxist nation in the Americas.[41] Radio Habana began transmissions approximately two years after the triumph of the revolution. Initially, two 10 and two 100 kW Swiss-made transmitters were used.[42]

In late 1969/early 1970, Radio Habana Cuba received four new 50 kW Czechoslovak (Tesla) transmitters, which permitted it to substantially increase broadcast hours.[43] It is believed that the initial construction costs of RHC was in the area of US$ 35 million.[44]

It was over Radio Habana Cuba that Fidel Castro announced the socialist nature of the revolution, at a time when the invasion of Playa Giron (Bay of Pigs) was underway, and after which, expressed the foreign policies of the new Cuban government.[45] On April 26, 1962, the Associated Press reported a statement by then-president of Guatemala, Miguel Idigoras, who alleged that "Radio Habana Cuba is making constant calls for revolution against Guatemala."[46] While on a visit to Caracas, Venezuela, in 1963, former Nicaraguan strongman, Anastasio Somoza

reported that: "I hear Radio Habana Cuba in my home, as if it were installed in Managua."[47] In 1970, Somoza declared before the Association of Correspondents at the U.N. that: "I listen to the Cuban radio and hear Fidel."[48] During civil disturbances in the Dominican Republic, in 1965, Radio Habana devoted many hours of broadcast time, intended for the residents of this Caribbean state.[49]

In terms of direct RHC broadcasts to North America, programs have been frequent and creative. There are very few topics which Radio Habana Cuba will not tackle. From 1968 to 1976, a special program, "The Voice of Vietnam" was presented in English, aimed at United States audiences.[50] The North Vietnamese point of view and a variety of features concerning the war were transmitted on a daily basis. In the course of its existence, some 2,500 programs were aired over Havana radio.[51]

After visiting Latin America, in 1969, Nelson Rockefeller reported to President Nixon that: "The Voice of America, transmitted from the U.S.A., should make its programming more attractive than that of Radio Havana."[52]

At the time of the 1973 coup d'etat in Chile, RHC began uninterrupted 24 hour broadcasts to Latin America, which lasted for a year.[53] Programming was intended to convey ill will to the new Chilean government, and express displeasure at the death of Salvador Allende. Many hours of well-produced and interesting programs were devoted to this subject.

The Paraguayan News Agency informed in 1975 that "Radio Habana is much listened to by the Paraguayan people, especially rural inhabitants, who

account for 64 percent of the population. Transmissions most listened to are in Guarani."[54]

Without a doubt, Radio Habana Cuba is listened to, as judged by the number of letters received at the station, and frequently read over the air. A few excerpts from correspondence follow: "Permit me, in this way, to express my most sincere thanks for your cultural and educative programming ..." "In my post as a university professor, I have had great use of your exposition of informative and cultural topics."[55] "I wish to thank you for the substantive information on the political status of Puerto Rico, which you have furnished by means of your programming..."[56] "Although it has been a long time since I last wrote to you, this is not to say that I have stopped listening to Radio Habana Cuba, to which I have tuned in for twelve years, on a daily basis."[57] "I do not like what you sell, but I have to admit that you do a good job of it."[58]

Cuba's international radio broadcasts cover a wide variety of programs, which are designed to address an equally wide number of issues. For one, Radio Habana transmits a sizeable quantity of news and commentaries; "Noticiero;" "Boletines de Noticias;" "Frente a la Agresion, Cuba Responde;" and "Socialismo, El Mundo Nuevo;" are all examples of this category.[59] Music is certainly not overlooked. "Formalmente Informal" is a variety program with guest performers from all of Latin America, and selections of the best of Cuban music.[60] "Cancionero Latinoamericano" - or "Latin American Songs," as it is called in the English service, also brings selections from all over the hemisphere.[61] "Pentagrama;" "Tiempo;"

"Carrousel;" "Nuestros Artistas;" and "1-2-3 Musical" are other types of RHC cultural programs.[62]

Features are also presented, most of which deal with more specific issues in Cuban life. "Voces de la Revolucion" ("Voices of Revolution") retransmits principal speeches of Fidel Castro and other individuals of note.[63] "Cuba en el Mundo de la Filatelia" ("Philately in Cuba") orients stamp collectors to new Cuban issues, and even has a contest, by which it is possible to win first-day covers and special stamp editions.[64] "Temas Economicas" deals with economic and socio-industrial matters on the island; "De Chile y Para Chile" - broadcasts to the people of Chile, with the Cuban viewpoint regarding current happenings in that South American republic.[65] Finally, "Cuba en los Deportes" portrays sporting events and competitions. Interviews with noted athletes are given, from time-to-time.[66]

Starting with July 1979, Radio Habana Cuba has relayed the English programs of Radio Moscow to North America.[67] This provides a stronger signal for listeners, and eliminates the need to use as many frequencies. Personal monitoring has revealed that 50 and 100 kW shortwave transmitters in the 25, 31 and 49 metre bands are used. Programs are relayed from Moscow via INTERSPUTNIK, using the Jaruco earth station. Havana relays suffer degradation of audio quality in comparison with direct transmissions from Moscow, as well as occasional interruption, and cross-talk from other Cuban programs.

In January 1980, a startling set of events took place. One of the ICRT's 150 kW MW transmitters, normally carrying the "La Voz de Cuba" program, after sign-off of Radio Rebelde, began transmitting an English-language "Voice of Cuba" instead.[68] The frequency of 600 kHz penetrates deep into the North American heartland, as well as the Caribe and Central/South America. As is common with the Spanish "La Voz de Cuba," materials come primarily from Radio Habana Cuba, with well-known announcers also working the medium-wave shift. A prominent position is given the news and commentaries, which occupy at least 15 minutes of every hour. "The Voice of Cuba" runs from midnight until 6:00 a.m., E.S.T.[69]

Following Cuba's international use of MW, the month of February 1980, brought an occurrence which attracted widespread attention. Programs of Radio Moscow's World and North American Services began to be sent out, over 600 kHz, during evening and early morning hours.[70] For the first time, the average U.S. radio listener can tune in Moscow in his home, car or office. Radio Moscow has mentioned the receipt of large numbers of letters from all over North America; especially southern and central states.[71] The impact of this development has yet to be determined, although it is certain to draw comment from many circles. Owing to the fact that the ICRT maintains two, identical 150 kW transmitters on adjacent frequencies of 590 and 600 kHz, parallel "La Voz de Cuba-Spanish" and Radio Moscow/Voice of Cuba-English programming takes place. Monitoring indicates that the 600 kHz channel is received with a substantially stronger and clearer signal than its mirror on 590 kHz. Taking into account the supposed "identical" nature of the facilities, it might be realistic to assume that an efficient directional antenna system is being used.

Besides RHC and "La Voz de Cuba," there is CMCA - "The Friendly Voice of Cuba/Radio Metropolitana," which programs almost exclusively in English, and is heard in many parts of the northern Caribe, as well as the southern United States. CMCA makes use of a 10 kW transmitter on 820 kHz.[72]

Common Carrier Services:

Cuba has at its disposal a nationwide trunk system, composed of pre-revolutionary cables, open-wire lines and microwave relay. Most of these facilities are at the time insufficient for demand, and new lines have been added. Close to 300,000 telephones are now in service, 95 percent automatic exchanges.[73] In recent years, a large quantity of crossbar switching has been installed, mostly of Eastern European make.[74] Some 100 new exchanges were provided in 1974/75, alone.[75] Major expansion of microwave and radio relay has taken place, intended for 960 telephone circuits and at least one television program.[76] Direct dial circuits exist between Havana and all provincial capitals, with the temporary exceptions of Ciego de Avila and Las Tunas.[77] In 1979, a major coaxial cable project was underway, using supplies and equipment from the USSR.[78] Besides acting as a reserve for the microwave network, the cable will permit future nationwide STD. Also, data and facsimile newspaper layout transmission will be sent over the coax.[79]

Telex is also available, with 1187 terminals and 14 exchanges at the time of writing.[80] This system was made possible by equipment and technical assistance from the German Democratic Republic, and incorporates both national and international direct selecting.[81] Telex is widely used by

government organizations.[82] Parallel to telex is a TGX domestic teleprinter system, which counts on 862 terminals, and provides nationwide automatic service.[83] Some 16 million telegrams are dispatched annually over TGX, in the public correspondence.[84]

International communications are handled via the new INTERSPUTNIK earth station, installed at Jaruco.[85] This facility, using a twelve metre antenna, gives direct interconnection with Moscow, Berlin, Warsaw, Prague, Budapest, Sofia, Ulan Bator and other points, using the Molniya (elliptical orbit) and Statsionar (geostationary) satellites.[86] In 1975, 12 telephone circuits and one TV channel made up the station capacity.[87] Television, broadcast audio, telephony, telex, and facsimile are regularly transmitted over this network. It is also possible to directly contact ships of the Cuban merchant and fishing fleets, using Soviet portable satellite terminals.[88] Molniya satellites have a useful contact time of eight to twelve hours, at the end of which, communications must be switched over to an approaching craft. Statsionar, on the other hand, is a fixed position satellite, providing 24-hour service.

In the summer of 1979, construction was started on an INTELSAT earth station, located alongside the existing INTERSPUTNIK facility at Jaruco.[89] This permits direct contact with nearly 100 countries, and was provided in order to cater to the September, 1979, Havana summit meetings of the Non-Aligned Movement.[90] The INTELSAT station is equipped with an 11 metre dish, capable of providing 24 telephone channels as well as one color TV circuit, and five additional audio feeds.[91] Initial links were established between Cuba and Spain, France, Italy, Mexico, Venezuela, Angola,

Ethiopia and Mozambique.[92] Temporary circuits are capable of being added at will with other nations, and trunking via gateways is possible.[93]

Plans were developed for transmission of the 1980 Moscow Olympic Games, including INTERSPUTNIK links with Cuba.[94] According to available information, channels common to both the Molniya and Statsionar satellites were used, with Statsionary 4 located at 13.5° W. longitude, over the South Atlantic.[95] This permitted geostationary international service on a 24-hour basis. Cuba received Olympic programs via link 10 of the system, also used for transmission of the central Moscow program.[96] Link 8 was dedicated for telephony and sound broadcast circuits.[97]

A submarine cable connects Havana with Key West, Florida, having a capacity of 24 voice circuits.[98] Troposcatter links Cuba with Jamaica, and many international calls have been routed via this path.[99]

Cuban communications with the rest of the Western Hemisphere are not quite as efficient as with Europe. Quoting from a letter sent to the Havana newspaper, Granma: "... your telephone service is not very rapid. On occasion, I call Havana and have to wait a long time. It seems that one first has to call Jamaica. Between Montreal and Jamaica, communication is rapid; with Havana, the delay begins. Is there not another way to speak directly?" The newspaper answered the following: "... you can also call Havana utilizing the path from the U.S.A., if the telecommunications administration of your country will permit it. This line, by virtue of existing facilities, permits more communications than by the

route you mentioned." "... by motive of contacts from the Cuban community in the exterior, there has been a notable increase in international telephone calls to our country, with which has come congestion of circuits, but delays are being reduced to a minimum, and we are also starting work on improving services even more."[100]

Electrical energy in Cuba is provided by the Empresa Consolidada de Electricidad, a government agency.[101] The majority of production is by thermal plants, using imported fuels, although some sugar mills have generators fired by bagasse.[102] There are only two hydro plants, totalling 44 MW capacity. Although the government has urged expansion of facilities, shortages have occurred, necessitating public conservation.[103] With assistance from the USSR, it has been possible to establish a national power grid, interconnecting most plants under a central operations control.[104] Main transmission lines work on 110 and 220 kV. New generating plants have been constructed, namely "Maximo Gomex" (Mariel), which is thermal and produces 400 MW; "Antonio Maceo" (Santiago de Cuba); "Diez de Octubre" (Nuevitas); and "Carlos Manuel de Cespedes" (Cienfuegos).[105] Other installations of note are: "Jose Marti" (Matanzas); "Otto Parellada" and "Antonio Maceo" both in Havana; "Hector Pavon" (Santiago) and the "Robustiano Leon" hydro facilities.[106] Total national production capacities at the time of writing is 1,779,600 kW,[107] to be compared with 397,100 kW in 1959. The USSR has agreed to provide a 440 MW nuclear power plant, to be built near Cienfuegos.[108] Construction is expected to be well underway in 1981, with operation scheduled for 1985.

As equipment is installed, of Eastern European manufacture, Cuba has planned to standardize power distribution at 220 volts.

Overall Analysis:

Cuba, which inherited a well-developed radio broadcast system from pre-socialist days, as well as a comparatively advanced common-carrier network, offers much to its citizens in terms of access to the mass media. With a distribution of 22 receivers per hundred inhabitants, Cuba is definitely among the top nations in this regard. Television has been given much priority over the past few years, primarily as a means of education and the dissemination of political awareness and culture. Ironically, it is still possible to watch American movies from the 1940's and '50s. Since 1959, Cuban TV has been strictly monochromatic; excepting an experimental color station which was built in Havana, before the revolution. Now, however, experimental transmissions are being made in SECAM, and Television Nacional-6 is planning to convert all of its stations to color. Not all viewing is by private individuals; many sets are located in areas where large numbers of people can watch as a group. This is especially true in the case of schools and public institutions.

Television, while it does not yet have the full distribution of radio, is most certainly a nationwide medium, with great potential. The Cuban government has recognized this, and is rapidly developing its use.

In terms of international broadcasting, Cuba is the voice of Marxism in the Western Hemisphere. It is also an alternative opinion to other

western nations, and for this reason, is listened to extensively. Political information generally coincides with that of the Soviet Union, and there is now much more cooperation between Radios Havana and Moscow, with Cuban relays being used for programs to North America, as well as Soviet relays of Havana broadcasts to Europe and the Middle East.

Common carrier services still lack much as to direct public access, which is mostly via phone booths or instruments in public locations. Few individuals have telephones in their homes, unless they have a specific reason for it; e.g. - being a doctor, or someone who must be reached. In the past, public telephones operated without having to deposit coins; but this has been changed - as abuse resulted. International circuits to nations other than in Europe, are not always available or of high quality. This, however, may well change as contact with Cuba is restored by many nations.

There is no commercial use of the media, nor private ownership of broadcast or common carrier facilities. All are operated directly by the government, through the Ministry of Communications, or its agencies.

CUBA

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DOMINICA

(State of Dominica)

Basic Information:[1]

Area: 751 kM^2
Population: 80,000 (1978)
" Density: 106.5 kM^2
Capital: Roseau
Major Cities: Roseau
Languages: English, French Patois
Religions: Roman Catholic, Church of England, Methodist
Gross National Product: US$ 21.0 million (1978)
Per Capita Income: US$ 263
Literacy: 80 percent

Geographical Summary:[2]

Dominica is composed of a mixture of volcanic and coral formation, consequently having mountainous and flatland sections. The island is situated in the Western Caribbean, part of a group which serves as a barrier against the Atlantic Ocean. Activity centers around the capital, Roseau.

Basic National Review:[3]

Dominica was integrated within the West Indies Associated States, in 1967, making it a self-governing part of the British commonwealth. Political independence has been growing, although British influence is strong.

The economy depends on agriculture and processing of foodstuffs, as well as rapidly growing tourism. Main crops are: cacao, bananas, and citrus. Most commerce is with the United Kingdom.

Telecommunications Overview:[4]

Number of Radio Broadcast Stations: 3
" " " Receivers: 33,635
" " " " per hundred: 42.0
" " Television Stations: None
" " " Receivers: Few
" " Telephones: 3,000
" " " per hundred: 3.75
Electrical Generation Capacity: 10,000 kW
" Service: 50 hZ, 230 volts
Satellite Earth Stations: None
International Communications: Radio relay to nearby islands, HF radio telephone
Ownership of Communications Media: Mixed government and private

Domestic Broadcasting:[5]

Dominica has three radio broadcast stations: one owned by the government and the others privately operated. Dominica Broadcasting Corporation transmits in English and Patois for 17 hours daily, on 595 kHz. At the present time, this frequency uses 10 kW but an increase to 20 kW is planned. A commercial station, Radio Caribbean (ex-Radio Jumbo) uses a 50 kW transmitter on 545 kHz, located at Morne Daniel. This facility is slated for removal to a new site, along with a change to 1150 kHz. Programs from St. Lucia and Guadeloupe are relayed.

The Gospel Broadcasting Corporation, in Roseau, has station ZGBC. Working on 1060 kHz, with 10 kW, programs are mostly in English, although plans include French and Spanish. The station also hopes to increase transmitter power.

During the crisis resulting from Hurricane David (1979), links to the outside were monitored and rebroadcast by Radio Antilles, on Montserrat, providing exceptionally valuable communications services.

Common Carrier Services:

The Dominica telephone system is completely automatic and serves 3,000 subscribers from four main exchanges.[6] Telex is also provided. International circuits are via Cable and Wireless, and comprise links with Martinique, St. Lucia and Guadeloupe; VHF and UHF radio relay.[7] The island is serviced by the Barbados trunk exchange, which provides connections to other islands and external points.[8] Worldwide contact is possible, via the Barbados INTELSAT earth station, as well as Cable and Wireless' extensive network.[9]

Dominica was hit by Hurricane David, late in August 1979, and the majority of communications facilities were extensively damaged.[10] According to BBC reports, the island was cut off from the outside world except for battery-powered emergency equipment. On August 31, 1979, a British frigate brought relief supplies and also enabled direct contact with London.[11] Indications were that normal links would be restored as soon as possible.

The Dominica electric system was put together with Commonwealth assistance, and uses turbine and diesel stations.[12] Two main facilities exist, being interlinked by a 11 kV line, which then leads to Roseau.[13] Power is supplied at 230 and 400 volts, 50 hZ, single and poly phase.[14]

Overall Analysis:

Dominica has available a very high concentration of radio receivers. It is quite impossible for this island to be a media island, considering the large number of broadcast facilities in the region, whose signals are

receivable there. Although there is no television station on Dominica, some residents own TV sets, and apparently can receive programs from nearby locations. International communications are provided by Cable and Wireless, and are very good.

DOMINICA

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5. Frost, World Radio TV Handbook, 1979, p. 292; 1980, pp. 290-291.

6. The Caribbean Year Book 1977-78, s.v. "Dominica."

7. "New International Switching Centres to be Installed in West Indies," Telecommunication Journal 37 (March 1970): 137.

8. Ibid.

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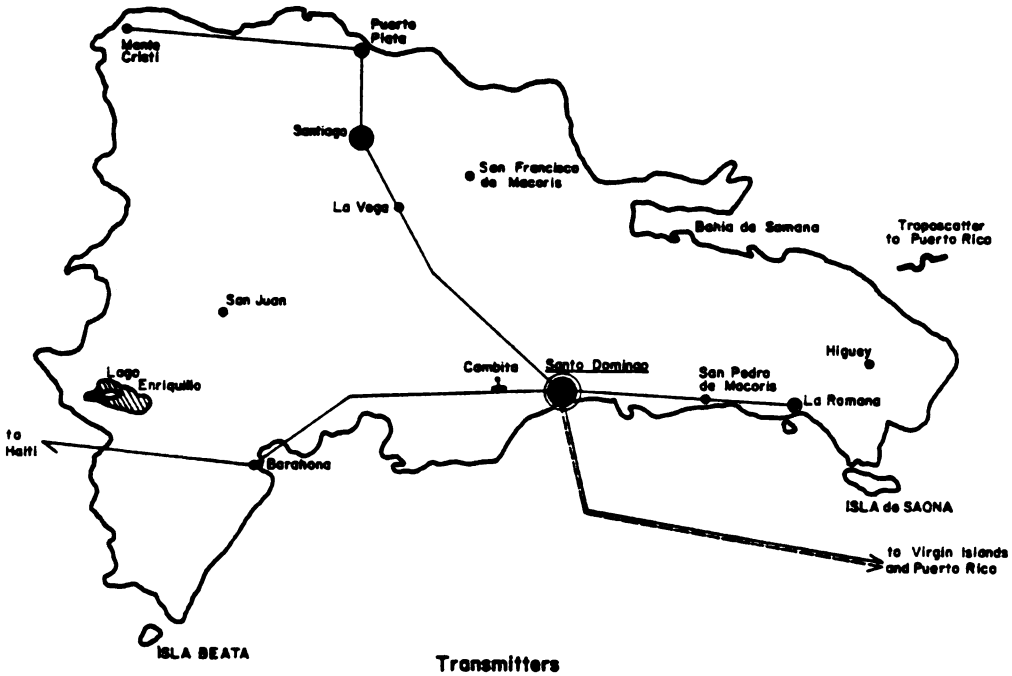
12. The Caribbean Year Book 1977-78, s.v. "Dominica."

13. Ibid.

14. Ibid.

FIGURE 5

Communication Networks
in
DOMINICAN REPUBLIC



DOMINICAN REPUBLIC

(Republica Dominicana)

Basic Information:[1]

Area: 48,734 kM^2
Population: 5.17 million (1978)
" Density: 106.0 per kM^2
Capital: Santo Domingo
Major Cities: Santo Domingo, Santiago
Language: Spanish
Religion: Roman Catholic
Gross National Product: US$ 3.8 billion (1976)
Per Capita Income: US$ 735
Literacy: 68 percent

Geographical Summary:[2]

Sharing the island of Hispaniola with Haiti, the Dominican Republic takes up approximately two-thirds of the land mass. Intersected from northwest to southeast by high mountains (3,000 metres), the republic has rich agricultural lands north of the range, and relatively arid terrain to the south, excepting a coastal strip. Much of the population lives in the northeast, although Santo Domingo has nearly one million people.

Basic National Review:[3]

Christopher Columbus landed on Hispaniola in 1492 and four years later founded Santo Domingo, the Western Hemisphere's oldest city. Columbus is alleged to be buried in the cathedral there. Passing from Spanish to French control and back again; Santo Domingo was captured by Haitian rebels, in 1801 and 1822-44. The country came under Spanish occupation in the 1860's. From 1916-1924, the Dominican Republic was controlled by U.S. Marines, at the end of which period a constitutional government was elected.

From 1930 until 1961, General Rafael Leonidas Trujillo Molina controlled the country. At the time of his assissination, Trujillo was succeeded by Dr. Joaquin Balaguer, who resigned under pressure one year later. In the first free elections in 38 years, Juan Bosch was chosen as president, but was overthrown in 1963. In April of 1965, a pro-Bosch revolt came about and widespread disorder and violence resulted. A few days later, a contingent of U.S. Marines intervened, restoring order. Peace-keeping forces from five South American nations were also sent.

A provisional government supervised new elections in 1966, in which Dr. Joaquin Balaguer was victorious by a wide margin. The peace forces were removed in 1966. Dr. Balaguer was re-elected in both 1970 and '74, but lost in 1978 to the liberal opposition, led by Antonio Guzman.

The country's economy is based on agriculture with large sugar, coffee, cacao, tobacco, banana, rice, corn, cassava and sweet potato crops. Also, cattle raising is important. The major industry is sugar refining.

Telecommunications Overview:[4]

International Prefixes: HIA-HIZ
Number of Radio Broadcast Stations: 105
" " " Receivers: 600,000
" " " " per hundred: 11.6
" " Television Stations: 6
" " " Receivers: 385,500
" " " " per hundred: 7.5
" " Telephones: 127,332
" " " per hundred: 2.5
Electrical Generation Capacity: 670,000 kW
" Service: 60 hZ, 115/230 volts
Satellite Earth Stations: INTELSAT station at Cambita, in San Cristobal province
International Communications: Via INTELSAT, submarine cables, radio relay
Ownership of Communications Media: Private & governmental. Mostly commercial
Television Standard: System M, NTSC color
Telecommunications Administration: Direccion General de Correos y Telecommunicaciones (Santo Domingo)

Domestic Broadcasting:[5]

(Medium and Short Waves)

City	Transmitters	Combined Power
Santo Domingo	40	411.5
Santiago	21	72
Puerto Plata	7	19
Barahona	5	17
La Vega	6	16.5
S. Francisco de Macoris	4	12
Tamayo	1	10
San Juan	3	7
S. Pedro de Macoris	5	5
Higuey	2	3.25
Monte Cristi	2	2
La Romana	3	1.5

(FM)

City	Number of Transmitters
Santo Domingo	25
Santiago	12
La Vega	2
Puerto Plata	2
S. Francisco de Macoris	2
San Juan	2

(Television)

City	Channels	Networks	(kW/ERP) Combined Power
Santo Domingo	2,4,7,9,11,13	all	365
Santiago	7,9,13	RAH,CDRT,TAN	15
El Cerro	10	CDRT	10
La Romana	9,12	CDRT,RTVD	5.5
Alto Bandera	5	RTVD	5
La Vega	5	RTVD	5
Navisa	70	RAH	3
Puerto Plata	9,12	CDRT,RTVD	1.5
Sto. Cerro	11	RAH	1.5

(Networks)

RTVD - Radio Television Dominicana
RAH - Rahintel Television
CDRT - Corporacion Dominicana de Radio y Television
TD - Telesistema Dominicana (Santo Domingo, only)
INE - Instituto Nacional de Electronica (Santo Domingo, only)
TAN - Tele-Antilles (Santo Domingo and Santiago)

Trends in Broadcasting:

Broadcasting has long been organized on a mixed government-private-commercial basis. This is to say, there have been a number of commercial stations, as well as a central, official voice. During the administration of General Trujillo, "La Voz Dominicana" (government station) became predominant, but the situation has since changed to where larger commercial broadcasters; such as Radio Clarin, Radio Universal, HIJB, Radio Comercial, Radio Mil and Radio HIN share the total audience with Radio-Television Dominicana.

Radio is the most influential medium, covering the national territory. Inexpensive, portable receivers have helped make sound broadcasting almost universal and have benefited commercial stations as well, creating a need for facilities. Due to geographical reasons, medium wave signals do not carry far into the interior; excepting the most powerful transmitters. Shortwave, however, does provide a steady coverage, and a good number of receivers are equipped with SW bands. FM, while extensively used, is primarily a local medium; since terrain restricts its range.

Licenses are issued to broadcasters by the Direccion General de Correos y Telecommunicaciones.[6] Social communications are based on the Constitution of 1962, put into effect after Trujillo's demise, which

guarantees freedom of expression - but states that the use of media for purposes of civil disorder may result in judicial actions.[7]

Television is a growing field in the Dominican Republic, with six stations, most of which also have a number of repeaters. In 1972, about 75 percent of Dominicanos lived within range of TV transmitters, although only 25 percent owned sets.[8] Each station is on the air for about nine hours daily, with much imported (U.S.) programming being telecast.[9] There is competition in attracting viewers, as there are only 385,000 sets in the market.[10] Off-air relays and microwave links assure retransmission of Santo Domingo stations. Commercial programming on TV is the norm, although one station, Tele-Inde, sends out educational material.[11]

The Radio-Television Dominicana transmits occasional English language programs intended for overseas listeners, on its shortwave frequencies.[12] A 50 kW transmitter is used. According to information recently disseminated, the RTVD may soon upgrade and expand this international operation.[13] Until 1978, Radio Clarin, Santo Domingo, broadcast an English service every day over its 50 kW 25 metre band channel.[14] This was discontinued, however, due to budgetary and technical reasons, but could return to the air if finances permitted.[15] Both stations are well received throughout North and Central America.

Common Carrier Services:

The Dominican Republic is an integral part of the North American telecommunications system, and belongs to the 809 Area Code group, along with Puerto Rico, the Virgin Islands and the Bahamas. Consequently, the major

part of international traffic is routed via the United States. Telephones are operated by Compania Dominicana de Telefonos, and some smaller enterprises. CDT is closely associated with GTE in the United States. A major part of communications equipment is of GTE/Automatic Electric manufacture. Trunk circuits on the island are primarily by microwave, and are of high capacity. Major routes are from Santo Domingo to Santiago, and on to Puerto Plata; and Santo Domingo to La Romana.[16] Radio relay also extends to Port-au-Prince, Haiti.[17] An over-the-horizon tropo system connects Santo Domingo with San Juan, Puerto Rico; as does a submarine cable.[18] A 144 channel cable runs from Santo Domingo to Magens Bay, Virgin Islands, and is jointly operated by the CDT and American Telephone and Telegraph.[19]

Automatic exchanges exist in Santo Domingo, La Vega, Puerto Plata, San Francisco de Macoris, San Cristobal, Bani, Azua, Santiago, Bonao, Barahona, and San Pedro de Macoris.[20] These include modern, processor-controlled, stored-program GTE/AE EAX equipment.[21] Domestic telegraphy is a government responsibility, but traffic has generally been routed over telephone circuits. The Dominican state also maintains a radiotelegraph station, which communicates with Cable & Wireless, on Barbados, and RCA and All America Cables, in New York.[22] An INTELSAT station is located at Cambita (Cambita Garabitas), and is operated by CDT.[23] This was provided by GTE and communicates within the general U.S. network. Television as well as telephony may be sent out via Cambita.

The Corporacion Dominicana de Electricidad generates most power in the republic, supplying residential and poly-phase service at 60 hZ.[24] During

the late 1960's and early '70s, production capability was insufficient for demand and the company embarked on a modernization program. In 1967, 90 percent of homes in Santo Domingo had electricity, although rural dwellers were generally without it.[25] Throughout recent years, efforts have been made to extend lines into rural communities. At last count, CDE produced 310 MW of power; the Falconbridge Nickel facilities - 198 MW; and various sugar mills - 50 MW.[26] The construction of the Tavera Dam in 1972 brought much needed power, as did the 50 MW Valdesia Dam on the Nizao River.[27] CDE has been concerned with an efficient interconnection of power-generating facilities.

Overall Analysis:

Communications in the Dominican Republic are among the most advanced in the Western Hemisphere. This includes a very comprehensive broadcast system. Receiver distribution is a bit lower than on some nearby islands, but facilities are more than adequate. Traditionally, in Latin America, there is a greater degree of group tele-viewing. A family or group of friends may watch "novelas" or other material, for several hours, consequently giving each set much greater circulation. The telephone system is more than adequate for the republic's needs, and is one of the most efficient in Latin America. The recent addition of Cambita satellite station has multiplied the availability of international circuits by many times.

The Dominican Republic was hit by Hurricane David in August of 1979. A great deal of damage was effected by the storm, resulting in breaks in the communications network. When the hurricane struck, the only radio

voice on the air was the Civil Defense station. In order to avoid electrocutions and fire, electricity was cut off in the capital. A Spanish-language Voice of America broadcast on September 5, 1979, reported that multiple millions of dollars damage was sustained by both the electrical grid and broadcast/telecoms installations.

DOMINICAN REPUBLIC

1. Information Please Almanac, 1979, 33rd ed., s.v. "Countries, Territories, and Dependencies - Dominican Republic;" U.S., Central Intelligence Agency, National Basic Intelligence Factbook, 1980 (Washington, D.C.: Government Printing Office, 1980), p. ; Reader's Digest 1980 Almanac and Yearbook, s.v. "Nations of the World - Dominican Republic;" The Caribbean Year Book 1977-78, 48th ed., s.v. "Dominican Republic;" The People's Almanac #2, s.v. "Nations and Their Rulers - Dominican Republic;" The World Almanac and Book of Facts 1979, s.v. "Nations of the World - Dominican Republic.

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4. Information Please Almanac, 1979, 33rd ed., s.v. "Countries, Territories, and Dependencies - Dependencies of the United Kingdom, West Indies Associated States;" U.S., Central Intelligence Agency, National Basic Intelligence Factbook, 1980 (Washington, D.C.: Government Printing Office, 1980), p. 6; Reader's Digest 1980 Almanac and Yearbook, s.v. "Nations of the World - British Dependencies - Antigua;" The Caribbean Year Book 1977-78, 48th ed., s.v. "Antigua;" The People's Almanac #2, s.v. "Nations and their Rulers - Antigua;" The World Almanac and Book of Facts 1979, s.v. "Nations of the World - United Kingdom, British West Indies;" J. M. Frost, ed., World Radio TV Handbook (Hvidovre, Denmark: Billboard Publications, Inc., 1979) pp. 292-294, 411-412.

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7. Thomas E. Weil, et al., Area Handbook for the Dominican Republic, Foreign Area Studies, The American University (Washington, D.C.: Government Printing Office, 1973), p. 125.

8. Ibid., p. 126.

9. Frost, World Radio TV Handbook, pp. 411-412.

10. Ibid., p. 532.

11. Weil, et al., Area Handbook for the Dominican Republic, p. 126.

12. Personal monitoring.

13. Ibid.

14. Ibid.

15. Ibid.

16. The Caribbean Yearbook 1977-78, s.v. "Dominican Republic."

17. "Inter-American Telecommunications Network," Telecommunication Journal 38 (September 1971): 632.

18. "Over-the-Horizon Microwave Radiotelephone," Telecommunication Journal 24 (January 1957): 22.

19. Jack E. Cole, George S. Li, The World's Submarine Telephone Cable Systems (Washington, D.C.: U.S., Department of Commerce, 1975, p. 161.

20. The Caribbean Year Book 1977-78, s.v. "Dominican Republic."

21. "Electronic Telephone Switching System in the Dominican Republic," Telecommunication Journal 46 (June 1979): 336.

22. The Caribbean Year Book 1977-78, s.v. "Dominican Republic."

23. "...In the Dominican Republic," Telecommunication Journal 41 (June 1974): 392.

24. Weil, et al., Area Handbook for the Dominican Republic, p. 194.

25. Ibid., p. 84.

26. Ibid., p. 194.

27. Ibid.

GRENADA

(State of Grenada)

Basic Information:[1]

Area: 344 kM^2
Population: 110,000 (1978)
" Density: 320 per kM^2
Capital: St. George's
Major Cities: St. George's
Language: English
Religions: Roman Catholic, Anglican, Methodist
Gross National Product: US$ 50 million (1976)
Per Capita Income: US$ 455
Literacy: 70 percent

Geographical Summary:[2]

The most southerly of Windward Islands, Grenada is located not far from the South American continent. It is also the smallest sovereign nation in the Western Hemisphere. Mountainous Grenada is of volcanic origin. The country encompasses smaller, adjacent islets.

Basic National Review:[3]

Discovered by Christopher Columbus, Grenada successively underwent French and British colonization, finally remaining in the British sphere for over 200 years. Independence within the West Indian Associated States was granted on February 7, 1974. Political instability, limitations on civil liberties and over-use of the "Mongoose Gang" (secret police) resulted in a coup d'etat on March 13, 1979. The new Prime Minister, Maurice Bishop, promised a more responsible government and has also urged greater Caribbean unity.

Tourism and agriculture are very important to the Grenadian economy. Cocoa, nutmeg and bananas are exported.

Telecommunications Overview:[4]

Number of Radio Broadcast Stations: 1
" " " Receivers: 80,000
" " " " per hundred: 72.73
" " Television Stations: None
" " " Receivers: Few
" " Telephones: 5,250
" " " per hundred: 4.77
Electrical Generation Capacity: 7,000 kW
" Service: 50 hZ, 110 volts
Satellite Earth Stations: None
International Communications: Via HF radio and interisland relay
Ownership of Communications Media: Government

Domestic Broadcasting:[5]

The government operates "Radio Free Grenada", formerly Radio Grenada, from St. George's, and provides service to all parts of the island. Three transmitters are employed: a single 1 kW medium wave, at 535 kHz; and two 5 kW shortwave, which have utilized frequencies in the 31 and 19 metre bands. The broadcast facility is a nucleus of national life, providing a much needed mark of identity. The home service is normally operated from 1000 to 0215 hours, with a combination of music, entertainment and information. Personal monitoring has found that limited commercial as well as public service messages are also included. News relays of the BBC, VOA and Radio Canada International have been commonplace in the past.

As a testimony to Radio Grenada's importance, it was the first installation to be taken over during the coup d'etat of March, 1979, and served as provisional headquarters for the uprising.[6] Notables spoke

to the people, urging an end to violence and encouraged support for the new administration. Radio Grenada is now used by the Prime Minister, Maurice Bishop, to convey messages to the nation. The station also stresses Caribbean unity, in keeping with the new government's policy.[7]

Radio Free Grenada's shortwave service is received in many parts of the hemisphere, although the strength is substantially less than full-scale international broadcasters. There is no television on Grenada.

Common Carrier Services:

Grenada has an automatic telephone system, with some 5,000 subsets and an interlinked network comprising seven exchanges.[8] The facilities were constructed by British concerns, and are operated by Grenada Telephone Company. VHF and UHF circuits exist to Trinidad and Carriacou, as well as a link to Barbados.[9] Trunks with international centers on Antigua, Barbados and Trinidad provide connections with the outside world, via Cable & Wireless.[10] Circuits with mainland South America are also possible via the Trinidad-Guyana tropo system. Submarine cables from the island of Tortola, which is available to Grenada, via Antigua, connect with the U.S., Jamaica and Bermuda, from whence additional routing is possible.[11] Likewise, a cable from Antigua leads to Puerto Rico and the U.S. HF radio (Cable & Wireless) provides circuits in addition to the abovementioned resources.[12]

Grenada Electricity Services, Ltd., provides electrical power on the island; using diesel generators.[13] The Queen's Park station, in St. Georges', produces the power, which is distributed with an 11 kW network, as poly-phase 400 volts and single-phase 230 volts, 50 hZ.[14]

Overall Analysis:

Grenada is excellently served by radio broadcast facilities, both in technical and programming structure requirements. It has one of the highest distributions of radio receivers in Latin America, and also has an acceptable telephone circulation. Domestic and international common carrier services are good.

GRENADA

1. Information Please Alamanc, 1979, 33rd ed., s.v. "Countries, Territories, and Dependencies -Grenada;" U.S., Central Intelligence Agency, National Basic Intelligence Factbook, 1980 (Washington, D.C.: Government Printing Office, 1980), p. 76; Reader's Digest 1980 Almanac and Yearbook, s.v. "Nations of the World -Grenada;" The Caribbean Year Book 1977-78, 48th ed., s.v. "Grenada;" The People's Almanac #2, s.v. "Nations and their Rulers -Grenada;" The World Almanac and Book of Facts, 1979, s.v. "Nations of the World -Grenada."

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3. Ibid.

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5. Frost, World Radio TV Handbook, p. 296.

6. Granma, 17 March 1979.

7. Personal monitoring.

8. The Caribbean Year Book 1977-78, s.v. "Grenada."

9. "World's Longest Inter-Island Microwave System," Telecommunication Journal 43 (April 1976): 315-316.

10. Ibid.

11. "New Caribbean Communications Scheme," Telecommunication Journal 31 (April 1964): 90.

12. Ibid.

13. The Caribbean Year Book 1977-78, s.v. "Grenada."

14. Ibid.

GUADELOUPE

(Department de la Republique Francaise)

Basic Information:[1]

Area: 1,779 kM^2
Population: 375,000 (1978)
Population Density: 211 per kM^2
Capital: Basse-Terre
Major Cities: Point-a-Pitre/Les Abymes, Basse-Terre
Languages: French, Creole
Religion: Roman Catholic
Gross Domestic Product: US$ 302 million (*Value of commerce, as Guadeloupe is a part of France)
Per Capita Income: US$ 805
Literacy: 70 percent

Geographical Summary:[2]

Situated in the Leeward Islands of the Caribbean, Guadeloupe is near the islands of Dominica, Antigua and Montserrat. Guadeloupe is actually divided into two: Basse-Terre and Grande-Terre, by a narrow channel. The smaller islets of Marie-Galante, La Desirade, Iles des Saintes, Iles de la Petite Terre, Saint Barthelemey and Saint Martine are also incorporated into the Department of Guadeloupe. The capital, Basse-Terre, is located on a mountainous section of the island, which has an active volcano. The largest city, Point-a-Pitre, is situated on Grande-Terre. A tropical climate predominates, with very heavy rains in higher regions.

Basic National Review:[3]

Guadeloupe was discovered by Columbus in 1493, French colonization started in the 17th century, with many Normans and Bretons settling. Infusions of Africans for plantations followed, resulting in a mixed ethnic stock.

Guadeloupe is an Overseas Department of the French Republic, and has representatives in the French legislature. Civil disturbances during the 1960's have resulted in subsequent reforms and modernization plans.

Production of sugar, bananas, coffee, cotton and sisal are important to the island's economy. Rum making and fishing are also of note.

Telecommunications Overview:[4]

Number of Radio Broadcast Stations: 1
" " " Receivers: 95,000
" " " " per hundred: 25.33
" " Television Stations: 1
" " " Receivers: 70,000
" " " " per hundred: 18.66
" " Telephones: 24,600
" " " per hundred: 6.56
Electrical Generation Capacity: 50,000 kW
" Service: 50 hZ, 220 volts
Satellite Earth Stations: None
International Communications: Via HF and VHF radio links
Ownership of Communications Media: Government
Television Standard: System K-1, SECAM color

Domestic Broadcasting:[5]

The Societe Nationale Radio-France, Regions 3, operates a two transmitter radio broadcasting station on Guadeloupe, with studios in Point-a-Pitre. A home service is maintained from 1030-0230 hours, with many relays from Metropolitan France. The Arnouville transmitter works on 640 kHz, with 20 kW power, and the Citerne installation is on 1420 kHz, with 4 kW. Television uses system K-1, in SECAM color, with the following distribution facilities:

Arnouville: Channel 8 (207.25-221.75 mHz/roughly between U.S. channels 12 and 13) 100 watts power, horizontal polarization

Citerne: Channel 5 (183.25-189.75 mHz/roughly between U.S. channels 8 and 9) 500 watts power, horizontal polarization

Morne a Louis: Channel 6 (191.25-197.75 mHz/roughly between U.S. channels 9 and 10) 30 watts power, horizontal polarization

Programs on TV are broadcast for seven hours, daily, mostly from videotape. According to available details, there are some 5,000 color receivers. A license fee is required for TV set ownership.

Common Carrier Services:

Guadeloupe is equipped with a French-made automatic telephone system, providing approximately 30,000 subsets.[6] Connections between the islands are via VHF radio, with microwave circuits extending to Antigua and Dominica, from where trunked radio and cable connections extend to other destinations.[7]

Use is made of the French INTELSAT station on Martinique for circuits with Europe.[8] Approximately 80 international circuits are extended to Guadeloupe and environs, from Antigua center.[9] Martinique's earth station has itself been equipped for nearly 100 telephone channels, which can be connected to Guadeloupe.[10]

HF radiotelephone connections can be established, through the 20 kW transmitter of station FZW.[11] Domestic telecoms services are still not completely adequate on Guadeloupe.

The Societe de Production d'Electricite de Guadeloupe is responsible for electricity on the island, mostly using imported fuels, although some small-capacity hydro exists.[12] The main generating plant is at Point Jarry.[13] Power is sent out at 110 and 200 volts, 50 hZ, both single and poly-phased.

Overall Analysis:

Guadeloupe and territories are equipped with an adequate radio and television broadcast system, with a very good distribution of receivers. Inter-island common carrier circuits are also good, but domestic telephone systems leave much to be desired.

GUADELOUPE

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2. Ibid.

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6. "Automatic Telephone Service for Subscribers in Pointe-a-Pitre," Telecommunication Journal 36 (May 1969): 238.

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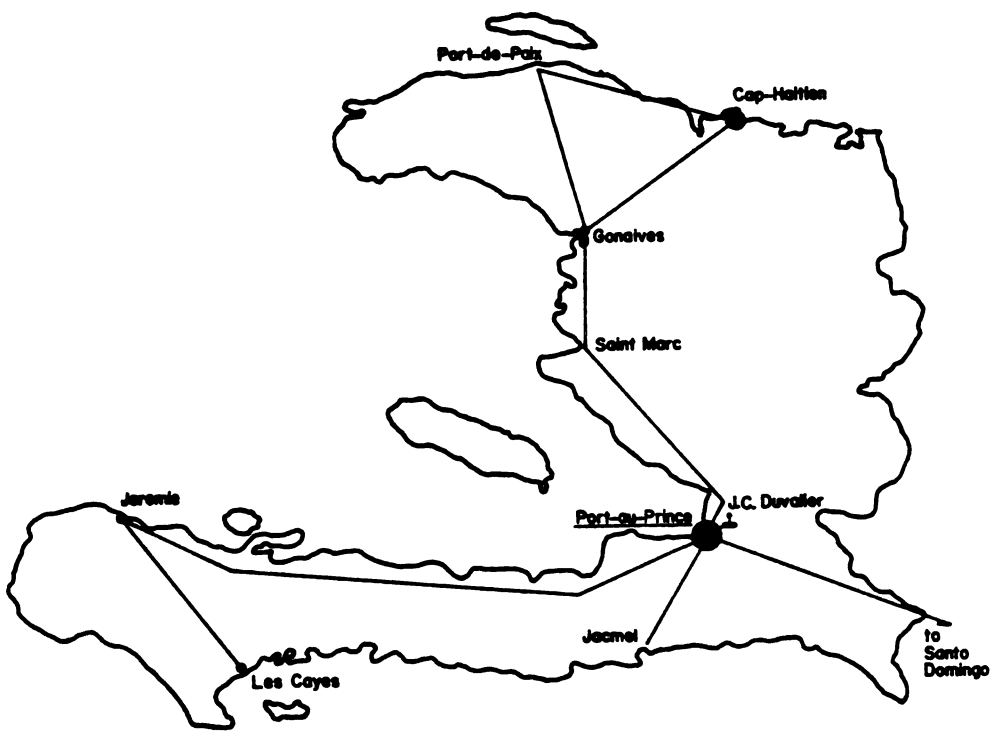
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FIGURE 6

Communication Networks
in
HAITI



● 16 radio transmitters
● 5 radio transmitters
• 2 radio transmitters
Satellite Station
Main Route
note: the capital has one TV station

HAITI

(Republique d'Haiti)

Basic Information:[1]

Area: 27,750 kM^2
Population: 4.83 million (1978)
" Density: 174.05 per kM^2
Capital: Port-au-Prince
Major Cities: Port-au-Prince, Cap Haitien
Languages: French, Creole-French
Religions: Roman Catholic, Protestant, Voodoo widely practiced
Gross National Product: US$ 930 million (1976)
Per Capita Income: US$ 192.55
Literacy: 10 percent

Geographical Summary:[2]

Hispanola, to the southeast of Cuba, west of Puerto Rico, and northeast of Jamaica, houses both the Republic of Haiti and Dominican Republic. The Haitian section of the isle comprises approximately a third, mostly of mountainous terrain, interspersed with valleys. Much of the land has been stripped of trees in order to make charcoal, resulting in serious erosion problems, rendering substantial parts of the country unsuited for agriculture. It should be noted that on the Dominican side, tree-felling is strictly controlled by law, in order to prevent a similar catastrophe. Close to 15 percent of the population lives in or near the capital, with the rest divided between remaining towns and rural areas.

Basic National Review:[3]

An anomaly among the states of the Mid-Caribe, Haiti is a French-Creole cultural entity which has been under independent black rule since 1804. First a colony of Spain, then of France, bloody slave revolts in the late

1700's led to an eventual break with France. After independence, Haitian armies established control over the whole of Hispanola, but were eventually driven from Santo Domingo. Long periods of internal strife and indigenous black/mulatto regimes followed. In 1905, the U.S. assumed control over Haiti's economy, later fully occupying the country until 1934, resulting in an anti-American feeling throughout the hemisphere. Dr. Francois Duvalier became president in 1957, remaining in this capacity until his death in 1971. He was succeeded by his son, Jean-Claude.

Agriculture plays a very important role in the Haitian economy, with coffee being the major crop. Also grown are sugarcane, cotton, sisal, bananas, and cacao. Tobacco is also produced. There is little true manufacturing, although assembly industries are frequent. Mineral resources, such as bauxite, tin, copper, gold and silver exist.

Telecommunications Overview:[4]

International Prefixes: HHA-HHZ, 4VA,4VZ
Number of Radio Broadcast Stations: 24
" " " Receivers: 300,000
" " " " per hundred: 6.21
" " Television Stations: 1
" " " Receivers: 15,000
" " " " per hundred: 0.31
" " Telephones: 11,000
" " " per hundred: 0.23
Electrical Generation Capacity: 70,000 kW
" Services: 60 hZ, 115/230 volts
Satellite Earth Stations: INTELSAT facility recently constructed near Port-au-Prince
International Communications: Via INTELSAT, HF radio, terrestrial lines and trunked connections via the Dominican Republic
Ownership of Communications Media: Both government and private
Television Standard: System M, SECAM color officially planned
International Telephone Code: 509
Telecommunications Administration: Conseil Nationale des Telecommunications (Port-au-Prince)

Domestic Broadcasting:[5]

(Medium and Short Waves)

City	Number of Transmitters	(kW) Combined Power
Port-au-Prince	16	63.21
Les Cayes	2	21
Cap Haitien	5	16.2
Gonaives	2	0.7
Jeremie	2	0.7

(FM)

Transmitters are employed by stations in Port-au-Prince, and Cap Haitien, primarily relaying a main program.

(Television)

A cable television system serves the capital area, having programs in French on channel 2 and English on channel 4.

Trends in Broadcasting:

Haitian mass communications are an oddity, as few broadcast stations even program in the native tongue. This may be explained by the fact that while the official language is French, most people speak Creole, and the two are not always mutually comprehensible. In a country where the literacy rate is rather low and economic situation is not conducive to the spread of television, radio plays a very important part in linking together the nation. This is also true, considering the fact that transportation and common carrier services do not effectively reach all sectors of the country.

While freedom of the press is guaranteed by the Constitution of Haiti and formal censorship has not usually been in force, those involved in mass communications have hesitated to criticize the government or send out information which might be considered as offensive. In late 1979, a new law came into effect which provides for severe penalties for materials which criticize President Duvalier or his family, as well as government, foreign officials and public policy.[6] Violations of national security and the integrity of the armed forces is also covered. According to available information, those convicted of offenses under this legislation may be imprisioned for three years, as well as the suspension for one year of the periodical or broadcast station through which material was disseminated.[7]

Other than government stations, broadcasting is licensed by the telecommunications authorities, on a private and often commercial basis. Financial and technical difficulties are not uncommon for Haitian broadcasters, many of whom are forced to operate on less than solid footings. It is also not uncommon for smaller stations to relay the signals of larger ones, especially in order to carry special programs, such as those of government origin. Religious and cultural stations play an important part in the broadcast media, as they tend to cater toward the man in the street, in his own language (Creole). Radio 4VEH and Radio Lumiere are examples of this category. La Voix Evangelique, 4VEH, also serves as Haiti's international voice as it programs in French, English and Spanish to the Caribbean over two moderate power (2.5 kW) shortwave transmitters.[8] Its signals are heard frequently in many parts of the world.

The single television station serves the capital city through a cable network.[9] Operating on a commercial basis, but now under government control, Tele-Haiti has two channels: one for French language programs and the other for English. Telecasting for several hours daily, an audience of 15,000 is catered to -- all in Port-au-Prince. Tele-Haiti also has a monopoly on the importation, sales and repair of television sets.[10]

Frequencies in the medium and short waves are used for domestic broadcasts, and FM channels exist in a few cases. Not all people own or have access to radio receivers, as they are still considered much of a luxury. Group and public listening is not uncommon.

It is also possible to receive programs from outside of the country, in a variety of languages. Radio Habana Cuba and Moscow's Radio Station Peace and Progress both transmit in Creole, whereas other broadcasts are in standard French.[11] The Cuban station makes use of a frequency in the 49 metre band, one which Haitian stations use for domestic programs.[12]

Common Carrier Services:

Haiti has long suffered from inadequate national communications resources. In parts of the country, the telephone system has been out of service for years.[13] Oddly enough, one of the first dial telephone systems in the hemisphere was installed at Port-au-Prince. After this notable event, however, stagnation occurred. The capital still has a small automatic exchange and trunk circuits to Cap Haitien, Jeremie, Les Cayes, Jacmel, Saint-Marc and Gonaives.[14] Approximately thirty towns have manual telephone service.

The government recently assumed control over telecoms and with technical assistance from Northern Telecom (Canada) plans to reconstruct Haiti's communications system.[15] According to information available, containerized electronic telephone exchanges will be installed in the capital; to be relocated at provincial centers once a permanent exchange is built in Port-au-Prince.[16] Also, interconnections will be rebuilt along modern lines.

Main international circuits are routed via Santo Domingo, from where cables to the U.S.A. and Puerto Rico exist.[17] A new INTELSAT facility near Port-au-Prince has made a tremendous improvement in overseas calls.[18] HF radio is also utilized for routes to some points abroad, in conjunction with RCA Globcom and All America Cables and Radio.[19]

With the installation of modernized switching and carrier equipment, STD will be possible between the major towns of Haiti, using the following zone codes:[20]

Cap Haitien:	3
Gonaives:	5
Port-au-Prince:	1

A government organization, Electricite d'Haiti operates the country's electrical system.[21] The Francois Duvalier Hydroelectric Plant at Lake Peligre supplies most of the need; having a capacity of roughly 70 MW.[22] The power distribution system is not as developed as it could be, leaving sections of the country underserved or without electricity. Poly and single-phase 110 and 200 volts, 60 hZ, are made available to commercial and residential customers. In 1972, less than one percent of the rural

population had electricity.[23] Recently, occasional droughts have caused great problems for the Haitian hydro plant and conservation orders have been announced. Peligre is rarely able to generate power at its rated capacity, owing to water shortage.[24]

Overall Analysis:

As one of the poorest nations in the world, Haiti is not expected to have an outstandingly modern communications system. Nevertheless, its radio broadcast facilities are adequate for present needs -- as they can reach most parts of the republic. A shortage of receivers inhibits contacting all citizens. Television is restricted to the capital city, and those with sufficient resources for the purchase of a set. Consequently, it has limited national impact, although influential among decision makers. Until very recently, the Haitian common-carrier system was in shambles. It is now undergoing a remarkable renaissance, with outside help.

HAITI

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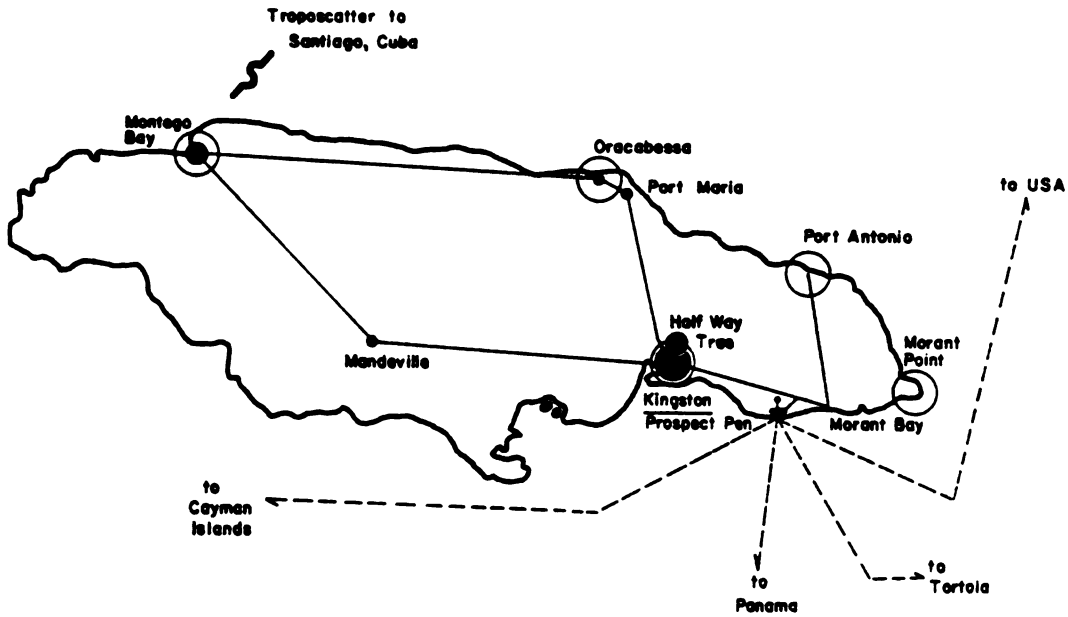
22. Ibid.

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FIGURE 7

Communication Networks in JAMAICA



JAMAICA

(Jamaica)

Basic Information:[1]

Area: 10,991 kM^2
Population: 2.11 million
Population Density: 192 per kM^2
Capital: Kingston
Major Cities: Kingston, Montego Bay, Spanish Town
Languages: English, English Patois
Religion: 75% Protestant Christian
Gross National Product: US$ 2.9 billion (1976)
Per Capita Income: US$ 1,374
Literacy: 82 percent

Geographical Summary:[2]

Situated in the mid-Caribbean, Jamaica is only 150 kM from Cuba. Most of the island is very mountainous but there are some flat lands in the extreme west and south. Plateaus and interspersed valleys are also found. The highest point is Blue Mountain, in the east, with an altitude of 2,256 metres. Approximately 40 percent of the population lives in urban centers.

Basic National Review:[3]

Discovered by Columbus, in 1494, and colonized by Spain in the 16th century, Jamaica came under British rule in 1655. Although the island was originally peopled by indigenous Arawak Indians, a large African population was established through importation of plantation labor. Slavery was abolished in 1833. In 1865, following negro revolts, a colonial government was firmly established.

Jamaica has had home-rule since the mid-1940's. In 1958, the island became part of the West Indies Federation and joined CARIFTA in 1968. By reasons of economic upheaval, black power movements gained strength during the 1970's, resulting in more nationalistic measures. The National People's Party, led by Dr. Michael Manley, won elections and the government took a more liberal stance. Relations with Cuba were restored and the government began a policy of greater participation in economic and social matters. A new, conservative government won in the 1980 elections.

Important to the Jamaican economy are large bauxite deposits, aluminum production and various agricultural crops: including sugar, citrus, bananas and tobacco.

Telecommunications Overview:[4]

International Prefixes: 6YA-6YZ
Number of Radio Broadcast Stations: 3
" " " Receivers: 718,000
" " " " per hundred: 34.02
" " Television Stations: 1
" " " Receivers: 120,000
" " " " per hundred: 5.69
" " Telephones: 108,500
" " " per hundred: 5.14
Electrical Generation Capacity: 758,000 kW
" Service: 50 hZ, 110 volts
Satellite Earth Stations: INTELSAT facility at Prospect Pen
International Communications: Via INTELSAT, four submarine cables, HF radio and tropo
Ownership of Communications Media: Both government and private/commercial
Television Standard: System N, presently monochrome, but PAL color planned
Telecommunications Administration: Ministry of Public Utilities, Communications and Transport (Kingston)

Domestic Broadcasting:[5]

(Medium Waves and FM)

City	Number of Transmitters	Networks	(kW) Combined Power
Kingston	6	RJR,JBC	22.7
Montego Bay	3	RJ,JBC,JBC2	10.25
Spur Tree	3	RJ,JBC2	7.25
Galina	2	RJ,JBC	6.2
Mandeville	1	JBC	5
Port Maria	1	JBC	5
Cooper's Hill	1	JBC2	2
Halfway Tree	2	JBC,JBC2	.33
Oracabessa	1	JBC2	.25

Networks: RJ: Radio Jamaica
JBC: Jamaica Broadcasting Corporation
JBC2: Jamaica Broadcasting Corporation, Second Program

(Television)*

Location	Channel	(kW/ERP) Combined Power
Cooper's Hill	7	33
Spur Tree	13	33
Montego Bay	9	16.5
Oracabessa	12	2
Port Antonio	8	1
Yallahs	9	1
Kingston	11	.5
Morant Point	13	25 watts
Kempshot	8	10 watts

*All JBC television

Trends in Broadcasting:

Social communications in Jamaica are an interesting mixture of traditional British quasi-public; American commercial and colorful Caribbean tendencies. The system which exists today is descended from an earlier Rediffusion subsidiary, as well as a public corporation which was formed at the behest of Jamaican nationalists. Both stations are commercial in operation, as is the television service.

The 1962 Constitution (Chapter III, Art. 22) specifically guarantees freedom of expression, and this is traditionally the case.[6] Interestingly enough, relations between government and media are usually quite close, taking into consideration large state advertising expenditures.[7]

Radio broadcasting is widespread, reaching an estimated 860,000 adult listeners every day.[8] Many MW and FM transmitters are employed in order to disseminate the programming. Short wave is not used in Jamaica. The rugged mountains of the island play havoc with radio and television reception, necessitating the extensive relay network.[9] The portable transistor receiver has carried radio into almost every home on the island.[10] Broadcast services are provided by Jamaica Broadcasting Corporation, a public entity, which operates a nationwide AM and FM network. The medium-wave facilities carry news and information, as well as entertainment: all catered to "express the diverse interests of the Jamaican people."[11] JBC's FM network carries stereophonic music. Radio Jamaica is related to the Rediffusion group, and broadcasts 24-hours daily on MW and FM.[12] A wide diversity of programming is carried, including over 100 news bulletins every day.[13] RJR, as it is known, carried three hours each week of government produced programs.[14] Radio Jamaica maintains a wired network, as well.[15]

Television has a potential audience of roughly 250,000 and is viewed across the island.[16] Transmissions are sent out in System N, (modified U.S. standard), on VHF channels.[17] At present, there is no color TV in Jamaica, although information has been released which states that if color were to be adopted, it would be in the PAL system.

Quite a few TV receivers are located in public places or business establishments, such as pubs.[18] Jamaican listeners can pick up broadcast signals from the outside world. Besides shortwaves, the more powerful MW transmissions of the region are also possible to receive.

Common Carrier Services:

There are presently over 100,000 telephones on Jamaica, served by an island-wide network and automatic switching.[19] Jamaica Telephone Company is the major common carrier, having close ties with Continental Telephone Company, of the U.S.A.[20] Approximately 80 percent of all telephones are located in the capital, Kingston, and in Montego Bay.[21] Smaller towns frequently have a lack of advanced services, and frequent criticisms have been heard of line outages, noisy connections, and other annoyances; caused at least in part by aged equipment.[22] There are also many outstanding applications for telephone installation.

Microwave systems link the major centers together, having initial capacities of 120 channels per carrier.[23] There is a 1200 channel microwave path between Kingston and Portmore, using PCM digital techniques.[24]

International telephone traffic is handled by JAMINTEL, a joint venture between the government and Cable & Wireless, Ltd.[25] The INTELSAT facility at Prospect Pen (approximately 25 kM from Kingston) plays an important part in overseas circuits, having 56 set aside for calls to Trinidad and Barbados, alone.[26] A modern Cable & Wireless center operates in Kingston, using equipment manufactured by LM Ericsson, and providing 150 international circuits.[27] Submarine cables are as follows:[28]

Route	Capacity (voice channels)
(Jamaica to:)	
Tortola	480
Cayman Islands	160
Panama*	128
Florida (U.S.A.)*	144

(Note: *indicates the cables to Florida and Panama interconnect at Jamaica).

There is a troposcatter route from Jamaica to Cuba, having approximately 60 channels possible.[29] According to information released by Cuban sources, this link is very important to overseas traffic for Havana, especially that originating in the Western Hemisphere.[30]

Jamaica is now a part of North America's Area Code 809, permitting direct dial telephone service between the island and the U.S.A. and Canada.

Internal telegraphy is the responsibility of the post office. Facilities have undergone considerable modernization in recent years, and include a tape relay center in Kingston.[31] Overseas telegraphy is conducted by Cable & Wireless, Ltd.

Jamaica Public Service Company undertakes the supply of electricity to the island, along with some smaller private sources.[32] Substantial growth in service has occurred in the past few years, with power being extended to approximately 40 percent of the population.[33] There are still segments of Jamaicans who do not have electricity. At last count, most power was generated by thermal sources. There were two steam facilities;

five hydro plants; four diesel stations and two gas turbines.[34] The public supply is provided at 50 hZ, 110 and 220 volts, poly and single phase. Some electricity is purchased from private industries which had a total capacity of 231 MW.[35] These are mostly sugar mills and mining industries. Part of the private system operates on 60 hZ, preventing interconnection of lines.[36] In the past, special generator-ships have been anchored off Kingston, in order to ease demand.[37]

Overall Analysis:

Jamaican social communications are very well developed, and could serve as an example to other states desiring a comprehensive, but free system. The common carrier facilities are also adequate, but less available to the population as a whole. As a rule, telephone and telegraph services are more than adequate for government and business needs. The electrical grid is also well developed, but requires more integration in order to reach full public service.

JAMAICA

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5. Frost, World Radio TV Handbook, pp. 300, 412, 413.

6. Irving Kaplan et al., Area Handbook for Jamaica, Foreign Area Studies, The American University (Washington, D.C.: Government Printing Office, 1976), p. 195.

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11. The Caribbean Year Book 1977-78, s.v. "Jamaica."

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13. Ibid.

14. Ibid.

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20. The Caribbean Year Book 1977-78, s.v. "Jamaica."

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23. "In Jamaica...Microwave Radio System," Telecommunication Journal 36 (February 1969): 92.

24. "Microwave Equipment for Jamaica," Telecommunication Journal 41 (October 1974): 622.

25. The Caribbean Year Book 1977-78, s.v. "Jamaica."

26. International Telecommunication Union, Thirteenth Report by the International Telecommunication Union on Telecommunication and the Peaceful Uses of Outer Space (Geneva: International Telecommunication Union, 1974), p. 98.

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29. "Inter-American Telecommunications Network," Telecommunication Journal 38 (September 1971): 632.

30. Granma, 10 June 1979.

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32. The Caribbean Year Book 1977-78, s.v. "Jamaica."

33. Kaplan et al., Area Handbook for Jamaica, p. 258.

34. The Caribbean Year Book 1977-78, s.v. "Jamaica."

35. Ibid.

36. Kaplan et al., Area Handbook for Jamaica, pp. 258-259.

37. Ibid.

MARTINIQUE

(Department de la Republique Francaise)

Basic Information:[1]

Area: 1,102 kM^2
Population: 375,000 (1978)
" Density: 340 per kM^2
Capital: Fort de France
Major Cities: Fort de France, Lamentin
Languages: French, Patois
Religions: 95 percent Roman Catholic, 5 percent Hindu, and African sects
Gross National Product: US$ 769 million (1975)
Per Capita Income: US$ 2,051
Literacy: 70 percent

Geographical Summary:[2]

Martinique is located in the Lesser Antilles, some 480 kM to the northeast of the South American mainland. Volcanic in origin and still having active volcanoes, Mt. Pelee is especially well-known. Neighbors are Guadeloupe, Dominica, St. Lucia, and St. Vincent.

Basic National Review:[3]

Martinique was claimed under the French flag in 1635, with development of the agricultural sector taking place on a plantation basis. Many African workers were imported. In 1902, Mt. Pelee erupted, obliterating the city of St. Pierre and 30,000 lives. The sole survivor was a prisoner held deep in a dungeon. In 1943, taking into account the German occupation of metropolitan France, the Free French took control of Martinique. In terms of official status, the island is an Overseas Department of France, administered by a prefect, and having representation in France's national assembly.

Much of the island's economy is based on agriculture, with bananas leading the way. Petroleum processing is also important, mostly for re-export. Tourism has played an increasingly significant role on the island.

Telecommunications Overview:[4]

Number of Radio Broadcast Stations: 1
" " " Receivers: 45,000
" " " " per hundred: 12.0
" " Television Stations: 1
" " " Receivers: 50,000
" " " " per hundred: 13.33
" " Telephones: 31,700
" " " per hundred: 8.45
Electrical Generation Capacity: 95,500 kW
" Service: 50 hZ, 220 volts
Satellite Earth Stations: INTELSAT facility at Trois-Ilets, near Fort de France
International Communications: Via INTELSAT, interisland VHF and UHF radio, as well as HF radiotelephone
Ownership of Communications Media: Government
Television Standard: System K-1, SECAM color
Telecommunications Administration: Postes et Telecommunications de France (Fort de France)

Domestic Broadcasting:[5]

Electronic social communications on Martinique are the responsibility of "France-Regions 3," a section of Societe Nationale Radio-France, which operates "Martinique Inter," the radio station, and "Television-France-Regions 3." All programs originate from Fort de France, with the exception of materials relayed from Europe. The French language predominates, although international news and information broadcasts for tourists are occasionally aired.

Martinique has a 50 kW medium-wave transmitter, operating on 1310 kHz, as well as two 4 kW short-wave units, working in the tropical bands. A 50

watt FM channel, on 95.0 mHz, provides clear local reception. The short-wave transmitters are capable of being coupled in order to provide 8 kW output power. Martinique radio is on the air for approximately 17 hours, daily.

Television uses standard K-1, SECAM color. Most programs are sent from Paris teleproduction centers, either by air or via the INTELSAT link. Programs on TV are sent out for five hours on weekdays and Saturdays; seven on Sundays. The following distribution network is utilized:

Location	Channels (K-1)	(watts/ERP) Power
Fort de France	4	500
La Trinite	6	60
Le Precheur	6	50
Morne Aca	8	50
Aileron	6	100

Martinique, as many French overseas territories, makes use of the interesting K-1 allocations and standard, which frequently lie between U.S. standard M channels. Channel 4-K1 is roughly equivalent to U.S. channel 7; channel 6-K1 being wedged between U.S. channels 9 and 10; and 8-K1 taking up parts of U.S. 12 and 13. It should be noted that all K1 channels are in the higher reaches of VHF, downplaying interference and atmospherics, but also restricting range.

On Martinique, however, the five transmitter network ensures reception in all corners of the island, with units situated atop high peaks and other lofty areas.

Common Carrier Services:

Postes et Telecommunications de France is the organization responsible for common carrier on Martinique, as in other parts of the French republic. There is an automatic telephone system, centered on Fort de France, where the exchange has a capacity of 10,000 circuits.[6] Direct dialling between all centers on the island is possible, as is international calling to nearby Guadeloupe, and via satellite to other areas.[7] The telegraphic network is also operated by the PTT.

Interisland VHF and UHF radio circuits link Martinique with Dominica, and thence to Guadeloupe and Antigua.[8] In the other direction, a path exists from Martinique to St. Lucia, continuing on to St. Vincent, Carriacou, Grenada and Trinidad.[9] Circuits are operated on a normal basis with Antigua, Barbados and Guadeloupe, as well as Guyana.[10] The PTT also maintains an international HF radio service from Fort de France, using equipment rated at 20 kW.[11] Interisland radio links which terminate at locations served by Cable & Wireless can also take advantage of that organization's extensive network.

An INTELSAT earth station exists at Trois-Ilets, near Fort de France, and is operated by the PTT.[12] The facility uses standard equipment, capable of over 80 telephonic channels and television.[13] Circuits are maintained with France, French Guiana, the U.S.A. and other locations.[14] Some satellite telephone channels have been extended to points in the Netherlands Antilles by radio relay. This provides a valuable service to that region.[15]

Electricity is generated by the Societe de Production et Distribution Electricite de Martinique (S.P.D.E.M.), which is guaranteed a monopoly under law; excepting certain sugar plantations.[16] Lacking natural resources, Martinique is rather dependent on importation of fossil fuels. The main power plants are Sainte-Therese and Pointe des Carrieres; both of which are equipped with steam turbines.[17] In recent years, some thought has been given to the exploitation of geothermal sources; considering Martinique's volcanic region.[18] Electrical service has not always been sufficient in capacity, nor efficient in distribution.

Overall Analysis:

Martinique is served by efficient social communications; both radio and television. Common carrier facilities are good, although somewhat lacking in domestic telephony. Martinique is a center for coordination of communications with other French territories in the Caribe.

MARTINIQUE

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11. Oliver P. Ferrell, Confidential Frequency List, 4th Edition, (Park Ridge, New Jersey: Gilfer Associates, Inc., 1979), p. 77.

12. Communications Satellite Corporation (COMSAT), COMSAT Guide to the Intelsat, Marisat and Comstar Satellite Systems (Washington, D.C.: Communications Satellite Corporation (COMSAT), 1979), p. 25.

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15. Ibid.

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17. Ibid.

18. Ibid.

MONTSERRAT

(Dependency of U.K.)

Basic Information:[1]

Area: 98 kM^2
Population: 13,500 (1977)
Population Density: 138 per kM^2
Capital: Plymouth
Languages: English, local French-African Patois
Religions: Mostly Christian, some African
Gross National Product: US$ 5.011 million (1977)
Per Capita Income: US$ 371
Literacy: 75%

Geographical Summary:[2]

Situated in the Leeward Islands, Montserrat is approximately 400 kM from Puerto Rico, and neighbors Guadeloupe, Antigua, St. Kitts and Barbuda. Having a mild, tropical climate, the island is varied in terrain, with corresponding low and high landscapes. Some points reach an elevation in excess of 1,000 metres. Montserrat's location makes it a prime site for broadcasts to the Caribbean region.

Basic National Review:[3]

Montserrat is a dependency of the United Kingdom, and as such, receives a large amount of financial and administrative assistance. The island's population is primarily composed of mixed European-African parentage. Reflecting the unique history is the island's name; the fact that both English and a French patois are spoken; as well as a staunchly Anglo-Saxon named capital, Plymouth. Agriculture is the economic mainstay with sugar being the primary export. Cotton, bananas, rice, corn and other crops are also grown. In recent years, tourism has become

increasingly important. A British administrator oversees island affairs, with help from an Executive Council and Legislative Council.

Telecommunications Overview:[4]

Number of Radio Broadcast Stations: 3
" " " Receivers: 5,500
" " " " per hundred: 41
" " Television Stations: 1 Relay
" " " Receivers: Few
" " Telephones: 1,000
" " " per hundred: 7.4
Electrical Generation Capacity: 3,700 kW
" Service: 60 hZ, 230/400 volts
Satellite Earth Stations: None
International Communications: Cable & Wireless circuits, via Antigua
Ownership of Communications Media: Government and private
Television Standard: System N, monochrome

Domestic Broadcasting:

Montserrat occupies a strategic position in the Leeward Islands, vis-a-vis broadcast transmission, as it is easily within radio distance from most of the region. Three broadcasting organizations are on the air. Radio Montserrat, ZJB, the government station, located in Plymouth. This facility programs a locally-oriented schedule from 5:00 a.m. until 9:00 p.m., local time, using a 1 kW transmitter on 885 kHz.[5] Programming is conducted in English.

The second station on the island is Radio Antilles, an "interregional," privately-owned, commercial broadcaster, which directs itself to the Eastern Caribbean from its site at O'Garros. Radio Antilles is owned by West German interests, through the "Caribbean Relay Company." Interestingly, this firm is actually a joint venture between the BBC and Radio Deutsche Welle.[6] Personnel listed for Montserrat are also found included with the DW staff in Germany.

Two medium wave transmitters are operated by Radio Antilles on Montserrat, along with one other on St. Vincent. The primary frequency is 930 kHz, equipped with 200 kW; as well as 740 kHz, with 20 kW. The St. Vincent station works on 1450 kHz (10 kW), and relays the 930 kHz outlet. This combination enables diverse programming in English, French and Spanish. English is sent out for 16 hours daily on 930 kHz; French -- for 15 hours on 740 and 1450 kHz; Spanish is transmitted for three hours on 930 kHz. Nighttime signals of the 200 kW transmitter propagate for very long distances; often heard in many areas in and around the Caribe. Cuban media have often expressed dislike for the station; accusing it of being part of "a West German plot against the progressive governments of the region."[7] The press in Guyana have also assailed the station.[8] These "honorable mentions" could be taken to indicate the extent of listenership and influence. During the recent (1979) hurricane disasters throughout the Eastern Caribbean, Radio Antilles played a vital communications role; and helped to restore information and order.[9]

BBC and Deutsche Welle maintain a shortwave relay site at Radio Antilles-Montserrat.[10] One 50 and a 15 kW shortwave transmitters are used, having four antenna systems.[11] Programs are fed from the Antigua control center. The Montserrat station works in close conjunction with Antigua facilities; providing improved reception for Caribbean and Western Hemisphere listeners.

Montserrat is served by a 1 kW television repeater, located northeast of Plymouth. The facility works on channel 7, relaying programs from the Antigua and Barbuda Broadcast Services. Monochrome is used exclusively.

Common Carrier Service:

Cable & Wireless, Ltd. operates telecommunications on Montserrat, and provides automatic telephone service with links to Antigua center.[12] Circuits extend from Antigua trunk exchange to Tortola, St. Kitts, St. Maarten, Puerto Rico, Guadeloupe, Jamaica, and other locations in the C&W system.[13] Access is provided to INTELSAT facilities on Barbados and Trinidad.[14] Trunked calls are also possible.

Montserrat Electricity Services, Ltd., provides power on the island.[15] The main generating plant is located at General Turning Road, and transmission lines extend from this point.[16] Three 762 and one 1485 kW generators are operated; providing 60 hZ power at 230 and 400 volts.[17] Some 50 substations are involved in the network.[18] It is interesting to note that Radio Antilles is the largest user of electricity on Montserrat.[19]

Overall Analysis:

For a small island in an important location, Montserrat fares well in both social and common-carrier communications. Although the telephone system is small and television services relatively limited, the overall telecom facilities are functional and ample. International circuits are adequate, with most points in the world reachable via Cable & Wireless. The geographical importance of Montserrat is attested to by the BBC-Deutsche Welle relay station.

MONTSERRAT

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7. Granma, 3 March 1977.

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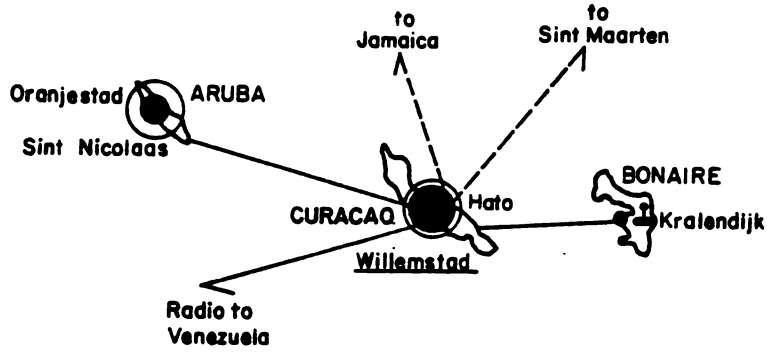
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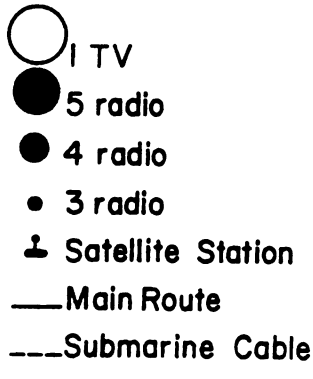
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FIGURE 8

Communication Networks in NETHERLANDS ANTILLES





NETHERLANDS ANTILLES

(Nederlandse Antillen)

Basic Information:[1]

Area: 961 kM^2
Population: 250,000
Population Density: 260 per kM^2
Capital: Willemstad (Curacao)
Major Cities: Willemstad, Oranjestad, Kralendijk, St. Nicolaas, Phillipsburg, Bottom
Languages: Dutch, Papiamento, English, Spanish
Religions: Roman Catholic, Protestant, Jewish
Gross National Product: US$ 280 million (1975)
Per Capita Income: US$ 1,120
Literacy: 95 percent

Geographical Summary:[2]

The Netherlands Antilles are situated in the Caribbean, divided into two separate clusters of three islands each. The main group, termed "ABC" islands, is 24 to 58 kM off the northern coast of Venezuela, and consists of Aruba, Bonaire and Curacao. The second group is located in the Leewards, more than 800 kM off the South American coast, and near Puerto Rico. St. Eustatius, Saba and the southern third of St. Maarten are involved. Interestingly enough, this last island has long been shared between the Dutch and French. In terms of size, Curacao has an area of 448 kM^2; Bonaire - 246 kM^2; and Aruba - 179 kM^2; while the three Leeward members total 88 kM^2.

Southern islands are mostly flat and arid, with some elevated sections. The Leewards comprise mountains and high plateaus, although having occasional valleys and flatlands. This region is notably influenced by volcanic origin.

In the case of all Netherlands Antilles islands, internal communications present few problems. Until recently, however, it has not always been a simple matter to link up the two groups. Reception of signals from neighboring islands and mainland states is commonplace; as is receiving Antillean broadcasts on the continent.

Basic National Review:[3]

Under the Dutch flag since acquisition from Spain in 1643, the Netherlands Antilles are an integral part of the Kingdom of the Netherlands; and by legislation, are considered on an equal footing with the mother country itself. Most people are of African or mixed African-European stock. The native language is Papiamento, a delightful mixture of Dutch, Portuguese, Spanish, English and African tongues. The official language, e.g. that of government business and regulation, is Dutch while the language of commerce tends to be English. Spanish is also widely understood.

Southern islands have prospered greatly from the refining of Venezuelan petroleum, having necessary installation on Curacao and Aruba. In fact, the Antilles have a per capita income greater than that of European Netherlands.

Tourism follows in economic importance, along with varied types of limited agriculture and fishing. On Bonaire, there is a time-honored salt-panning establishment, employing solar techniques over three-hundred years old. The Netherlands Antilles government has hoped to diversify the economy somewhat; in order to lessen dependence on oil refining. Towards this aim, free-trade zones have been established, notably on Curacao and Aruba. While life tends

to be relatively calm in the islands, 1969 was a year of violence on Curacao, with fighting and looting breaking out as a result of a labor dispute. Destruction or severe damage was suffered by at least 70 percent of businesses in Willemstad, the Capital. Order was later restored by the Royal Netherlands Marines. Peace subsequently returned, with little evidence left that violence had ever broken out.

Most imports come from neighboring Venezuela (57 percent), and the United States is the major export customer, accounting for 62 percent of trade.

Telecommunications Overview:[4]

International Prefixes: PJA-PJZ
Number of Radio Broadcast Stations: 13
" " " Receivers: 175,000
" " " " per hundred: 70
" " Television Stations: 3
" " " Receivers: 45,000
" " " " per hundred: 18
" " Telephones: 47,000
" " " per hundred: 19
Electrical Generation Capacity: 300,000 kW
" Service: 50, 60 hZ; 127/220 volts
Satellite Earth Stations: INTELSAT terminal on Bonaire, operated by Radio Nederland.
International Communications: Via submarine cables, radio relay, HF radiotelephone and INTELSAT (limited)
Ownership of Communications Media: Both government and private-commercial.
Television Standard: System M, NTSC color
International Telephone Code: 599

Domestic Broadcasting:[5]

(Medium Waves)

Island	Number of Transmitters	(kW) Combined Power
Bonaire	2	526
Aruba	4	13.25
Curacao	5	4.25
Saba	1	1
Sint Maarten	1	1

(Short Waves)

Island	Number of Transmitters	(kW) Combined Power
Bonaire	4	910
Curacao*	1	10

*Infrequent use

(FM)

There are FM transmitters on Aruba and Curacao, all with low power.

(Television)

Island	Channels	(kW/ERP) Combined Power
Curacao	8	20
Saba	3	12.5
Aruba	13	3
Sint Maarten	7	0.1

Trends in Broadcasting:[6]

The Netherlands Antilles are a diverse mixture of cultures, geographical situations and livelihoods. Consequently, broadcasting and all forms of social communications follow through, attempting to interpret this unique intermixture. Here is how programming is typically conducted:

Station	Island	Programming
R. Curom	Curacao	80%-Papiamento
R. Victoria	Aruba	Broadcast day is divided into segments of Dutch, Papiamento, English and Spanish
R. Hoyer	Curacao	1010 kHz - Spanish/Papiamento *1400 kHz - Spanish/Papiamento/ Dutch/English 1500 kHz - Dutch/English
R. Caribe	Curacao	Papiamento/Spanish (English on Sundays)
R. Antiliana	Aruba	English/Papiamento
R. Sint Maarten	Sint Maarten	Dutch/English
Voice of Aruba	Aruba	Papiamento/Dutch/English/ Spanish
R. Kelkboom	Aruba	Papiamento/Spanish/Dutch
Voice of Saba	Saba	English/Dutch
Trans World Radio	Bonaire	**Spanish/English/Portuguese/ Norwegian/Dutch/French

*Equivalent to Voice of Bonaire; part of the Hoyer system

**Languages employed on the medium wave transmitter; excluding those on shortwaves, destined for distant regions.

This information clearly shows the interesting combination of backgrounds, which make for a very colorful broadcast schedule. Most stations are privately owned and operate on a commercial basis. Licenses are obtained from the Lands Radio en Telegraaf Administration, which also operates the common carrier facilities.[7] Trans World Radio and Radio Victoria are the only two non-commercial stations, both religious in nature. Broadcast programming consists of much music, with the usual newscasts, commercial and public-service announcements. Papiamento transmissions, including steel-drum

music, are especially interesting.

Antillean radio stations are generally of low power, but frequently heard across the Caribbean, due to propagation conditions of the location. Bonaire's Trans World Radio can be heard as far as 3,000 kM inland, on medium wave. Broadcast reception between the two island groups has not always been possible, effectively isolating direct cultural contacts. In the past, the Antillean government has made use of one of Landsradio's radiotelephone transmitters for occasional broadcasts. Improved common-carrier links now permit direct interchange.

Trans World Radio is an international religious organization, having broadcast stations in all corners of the world. The facility on Bonaire was opened in 1964, becoming the most powerful transmitter in the Western Hemisphere.[8] TWR employs a mammoth 525 kW sender, working on 800 kHz, and utilizing a highly efficient antenna system which incorporates miles and miles of ground radials, dug into the salt flats.[9] The medium wave antenna network is a driven tower of 168 metres and four parasitic masts of 152 metres.[10] Sophisticated directional patterns and an impressive effective power are available from this system. Two shortwave transmitters, one of 260 and another of 50 kW permit worldwide coverage from the "flamingo isle."[11] Thirty towers, carrying eight antenna array are used in conjunction, permitting flexibility.[12] TWR generates its own electricity, using a diesel plant of approximately three megawatt capacity.

TWR studios are located in Kralendijk, capital on Bonaire, as well as at the transmitter site.[13] Most programs are pre-recorded, many being obtained

from sources other than the station itself. On medium wave, languages reflect an interest in serving the Caribbean and adjacent regions. Short-wave broadcasts are often intended for worldwide points.

Radio Nederland Wereldomroep, the Dutch World Broadcasting Foundation, also maintains a set of transmitters on Bonaire. Located in the island's north, two 300 kW Philips' senders are used, among the most modern in existence, with automatic, digital tuning and having many pre-set frequencies and operating conditions.[14] There are twenty-one different antenna systems, mostly of the curtain type, along with omnidirectional quadrant antennae, intended for the Caribe.[15] Due to strong winds and hurricane potential, towers are of self-supporting, open-lattice construction.[16] Power is generated by six diesel units, each capable of 500 kW.[17] There is a sophisticated processor-controlled fault tracing and marshalling system with which it is possible to reduce "down time" to a minimum.[18] In the past, time on TWR's powerful 800 kHz channel was leased; the better to serve the Caribe, but this has since been discontinued due to budgetary considerations.[19]

Television in the Netherlands Antilles is quite different from sound broadcasting, in that it is mostly a state-owned enterprise. The two stations in the ABC islands are "Telecuracao" and "Telearuba."[20] System M, NTSC color is utilized, on channels 8 (20/5 kW) and 13 (3/0.6 kW) respectively.[21] In the past, programs have run for approximately six hours daily, with much taped and film material.[22] On Saba and Sint Maarten, the West Indies Television Network, a commercial/international company, provides programming.[23]

Facilities are located in Philipsburg, with around eight hours per day of transmission.[24] Sint Maarten uses channel 7, with 100 watts visual, 20 watts aural; Saba - channel 3; 12.5/2.5 kW; and a relay on Tortola, British Virgin Islands, works on channel 5.[25] Telecasts are all in English.

Common Carrier Services:

Landsradio en Telegraafdienst is reponsible for and operates the telecommunications services in the Netherlands Antilles. This consists primarily of domestic telephone networks, as well as interisland circuits and connections to international points. At last count, there were 47,000 telephones in the islands; mostly operating with automatic exchanges.[26]

A substantial amount of modernization has been undertaken in recent years including new Philips' stored-program exchanges, and digital PCM transmission.[27] Radio relay links provide service between the islands, and there are five submarine cables as well.[28] Direct interisland dialling is possible as is international service.

The Netherlands Antilles has been assigned an international telephone prefix of 599, permitting full integration within the world communication system. The following zone codes are used:[29]

Island	Telephone Zone Code
Bonaire	7
Curacao	9
Saba	4
St. Eustatius	3
St. Maarten	5

International services are extended via radiotelephone, operated from Curacao and via submarine cable. At present, there is no major satellite facility, although the station on Bonaire does provide service for Radio Nederland.[30] HF radio connects with the Netherlands, U.S.A., Barbados, Venezuela, Brazil, Suriname and Martinique.[31] A large submarine cable links Curacao with St. Maarten and St. Thomas, in the U.S. Virgin Islands.[32] This coaxial cable is nearly 1130 kM in length, and is jointly owned by the Government of the Netherlands Antilles and ITT.[33] There are 34 repeaters involved and 160 channels may be accommodated for telephony.[34] The cable entered service in 1973 and notably upgraded Antillean inter-group and international communications.

Microwave relays from the Cable & Wireless network in the Leewards extend to Saba and Sint Maarten.[35] Telephone and other circuits are possible over these means. There is also an older submarine cable between the two islands. Microwave links are capable of providing a maximum of 960 voice channels, with Saba and Sint Maarten being connected with the Antigua trunk center, from where additional routing is possible.[36] From Jamaica to Curacao, there is also a previous submarine cable, which continues to Caracas, Venezuela.[37]

A very interesting feature concerning Antillean communications is the use of some telephone channels provided by the Martinique INTELSAT station, and relayed via radio and cable to Curacao.[38] These are primarily intended for paths to Europe. The All American Cable & Radio, part of the ITT group, operates a telegraphic service via its own cable system.[39] This organization maintains offices in Willemstad as well as Oranjestad, Aruba.

Electricity is provided exclusively by thermal means as the islands lack hydro or other resources. On Curacao and Bonaire, the power is supplied by the Overzee Gas en Elektriciteits Maatschaapij (O.G.E.M.) which is a private, investor-owned concern.[40] On Aruba, the ELMAR (Elektriciteits Maatschappij, Aruba, N.V.) provides service, while in the Leewards, local government sources perform the function.[41] On Aruba, Bonaire and Curacao, there are also desalinization plants which generate electricity as a part of the purification process.[42] This is added to local supplies for distribution. On Curacao, the Shell Refinery generates its own power; Aruba's Lago Oil also has a power plant; while Trans World Radio and Radio Nederland on Bonaire maintain their own diesel generators.[43] Electrical energy tends to be costly, at roughly nine cents (U.S.) per kilowwat hour.[44] This compares to four or five cents per kWh in the United States. The following is a breakdown of electrical services, by island:[45]

Island	(hZ) Line Frequency	Service Voltages
Curacao	50	127/220
Aruba	60	127/220
Bonaire	50	125/220
Saba	60	110
Sint Maarten	60	110
Sint Eustatius	60	110

Overall Analysis:

Social and common-carrier communications in the Netherlands Antilles are very high grade; touching every sector in the islands. Serving as a "springboard" for the Western Hemisphere, international broadcasts make the Antilles well-known. The electrical services, while of high capacity, are not unified in terms of line frequency.

NETHERLANDS ANTILLES

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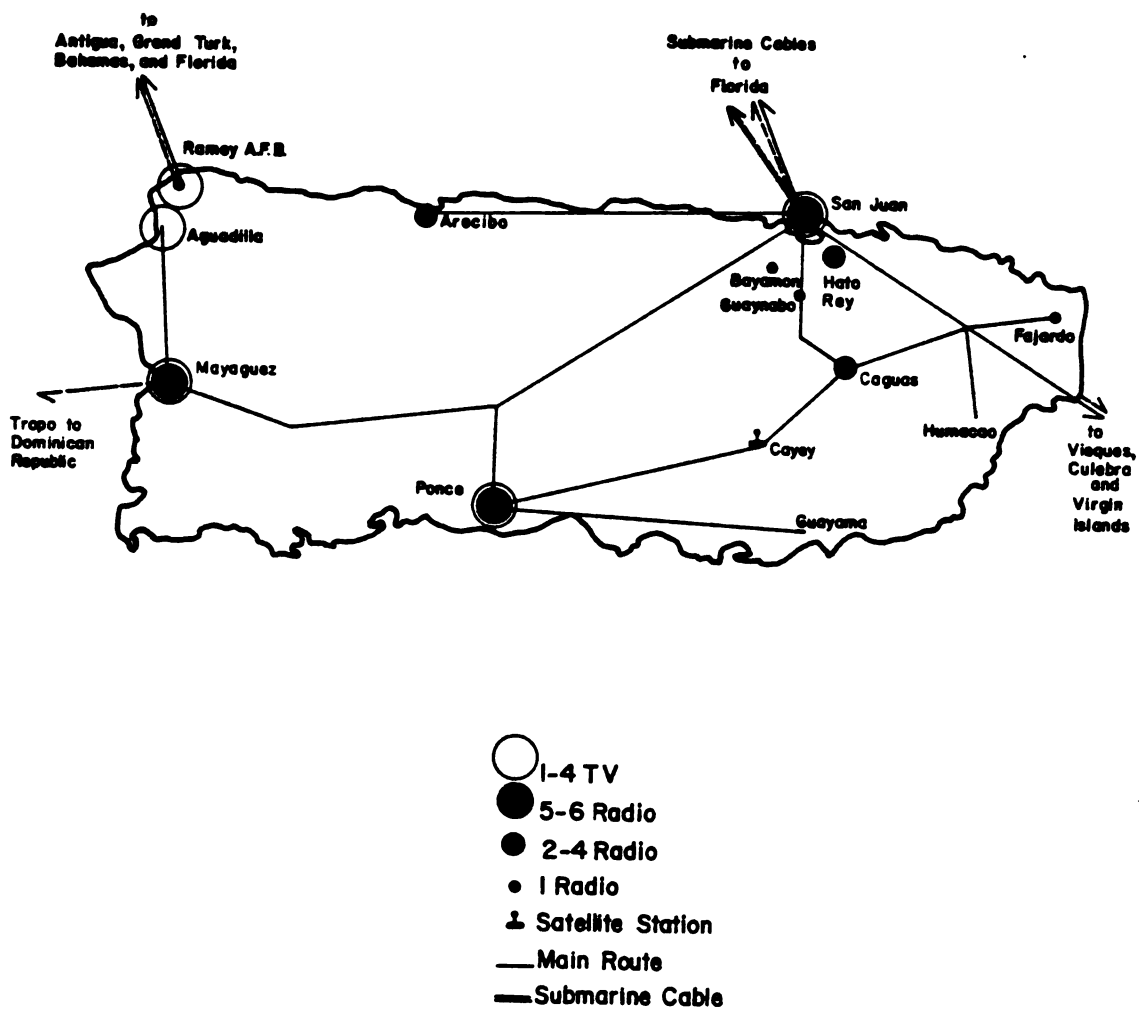
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FIGURE 9

Communication Networks in PUERTO RICO



PUERTO RICO

(Estado Libre Asociado de Puerto Rico)
(Free Associated State (Commonwealth) of Puerto Rico)

Basic Information:[1]

Area: 8,860 kM^2
Population: 3.337 million $(1977)_2$
Population Density: 376.6 per kM^2
Capital: San Juan
Major Cities: San Juan, Ponce, Bayamon, Carolina, Mayaguez
Languages: Spanish, English
Religion: Predominantly Roman Catholic
Gross Domestic Product: US$ 9.7 billion (1977)
Per Capita Income: US$ 2,907
Literacy: 90 percent

Geographical Summary:[2]

Located at the northwestern end of the Caribbean Sea, Puerto Rico has been called "gateway to the Caribe." Approximately 107 kM long and 56 kM wide, the island is made up of mountainous terrain, encircled by coastal lowlands. Valleys and plateaus are frequent. The highest point on Puerto Rico is 1,063 metres; Cerro de Punta. Neighboring islands are: Hispaniola, and the British Virgin Islands; as well as St. Kitts-Nevis-Anguilla, and Antigua-Barbuda. The distance from Puerto Rico to Florida is roughly 1,658 kM. Puerto Rico is well within radio and television reception of neighboring and regional states.

Basic National Review:[3]

Discovered by Christopher Columbus in 1493, Puerto Rico long remained under the Spanish Crown. Sugar cane cultivation was introduced in 1515, with slaves from Africa later being brought for field workers. During the Spanish-American War of 1898, Puerto Rico passed to the United States.

By terms of its constitution, Puerto Rico is voluntarily associated with the U.S. and retains internal self-government, along the same lines as any of the 50 states. Puerto Ricans are U.S. citizens, but do not vote on national issues. The island has its own political structure, having a governor and elected legislature. A commissioner sits in the U.S. Congress, but cannot vote. The two major political parties on the island are NPP-New Progressive Party which favors U.S. statehood, and PDP-Popular Democratic Party, seeking a continuation of the present commonwealth affiliation. These organizations have traditionally garnered roughly 90 percent of the vote.

Most U.S. taxes are not in effect in Puerto Rico, with the exception of Social Security. There is also no income tax. "Operation Bootstrap" was organized during the late 1940's, in order to raise the standard of living. This was carried out through encouragement of manufacturing and tax incentives.

Main industries include chemical, textile, electronics, fish products and petroleum processing. Most trade is with the mainland, U.S.A.

Telecommunications Overview:[4]

International Prefixes: Uses those of the U.S.A.
Number of Radio Broadcast Stations: 60
" " " Receivers: 2 million
" " " " per hundred: 60
" " Television Stations: 11
" " " Receivers: 650,000
" " " " per hundred: 19.5
" " Telephones: 357,351
" " " per hundred: 11
Electrical Generation Capacity: 125,000 kW
" Service: 60 hZ, 115/230 volts
Satellite Earth Stations: INTELSAT (COMSAT) earth station at Cayey, some 56 kM south of San Juan
International Communications: Via INTELSAT, submarine cables, and radio relay
Ownership of Communications Media: Government and private-commercial
Television Standard: System M, NTSC color
International Telephone Code: 1-809
Telecommunications Administration: U.S. Federal Communications Commission (Washington, D.C.)

Domestic Broadcasting:[5]

(Medium Waves)

City	Number of Transmitters	(kW) Combined Power
San Juan	6	70
Hato Rey	4	30
Ponce	6	13.25
Guaynabo	1	10
Mayaguez	5	99
Arecibo	3	6.5
Caguas	2	5.25
Bayamon	1	5
Fajardo	1	5
Vieques Island	1	5

(FM)

There are FM channels associated with many Puerto Rican broadcast stations, especially in the major cities. Most are low powered, although a few have substantial output. FM transmitters are frequently located atop high mountains.

(Television)

City	Channels	(kW/ERP) Combined Power
Aguadilla*	44	995
San Juan	2,4,7,11	423.4
Mayaguez	3,5,12	149.3
Ponce	9	57.5
Rio Piedras	6	53.7
Roosevelt Roads @	40	7
Ft. Allen @	40	1
Ramay AFB @	21	0.1
Vieques Island @	56	1 watt

*Aguadilla lists as first ranked in television by reason of its high-powered UHF station. Propagational differences between VHF and UHF should be kept in mind; in that, UHF required substantially more power to achieve the same distance as VHF.

@ = Denotes an AFRTS (Armed Forces) station.

Trends in Broadcasting:

Electronic communication in Puerto Rico is a mixture of "typical" Caribbean broadcasting and the "industrialized" media of the U.S. Most stations are privately owned and operate on a commercial basis. Radio and Television are regulated by the U.S. Federal Communications Commission, with American regulations and allocations applying.

Medium wave stations predominate, most of which have low or moderate power; thereby serving local or regional audiences. Out of 56 total, there are 37 broadcast transmitters of 1 kW or less; 11 of 5 kW; and 11 of 10 kW or more in power.[6] FM is also widespread in Puerto Rico, with stations being located in all major cities and towns. At last count, there were 31 FM facilities, reflecting the North American trend.[7] Most FM stations are associated with a medium wave broadcaster and may relay the main programs. Due to the geographical nature of the island, VHF frequencies (FM) both

benefit and are hindered by the combination of mountains and valleys, depending on locations of transmitter and receivers. Therefore, FM stations located in valleys have a relatively short range, while antennae which are atop mountains ensure propagation over respectable distances. Many FM broadcasters utilize stereo.

As is the case in the United States, Puerto Rican stations frequently specialize in given types of programming; such as music, or news, sports, etc. This attracts a specific demographic audience.

Television is also an important factor in Puerto Rico with eleven stations serving the island.[8] Most of these are commercial; that is, privately owned, and carry a variety of entertainment and information in a manner similar to stateside TV broadcasters. Programs are produced locally, as well as imported from the U.S.A. and other sources. Channels 3 and 6, located in Mayaguez and Rio Piedras, respectively, are operated by the Puerto Rican Department of Education and carry cultural and didactic programming.[9] Several public radio stations also exist, such as one operated by the University of Puerto Rico.

Due to location and propagational characteristics of the Caribbean, television stations generally use much less transmission power than counterparts in North America. This is done in order to avoid unnecessary interference with co- and adjacent channel holders throughout the region.

In general, Puerto Rican media enjoy a very close relationship with corresponding organizations in the United States, and benefit from the high level

of technical and production capacity. Programs broadcast are mostly in Spanish, although English is carried to a lesser extent. In the past, some television programs in Spanish have had English-language audio available on an FM radio station. This practice was used by at least one San Juan broadcaster, and proved popular.[10]

Common Carrier Services:

Telecommunications on Puerto Rico are the responsibility of the Autoridad de Communicaciones, a Commonwealth government organization.[11] Until 1974, there were two major systems serving the island; one operated by the Autoridad itself, and the other, Ricotel, a subsidiary of ITT. The latter, with by far the most resources, served San Juan and vicinity; as well as Mayaguez and other larger cities. The Autoridad had the cities of Aguas Buenas, Aibonito, Caguas, Cayey, Cidra, Guaynabo, Gurabo, Juncos, Las Piedras, San Lorenzo, Culebra and Aguadilla.[12] Smaller villages received special connections, as possible.

Puerto Rican telecoms were unified in July of 1974 when the Commonwealth, through the Autoridad de Communicaciones, purchased ITT's holding for roughly US$ 165 million.[13] All operations were subsequently transformed to a "public service" status.

The island, along with others in the Caribbean region, is part of the North American telephone system, under Area Code 809. Communications systems mainly function in accordance with those of the U.S.A., in technical and operational details.

Most telephone exchanges operate on an automatic basis, utilizing step-by-step, rotary, crossbar and processor-controlled switching. There are still a few old manual switchboards in existence, serving smaller towns. The Autoridad de Communicaciones "original" system, primarily catering to the interior, is completely automatic; using recently installed equipment.[14] Much of the former ITT network is rather antiquated; having been at one time a pioneer in automatic and direct-distance telephony, but now past its "prime". Ricotel equipment in some parts dates from the mid-1920's.[15] The two networks, although now officially under a single administration, are formed quite differently. Interconnection is effected via a special trunk center in Santurce.[16]

The two main telecom centers are in San Juan and Caguas, respectively.[17] The former being of ITT-Ricotel origins and the latter having been constructed by the Autoridad. Trunk routing and control over paths is maintained from these locations. Most of the island is criss-crossed by land-line and microwave circuits; with a heavy emphasis on the latter.[18] Advantage is generally taken of high mountains, in order to stretch radio relay links as far as possible. Paths tend to be tributary to either Caguas or San Juan.

In 1978, the Autoridad de Communicaciones opened a very modern GTE Automatic Electric 3EAX computer-controlled trunk exchange, initially with a capacity to 3,000 circuits, but expandable to 60,000.[19] This has significantly upgraded the Autoridad's network switching for direct toll dialling (STD).[20] This and other expansions were made possible, in part, by a loan from the

"Rural Electrification Administration", part of the U.S. Department of Agriculture.[21] According to Autoridad information, the DDD network has been upgraded by at least 30 percent in recent years.[22]

While the Autoridad has attempted, as finances permit, to bring large-scale telephone systems to all towns and villages of the island, this has been a rather difficult task. In order to temporarily meet the growing service demands from smaller communities, until resources encourage installation of permanent facilities, the Autoridad has a special program for "Rural Public Telephones."

Initially, rural telephones were connected to the general system via open-wire lines; a costly and unreliable practice. Starting in 1972, the Autoridad began installing unique radiotelephones, using UHF and microwave channels.[23] Various telephones are located in public places or commercial establishments and associated with relay equipment on high elevations.[24] The radiophone scheme may be broken down as follows:[25]

Zone	Sets
Caguas	146
Mayaguez	106
Arecibo	20
Ponce	14
Fajardo-Humacao	9

Each radiophone is provided with a completely independent circuit, permitting direct dialling and trunking via ordinary facilities. Typically, each station is equipped with a telephone, transceiver and corner-reflector antenna, mounted atop a 15 metre mast.[26]

Direct automatic dialling into the North American telephone network is possible from Puerto Rico through satellite and cable connections. The island is linked with the rest of the world via COMSAT's standard (30 metre) earth station at Cayey, corresponding with Atlantic Ocean INTELSAT satellites.[27] Tropo is also used to link Puerto Rico to the Dominican Republic and microwaves in visibility with the U.S. Virgin Islands.[28] The following submarine cables are used:[29]

Cable Route	Number of Voice Channels
Puerto Rico-Florida	74
Puerto Rico-Antigua (military	60
Puerto Rico-Turks/Caicos (military)	60
Puerto Rico-Florida II	1840

Also, Puerto Rico has access to the many submarine cables connecting the U.S. Virgin Islands with other parts of the Caribbean region, such as to Venezuela and Brazil.[30] A connection into the Cable & Wireless network exists, via the Virgin Islands.[31] Television transmission in and out of the island are via satellite.

Electric power in Puerto Rico is provided under the auspices of the government's Autoridad de las Fuentes Fluviales.[32] All of the various generating plants and systems have been effectively interconnected; permitting the sharing of capacity as required. Most electricity is produced by thermal (petroleum fired) plants, although hydro installations make a sizeable contribution.[33] The Palo Seco facility, near the capital, produces 465 MW, using steam turbines, as well as an additional 10 MW, using an aircraft jet engine.[34] Associated with this operation is a large desalinization plant,

which makes fresh water for San Juan. Also in the capital area is another steam plant, generating a total of 588 MW; and having similar facilities as Palo Seco.[35]

Near Ponce is a 1,063 MW steam turbine and another jet facility.[36] The steam equipment operates from low-grade oil. At Mayaguez, a further site produces 50 MW, using gas turbines and a jet system.[37] Throughout the island, there are 15 hydroelectric stations, providing a total of 105 MW.[38] Interestingly, ten of these plants are fully automatic in operation; thereby permitting remote operation and avoiding the need for full-time personnel present.

There was at one time an experimental Federal Atomic Energy nuclear plant, which has subsequently been decommissioned.[39]

Puerto Rico is equipped with a large number of high-tension transmission lines, permitting the easy and efficient distribution of electric power to all areas of the island. There are over 200 substations in operation.[40]

Overall Analysis: Puerto Rico is equipped with a widespread and very comprehensive broadcast system, which provides a multiplicity of choices for residents. Common carrier facilities are good, although there are difficulties to be resolved. The present integration of the two existing systems should provide solutions to some of the problems. International trunks are excellent and widespread.

PUERTO RICO

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ST. CHRISTOPHER-NEVIS-ANGUILLA

(West Indies Associated States; Self-Governing U.K. Dependencies)

Basic Information:[1]

Area: 397 kM^2
Population: 70,000
Population Density: 176 per kM^2
Capital: Basseterre (St. Christopher)
Major Cities: Basseterre, The Valley, Charlestown
Languages: English, local French Patois
Religion: Mostly Protestant
Gross Domestic Product: US$ 14.7 million (1970)
Per Capita Income: US$ 210
Literacy: 80 percent

Geographical Summary:[2]

Located in the Leeward Islands are the British self-governing territories of St. Christopher (Kitts), Nevis and Anguilla. These three islands were merged into the West Indies Associated States, a form of federation. St. Kitts, the largest, has an area of 176 kM^2; Nevis - 130 kM^2; and Anguilla, with 91 kM^2. There is also the islet of Sombrero, having 5.2 kM^2. A very humid and tropical climate exists. Neighbors include: Antigua, Montserrat, Guadaloupe, the Leeward Netherlands Antilles, and the Virgin Islands.

Basic National Review:[3]

Long possessions of the British Crown, the islands of St. Kitts, Nevis and Anguilla, along with Sombrero, passed into a status of self-rule in the mid-1960's. The Associated States are a federation arrangement, by which the U.K. remains responsible for defense and foreign relations, while allowing almost total home rule. Anguilla renounced its participation in federation, on June 16, 1967, and broke all ties with Britain in 1969, declaring itself

an independent republic. In order to prevent anarchy and restore essential services, the U.K. landed policemen on the island in 1969, resulting in a return to the British fold. In 1971, Anguilla was proclaimed a dependency of the United Kingdom, receiving a new constitution in 1976. While Anguilla maintains representation within the St. Christopher-Nevis-Anguilla Assooci-ation, its relationship with the mother country is special and separate.

Sugar exports accounted for 65% of the island's trade, followed by electrical equipment, at 24%. Other agricultural items are also of importance. Tourism is growing in the islands. Various crops are also planted for use as local foodstuffs, ensuring a measure of self-sufficiency.

The population of all four islands is mostly mixed; European and African.

Telecommunications Overview:[4]

Number of Radio Broadcast Stations: 3
" " " Receivers: 22,050
" " " " per hundred: 31.5
" " Television Stations: 1
" " " Receivers: 4,150
" " " " per hundred: 6.0
" " Telephones: 2,000
" " " per hundred: 3.0
Electrical Generation Capacity: 15,000 kW
" Service: 60 hZ, 230/400 volts
Satellite Earth Stations: None
International Communications: Via radio relay, by way of Antigua trunk center
Ownership of Communications Media: Government and private
Television Standard: System M, NTSC color
Telecommunications Administration: U.K. Post Office (GPO)
(Basseterre, St. Kitts)

Domestic Broadcasting:[5]

(Medium Waves)

Island	Station	(kHz) Frequency	(kW) Power
Anguilla	R. Anguilla	1505	0.5
St. Kitts	R. Z I Z	555	20
St. Kitts	R. Paradise	1265	50

(Television)

Island	Station	Channels	(kW/ERP) Power
St. Kitts	ZIZ TV	5	20/5
" " (Basseterre)	"	2	.2/.04
" " (Otley's)	"	11	42/8.4
" " (Sandy Point)	"	9	15/3
Nevis	"	13	42/2.5

Trends in Broadcasting:

The Federation of St. Kitts-Nevis-Anguilla is served by three independent radio stations, two of which are owned by the island government. A single, state-operated television service is on the air from St. Kitts and has relay transmitters at various points of the main island, as well as on Nevis. At present, Anguilla does not have a television transmitter, although signals may be picked up from other locations.

All radio broadcasting is conducted on the medium waves, although residents frequently tune in programs from outside, via either medium or short waves. The BBC is especially favored, as evidenced by letters to the station read over the air.[6] The government's station, Radio Z I Z, started operations in 1961, and has since upgraded power and scope of programs.[7] Public revenue, as well as limited commercial airtime, provide the necessary funding.[8] Radio Z I Z transmits for 17 hours daily, in English, using a 20 kW sender.[9]

Studios and facilities are situated at Basseterre, the capital. Also at Basseterre is the religious broadcaster, Radio Paradise, sending out inspirational programs via a powerful 50 kW transmitter.[10] Services are in English and French, intended for reception throughout the Eastern Caribe.

On Anguilla, a very interesting radio station exists: Before the 1967 Declaration of Independence, Anguilla had no radio station. Shortly before the "invasion", which brought the island back under British control, certain elements reportedly slipped ashore and established a "secret station", which, according to local sources, called for the population to support the British forces. The Anguillan "republican" government insisted that the "secret" station was none other than an HF transmitter, belonging to the Anguillan branch of the Bank of American and clandestinely modified to medium wave operation. Originally, this small transmitter worked on shortwave, and connected the bank with offices in the U.S. Virgin Islands and Puerto Rico.

Whatever the truth about the Bank of America transmitter and British "invasion", Radio Anguilla is now on the air; established at the time of return within the Commonwealth. Oddly enough, the present facility operates at 1,505 kHz; the frequency alleged to be that used by the clandestine voice.[11] Programming is in English for an average of 13 hours daily.[12] Radio Anguilla has a 500 watt signal and is occasionally heard as far north as the U.S.A.[13]

Television was brought to St. Kitts-Nevis-Anguilla in 1971. Facilities are located at Basseterre with appropriate transmission sites relaying the programs to all parts of St. Kitts, as well as Nevis.[14] System M, NTSC color is utilized, and programs run for four hours each day.[15] According to

available information, there are over 4,000 receivers in the islands; including 150 color sets.[16] Most of the program material is brought in from outside. Videotape is used extensively at the station.

St. Kitts-Nevis-Anguilla are located in an area well covered by radio and television broadcasting; as well as being a prime location for transmission. Broadcasts on all bands are receivable from other stations of the region, as well as from around the world on short wave.

Common Carrier Services:

The U.K. Post Office is responsible for telecoms on the islands, and maintains a domestic telephone system using automatic switching.[17] Equipment is of British manufacture. International connections are via the Cable & Wireless system, in conjunction with the important trunk center on Antigua.[18] VHF and UHF radio relay systems interconnect the islands, as well as provide the outside link to Antigua.[19] From this location, circuits to other islands in the region and the rest of the world are possible. Access to the INTELSAT earth station on Barbados may be provided. Cable & Wireless submarine cables are also utilized, leading from Antigua.[20]

Electricity is the responsibility of the government, with diesel generators supplying demand.[21] A total capacity of 15,000 kW exists, bringing service at 230/400 volts, single and poly phase, 60 hZ, to consumers.[22]

Overall Analysis:

St. Kitts-Nevis-Anguilla is equipped with a good radio and television system, although Anguilla lacks the visual medium. Interisland connections are

adequate for the present, and domestic telephony also is sufficient. Cable & Wireless links with the outside world are very good and expansive.

ST. CHRISTOPHER-NEVIS-ANGUILLA

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ST. LUCIA

(Independent Commonwealth Member State)

Basic Information:[1]

Area: 626 kM^2
Population: 115,000 (1972)
Population Density: 183.7 per kM^2
Capital: Castries
Major Cities: Castries
Languages: English, French-African Patois
Religion: Mostly Roman Catholic
Gross Domestic Product: US$ 33.2 million (1973)
Per Capital Income: US$ 228.70
Literacy: 80%

Geographical Summary:[2]

St. Lucia is located in the Windward Islands, to the south of Martinique and north of St. Vincent, forming a barrier against the open sea. St. Lucia, as other islands, is of volcanic composition, having varied landscape and vegetation. The climate is tropical and very humid, with intense rains at times. Castries has one of the best naturally-formed ports in the Caribbean.

Basic National Review:[3]

Long a possession of Britain, St. Lucia, along with other members of the West Indies Associated States, passed into self-rule during the mid-1960's. Instead of opting to maintain an associated relationship with the U.K., St. Lucia voters elected independence within the Commonwealth, and this came to pass on February 22, 1979. Most inhabitants of St. Lucia are of mixed European-African descent. The major industry is the production and exportation of bananas, which accounts for 64 percent of trade. Cardboard

boxes and coconut oil are also traded. Most commerce is with the United Kingdom.

Telecommunications Overview:[4]

Number of Radio Broadcast Stations: 2
" " " Receivers: 85,000
" " " " per hundred: 74
" " Television Stations: 1
" " " Receivers: Few
" " Telephones: 7,000
" " " per hundred: 6.1
Electrical Generation Capacity: 14,000 kW
" Service: 60 hZ, 240 volts
Satellite Earth Stations: None
International Communications: Via microwave to Martinique, as well as troposcatter to Barbados and Antigua
Ownership of Communications Media: Government and private
Television Standard: System M

Trends in Broadcasting:[5]

St. Lucia is equipped with two standard broadcast radio stations, as well as a limited-service television station. Reception of programs from other islands in the region, as well as shortwave from around the world, is possible. Television signals from Barbados and Martinique come in well.

Radio St. Lucia, owned and operated by the island government, but on a commercial basis, is the main broadcast facility. The station is situated in Castries, and programs in English, French and Creole for 18 hours daily. Frequency used is 660 kHz, medium wave, with 20 kW power. Radio Caribbean, a subsidiary of Rediffusion, works for roughly the same number of hours as the government station, calling in English on 840 kHz, 10 kW power. Both stations relay BBC at various times throughout the day; primarily as a source of world news, as well as popular sporting events.

Television came to St. Lucia in 1967 in the form of a limited service relay station, St. Lucia Television. This facility is primarily intended for relay of taped programs and originates very little.

Common Carrier Services:

St. Lucia inherited an automatic telephone system, including approximately 7,000 subscribers, from the colonial administration.[6] This is overseen by the Ministry of Communications and Works, but operated by the well-known Cable & Wireless, Ltd.[7] External connections are also made possible by C&W, via Barbados trunk center.[8] The Caribbean inter-island microwave network includes St. Lucia, extending connections to Martinique and St. Vincent.[9] Through Barbados, Antigua and Trinidad, circuits may be routed via additional radio relay and submarine cable, as well as INTELSAT stations on Barbados and Trinidad, as well as Martinique in case of main route failure.[10]

Electricity is provided by St. Lucia Electricity Services, Ltd., which operates in conjunction with the island government.[11] There is a generating capacity of 14 MW at the Castries diesel plant.[12] Electricity is supplied at 240 volts, 50 hZ, single phase; and 400 volts - poly phase. Special arrangements are available for industrial requirements.

Overall Analysis:

Radio broadcast services on St. Lucia are very good, while television still has room for growth. The domestic telephone network is sufficient, and the international connections very good. St. Lucia's power plant is adequate for the present, but would require expansion for any future growth.

ST. LUCIA

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8. "New International Switching Centres to be Installed in the West Indies," Telecommunication Journal 37 (March 1970): 137.

9. "World's Longest Inter-Island Microwave System," Telecommunication Journal 43 (April 1976): 315.

10. Ibid.

11. The Caribbean Year Book 1977-78, s.v. "St. Lucia."

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ST. VINCENT

(Commonwealth Independent Member State)

Basic Information:[1]

Area: 388 kM^2
Population: 101,653 (1974)
Population Density: 262 per kM^2
Capital: Kingstown
Major Cities: Kingstown
Languages: English, French-African Creole
Religion: Protestant, some Roman Catholic
Gross Domestic Product: US$ 20 million (1971)
Per Capita Income: US$ 196.75
Literacy: 80 percent

Geographical Summary:[2]

Part of the Windward Islands, St. Vincent is located to the south of St. Lucia and north of Grenada. The small islets of Grenadines are part of St. Vincent. The origin, as with many other of the Windwards, is volcanic, making for an interesting and varied terrain. Climatic conditions are normally hot and humid, with much rain during summer. St. Vincent's location makes for good reception for both radio and television, from many sources.

Basic National Review:[3]

A British dependency until October 27, 1979, St. Vincent is now an independent member nation of the Commonwealth. Close relations with the mother country remain, with the U.K. advising and assisting as needed. Most of the population are of mixed European-African and Indigenous composition, reflecting an interesting history. The languages spoken, as with other nearby islands, also reflect the heritage; being English as

official tongue; and Creole, a mixture of French, African dialect and English, being the language of the street.

Agriculture is the basis of the St. Vincent economy, especially in terms of bananas and cotton. The "sea-island" variety of cotton is highly desirable on the world market, due to its fine qualities. Tourism is a growing industry, encouraged by improvements in transport and communications.

Telecommunications Overview:[4]

Number of Radio Broadcast Stations: 1
" " " Receivers: 10,000
" " " " per hundred: 9.84
" " Television Stations: None
" " " Receivers: Few
" " Telephones: 5,130
" " " per hundred: 5.0
Electrical Generation Capacity: 8,175 kW
Electrical Service: 50 hZ, 110 volts
Satellite Earth Stations: None
International Communications: Radio relay to the Grenadienes and Barbados
Ownership of Communications Media: Government

Trends in Broadcasting:[5]

St. Vincent is served by a single radio broadcast station located in the capital city, Kingstown. Of course, as with other islands in the Windwards and Leewards, it is rather a simple matter to pick up transmissions from adjacent and regional territories. The Kingstown station programs in English, for approximately 12 hours daily, with mostly local material. A 10 kilowatt transmitter on 705 kHz is Radio St. Vincent's primary frequency, although a smaller, 100 watt outlet parallels on 1535 kHz.

At last count, there were several hundred television receivers on St. Vincent, tuning in programs from adjacent islands. St. Vincent itself does not have a TV station.

Common Carrier Services:

St. Vincent has a totally automatic telephone system provided by Cable & Wireless, Ltd.[6] The main facilities are in the capital, with subscriber stations provided as needed. Cable & Wireless also maintains outgoing links; primarily via radio-relay to Barbados trunk exchange, from where connections can be made to almost any part of the world through the C&W network.[7] UHF and VHF radio also connect the island to the Grenadines; a local group dependent on St. Vincent; and to St. Lucia and Carriacou.[8] Direct international telephony is possible, owing to the modernized network recently installed. The Barbados INTELSAT station may be used for paths of international scope.[9]

Electricity is provided by St. Vincent Electricity Services, Ltd., which closely cooperates with the government.[10] Four generating stations are utilized; two of which are hydro and two being diesel.[11] Generating capacities are listed as follows:[12]

Facility	(kW) Power Output
South Rivers Hydro	850
Richmond Hydro	1,100
Kingstown Diesel	2,125
Cane Hall Diesel	3,570
(Grenadines)	
Bequia	350
Clifton	180
	8,175 kW

High tension lines interconnect St. Vincent, working at 11 kilovolts.[13] The various main-island generating plants are likewise linked together, providing for an advantageous networking scheme.

Overall Analysis:

St. Vincent's radio coverage is sufficient for the present, and the island has a modern domestic and external telephone system. Electrical services are more developed than on many other islands. The Grenadines are less developed in the communications area than St. Vincent proper.

ST. VINCENT

1. Information Please Almanac, 1979, 33rd ed., s.v. "Countries, Territories, and Dependencies - United Kingdom, Dependencies, West Indies Associated States;" U.S., Central Intelligence Agency, National Basic Intelligence Factbook, 1980 (Washington, D.C.: Government Printing Office, 1980), p. 168; Reader's Digest 1980 Almanac and Yearbook, s.v. "Nations of the World - Saint Vincent;" The Caribbean Year Book 1977-78, 48th ed., s.v. "St. Vincent;" The People's Almanac #2, s.v. "Nations and their Rulers - St. Vincent;" The World Almanac and Book of Facts, 1979, s.v. "Nations of the World - United Kingdom, British West Indies."

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5. Frost, World Radio TV Handbook, p. 314; The Caribbean Year Book 1977-78, s.v. "St. Vincent."

6. The Caribbean Year Book 1977-78, s.v. "St. Vincent."

7. "New International Switching Centres to be Installed in West Indies," Telecommunication Journal 37 (March 1970): 137.

8. "World's Longest Inter-Island Microwave System," Telecommunication Journal 43 (April 1976): 315.

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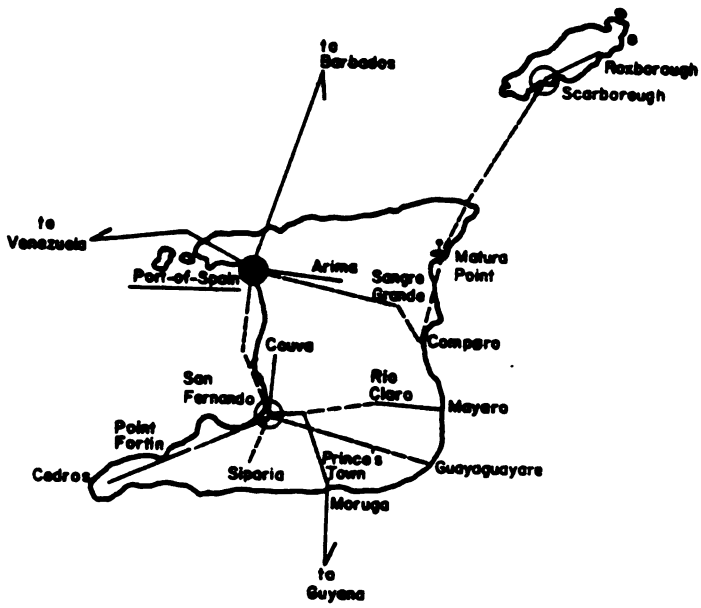
11. Ibid.

12. Ibid.

13. Ibid.

FIGURE 10

Communication Networks in TRINIDAD and TOBAGO



○ 1 TV
● 5 Radio
Satellite Station
—— Cable Link
—— Radio Link

TRINIDAD AND TOBAGO

(Republic of Trinidad and Tobago)

Basic Information:[1]

Area: 5,128 kM^2
Population: 1.12 million (1978)[2]
Population Density: 218.4 per kM^2
Capital: Port-of-Spain
Major Cities: Port-of-Spain, San Fernando
Languages: English, Spanish, Hindi
Religions: Roman Catholic, Protestant, Hindu, Islam
Gross National Product: US$ 1.9 billion (1976)
Per Capital Income: US$ 1,696.42
Literacy: 89%

Geographical Summary:[2]

Trinidad and Tobago are the last islands to the south of the Lesser Antilles, only 11 kM north of the Venezuelan mainland. The two islands are divided by a channel of 54 kM, and the open Atlantic is just on the other side, permitting storm ravage from time-to-time.

The island of Trinidad is crossed by three low mountain ranges, from east to west, with a central, fertile plain. In the south and north, mountains and hills predominate. Tobago is of volcanic origins. The location permits easy communication with both the Caribbean islands and with the South American mainland. Trans-Atlantic traffic is also simplified.

Basic National Review:[3]

Trinidad and Tobago were, along with other islands, discovered by Christopher Columbus in 1498. In the 17th century, after a long period of neglect, Spanish plantations were set up. In 1797, English forces conquered

the islands, and they were ceded to the British Crown in 1802. Tobago's status was uncertain for quite some time, but remained with Britain after 1814. Under British rule, slavery was abolished and imported Asian workers replaced former slaves. In 1889, the two islands were officially united under a single colonial status. In 1958, Trinidad and Tobago joined the West Indies Federation, which lasted until 1962, when independence came. During the late '60s and early 1970's, Trinidad and Tobago experienced violence and civil disobedience as a result of a "black power" movement. Diplomatic relations were established with Cuba in 1972, followed by relations with the USSR and the PRC in 1974. In 1975, Trinidad and Tobago signed the Lome (Togo) Convention, agreeing to cooperation with the EEC. In the same year, the nation joined SELA, Latin American Economic System.

Oil and petroleum products are important to the national economy. The island's refineries are among the largest in the world. Asphalt, taken from a natural lake, also is exported. Sugar, cocoa, coconuts and copra are grown.

Telecommunications Overview:[4]

International Prefixes: 9YA-9ZZ
Number of Radio Broadcast Stations: 2
" " " Receivers: 296,000
" " " " per hundred: 26.43
" " Television Stations: 1
" " " Receivers: 140,000
" " " " per hundred: 12.5
" " Telephones: 70,364
" " " per hundred: 6.3
Electrical Generation Capacity: 375,000 kW
" Service: 60 hZ, 115/230 volts
Satellite Earth Stations: INTELSAT facility at Matura Point
International Communications: Via INTELSAT, microwaves/ radio relay and tropo to adjacent regions, as well as HF radio
Ownership of Communications Media: Government and private
Television Standard: System M, NTSC color
Telecommunications Administration: Ministry of Public Utilities, Wireless Division (Port-of-Spain)

Trends in Broadcasting:

Trinidad and Tobago have a long-standing tradition of freedom of communications and expression, which was established by the British. At the same time, a need for public responsibility in the media is also underscored, primarily by the Emergency Powers Regulation Act of 1970, which came into force after black power demonstrations in that year.[5] For the same reasons, a new sedition law was promulgated in the year that followed.[6] Both of these documents make it clear that public order and interests must at all times be given first priority.

In 1969, the Trinidad and Tobago government published its third Five-Year Plan, in which a statement concerning the media existed. The primary task indicated was the establishment of a "positive national image and identity."[7] The national government also opted for an increasing role in media, as well as protective regulations: No media property may be sold or transferred without prior government approval; non-Trinidad-Tobago organizations may not acquire local media; advertising and didactic-cultural requirements may be imposed; and the government shall endeavor to acquire the broadcast media, as possible.[8]

Serving the islands is a mixed government-private broadcast system, with radio divided into two distinct organizations, while television operates from a single station, with both government and private financial participation. NBS - National Broadcasting Service, "The Voice of Trinidad and Tobago" is the government station, on the air from Port-of-Spain, and programming in English for 19 hours per day.[9]

NBS' primary frequency is 610 kHz, medium wave, with a transmitter power of 10 kW.[10] An FM outlet is also in operation, with 3 kW E.R.P., on 100.0 mHz.[11] Trinidad Broadcasting Company, a part of the Rediffusion Group, operates "Radio Trinidad", which serves the islands on 730 kHz/20 kW, and 105.0 mHz, FM, with 1 kW, E.R.P.[12] Programs are run for some 19 hours each day. A separate department of Radio Trinidad operates "Radio Nine/Five", an FM stereophonic facility on 95.1 mHz; 2.5 kW E.R.P. power.[13] Schedules are maintained for 18 hours, daily.

The Voice of Trinidad and Tobago is heard over a wide area, owing to a rather novel antenna system; consisting of a rotatable directional set of towers, some 110 metres in height.[14] According to available information, this structure is the highest on Trinidad. Radio Trinidad also has good coverage, being regularly heard in coastal South America, and the Windward and Leeward Islands.[15] Much radio programming is locally produced, although some is imported. Relays of BBC news and other material takes place. In the past, educational radio productions were aired; mostly catering to elementary and secondary schools.

Trinidad and Tobago Television Company, Ltd., provides visual media services from their station, located in Port-of-Spain.[16] System M, NTSC color is employed, and much American equipment is utilized.[17] Channel 2 is the main outlet, working with 30 kW E.R.P., visual, and 3 kW E.R.P. aural.[18] There is a repeater on channel 13, operating with 2/0.2 kW E.R.P., as well as a second repeater on channel 13, which is 1.2 kW visual; 0.1 kW aural.[19] Some seven hours of daily programs are sent out. The television station began as a coalition of Rediffusion, the Thomson interests (newspapers), CBS and

the island government.[20] In 1969, the government was able to purchase the holdings of Thomson and Rediffusion, leaving only the administration and CBS as shareholders.[21] Some 90 percent of the stock belongs to the government at present.[22] At last information, roughly 50 percent of TV programs were locally produced; leaving the other 50 percent to be imported from various sources.[23] Likewise, programming was broken down into the following categories:[24]

Percentage	Category of Programs
51	Features
18.5	Community interest, adult education
13	News/Information
7	Specials
5	Light entertainment
4.1	Literature and the arts
1.4	Commercial material, other

Common Carrier Services:

The island telephone system is owned and operated by Trinidad and Tobago Telephones, Ltd., formerly a subsidiary of Continental Telephone, of the United States.[25] The system is almost completely automatic, and provides for STD throughout the nation. Due to the fact that demand exceeded existing facilities, expansion was begun quite some time ago; especially of the trunk network. Much of the domestic equipment is of U.S. manufacture, including a large number of step-by-step automatic exchanges, wireline and cable carrier systems, and a newly installed microwave relay network.[26]

Main routes run from Port-of-Spain to San Juan, St. Augustine, Sangre Grande, Compara - and on to Scarborough, Tobago; Port-of-Spain to San Fernando, and on to Rio Claro, Mayaro, Guayaguayare, Cedros and other

reaches.[27] Most connections are using both radio relay and cable.

International circuits are the prerogative of TEXTEL, the government's agency.[28] This organization cooperates with Cable & Wireless, Ltd.[29] The INTELSAT earth station at Matura Point provides a large number of voice and broadband circuits to the exterior; including the U.S.A., Canada, and Europe.[30] Cable & Wireless' relay network links Trinidad with Barbados, and other islands.[31] Troposcatter at 900 mHz is utilized, with 1 kW quadruple diversity terminal equipment, capable of roughly 80 voice channels on carrier.[32] Trunk connections via other relay paths and submarine cables are also possible, via Barbados and Antigua.[33]

The Marconi firm constructed a powerful tropo link between Trinidad and Guyana, on the South American continent.[34] Two 18 metre dish antenna are used; situated at Morne Bleu, Trinidad and Thomas Lands, Guyana.[35] There is a distance of approximately 365 kM.[36] Quadruple diversity reception is employed, with a power of 10 kW for transmission, employing frequencies in the 900 mHz band.[37] Up to 64 voice channels may be accommodated.[38] Television would not be reliable on such a link. There is also a radio relay path to neighboring Venezuela.[39] Trunked connections via Venezuela are possible, if desired.

Trinidad and Tobago Electricity Commission is responsible for power generation and distribution on the islands.[40] The main generating plants are located in Port-of-Spain, Penal and Point Lisas; having a combined capacity of 375 MW, mostly by natural gas powered thermal equipment.[41] The Trinidad stations are all interconnected by high-tension lines. Two 33 kV submarine

power cables connect with Tobago, and under normal circumstances, all electricity comes from the Trinidad generators.[42] There is a standby plant in case of cable malfunction. Electrical distribution is nearly universal; most homes having electric power. In the past, the island government had an "assisted wiring scheme", by which low-cost electrical installation was arranged for homes.[43]

Overall Analysis:

In terms of facilities and programming, Trinidad and Tobago have a very modern radio and television system. There is a trend towards total government acquisition of broadcast and telecoms properties, in keeping with nationalistic ideals of the islands. Common Carrier facilities are also modern and extensive.

TRINIDAD & TOBAGO

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5. Jan Knippers Black et al., Area Handbook for Trinidad & Tobago, Foreign Area Studies, The American University (Washington, D. C.: Government Printing Office, 1976), p. 177.

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7. Ibid., p. 178.

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9. Frost, World Radio TV Handbook, p. 314.

10. Ibid.

11. Ibid.

12. Ibid.

13. Ibid.

14. The Caribbean Year Book 1977-78, s.v. "Trinidad & Tobago."

15. Ibid.

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17. Ibid.

18. Ibid.

19. Ibid.

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22. Ibid.

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24. Ibid.

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26. "Trinidad and Tobago Telephone Network Expands," Telecommunication Journal 46 (January 1979): 41.

27. "In Trinidad & Tobago, GT&E Doubles the Telephones - Without Interrupting Service," Telecommunication Journal 33 (May 1966): iv.

28. The Carribean Year Book, 1977-78, s.v. "Trinidad & Tobago."

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32. "Tropo...in the Caribbees," Telecommunication Journal 32 (August 1965): vii.

33. "New International Switching Centres to be Installed in West Indies," Telecommunication Journal 37 (March 1970): 137.

34. "L. 1 Million Project for Guyana and Trinidad," Telecommunication Journal 34 (October 1967): 373.

35. Ibid.

36. Ibid.

37. Ibid.

38. Ibid.

39. "Inter-American Telecommunications Network," Telecommunication Journal 38 (September 1971): 632.

40. The Caribbean Year Book 1977-78, s.v. "Trinidad & Tobago."

41. Ibid.

42. Ibid.

43. Ibid.

TURKS AND CAICOS ISLANDS

(Dependency of the U.K.)

Basic Information:[1]

Area: 430 kM^2
Population: 5,000
" Density: 14 per kM^2
Capital: Grand Turk
Major Cities: Grand Turk
Language: English
Religion: Protestant, Roman Catholic
Gross Domestic Product: US$ 1.701 million (1973)
Per Capita Income: US$ 340
Literacy: Almost total

Geographical Summary:[2]

Neighboring the Bahamas chain, the Turks and Caicos Islands are located nearly 1000 kM southeast of Florida. Geographically speaking, the islands are actually part of the Bahamas. There are 30 islands and islets, of which six are inhabited: Grand Turk, Caicos, Salt Cay, and South Caicos, as well as adjacencies. A hot, dry climate predominates, with occasional tropical storms. The Turks and Caicos tend to be in the path of many hurricanes.

Basic National Review:[3]

Part of the British Realm for hundreds of years, Turks and Caicos are relatively remote and little-known. The population is mostly of African origin. Until its own independence, the British Government of the Bahamas served as executive of Turks & Caicos, as well. At present, a local administrator governs, appointed by the Crown. An executive council and legislative assembly also exist.

Fishing and salt production are mainstays of the economy, with crayfish being the major export items.

Telecommunications Overview:[4]

Number of Radio Broadcast Stations: 2
" " " Receivers: 3,050
" " " " per hundred: 51
" " Television Stations: 1
" " " Receivers: Few
" " Telephones: 400
" " " per hundred: 6.66
Electrical Generation Capacity: 840 kW
" Service: 50 hZ, 240 volts
Satellite Earth Stations: Receive-only Disk at TV Station
International Communications: Via HF radio. Also, submarine cable to Antigua and Florida, for the use of U.S. Government, NASA
Ownership of Communications: Government

Trends in Broadcasting:[5]

The sparsely populated and remotely located Turks and Caicos Islands are served by a single radio broadcast station. Radio Turks & Caicos is the responsibility of the Government Information Officer in Grand Turk, and operates in conjunction with Cable & Wireless facilities at multi-purpose radio center, VSI. Programs run in English for roughly eleven hours every day, over a 2.5 kW transmitter on 1550 kHz. The station covers the main population centers, and is included in the island government's budget, thus making commercial airtime unnecessary. Reception of outside stations on both medium and short waves is a simple matter. Powerful signals from Cuba, the U.S.A., Bahamas, and other areas are commonplace.

New AFRTS (US) radio and television installations were recently provided on Grand Turk, for the enjoyment of military personnel at the Navy facility

there. Included is station XNGT, on 1460 kHz, with a power of 10 watts; as well as XNGT-TV, Grand Turk, operating on channel 4 with very low power.

Common Carrier Services:

Cable & Wireless, Ltd., is the operator of all communications, including an automatic telephone exchange on Grand Turk (300 lines), and on South Caicos (100 lines).[6] Expansion of telephone service to other areas is under consideration. Communications with the outside world are via the C&W HF radio station, V S I.[7] This facility does not permit direct outward dialling, but requires that calls be booked in advance and placed if and when possible.

A submarine cable runs from Antigua to Florida, via the Turks & Caicos.[8] This is the property of the U.S. Government, and used by the National Aeronautics and Space Administration (NASA) for space-vehicle tracking station communications. The cable is coaxial and made up to two segments; one from Grand Turk to Ramey A.F.B., Puerto Rico; from where it extends to Antigua.[9] The main link from Cape Canaveral is to Grand Bahama Island, continuing to Grand Turk. Sixty voice channels are provided on each segment.[10]

Grand Turk and South Caicos are the only islands in the group to have regular electricity supply, provided by diesel generators.[11] Grand Turk's station has an output of 600 kW; South Caicos - 240 kW.[12] There were, at last count, 500 electrical consumers on Grand Turk and 340 on South Caicos.[13]

Overall Analysis:

The Turks & Caicos Islands have a minimum of communications services, which provide the bare necessities; both in reference to inside and outward links.

The radio station is adequate for present needs, in terms of broadcast service, as it covers the populated territory. External circuits are particularly lacking, relying upon HF radiophone, which is often unreliable. The generating capacity of the Turks & Caicos electrical utility is small, but adequate for the present. A satellite dish recently came to the islands, when the new TV station decided to use programming originating in the U.S.[14]

TURKS & CAICOS

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9. Ibid.

10. Ibid.

11. The Caribbean Year Book 1977-78, s.v. "Turks & Caicos Island."

12. Ibid.

13. Ibid.

14. Wayne Green, "Never Say Die ... Turks and Caicos," 73 Magazine (July 1981): 16.

VIRGIN ISLANDS, BRITISH

(Dependency of the U.K.)

Basic Information:[1]

Area: 153 kM^2
Population: 10,400
Population Density: 6.8 per kM^2
Capital: Road Town (Tortola)
Major Cities: Road Town
Language: English
Religions: Protestant, Roman Catholic
Gross Domestic Product: US$ 5.56 million (1973)
Per Capita Income: US$ 535
Literacy: Almost universal

Geographical Summary:[2]

Located in the eastern Caribbean, somewhat east of the U.S. Virgin Islands and not far from Puerto Rico, are the British Virgin Islands. There are approximately 36 islands in all, 13 of which are inhabited. Most prominent are: Tortola, Virgin, Gorda, Anegada and Jost van Dyke. The climate is tropical and fairly consistent, although rather severe storms do occur.

Basic National Review:[3]

The British Virgin Islands are a colony of the United Kingdom; administered by a colonial government. A partially elected legislature also exists. Almost all of the population is of African origin or mixed. Major industries are: cattle raising, various agriculture and fishing. Workers who leave the islands but remit salaries are also of importance. Re-export of machinery and consumer goods is growing in value: tourism is on the upswing.

Telecommunications Overview:[4]

Number of Radio Broadcast Stations: 1
" " " Receivers: 6,600
" " " " per hundred: 63.5
" " Television Stations: 1
" " " Receivers: 2,000
" " " " per hundred: 19.23
" " Telephones: 1,000
" " " per hundred: 9.61
Electrical Generation Capacity: 4,200 kW
" Service: 60 hZ, 120/208 volts
Satellite Earth Stations: None
International Communications: Via Cable & Wireless' radio relay, tropo-scatter, and submarine cables
Ownership of Communications Media: Government and private
Television Standard: System M, NTSC color

Trends in Broadcasting:[5]

The British Virgin Islands are served by one radio broadcast station, and one television relay transmitter. The Virgin Islands Broadcasters, Ltd., operates from Road Town, Tortola, on 780 kHz. The power is 10 kW. This station is commercial in nature, and programs for roughly 18 hours daily. Material broadcast is mostly local in nature.

On Tortola, there is a relay transmitter for the West Indies Television Network, headquartered at Sint Maarten, Netherlands Antilles. This organization is also commercial in nature, and brings television to a number of islands. The Tortola station is on the air for eight hours each day, and works on U.S. channel 5; 15 kW visual and 3 kW aural power, E.R.P. The NTSC-M technical standard is utilized.

Owing to geographical proximity, radio and television signals may be received from the U.S. Virgin Islands, Puerto Rico, and other nearby islands. Higher powered medium and short wave broadcasts from other areas may also be picked up.

Common Carrier Services:

Cable & Wireless, Ltd., operates communications in the British Virgin Islands, and has integrated the services with their extensive Caribbean network. Automatic telephone service is provided with radio relay to all islands.[6] Troposcatter exists between Tortola and Antigua, with microwaves in visibility to St. Thomas, U.S. Virgin Islands.[7] Extended connections into the C&W system and the North American network may be made, respectively, and the British Virgin Islands are included in North America's Area Code 809, along with the U.S. Virgin Islands.[8]

Submarine cables link the islands with Bermuda, and on to Europe, and with Jamaica.[9] The first cable has 80 voice grade channels, and the second, 480 channels.[10] The Virgin Islands are associated with the Antigua trunk center, and have access to INTELSAT earth stations on Barbados and Jamaica.[11] Trunked connections via several centers are possible.

The government provides electrical services, with facilities on Tortola, Virgin Gorda, Great and Little Camarones.[12] The main generating plant is at Road Town, and capable of 4.2 MW output.[13] Overhead high tension lines (13.2 kV) and submarine power cables interconnect as required, bringing supply voltages of 120 and 208 volts, 60 hZ, single and poly-phase.[14]

Overall Analysis:

The British Virgin Islands have a modern and efficient telephone system, fully integrated within the Cable & Wireless and North American networks. Radio broadcast coverage is complete, and television service is adequate for the present.

VIRGIN ISLANDS, BRITISH

1. Information Please Almanac, 1979, 33rd ed., s.v. "Countries, Territories, and Dependencies - Dependencies of the United Kingdom, British Virgin Islands;" Reader's Digest 1980 Almanac and Yearbook, s.v. "Nations of the World - British Dependencies - British Virgin Islands;" The Caribbean Year Book 1977-78, 48th ed., s.v. "British Virgin Islands;" The People's Almanac #2, s.v. "Nations and their Rulers - Virgin Islands, British;" The World Almanac and Book of Facts, s.v. "Nations of the World - United Kingdom, British West Indies."

2. Ibid.

3. Ibid.

4. Information Please Almanac, 1979, 33rd ed., s.v. "Countries, Territories, and Dependencies - Dependencies of the United Kingdom, British Virgin Islands;" Reader's Digest 1980 Almanac and Yearbook, s.v. "Nations of the World - British Dependencies - British Virgin Islands;" The Caribbean Year Book 1977-78, 48th ed., s.v. "British Virgin Islands;" The People's Almanac #2, s.v. "Nations and their Rulers - Virgin Islands, British;" The World Almanac and Book of Facts, s.v. "Nations of the World - United Kingdom, British West Indies;" J.M. Frost, ed., World Radio TV Handbook (Hvidovre, Denmark: Billboard Publications, Inc., 1979), pp. 315, 415.

5. Frost, World Radio TV Handbook, pp. 315, 415.

6. The Carribean Year Book 1977-78, s.v. "British Virgin Islands."

7. Ibid.

8. Ibid.

9. Jack E. Cole, George S. Li, The World's Submarine Telephone Cable Systems (Washington, D.C.: Department of Commerce, 1975), pp. 53, 140.

10. Ibid.

11. "New International Switching Centres to be Installed in West Indies," Telecommunication Journal 37 (March 1970): 137.

12. The Carribean Year Book 1977-78, s.v. "British Virgin Islands."

13. Ibid.

14. Ibid.

VIRGIN ISLANDS, U.S.

(Territory of the U.S.A.)

Basic Information:[1]

Area: 214.04 kM^2
Population: 100,000 (1978)
Population Density: 467.2 per kM^2
Capital: Charlotte Amalie (St. Thomas)
Major Cities: Charlotte Amalie, Christiansted, Frederiksted, (St. Croix)
Language: English, some Danish
Religions: Protestant, Roman Catholic, some Judaism
Gross Domestic Product: US$ 500 million (1977)
Per Capita Income: US$ 5,000
Literacy: Almost universal

Geographical Summary:[2]

Located some 110 kM from Puerto Rico, in an area linking the Caribbean and Atlantic. There are three major islands of St. Croix, St. Thomas, and St. John, and 50 minor islands in the group. The British Virgin Islands and other U.K. and Netherlands possessions neighbor.

Basic National Review:[3]

Discovered by Columbus and claimed by Spain, the Virgin Islands were the site of conflict between Indians and Spanish forces. The Danish first settled there in 1672 and established a colony. The United States purchased the islands in 1917 in order to protect the Caribe from possible German U-Boat attacks. Residents of the Virgin Islands were made U.S. citizens in 1927 and are represented in the American legislature by delegates, who have similar powers as representatives from U.S. states, although they cannot vote. The Virgin Islands have a unicameral Legislative Assembly for domestic matters and an elected governor.

Approximately 80 percent of the population is of African origin. The main industry is tourism, but rum, petroleum products, textiles, bauxite processing, and minor products play notable economic roles.

Telecommunications Overview:[4]

Number of Radio Broadcast Stations: 7
" " " Receivers: 80,000
" " " " per hundred: 80
" " Television Stations: 3
" " " Receivers: 40,000
" " " " per hundred: 40
" " Telephones: 30,885
" " " per hundred: 30.9
Electrical Generation Capacity: 65,292 kW
Electrical Service: 60 hZ, 110/200 volts
Satellite Earth Stations: None
International Communications: Via microwaves to Puerto Rico and adjacent British possessions; submarine cables to other regions
Ownership of Communications Media: Government and private-commercial
Television Standard: System M, NTSC color
International Telephone Code: 1-809
Telecommunications Administration: U.S. Federal Communications Commission (Washington)

Domestic Broadcasting:[5]

(Medium Waves)

Location	Number of Transmitters	(kW) Combined Power
Christiansted	1	5
Charlotte Amalie	2	1.25
Frederiksted	1	.5

(FM)

There are FM stations at Charlotte Amalie, Frederiksted and Christiansted. Powers are substantial, and cover much of the territory.

(Television)

Location	Channels	(kW/ERP) Combined Power
Charlotte Amalie	10,12	69.1
Christiansted	8	58.5

Trends in Broadcasting:[6]

The U.S. Virgin Islands are served by a combination of medium-wave and FM sound broadcasting stations, as well as three television stations. Facilities center on the capital, Charlotte Amalie, although each of the three major population concentrations have stations.

All radio is operated on a commercial basis, owned by private individuals or juridical persons. Two of the three television operations are also commercial in nature; the third being public and cultural-educational in orientation. Stations are distributed as follows:

Location	Station	Frequency	(kW) Power	Service Hours/Day
Charlotte Amalie	WSTA	1340 kHz	.25	20
	WVWI	1000 kHz	1	18
	WCRN	101.1 mHz	50 (ERP)	
	WIBS	97.5 mHz	5 (ERP)	
Christiansted	WSTX	970 kHz	5/1	19
	WIVI	99.5 mHz	4.9 (ERP)	
Frederiksted	WRRA	1290 kHz	.5	daytime only
	WVIS	106.1 mHz	5.8 (ERP)	

The television system is as in the United States and Puerto Rico; system M, NTSC color. Stations are as follows:

Location	Station	Channel	(kW/ERP) Power
Charlotte Amalie	WBNB-TV	10	52.5/5.2
	WJTX	12	16.6/3.31
Christiansted	WSVI	8	58.5/7.2

Programs on all stations tend to be approximately for 12 hours, each day. Materials carried are much the same as in the United States, excepting local emphasis. Videotaped and filmed programs are regularly imported, and microwave feeds, via Puerto Rico, are also used. Access may be provided to the INTELSAT station Cayey, Puerto Rico. St. Thomas is equipped with a cable-television (CATV) system, serving residential subscribers.[7] Reception from Puerto Rico, the British Virgin Islands and other adjacencies is common.

Common Carrier Serivces:

The Virgin Islands are very valuable to the North American telecommunications system, as well as the entirety of the Americas, as they serve as a point of connection for several routes and paths.

The islands telephone and telegraph systems are owned and operated by VITELCO, a subsidiary of ITT.[8] Formerly, the facilities were the property of the Virgin Islands Government, but were sold to ITT with the intent that improvements be made.[9] Automatic telephone exchanges operate in all major centers, as well as interisland direct dialling facilities.[10] The Virgin Islands are part of North American Area Code 809.

Microwave relay connects the islands to Puerto Rico, and to Tortola, British Virgin Islands, from where a path extends into the extensive Cable & Wireless network.[11] The main junction for circuits of all types is at Magen's Bay, St. Thomas.[12]

A large, coaxial submarine cable runs from Magen's Bay to Vero Beach, Florida, capable of 142 voice circuits.[13] Likewise, another such cable of 720 channels links Magen's Bay with Jacksonville Beach, Florida.[14] Both cables are jointly owned by major North American and other common carriers.[15] In addition to the above, submarine cables run to Maiquetia, Venezuela (83 channels); Santo Domingo, Dominican Republic (144 channels); and Sint Maarten-Curacao, Netherlands Antilles (160 channels).[16] In 1978, a new cable was constructed between St. Thomas and Maiquetia, Venezuela; equipped with 1380 circuits.[17] Consideration has been given to the provision of a cable to Puerto Limon, Costa Rica.[18]

The Virgin Islands were linked with the Southern Hemisphere once again, when, in 1978, BRUS came into operation.[19] This cable, with 600 channel capacity, runs from Fortaleza, Brazil to Magen's Bay, St. Thomas, continuing on to Florida.[20]

The Virgin Islands Water and Power Authority is responsible for electricity on St. Thomas and St. Croix.[21] St. John, Water Island and Hassell Island are linked to the power grid via underwater high tension cable.[22] The two main power plants are on St. Thomas and St. Croix, with the following configurations:[23]

St. Thomas:	7 diesel and three steam turbines:	37,800 kW capacity
St. Croix:	10 diesel and one steam turbine:	27,492 kW capacity
	Total:	65,292 kW capacity

Overall Analysis:

The Virgin Islands have an excellent social and common carrier infrastructure; rarely equalled elsewhere in the Americas. Acting as a nerve center for much of the hemisphere; the islands have direct or trunked connections with many countries and regions. Power generation capacity is adequate for the present, but may require increase with population trends.

Yet another cable has been added to the Virgin Islands "marshalling point," this time adding 640 circuits to the Venezuela-North America route, linking St. Thomas with Marguetia, a distance of 1040 kM is covered.[24]

VIRGIN ISLANDS, U.S.

1. Information Please Almanac, 1979, 33rd ed., s.v. "Countries, Territories, and Dependencies - U.S. States and Territories - U.S. Virgin Islands;" Reader's Digest 1980 Almanac and Yearbook, s.v. "U.S. Territories and Dependencies, U.S. Virgin Islands;" The Caribbean Year Book 1977-78, 48th ed., s.v. "U.S. Virgin Islands;" The People's Almanac #2, s.v. "Nations and their Rulers - U.S. Virgin Islands;" The World Almanac and Book of Facts, 1979, s.v. "States and other Areas of the U.S., Outlying U.S. Areas, U.S. Virgin Islands."

2. Ibid.

3. Ibid.

4. Information Please Almanac, 1979, 33rd ed., s.v. "Countries, Territories, and Dependencies - U.S. States and Territories - U.S. Virgin Islands;" Reader's Digest 1980 Almanac and Yearbook, s.v. "U.S. Territories and Dependencies, U.S. Virgin Islands;" The Caribbean Year Book 1977-78, 48th ed., s.v. "U.S. Virgin Islands;" The People's Almanac #2, s.v. "Nations and their Rulers - U.S. Virgin Islands;" The World Almanac and Book of Facts, 1979, s.v. "States and other Areas of the U.S., Outlying U.S. Areas, U.S. Virgin Islands;" J.M. Frost, ed., World Radio TV Handbook (Hvidovre, Denmark: Billboard Publications, Inc., 1979), pp. 315, 415.

5. Frost, World Radio TV Handbook, pp. 315, 415.

6. Frost, World Radio TV Handbook, pp. 315, 415.

7. The Caribbean Year Book 1977-78, s.v. "U.S. Virgin Islands."

8. Ibid.

9. Ibid.

10. Ibid.

11. Ibid.

12. Jack E. Cole, George B. Li, The World's Submarine Telephone Cable Systems (Washington, D.C.: Department of Commerce, 1975), pp. 129, 154-155.

13. Ibid.

14. Ibid.

15. Ibid.

16. Ibid., pp. 129, 154-155, 161, 212-213.

17. Ibid., pp. 51, 83.

18. Ibid., p. 52.

19. Ibid., p. 53

20. Ibid.

21. The Caribbean Year Book 1977-78, s.v. "U.S. Virgin Islands."

22. Ibid.

23. Ibid.

24. "New Cable Linking Virgin Island with Venezuela," Telecommunication Journal 47 (December 1980): 756.

CENTRAL AMERICA

From unity under the empires of the indigenous peoples, to division by the Spanish conquerors, back to unity under the Spanish crown, to separation by revolts for independence, to oneness within a framework of United Republics, returning finally to true national independence. This is the model which applies, in most cases, to the Central American region. A continuous cycle of change has also laid the ground rules for establishment of communications systems in the area.

There are eight countries making up Central America; namely: Belize, Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua and Panama. Major statistics follow:

Total Regional Area: 2,493,880 kM^2
" " Population: 87.3 million
Average Population Density: 52.21 per kM^2
Total Regional GNP: US$ 81.29 billion
Average PCI: US$ 931.12
Average Literacy: 67 percent
Total Number of Radio Broadcast Stations: 732
" " " " Receivers: 21.42 million
" " " " " per hundred: 22.87
" " " Television Stations: 102
" " " " Receivers: 6.481 million
" " " " " per hundred: 5.14
" " " Telephones: 3.78 million
" " " " per hundred: 3.54
Total Electrical Generation Capacity: 15,611,000 kW
Electrical Services: All 60 hZ
Television Systems: M-NTSC: 62.5 percent
" " : M-MONO: 25 percent
No Television: 12.5 percent
Number of Satellite Earth Stations: 6

Beginning in the late 19th and early 20th centuries, submarine telegraph cables were installed between the capitals of the Republics; eventually extending from North to South America, by way of the Central American states. While these old cables have now been phased out of service, they were the primary means of electrical communication for many years. The advent of wireless brought a new lease on life for Central American telecoms. Starting with the various international companies, such as United Fruit, which established a network of radio-telegraph stations, the capitals of the Republics were linked together. Wireless circuits to the United States and Europe were also provided. For a long time, radio was a mainstay and still plays an important part in overall communications requirements.

Broadcasting often started as an offshoot of point-to-point or experimental communications transmitters. This was especially true as receivers became more widespread. Radio stations frequently were established on a commercial basis, although in certain instances, governments also participated in electronic media. The adoption of short-waves to broadcast purposes marked the start of a tradition in Latin America; covering great distances and sparsely populated zones with relatively little transmission power. Television began as a sort of novelty, as in the United States, but later spread into many homes. Notable in early Latin television were the experiments of Mexican engineer, Guillermo Gonzalez Camarena, in the 1930's. He invented a color television system in 1938, which was patented in both Mexico and the U.S.A. In recent years, television has been oriented mostly on a

private-commercial basis, with exceptions for educational-cultural and government operations.

The electronic media have played a major part in the integration of Central American nations. While there are still distant and isolated regions, these are now not quite so remote; thanks to the electronic bridges which link all areas to the rest of the world. The multi-cultural societies present in many Central American Republics are especially well-served by these capabilities, providing each with a voice and soundingboard. Education and literacy training have also found a home in Central American broadcasting.

Satellites have brought a modern miracle to communications. Not only in Central America is this the case, but in all parts of the world. Of the eight republics, seven have earth stations. As distances and terrain are normally not exceptionally difficult, there are presently no domestic uses of satellite in the region - with the exception of Colombia's San Andres Island, located off the coast of Nicaragua.

CENTRAL AMERICA

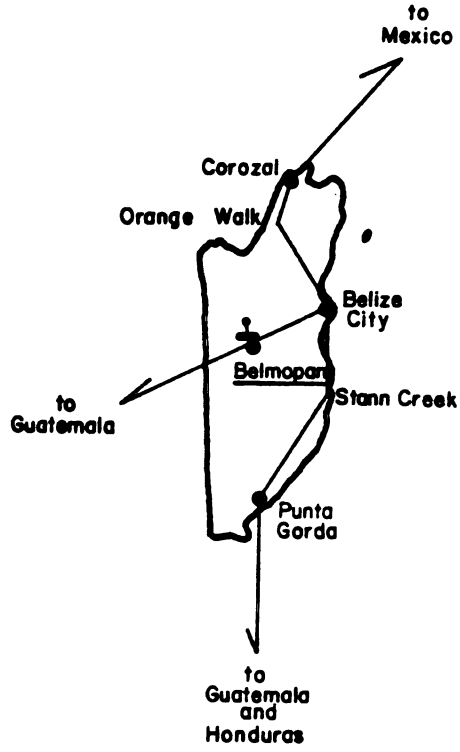
1. Information Please Almanac, 1979, 33rd ed., s.v. "Countries, Territories and Dependencies;" U.S., Central Intelligence Agency, National Basic Intelligence Factbook, 1980 (Washington, D.C.: Government Printing Office, 1980); Reader's Digest 1980 Almanac and Yearbook, s.v. "Nations of the World;" The Caribbean Year Book 1977-78, 48th ed.; The People's Almanac #2, s.v. "Nations and their Rulers;" The World Almanac and Book of Facts 1979, s.v. "Nations of the World;" J.M. Frost, ed., World Radio TV Handbook (Hvidovre, Denmark: Billboard Publications, Inc., 1979, 1980).

2. Televisa, S.A. Que Es Televisa (Mexico City: Televisa, S.A., 1979).

3. Communications Satellite Corporation (COMSAT), COMSAT Guide to the Intelsat, Marisat and Comstar Satellite Systems (Washington, D.C.: Communications Satellite Corporation (COMSAT), 1979, 1980).

FIGURE 11

Communication Networks in BELIZE



● I Radio
Satellite Station
_MainRoute

BELIZE

(Self-Governing Dependency of the U.K.)

Basic Information:[1]

Area: 22,965 kM^2
Population: 150,000 (1978)
Population Density: 6.53 per kM^2
Capital: Belmopan
Major Cities: Belize City, Belmopan
Languages: English and Spanish
Religions: Roman Catholic (50%), Anglican and other Protestant
Gross National Product: US$ 87 million (1974)
Per Capita Income: US$ 680
Literacy: 70-80 percent

Geographical Summary:[2]

Located on the Caribbean coast of Central America, Belize is bordered by Mexico and Guatemala. A good portion of the country is forested, and population centers cling to the littoral. In a move to integrate the nation, the capital was transferred from Belize City (coast) to Belmopan (interior).

Basic National Review:[3]

Under British influence since the 17th century, Belize (British Honduras) became a Crown Colony in 1884, a result of an understanding with neighboring Guatemala. Promised eventual independence, Belize has faced territorial claims from the Guatemalans, and consequently has remained firmly within the sphere of the U.K. Over the past few years, an independence solution acceptable to all parties has been sought, but not completed as of date. In 1977, British troops were dispatched to Belize after signs of potential Guatemalan "bellicosity."

The country has a diverse agricultural output, which is the mainstay of the national economy. Included are timber, sugarcane, bananas, citrus and seafoods. Belize is very concerned with future development and has done much to encourage investment and expansion.

Telecommunications Overview:[4]

Number of Radio Broadcast Stations: 1
" " " Receivers: 70,000
" " " " per hundred: 46.7
" " Television Stations: None
" " " Receivers: None
" " Telephones: 5,800
" " " per hundred: 3.86
Electrical Generation Capacity: 16,000 kW
" Service: 60 hZ, 110/220 volts
Satellite Earth Stations: Recently installed Cable & Wireless INTELSAT station at Belmopan
International Communications: Via INTELSAT, landlines and HF radio
Ownership of Communications Media: Government, partially commercial
International Telephone Code: 501
Telecommunications Administration: Belize Telecommunications Authority

Domestic Broadcasting:[5]

Radio Belize is a government-owned, partially commercial station, centered in Belize City. Programs run in English and Spanish for about 120 hours weekly. News is carried from the BBC and VOA at various times of the day. A national program is broadcast over transmitters, located as follows:

Location	(kHz) Frequency	(kW) Power
Belize City	834	20
Punta Gorda	910	1
Corozal	930	1
San Ignacio	940	1
Belmopan	3300 (3285)	1

Radio is the primary means of national communication and integration in Belize. Terrain and settlement patterns do not permit easy access to all parts of the country, and common carrier services have been rather limited. Also, the continuing territorial dispute with Guatemala stresses a need for educational and cultural communications. The short-wave transmitter in the capital, on 3300 kHz, has been interfered with by a 10 kW station on the same frequency in Guatemala City. A slight change in Belize's frequency has helped to alleviate this problem. Radio Belize's 834 kHz outlet has a primary daytime range of 160 kM, although nighttime distance extends markedly. There is no television in Belize. With the advent of the nationwide microwave network, Radio Belize has given consideration to adding an FM system, which might even replace the medium-wave facilities at a later date. This would improve reception in an area where tropical disturbances are not uncommon.

Common Carrier Services:

Most telecom facilities were inherited from the British colonial administration and include nearly 6,000 telephones connected to automatic and manual exchanges.[6] Interconnections between towns in Belize are via landlines and radio relay.[7] Principal routes link Belize City with Belmopan, as well as with Dangviga, Independence, Orange Walk, Punta Gorda and San Ignacio.[8] A new microwave system, installed by GTE, has drastically upgraded the circuits available.[9] International routes extend from Belize City to Chetumal, Mexico; Belize City to Flores, Guatemala; as well as a southern line with Puerto Barrios, Guatemala, and extending to San Pedro Sula, Honduras.[10] The circuits from Flores and

Puerto Barrios, Guatemala, continue on to Guatemala City.[11] Connections into the Central American microwave network are via Mexico, consequently permitting direct calls to and from North America.[12] Cable and Wireless, Ltd., maintains an HF station at Ladysville, some 16 kM from Belize City, and connects with various points via Jamaica and Miami.[13]

The new microwave network makes STD possible. Belize now has the capability of joining the international direct dialling club as well. The national trunk exchange is located at Belize City.

Belize Telephone Zone Codes:[14]

Belize City:	01
Belmopan:	08
Dangviga:	05
Independence:	06
Orange Walk:	03
Punta Gorda:	07
San Ignacio:	09

An INTELSAT satellite station was recently installed at Belmopan, and is operated by Cable & Wireless. Using the Atlantic Ocean birds, direct connections are maintained with Europe and North America.

The National Electricity Board overseas energy production under the Ministry of Power and Communications.[15] Diesel alternators provide most of the supply with plants in Belize City, Belmopan, Corozal, Orange Walk, Stann Creek, San Ignacion, Punta Gorda and San Pedro.[16] Although voltages do vary across the country, all public service is provided at 60 hZ.[17] Outside of the immediate areas of the generating facilities, electrical distribution is spotty.

Overall Analysis:

The number of radio receivers is very high, 46.7 per hundred. Of course, the small population must be taken into consideration. Radio broadcasting is a very important tool in the country, permitting communications and understanding which would be impossible by any other way. This is especially true with the political situation facing Belize.

Common carrier services are presently below average but have improved greatly with the new microwave system. There is also a severe shortage of trained personnel in all technical areas.

BELIZE

1. Information Please Almanac, 1979, 33rd ed., s.v. "Countries, Territories, and Dependencies - Dependencies of the United Kingdom, Belize;" U.S., Central Intelligence Agency, National Basic Intelligence Factbook, 1980 (Washington, D.C.: Government Printing Office, 1980), p. 18; Reader's Digest 1980 Almanac and Yearbook, s.v. "Nations of the World - British Dependencies - Belize;" The Caribbean Year Book 1977-78, 48th ed., s.v. "Belize;" The People's Almanac #2, s.v. "Nations and their Rulers - Belize;" The World Almanac and Book of Facts 1979, s.v. "Nations of the World - United Kingdom, Belize."

2. Ibid.

3. Ibid.

4. Information Please Almanac, 1979, 33rd ed., s.v. "Countries, Territories, and Dependencies - Dependencies of the United Kingdom, Belize;" U.S., Central Intelligence Agency, National Basic Intelligence Factbook, 1980 (Washington, D.C.: Government Printing Office, 1980), p. 18; Reader's Digest 1980 Almanac and Yearbook, s.v. "Nations of the World - British Dependencies - Belize;" The Caribbean Year Book 1977-78, 48th ed., s.v. "Belize;" The People's Almanac #2, s.v. "Nations and their Rulers - Belize;" The World Almanac and Book of Facts 1979, s.v. "Nations of the World - United Kingdom, Belize;" J.M. Frost, ed., World Radio TV Handbook (Hvidovre, Denmark: Billboard Publications, Inc., 1979), pp. 289-290.

5. Frost, World Radio TV Handbook, pp. 289-290.

6. Central Intelligence Agency, National Basic Intelligence Factbook, 1980, p. 18.

7. Ibid.

8. The Caribbean Year Book 1977-78, s.v. "Belize."

9. "Ł 3 Million Telecommunications Expansion," Telecommunication Journal 38 (March 1971): 154.

10. "Inter-American Telecommunications Network," Telecommunication Journal 38 (September 1971): 632.

11. Ibid.

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13. The Caribbean Year Book 1977-78, s.v. "Belize."

14. American Telephone and Telegraph Company, Personal International Directory 1979 (New York: American Telephone and Telegraph Company, 1979), p. 4.

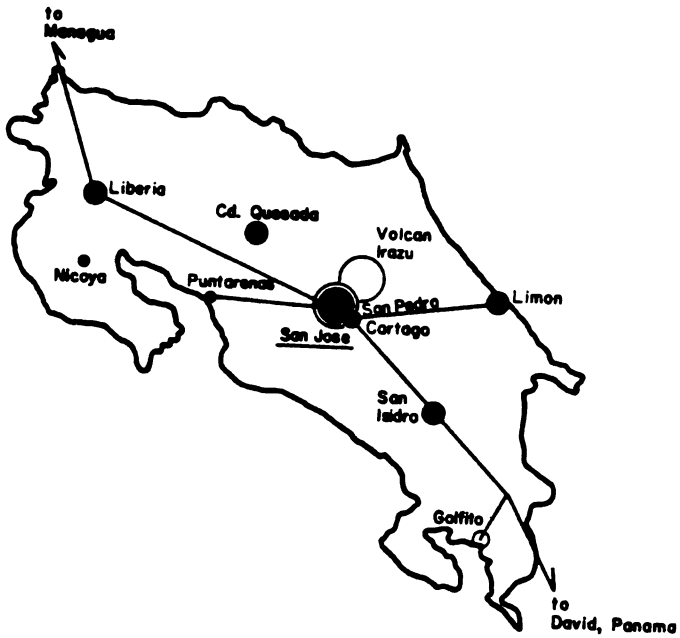
15. The Caribbean Year Book 1977-78, s.v. "Belize."

16. Ibid.

17. Ibid.

FIGURE 12

Communication Networks in COSTA RICA



Transmitters

Radio	TV
28	3-4
3-4	
2	1

Main Route

COSTA RICA

(Republica de Costa Rica)

Basic Information:[1]

Area: 50,700 kM^2
Population: 2.12 million (1978)[2]
Population Density: 41.8 per kM^2
Capital: San Jose
Major Cities: San Jose
Language: Spanish
Religions: Roman Catholic
Gross National Product: US$ 2.3 billion (1976)
Per Capita Income: US$ 1,085
Literacy: 89 percent

Geographical Summary:[2]

Situated between the republics of Nicaragua and Panama, Costa Rica has shores on both the Caribbean Sea and Pacific Ocean. Mostly a plateau (914 to 1829 metres), higher mountains and coastal lowlands also exist. Much of the landscape is forested. A rather high potential for volcanic activity exists in the country, with occasional eruptions and earthquakes. From a telecommunications standpoint, much of the population resides within areas commanded by some of the higher peaks, consequently enabling satisfactory use of VHF and above.

Basic National Review:[3]

Costa Rica was under Spanish domination from 1502 until 1821, when independence was achieved. After leaving the Central American Federation, a separate republic was formed. Civil disturbances in the 1940's led to difficult times, but stability has prevailed since. Costa Rica joined

the Central American Common Market in 1962. Volcanic and seismic activity have created havoc at times.

Costa Rica has the highest per capita income of all Central America, with its economy based on agricultural production. Coffee, bananas, abaca, sugar, cacao and various fibres are important. Silviculture in mountain regions also is notable.

Telecommunications Overview:[4]

International Prefixes: TEA-TEZ, TIA-TIZ
Number of Radio Broadcast Stations: 33
" " " Receivers: 350,000
" " " " per hundred: 16.5
" " Television Stations: 5
" " " Receivers: 175,000
" " " " per hundred: 8.3
" " Telephones: 126,879 (1977)
" " " per hundred: 6.0
Electrical Generation Capacity: 380,000 kW
" Service: 60 hZ, 120/228 volts
Satellite Earth Stations: None
International Communications: Via HF radio, terrestrial links to neighboring states
Ownership of Communications Media: Broadcasting is mostly privately owned; common carrier services are governmental
Television Standard: System M, NTSC color
International Telephone Code: 506
Telecommunications Administration: Departamento Control Nacional de Radio (San Jose)

Domestic Broadcasting:[5]

(Medium and Short Waves)

City	Number of Transmitters	(kW) Combined Power
San Jose	28	210.5
San Pedro	2	25
San Isidro del Gral.	14	14
San Isidro de Puntarenas	2	7
Ciudad Quesada	3	6
San Ramon	1	6
Heredia	1	5
Limon	4	4
Cartago	2	3.5
Liberia	3	3

(FM)

There are FM stations in San Jose, Cartago, Limon, Liberia, Cd. Quesada and San Isidro.

(Television)

City	Channels	Networks	(kW/ERP) Combined Power
Rancho Redondo	7	TCR	80
San Jose	9,13	MV,RNTV	8
Buena Vista	10,11	RNTV,TCR	4.5
Santa Elena	10,12	RNTV,TCR	2.5
Volcan Irazu	2,4,6,7	TCR,MV,CCTV	2.018
Golfito	5	TCR	1.2
Palmira	5	TCR	1.2
Llano Grande (Cartago)	11	TON	1

Networks:

TCR - Televisora de Costa Rica
MV - Multivision
CCTV - Corporacion Costarricense de Television
TON - Teleonce
RNTV - Red Nacional de Television (Government)

Trends in Broadcasting:

Costa Rica is one of the most democratic nations in the world, and as such, is saturated with electronic and printed media. Radio can be considered the primary communications medium reaching most of the population. Each station offers its own points of view and programs as each sees fit, in order to please segments of the listening public. Therefore, there are broadcasters specializing in one or another area: music, news, sports, etc. The mountainous terrain inhibits the coverage of many stations, making them effectively local in nature. More powerful MW and shortwave stations are able to overcome the barriers. The government issues licenses through the Departamento de Control de Radio, which is a part of the Ministerio de Gobernacion.[6]

One of the drawbacks with such a large concentration of stations is that competition is fierce, and many broadcasters are only able to exist on a marginal economic basis. Price wars in commercial rates are not unknown. Multiple ownership is practiced to an extent, notably on the part of Radio Cadena Nacional, which operates four stations in the capital.[7] In the mid-1970's, this organization tested a million-watt MW transmitter, appropriately named "Radio Million," and possibilities were mentioned of establishing a full-time international service. The megawatt installation has since been uprooted, and reportedly moved to Venezuela.[8]

Major radio broadcasters are situated in the capital, most of which operated with moderate powers. In fact, the largest transmitter works with 50 kW, and most stations have much less.[9]

Television is operated by five networks; four of which are privately owned. The national government has just started its own television service, which will be directed toward educational and cultural goals.[10] A large number of repeaters ensures reception in many parts of the country. Television transmitters are usually located atop high mountains, in order to serve a wide area below. It is interesting to note that several senders are placed on Volcan Irazu, at times an active volcano. Also, low powers are the rule for these mountain-top installations, as electrical lines are not easily provided in difficult terrain. Television receivers, especially color, are rather costly and the audience is comprised of relatively well-to-do urban dwellers. Programs have been imported from the U.S.A. and Mexico. Also, the Central American Microwave Network permits interchange of television signals with other countries of the region. Available information indicates that television programming may be broken down into the following categories: 65 percent entertainment; 20 percent news; and 10 percent education, as well as the remaining five percent falling into the miscellaneous category.[11]

Some radio stations are frequently heard outside of Costa Rica and are listened to by residents of other countries in the area. The shortwave outlets of Radios Reloj, Faro del Caribe, Casino, Universidad and Centroamericana all operate with low powers, but propagate into North America and Europe, with usable signals.[12] During the Nicaraguan civil war (1979), Costa Rica was accused of harboring Sandinista forces, including clandestine broadcasting stations. Information recently released in the U.S. has linked Radio Sandino with Costa Rica's well-known Radio Reloj,

itself a part of the largest broadcast organization in the country.[13] Another Costa Rican station which has received much attention lately is the little-known "Radio Noticias del Continente," also mentioned as a station allied with the Sandinista Front.[14] Radio Noticias operates a 50 kW shortwave transmitter, and carries news which is critical of various Central and South American administrations. A supposed commercial station, which actually carries few or no commercials, the exact ownership and financial details of Radio Noticias are vague. Accusations made by Argentine sources have linked the station with Marxist organizations.[15]

Common Carrier Services:

In 1963, a chaotic state of affairs existed in Costa Rican telecommunications. In all of the country, there were but 10,000 telephones - all of them manually switched; and these were concentrated in the San Jose region.[16] Foreign operation of the telephone system had proven inefficient. Under terms of Law No. 3226, the Instituto Costarricense de Electricidad (ICE) was assigned the task of rebuilding the communications system.[17] ICE, in conjunction with COMTELCA, the Central American regional telecoms planning commission, made studies as to the provision of more adequate services and interconnections with neighboring states.

Until 1964, international traffic was handled by a private firm, Radiografica; later transformed into RACSA.[18] In the year 1975, RACSA became a subsidiary of ICE.[19]

Important renovations took place, giving Costa Rica 126,879 telephones, by 1977.[20] Some 6,500 trunk circuits were also provided and automatic exchanges were installed where possible.[21] Services were extended to most cities and towns and STD direct dialling became possible. VHF radio links are used for communications with remote areas.[22] Automatic telephone equipment has generally been of the Ericsson (Swedish) type.[23] The main traunk routes are supplied by high-capacity microwave.[24] North-south circuits run parallel to the Central American Microwave System, but use different towers.[25] East-west links also use microwave and have 960 channel capacity.[26] Direct dialling to most of Central America, the U.S.A. and Canada is possible, via the 1000 line international exchange in San Jose.[27] Approximately 800 telex terminals are in operation.[28]

Two submarine cables have been planned; each of 480 circuits.[29] The first would run between St. Thomas, Virgin Islands, and Puerto Limon; while the second would link Costa Rica with El Salvador.[30]

Data transmission is maintained by ICE and serves the major cities.[31] A correspondent relationship was agreed upon with ITT, RCA, WUI, and TRT for international services.[32] Principal links run from north to south; Cartago to San Jose - Liberia; with international connections to David, Panama; Managua, Nicaragua.[33] East-west circuits go from Puntarenas, on the Pacific, to Limon, on the Caribe.[34]

Costa Rica was the first Central American nation to have electrical service; that in 1884.[35] Over half of the population has access to power,

although most lines run in urban areas.[36] Rural users have had to contend with wildly fluctuating voltages, which have been known to damage appliances and machinery.[37] Some 60 percent of the total power demand is for residential use, with 20 percent being devoted to industry.[38] Costa Rica has one of the highest electrical consumption rates in the world.[39]

ICE, Instituto Costarricense de Electricidad, oversees the electrical industry, as well as telecoms.[40] An American-owned company, Cia. Nacional de Fuerza y Luz, generates most power for consumer use.[41] In 1970, generating capacity was 416,758 kW for hydro installations, and 84,066 kW for thermal plants.[42] Most plants in the country are now interlinked by a national grid, which can also tie in with the facilities of Panama and Nicaragua.[43]

Overall Analysis:

Costa Rica has at its disposal a highly sophisticated and modern mass and common-carrier communications system, one of the most extensive in the world. Efforts are underway to upgrade what exists to even better levels.

COSTA RICA

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8. Personal monitoring.

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33. "Inter-American Telecommunications Network," Telecommunication Journal 38 (September 1971): 632.

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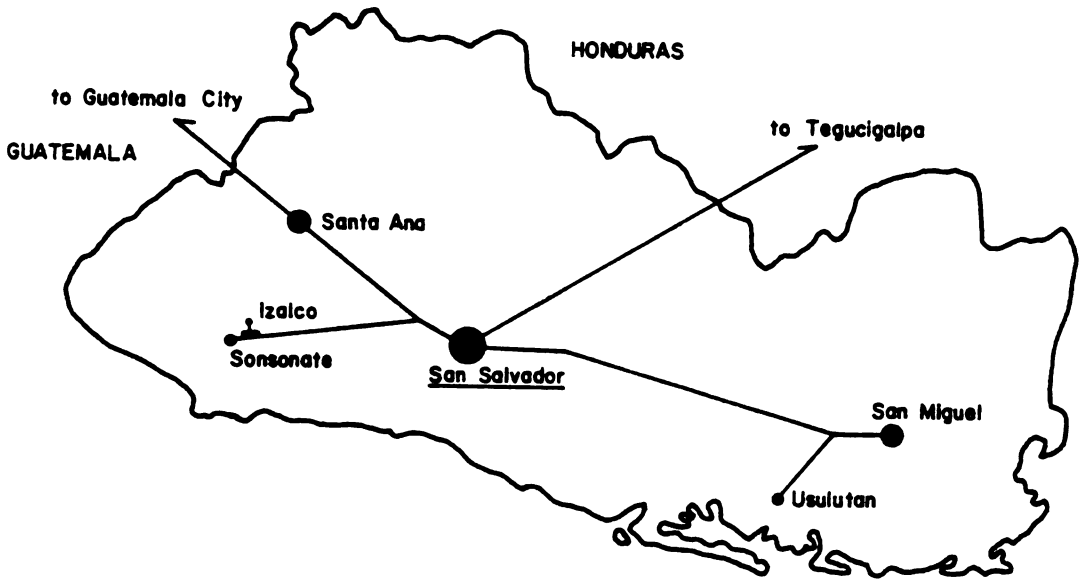
41. Ibid.

42. Ibid.

43. Blutstein et al., Area Handbook for Costa Rica, p. 207.

FIGURE 13

Communication Networks
in
EL SALVADOR



33 radio transmitters
10 radio transmitters
6 radio transmitters
Satellite Station
Main Route

note: the capital has seven TV stations

EL SALVADOR

(Republica de El Salvador)

Basic Information:[1]

Area: 21,041 kM^2
Population: 4.34 million (1978)
Population Density: 206.3 per kM^2
Capital: San Salvador
Major Cities: San Salvador, Santa Ana, Sonsonate, Usulatan, San Miguel
Language: Spanish
Religion: Roman Catholic
Gross National Product: US$ 2.2 billion (1976)
Per Capita Income: US$ 507
Literacy: 50 percent

Geographical Summary:[2]

Located on Central America's Pacific coast, the Republic of El Salvador borders on Guatemala and Honduras. Smallest of the area's nations, El Salvador is densely populated. Along the coast, a hot plain exists, giving way to a plateau farther inland, which is marked by a central valley. Mountainous terrain in the north is generally isolated, and in some cases, volcanic.

Basic National Review:[3]

Independent from Spain in 1821, El Salvador joined a federation of Central American states, remaining until 1838. Difficult relations with other nations in the region have not been uncommon. For a very long time, El Salvador has been beset by political disturbances, improving with the resumption of Constitutional process in 1962, and the country's greater involvement in regional economic affairs. Armed

conflict broke out between El Salvador and Honduras in 1969, but demilitarization was arranged in the following year. Politically motivated violence has plagued the country in the past few years, culminating in a military coup in October 1979, after which, reforms were promised.

Intensive agricultural activities make up the backbone of the El Salvadorean economy, producing coffee, cotton, sugar, corn, rice and other foodstuffs. Silviculture is also important with exportation of mahogany, walnut, balsam and cedar. Industrial development has occurred over the past few years and includes textiles, chemicals, cement and metals.

Telecommunications Overview:[4]

International Prefixes: HUA-HUZ, YSA-YSZ
Number of Radio Broadcast Stations: 53
" " " Receivers: 1,416,000
" " " " per hundred: 32.6
" " Television Stations: 4
" " " Receivers: 180,000
" " " " per hundred: 4.15
" " Telephones: 54,156
" " " per hundred: 1.25
Electrical Generation Capacity: 260,000 kW
Electrical Service: 60 hZ, 110/220 volts
Satellite Earth Stations: INTELSAT facility at Izalco, near Sonsonate using standard dish
International Communications: Via satellite, terrestrial links with neighboring states, and HF radio
Ownership of Communications Media: Both private and governmental
Television Standard: System M
International Telephone Code: 503
Telecommunications Administration: ANTEL - Administracion Nacional de Telecommunicaciones (San Salvador)

Domestic Broadcasting:[5]

(Medium and Short Waves)

City	Number of Transmitters	Networks	(kW) Combined Power
San Salvador	33	YSU,CEN,YSR,YSKL	175.5
San Miguel	10	YSU,YSR,YSKL	28.5
Santa Ana	10	YSU,CEN,YSR,YSKL	27
Ahuachapan	4	YSU,YSKL	22
Usulutan	6	YSU,YSR,YSKL	15.5
Sonsonate	6	YSU,USR,YSKL	13.25
Chalatenango	2	YSKL	4

(FM)

There are FM transmitters in the major cities.

(Television)

All stations are located in San Salvador and operate on the following channels: 2,4,6,8,10,14 and 20. One governmental (educational) and three commercial organizations are responsible for television: Canales de Television Educativa; Canal Dos; Canal Cuatro; Canal Seis. Two organizations have relatively powerful signals, emanating from 75 and 100 kW senders, respectively. This permits coverage throughout much of the nation.

Trends in Broadcasting:

Social communications in El Salvador are operated on a commercial basis, with the exception of a few governmental and educational/cultural stations. Without a doubt, radio is the main vehicle of communication and expression considering the relatively low circulation of newspapers. The

portable, transistorized receiver has made it possible for all parts of the nation to be integrated.

As is the case in many countries, most Salvadorean broadcasters are "marginal" in nature; operating with limited resources and under duress of severe competition.[6] Commercial rates have to be held low in order to garner business, but are often barely sufficient to cover expenses. Few stations subscribe to wire services, although all carry official news bulletins. Licenses are issued by the Ministry of the Interior, for a period of five years.[7] Interestingly enough, this same bureau also operates Radio Nacional de El Salvador, the official government station. Although there are a large number of privately-owned, independent stations, several "circuitos" cover the national territory with network programs. The normal arrangement is to have a leading station in the capital, where productions are centralized, and repeaters distributed throughout the rest of the land. Main networks are listed below:[8]

Network	Flagship Station	Total Number of Stations
Radio Television YSU	YSU	6
Radiocadena Central	YSZ	3
Circuito YSR	YSR	5
Radio Cadena Universal	YSKL	7

For quite some time now, television has been used by the Salvadorean government for educational and cultural purposes.[9] Canales de Television Educativa operates four outlets, as well as an extensive microwave interconnection scheme.[10] A wide variety of instruction is carried via this medium. Studios are located in a school at San Andres, a section of San Salvador, and are carried to the transmitter site via microwave.[11]

As a testimony to social importance of electronic media in El Salvador, stations have frequently been taken over by guerilla forces and participants in civil disobedience.[12] Statements have been read over the air, expressive of various points of view. In the severe disturbances of late 1979, early 1980, it was reported that clandestine radio broadcasts had appeared on the scene; including "Radio Revolucionaria del Pueblo," official voice of the ERP - People's Revolutionary Army.[13] Working on medium waves between 1400 and 1600 kHz, the station called for general uprisings and anti-government manifestations.[14] Some legitimate stations have also carried statements and special reports in relation to continuing political upheaval.

Television reaches most parts of El Salvador, and viewers in border regions can also pull in signals from neighboring states, especially Guatemala.[15] Many videotaped programs from Mexican or North American organizations have been carried. Materials can be brought in via the Central American microwave net, and by INTELSAT.

Common Carrier Services:

Telephones and telegraphs in El Salvador are operated by government agencies, coordinated by ANTEL, Administraction Nacional de Telecomunicaciones.[16] The national system is based on a 7 gHz microwave relay, capable of 300 voice channels, as well as television.[17] Using British-made equipment, the relay network interconnects San Salvador with the cities of Sonsonate, Santa Ana, San Miguel, and Usulatan, as well as other regional towns.[18] Over 50,000 telephones are in service, many on

automatic exchanges.[19] In recent years, telecoms facilities have been seriously overloaded, but modernization has ameliorated the situation greatly.[20]

El Salvador is a member of the Central American Microwave Network, which permits direct interconnection with the entire region, as well as with the U.S.A. and Canada. Principal international terrestrial circuits go via Tegucigalpa, Honduras and Guatemala City, Guatemala.[21] During the 1969/70 conflict with Honduras, lines were cut; playing havoc with regional communications.[22] All have been subsequently restored.

The government operates an HF radiotelephone station, and radiotelegraph is provided by TRT.[23] The INTELSAT earth station at Izalco uses a 32.5 metre dish, and communicates via Atlantic Ocean satellites.[24] Equipment was provided by GTE of the United States.[25]

Most parts of the country are electrified under the auspices of CEL, Comision Ejecutiva Hidroelectrica del Rio Lempa.[26] This organization operates a large "5 de Noviembre" hydro plant on the Lempa River, north of San Salvador.[27] Other dams include that at Lago Guija, upstream from the first plant.[28] Power coming from CEL is distributed by local utilities and most generating plants are linked together.[29] The government's Comision Salvadorena de Energia Nuclear has investigated the possibilities of establishing a nuclear power plant.[30] There is a 30 MW geothermal plant operating in Ahuachapan.[31]

In October of 1979, an incendiary bomb seriously damaged the central power plant and substation in San Salvador, bringing most of the capital into darkness and affecting part of the nation.[32] Recircuiting and repair work started almost immediately.

Overall Analysis:

For such a small country, El Salvador has a wide variety of media resources, although many are owned by a very few organizations. Radio is definitely of great importance and is treated as such with almost total coverage. Reception of signals from neighboring states is possible, and indications are that quite a number of people listen to these trans-border programs. Relative political instability over the years has taken a heavy toll on the mass media, in terms of function and potential. However, use of instructional television is greater in El Salvador than in most countries of the region. Individual broadcast stations suffer from extreme competition, to the point that quality is affected, in some cases. Common carrier facilities are adequate, especially since the installation of the satellite terminal and evolution of microwave relays.

During the first few days of 1981, anti-government forces announced the establishment of "Radio Liberacion," a clandestine broadcast station. Regular, daily broadcasts were promised, to be made in the 31 and 41 metre bands. Major excerpts from Radio Liberacion have been picked up and rebroadcast by Radio Habana Cuba. Signal characteristics hint at a moderate power communications transmitter, with a portable alternator supplying electricity.

EL SALVADOR

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27. Ibid.

28. Ibid.

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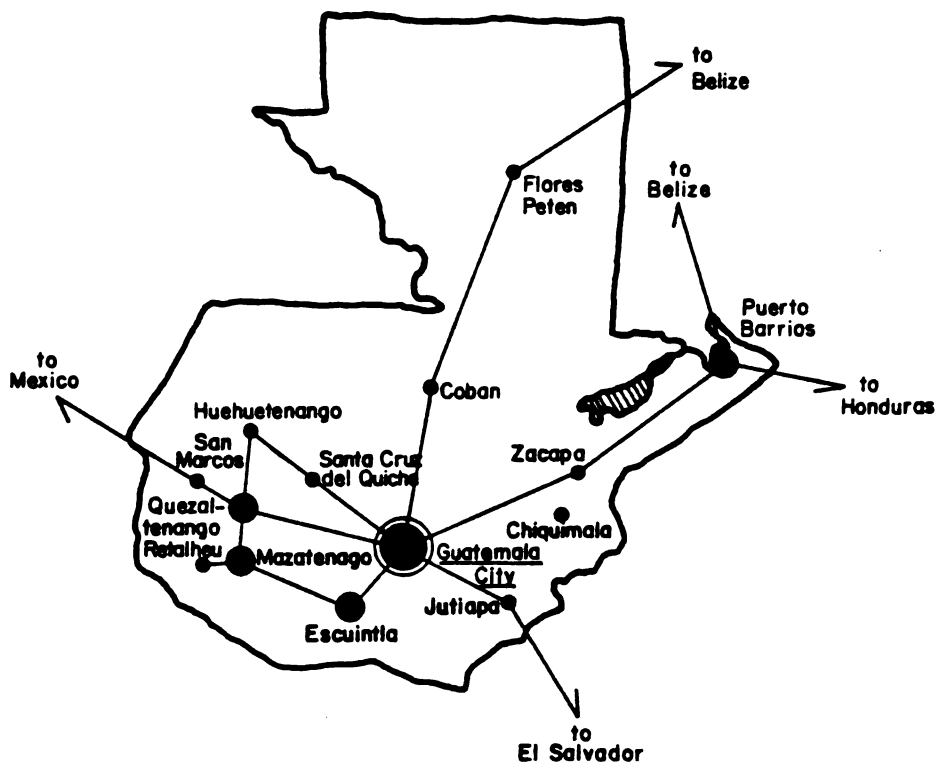
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FIGURE 14

Communication Networks in GUATEMALA



GUATEMALA

(Republica de Guatemala)

Basic Information:[1]

Area: 108,889 kM^2
Population: 6,63 million (1978)
Population Density: 60.88 per kM^2
Capital: Guatemala City
Major Cities: Guatemala City, Escuintla, Quetzaltenango
Languages: Spanish, various Maya-Quiche tongues
Religion: Roman Catholic (majority), some Mayan practices
Gross National Product: US$ 4.1 billion (1976)
Per Capita Income: US$ 618
Literacy: 46 percent

Geographical Summary:[2]

Located in Central America, Guatemala shares frontiers with Mexico, Belize, Honduras and El Salvador. It has considerable Pacific Ocean coastline, as well as a small strip of Caribbean access. The country is primarily divided into four sections; the Pacific plain, which stretches between mountains and the ocean; Caribbean lowlands - comprised of river valleys and swamps; forested areas of the north; and the central highlands - which make up much of the country.

Basic National Review:[3]

A flourishing Mayan civilization, Spanish conquest and independence from the Spanish Crown in 1821, mark early Guatemalan history. At the time of true national sovereignty in 1839, Guatemala became a republic and was governed by military administrations for more than 100 years. In the early 1950's, a left-leaning president, Jacobo Arbenz, expropriated land of the United Fruit Company and relations with the U.S. became strained.

Political instability of the late 1950's, '60s, as well as early 1970's made life difficult in Guatemala. After the election of President Kjell Lagerud Garcia, violence stopped for awhile, and then resumed. A long-standing dispute with the United Kingdom, over Belize, played a central role in Guatemalan affairs for many years.

Guatemala grows large crops of coffee, sugar, bananas, and cotton. There are extensive deposits of zinc, lead, tungsten, cadmium, antimony, silver and other materials, much of which is for export. There are industries for shoe manufacture and textiles. Some oil and gas production exists. Fishing and production of chicle also play parts in the economy.

Telecommunications Overview:[4]

International Prefixes: TDA-TDZ, TGA-TGZ
Number of Radio Broadcast Stations: 92
" " " Receivers: 280,000
" " " " per hundred: 4.22
" " Television Stations: 4
" " " Receivers: 150,000
" " " " per hundred: 2.26
" " Telephones: 53,000
" " " per hundred: .8
Electrical Generation Capacity: 315,000 kW
" Service: 60 hZ, 110/220 volts
Satellite Earth Stations: INTELSAT station near Guatemala City
International Communications: Via terrestrial links, INTELSAT, HF radio, and planned submarine cables
Ownership of Communications Media: Government and private-commercial
Television Standard: System M, NTSC color
International Telephone Code: 502
Telecommunications Administration: Ministerio de Comunicaciones y Obras Publicas (Ciudad de Guatemala)

Domestic Broadcasting:[5]

(Medium and Short Waves)

City	Number of Transmitters	(kW) Combined Power
Guatemala City	35	318
Quetzaltenango	8	24.5
Villa Victoria	3	21
Cotepeque	1	10
Huehuetenango	4	6.75
Coban	4	6
Santa Cruz	2	6
Zacapa	4	4
Puerto Barrios	4	3.1
Chiquimula	3	3
Mazatenango	4	3
Escuintla	4	2.3
San Marcos	3	1.85

(FM)

There are several low powered FM transmitters in Guatemala City and other towns, most of which repeat programs from stations' primary frequencies.

(Television)

City	Channels	(kW/ERP) Combined Power
Guatemala City	3,7,11,13	333

Note: There are nine repeaters associated with the above channels.

Trends in Broadcasting:

Guatemala is generally divided into three population groups; those of European, Indian, and Mixed. The majority are either pure Indian, or "mestizo," with only a small minority of whites. In terms of radio audiences, most Guatemalans are in the "Ladino," or westernized

category; e.g., those who are Spanish speaking. Radio is, without a doubt, the most important means of communication in Guatemala, as it is able to transcend the many obstacles of geography and location. Programming has been conducted not only in Spanish, but also in the Indian languages of Maya-Quiche.

Most radio broadcasting stations are privately owned, although the national government and some cultural-religious organizations also have facilities. At the time of writing, a single radio network existed, "Fabucadena de Emissoras Unidas," lead by Radio Fabulosa.[6] Six cities were connected in this system, reaching a good portion of the national territory.[7] As is the case in many Latin American nations, Guatemalan broadcasters frequently take advantage of multiple channels on the medium and short waves. As of late, interest in FM has also been prevalent.

Of all types of broadcast stations, the majority of programming is musical; interspersed with other entries. Personal monitoring has revealed that newscasts tend to be infrequent and of short duration. Some stations have specialized in newspaper-style reporting, called "radioperiodicos," which have been found to be very informative and useful.

Besides personally-owned radio receivers, radio sets are not infrequently located in town squares and other central areas.[8] This is also true in terms of plantations and other agribusiness centers, where receivers are often located for the convenience of worker-listeners, serving to entertain and inform all concerned.[9]

Radio stations are licensed by the national government, and may be cancelled on appropriate action. Under former administrations, the issuance of temporary licenses served to intimidate broadcasters.[10] Government radio stations are important, having started their work back in the 1930's.[11] La Voz de Guatemala transmits with 100 kW on medium wave, and is received in all parts of the country, as well as points distant.[12] The author has tuned in this official voice here in the United States. Two 10 kW short-wave units also convey government programs.

There have been problems with clandestine broadcasters from time to time, and former administrations have taken steps to squelch them.[13] One president ordered all amateur radio transmitters off the air, but later found that the majority of underground signals originated from locations other than licensed hams.[14]

Television does not play nearly as important a role in Guatemalan mass communications as does radio. This is due to the fact that the cost of TV receivers is simply out of most people's purchasing range.[15] Four television stations exist, all located in the capital.[16] Coverage extends throughout the central part of Guatemala. Reception of programs is also possible in parts of neighboring El Salvador, Honduras and Mexico.[17] All but one television organization is operated on a commercial basis.[18] The government-owned station broadcasts cultural and educational materials. Relays of Mexican television can be accomplished "off-air" via facilities in Quetzaltenango, as well as by the Central American Microwave Net.[19] Many imported programs are telecast, and equipment is generally of United States origin.[20]

While Guatemala has no official international radio service, the short-wave frequencies of some stations tend to propagate over great distances; notably the 10 kW channels of LaVoz de Guatemala and the 10 and 5 kW frequencies of Radio Cultural, which carry multi-lingual programs.[21] Adventist World Radio has constructed an international station in Guatemala.[22] This facility initially has a 20 kW shortwave transmitter, but an increase to 100 kW is planned. Less powerful domestic outlets are also in use.[23]

Common Carrier Services:

Telephone and telegraph connections in Guatemala are operated by the government administration - GUATEL.[24] Nationwide circuits are based on terrestrial lines, radiotelephone and microwave relay.[25] Approximately 60,000 telephones are in service, with nearly 40,000 of these being in and around the capital city.[26] Automatic exchanges are found in Guatemala City, Quetzaltenango, Mazatenango, Escuintla, Zacapa, Antigua, Amatitlan and in a growing number of other towns.[27] All principal cities are inter-linked by trunk lines, and STD is now possible following this code scheme.[28]

Amatitlan:	33
Antigua:	32
Guatemala City:	2
Quetzaltenango:	61
Villa Nueva:	31

Recently a large quantity of crossbar switching equipment (NEC-Japan) was installed, modernizing in a short time the Guatemalan telephone system.[29] Most of this new apparatus is situated in the capital, providing some 43,000 lines.[30]

Main national circuits follow the Central American microwave route, from Quetzaltenango on the border with Mexico, to Guatemala City and hence, to El Salvador.[31] Lines also extend from the capital to Flores, and on to Belize; as well as to Puerto Barrios on the Caribbean littoral.[32]

Membership in the Central American Microwave Network permits Guatemala to have direct access to most countries of the region. Links utilized are television capable. Telegraph and telex services are also available between major points in the republic; and the United Fruit Company maintains its own lines.[33]

In 1977, an INTELSAT earth station was installed near Guatemala City, and has further integrated the country into the "world village."[34] Consideration has been given to the installation of a high-capacity (480 channel) submarine cable linking Guatemala with Florida (U.S.A.)[35] This, in addition to cables already reaching the area, would extend the flow of communications and further upgrade routing possibilities at a relatively moderate cost.

Electrical power in Guatemala is provided by a mixed governmental-private scheme, by which many parts of the country are served. While it is true that not all people yet have access to electricity, residential subscribers account for 45 percent of total power usage.[36] Over eighty percent of all electricity produced is consumed in the central region of the country, incorporating the capital and surroundings.[37] The

government has hoped to extend electrical services, and such efforts are being coordinated by INDE - Instituto Nacional de Electrificacion.[38] INDE generates large amounts of electrical energy and then makes it available to local utilities, for distribution; notably, the Empresa Electrica de Guatemala, S.A.[39] Most power is produced by hydro installations.[40] Thermal plants turn out less - being steam and gas turbines, as well as diesel generators. The largest single installation in the country is the Chixoy River facility, with 230 MW capacity.[41] In the past few years, consideration has been given to construction of a large hydro project at Lago Atitlan; from which it is estimated that 500 MW could be produced.[42]

Overall Analysis:

Radio broadcast services link the Guatemalan nation together and provide immensely valuable social functions. Coverage is primarily complete and is being expanded. Television has impact only in the metropolitan region and large cities, although its signals are received at distances. Also, the high cost of television receivers makes them inaccesible to most Guatemalans. Likewise, common carrier services are inadequate for domestic use, although interconnections between locales are suitable for governmental and low-capacity requirements. International circuits are adequate for most needs, especially with the addition of the INTELSAT station and microwave links to neighboring states. Without a doubt, electronic media will play an important role in the integration and modernization of Guatemala.

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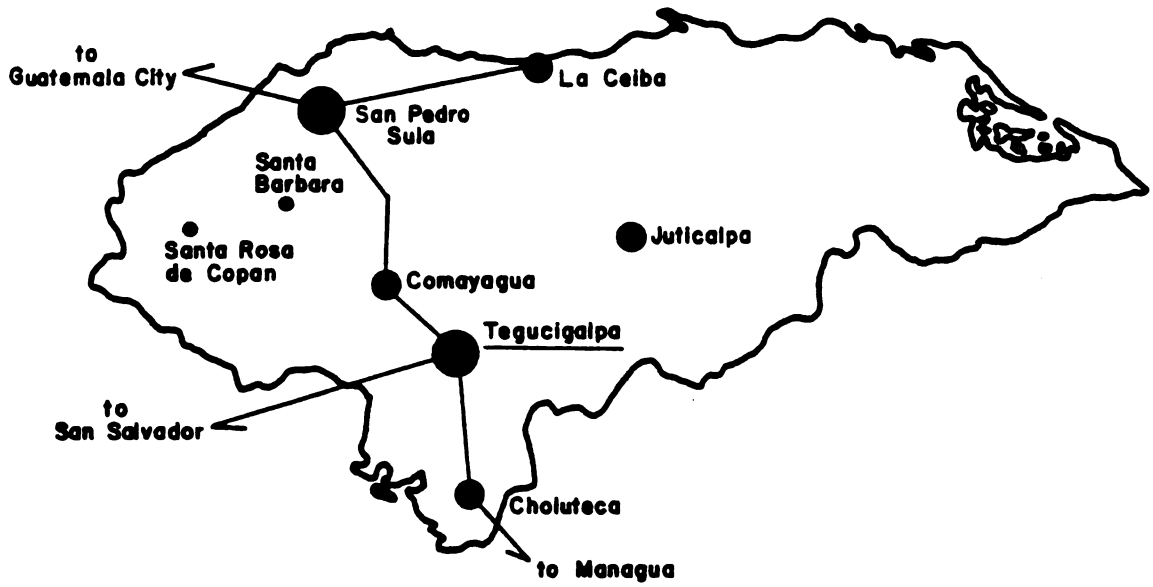
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FIGURE 15

Communication Networks in HONDURAS



36-37 Radio and 2 TV

5-7 Radio

3 Radio

Main Route

HONDURAS

(Republica de Honduras)

Basic Information:[1]

Area: 112,088 kM^2
Population: 2.9 million (1977)
Population Density: 25.87 per kM^2
Capital: Tegucigalpa
Major Cities: Tegucigalpa, San Pedro Sula
Languages: Spanish, Indian dialects
Religions: Roman Catholic
Gross National Product: US$ 1.2 billion (1976)
Per Capita Income: US$ 413.79
Literacy: 57.4%

Geographical Summary:[2]

Situated in Central America, Honduras borders on both the Caribbean and the Pacific, as well as the republics of Nicaragua and Guatemala. The country is principally mountainous, with many fertile valleys. Plains are found along the coastal regions. Only 28 percent of the population lives in urban areas; the rest being distributed across the landscape.

Basic National Review:[3]

The former center of Mayan civilization, Honduras came under Spanish rule in 1502. After its proclamation of independence in 1821, Honduras was annexed by Mexico, along with other Central American states. This lasted until 1825 when Honduras broke away from Mexican influence and joined the Central American Federation; becoming a fully independent republic in 1838. Internal disputes marked much of the late 19th and early 20th centuries.

From 1933 until 1949, the country was governed by a dictatorship. During the 1950's and '60s, various political changes and instabilities made life difficult. In 1969 tensions between Honduras and El Salvador resulted in a Salvadorean invasion and brief war. Peace and a demilitarized zone along the common border followed. The first direct presidential election since 1932 was held in 1971, but the successful candidate was thrown out of office by military action. In 1974 severe damages were inflicted on industrial and agricultural installations by a hurricane, hurting the Honduran economy. A change of leaders again occurred in 1975, and in the same year, the country joined the Central American Common Market.

Honduras depends heavily upon agricultural production, with bananas, coffee, corn, beans, cotton, sugar and tobacco being important crops. Fishing is also important, and the main national industries are agriculturally-oriented. The United Brands (United Fruit) Company has played a notable role in the country's economy.

Telecommunications Overview:[4]

International Prefixes: HQA-HRZ
Number of Radio Broadcast Stations: 86
" " " Receivers: 300,000
" " " " per hundred: 10.34
" " Television Stations: 1
" " " Receivers: 50,000
" " " " per hundred: 1.72
" " Telephones: 19,500
" " " per hundred: .672
Electrical Generation Capacity: 175,000 kW
" Service: 60 hZ, 110/120, 220/240 volts
Satellite Earth Stations: None
International Communications: Via Central American Microwave Network, and other terrestrial circuits to neighboring states. Also via HF radiotelephone to points abroad, as well as trunked connections
Ownership of Communications Media: Mixed governmental/private-commercial
Television Standard: System M, monochromatic
International Telephone Code: 504
Telecommunications Administration: Direccion General de Telecomunicaciones (Tegucigalpa)

Domestic Broadcasting:[5]

(Medium and Short Waves)

City	Number of Transmitters	(kW) Combined Power
Tegucigalpa	36	117.5
San Pedro Sula	37	115
Santa Barbara	3	13
El Progreso	3	12
Puerto Cortes	5	11
La Ceiba	7	7.5
Choluteca	5	7
Santa Rosa de Copan	3	7
Comayagua	7	6.25
Juticalpa	5	4.5
Danli	2	4
Siguatepeque	3	2.5

(FM)

FM transmitters are in service in all main cities, primarily relaying from MW.

(Television)

There is one television station, broadcasting from Tegucigalpa, which utilizes the following relay arrangements:

City	Channels	(kW/ERP) Combined Power
Tegucigalpa	3,5	154
El Socorro	9	20
San Pedro Sula	7,13	17

Also, two low-powered repeaters are utilized.

Trends in Broadcasting:

Radio in Honduras plays a very important role in society, as it is the most efficient means of linking the country together. Most stations

are operated by private interests and program commercially. Religious and cultural organizations also have broadcast stations. At this time, the government does not engage in broadcasting, although it does control the common-carrier facilities as well as overseeing licensing.

The Constitution of 1965 guarantees freedom of expression.[6] This basic law forbids the closure of any media establishment and holds that an author is responsible for offensive statements, not necessarily the medium by which they were transmitted.[7] Consequently, the actual originator is legally liable for whatever judicial actions may be forthcoming, should grounds for slander or libel be determined. Honduran law also states that broadcast facilities must be under the control of nationals, and that only Hondurans may produce news and editorials.[8] This last section has special significance in relation to nervousness about El Salvadorean influence.

Group ownership of radio stations is common with several outlets in a given city being under the control of one or more entities. Powers utilized are normally moderate, in effect making radio a local and regional service. At last note, the most powerful radio transmitter had only 25 kW.[9] Likewise, some stations have frequencies in both medium and short-waves, as well as FM. Here, too, little power is used - with the strongest Honduran SW unit being 5 kW.[10] FM transmitters are widespread, but normally have limited range. Major broadcast stations include:[11]

Radio America, San Pedro Sula	(10 kW)
Radio Exitos, Tegucigalpa	(10 kW)
La Voz de Honduras, Tegucigalpa	(10 kW)
Radio Morazan, Tegucigalpa	(10 kW)
Radio San Pedro, San Pedro Sula	(10 kW)
Radio Catolica, Tegucigalpa	(10 kW)
Radio Swan de Honduras, San Pedro Sula	(25 kW)
La Voz de Centroamerica, San Pedro Sula	(10 kW)
Radio Monumental, Tegucigalpa	(10 kW)

Honduran stations frequently carry programs produced by overseas sources; mainly the United States.[12] Inexpensive or gratis materials supplement regular features. It is also possible to tune in broadcasts from many countries, on both medium and short-waves. Available information has indicated that the transmissions of Cuban stations are heard particularly clearly.[13]

One television network, Compania Televisora Hondurena, S.A., programs to the populated sections of the republic, using VHF.[14] System M is the official standard and no color is used at present, although plans indicate the adoption of NTSC technology. Many pre-recorded programs are used; some imported from Mexico and the U.S.A. There are some television receivers placed in public areas, although independent viewing is the rule.[15]

Common Carrier Services:

Telecommunications in Honduras are the responsibility of the Direccion General de Telecomunicaciones.[16] Main trunk lines connect Tegucigalpa with San Pedro Sula and thence to La Ceiba.[17] These three cities have relatively large automatic telephone exchanges, including new semi-electronic systems of Japanese (NEC) manufacture.[18] Old step-by-step equipment is being replaced in the major cities and may be transferred to smaller towns.[19] Some 40 cities have small, manually-operated central offices.[20] Telephone users have frequently complained of poor connections, noise and low voice levels.[21]

A new microwave network, working in the 6 gHz band and providing 960 channels for telephone and TV, has definitely augmented communications possibilities.[22] This system is a coeval of the Central American Microwave Network in which Honduras is a participant.[23] Telex connections run between major cities, and most places in the country can be reached by the telegraph system (Morse), which is very old.[24] Internal radiotelephone is used frequently, especially in remote areas.[25] Communications to the Department of Gracias a Dios and offshore islands are very limited and difficult to establish.[26]

International circuits are routed via the Central American Microwave network, to El Salvador and Nicaragua.[27] All America Cables and Radio, and Tropical Radio Telegraph (TRT) serve as overseas correspondents for Honduran communications.[28] There has been interest expressed in the installation of a satellite terminal.[29]

Empresa Nacional de Energia Electrica oversees power production.[30] The generating capacity is mostly hydro, with the remainder coming from diesel plants.[31] The Rio Lindo dam is the largest facility, turning out 70 MW.[32] Many power plants are interconnected, with a total capacity being divided between industrial and consumer users at 48 and 22 percent respectively.[33] Public lighting and other uses account for the remainder of use. According to available information, electrical rates are rather prohibitive and service has been frequently interrupted.[34] Also, the line voltages have a tendency to vary, damaging home appliances.[35]

Throughout the nation, there are roughly 100 generators; not all of which are serving the public supply.[36] Electricity is distributed at 110/120 - 220/240 volts; 60 hZ, both poly- and single phase. Consumer power is supplied in the capital and Comayagua at 220 volts; 110/120 volts elsewhere.[37]

Overall Analysis:

Honduran communications and electrical services are undergoing rapid change. At this time, however, they are still rather inadequate for full-scale purposes, although basic telecoms services satisfy demands. The radio represents a definite factor of national integration and should not be overlooked as a modernizing force. International communications would be improved by the addition of a satellite station.

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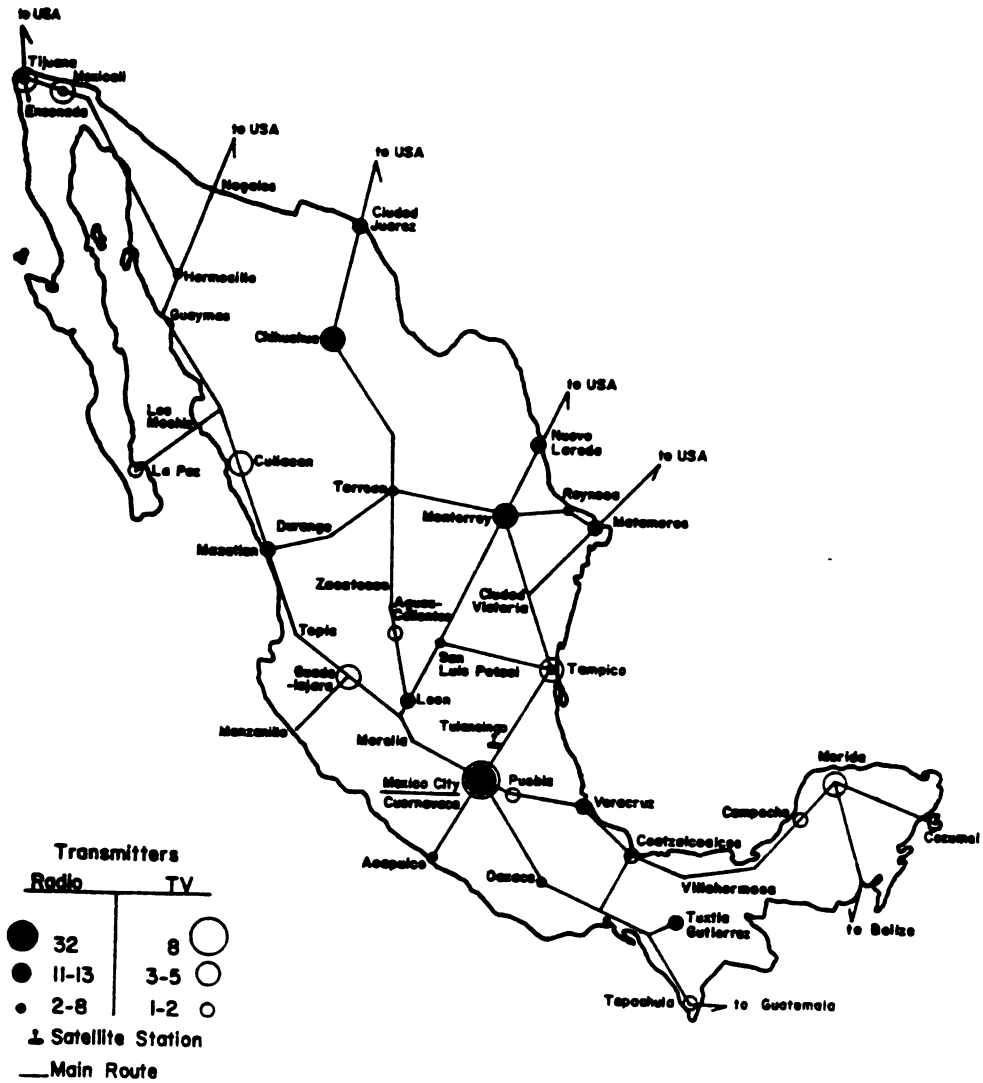
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FIGURE 16

Communication Networks
in
MEXICO



MEXICO

(Estados Unidos Mexicanos)

Basic Information:[1]

Area: 1,972,547 kM^2
Population: 66.95 million (1976)
" Density: 33.94 per kM^2
Capital: Mexico City
Major Cities: Mexico City, Guadalajara, Monterrey, Ciudad Juarez
Languages: Spanish, also Indian tongues (Mayan, Otomi, Mixteca)
Religion: Predominantly Roman Catholic
Gross National Product: US$ 67.6 billion (1976)
Per Capita Income: US$ 1,010
Literacy: 82 percent

Geographical Summary:[2]

A "bridge" between North and Central America, Mexico shares borders with the United States, Belize and Guatemala. Shorelines on the Gulf of Mexico and Pacific Oceans provide valuable maritime access. Most of the country is a high plateau, turning into lowlands in the north. On the east and west coasts, mountain ranges (Sierra Madre) predominate. In certain northern parts, the terrain is desert. Highest elevations are in the Mexico City region, where 2500 metres prevail. Approximately 45 percent of the national territory is arid, although tropics exist along the coast and in the south. Some 53 percent of the population lives in urban areas, especially in the crowded Federal District.

Basic National Review:[3]

Indigenous civilizations existed for many centuries in what is now Mexico. At the time of Spanish conquest in 1519, Indians were subjugated as laborers. In the years that followed, Mexican-born Europeans evolved into an

identifiable group, the creoles. A certain nationalism developed, leading to an unsuccessful revolt in 1810, inspired by Father Miguel de Hidalgo y Costilla, a creole priest.

Mexico became a sovereign nation in 1821, but anarchy and political struggle followed. The proclamation of Texas independence and later annexation by the U.S. resulted in a war between Mexico and its northern neighbor in the period 1846-8. Mexico's defeat resulted in a loss of large territories to the United States, by terms of the Treaty of Guadelupe-Hidalgo.

An Indian lawyer, Don Benito Juarez, became Minister of Justice and later, president. He started a campaign to liberalize the constitution, and transfer power to the mestizo; mixed Indian-European peoples. Juarez also nationalized lands held by the powerful Roman Catholic Church and insisted on separation of Church and State. The War of Reformation, 1858-61, ended with a liberal victory, giving yet more support for Benito Juarez.

Raids on U.S. border towns by certain political factions during the Mexican Civil War resulted in a punitive campaign under the command of General Pershing. A liberal constitution was prepared in 1917, which nationalized much mineral wealth and established land rights for Indians.

Efforts at economic and social development have taken priority in the past few years. Mexican agriculture is very important to the country, with crops being widespread. Stock raising is also of note. Mineral wealth has become more and more valuable, as new deposits are discovered. Petroleum and gas production have attracted much attention.

Telecommunications Overview:[4]

International Prefixes: XAA-XIZ, 4AA-4CZ, 6DA-6JZ
Number of Radio Broadcast Stations: 361
" " " Receivers: 18 million
" " " " per hundred: 26.89
" " Television Stations: 83
" " " Receivers: 5.6 million
" " " " per hundred: 8.36
" " Telephones: 3.31 million
" " " per hundred: 4.94
Electrical Generation Capacity: 13,500,000 kW
" Service: 60 hZ, 110/220 volts
Satellite Earth Stations: INTELSAT facility at Tulancingo, working with the Atlantic Ocean satellites
International Communications: Via INTELSAT, terrestrial connections to neighboring states and HF radio
Ownership of Communications Media: Mixed private and government
Television Standard: System M, NTSC color
International Telephone Code: 52
Telecommunications Administration: Direccion General de Telecomunicaciones (Mexico City)

Domestic Broadcasting:[5]

(Medium Waves)

City	Number of Transmitters	(kW) Combined Power
Mexico City	32	710
Ciudad Acuna	3	252
Monterrey	13	240
Ciudad Juarez	7	169
San Luis Potosi	4	161
Tijuana	6	73
Tampico	6	64
Hermosillo	6	59.5
Veracruz	6	59
Rosarito	1	50
Chihuahua	11	36
Jalapa	6	24
Leon	7	24
Culiacan	7	19
Mexicali	6	19
Tuxtla Gutierrez	5	18
Villahermosa	6	18
Torreon	8	16
Ciudad Obregon	6	14
Iraputo	5	14
Nuevo Laredo	5	13
Oaxaca	4	12
Acapulco	3	11
Mazatlan	5	11
Cosamaloapan	2	10
Orizaba	1	10

(Short Waves)

City	Number of Transmitters	(kW) Combined Power
Mexico City	16	282.75
Hermosillo	2	1.15
Ciudad Mante	1	1
Huayacocotla	1	.5
Merida	1	.25
Veracruz	1	.25

(FM)

Most cities have stations with an FM transmitter. In some cases, this facility is used both as a STL link and a channel for general broadcast reception.

(Television)

City	Channels	Networks	(kW/ERP) Combined Power
Mexico City	2,4,5,7,8,9,11,13	2,4,5,8	1621
Las Lajas	5,8,10	2,4,5	771
Monterrey	3,6,8,10,12	2,5	596
Tijuana	6,12,45	--	331.5
Merida	3,9,13	2	269
Aguascalientes	8.13	2,5	253.8
Mexicali	3,5,14	2	213.5
Cerro del Zamorano	3,5,6	2,5	200
Guadalajara	2,4,6,9	2,5	199
Matamoros	2,7	2	180
Leon	10	2	150
Tampico	4,7,9	2,5	140
Cd. Obregon	2,4	2	118
Cd. Juarez	2,5	2	77.3
Nuevo Laredo	2,11	2	63.5
Chihuahua	2,4,5	2,13	63
Queretaro	9	8	47.5
Culiacan	3,7,13	2,5	42.5
Mazatlan	7,12	2,5	38.4
Puebla	3	8	30
Torreon	2,4,11	2,5	29.9
Saltillo	5,7	2,5	24.6
Tapachula	7	2	24.5
Veracruz	2	8	14.2
Campeche	12	2	13.7
Hidalgo del Parral	3,12	5	13.5
Coatzalcoalcos	3	2	12.2
Cd. Jimenez	8	2	12
Tuxtla Gutierrez	8	2	8.15
La Paz	10	--	7
Villahermosa	13	2	7

Networks

Cadena Canal 2:	XEW-TV, Mexico City, TELEVISA
Cadena Canal 4:	XHTV, Mexico City, TELEVISA
Cadena Canal 5:	XHGC-TV, Mexico City, TELEVISA
Cadena Canal 8:	XHTM-TV, Mexico City, TELEVISA
TCM:	Television Cultural de Mexico, Mexico City (limited network)

Domestic Broadcasting:

Social communications in Mexico operate on an interesting mixture of private-commercial and government ownership, with the vast majority of facilities falling under the former category. As such is the case, the country is amply covered by a variety of broadcast signals. The underlying regulations for electronic media are based on the 1960 "Derecho de Radio y Television," which underscores a few important issues.[6] Firstly, the electromagnetic spectrum is in the public domain with stations, consequently, having to operate in the public interest.[7] Secondly, the state is charged with seeing that broadcasters do perform with the national interest in mind.[8] Specifically, stations are required to:[9]

1) Underscore and enhance respect for morality, human dignity and family.
2) Avoid programming which may be contrary to the development of children.
3) Work for an improvement in the cultural level of the Mexican nation.
4) Contribute to national integration by aiding the process of democracy.

Article 67 of the basic legislation suggests a "prudent balance" between programs broadcast and commercial airtime.[10]

Broadcasting is regulated by the Direccion General de Telecomunicaciones, as well as by the Direccion General de Concesiones y Permisos; acting for the Departamento de Comunicaciones y Transportes and the Secretaria de Gobernacion, respectively.[11] The first organization is primarily concerned

with technical matters, while the second concentrates on social and functional, as well as administrative affairs.[12] Licenses may be issued for as long as 30 years, although revocation is possible.[13] Recently the Mexican state has made it known that it will have the option of purchasing stations at the end of the present 20 year license period.

Broadcast licenses are termed "concessions" and serve as a form of contract between the "concesionario" and government to provide service to the public. There is no censorship in Mexico, although the transmission of injurious or inflammatory material may result in an injunction or other legal action. Also the government, by law, has priority over air time and may request it for important national matters. The Secretaries of Health and Public Welfare, as well as Education, also have input, principally in terms of advertising and the provision of educational materials, as stipulated in license agreements.[14]

Each week the "Hora Nacional," a government newscast, is carried by all stations.[15] The purpose of this is to promote national integration and education.

Radio broadcast stations operate on medium waves, as a rule, although many have FM transmitters as well. Some of the larger facilities maintain shortwave channels, intended for nationwide coverage or penetration of remote and sparsely-populated regions. Mexico is a signatory to the NARBA-North American Regional Broadcasting Agreement, which provides primary, secondary and tertiary frequency allocations; shared with other countries of the area. Care is taken to avoid conflicts in station assignments. The

plan of allocation within Mexico reflects a local, regional and major grouping; with some of the larger broadcasters being permitted substantial transmission powers. Major radio facilities are as follows:[16]

City	Station	(kHz) Frequency	(kW) Power
San Luis Potosi	XEWA-La Voz de la America Latina	540	150
Tijuana	XETRA	690	50
Mexico City	XEX-La Voz de Mexico	730	100
Cd. Juarez	XEROK-R. Ochenta/ X-Rok-80	800	150
Tampico	XEFW-La Voz y Imagen de Tampico	810	50
Mexico City	XEW-La Voz de la America Latina	900	250
Veracruz	XEWB-La Voz de la America Latina	900	50
Mexico City	XEQ-La "Q" de Mexico	940	50
Monterrey	XET-La "T" de Monterrey	990	50
Monterrey	XEG-Radio Melodia	1050	150
Rosarito	XEPRS-Big Country Express	1090	50
Mexico City	XERED-Radio Red, RCN	1110	50
Guadalajara	XEWK-La Voz de la America Latina	1190	50
Mexico City	XEB-Radio Cuatro	1220	50
Cd. Acuna	XERF	1570	250
Hermosillo	XEDM-La Grande de Sonora	1580	50

Most of the remaining broadcast stations operate with moderate or low power. The short-wave scene is dominated by two stations; XERMX- the federal government's international voice, and various HF outlets of La Voz de la America Latina.[17] XERMX, Radio Mexico, began international operations in 1969, using transmitters of 20, 50 and 100 kW.[18] Programs were originally conducted in Spanish, French and English; although operations have been

substantially curtailed. With omnidirectional antennae for nearby areas and three large log-periodics of 10 dB gain each, Radio Mexico can be heard in many parts of the world.[19] Frequency choices have tended to be poorly advised, occasioning unwanted interference.[20] XERMX is directly operated by the Secretaria de Comunicaciones y Transporte.[21] Radio Mexico has close relations with NOTIMEX, the government's news agency, and has frequently carried materials from this source.

Television is widespread and operates on the basis of nationwide networks, as well as locally produced programs. Stations are divided into the following carriage patterns:[22]

Networks and Affiliations	Percentage of Total Stations
Cadena 2	41%
TCM	19
Local	18
Cadena 5	14
Cadena 8	4
Cadena 4	3
Cadena 13	1

In terms of channel utilization, 45 percent of television transmitters work on low VHF (2-6); 52 percent make use of high VHF channels (7-13); and three percent are on UHF. Some 82 percent of all TV transmitters relay, in one form or another, networks from Mexico City.[23] Seventy-one percent are strictly relay stations, without local origination.[24] This vast network is interconnected by a comprehensive microwave system.

When one speaks of Mexican social communications, it is essential to remember TELEVISA, S.A., a media giant in anyone's terms. Headquartered in the capital city, TELEVISA owns and operates the Channel 2,4,5, and 8 networks, as

well as the relays; and radio stations XEW, XEX, XEQ, XEW-FM and XEX-FM, including associated repeaters.[25] Publishing and cine divisions are also operated. Interestingly enough, TELEVISA was formed by a merger of existing Mexico City broadcasters, when it was discovered that the market was so saturated and overworked that no single entity could hope to finance television on its own.[26]

This giant organization has headquarters in Mexico City and counts on 12 TV studios, 51 color cameras, 80 video-tape machines, and a nationwide microwave system capable of handling up to eight TV channels.[27] Very modern and efficient equipment is utilized. The four networks operate in a manner so as to provide distinct, but coordinated programming sources.[28] In compliance with regulations, 12.5 percent of each channel's airtime is given for the use of the government.[29]

According to available information, Cadena 2 has a potential audience of 5.4 million homes; more than 28 million viewers.[30] Programming is traditionally family-oriented.[31] Channel 4 is directed to the Federal District, and may be watched by 2.077 million TV homes; 12 million viewers.[32] Programming is entertainment and culturally oriented.[33] Channel 5 serves the southern regions and the Yucatan; capable of addressing 4.21 million homes, or 22 million viewers.[34] Cultural, youth and entertainment programming predominates.[35] Channel 8 is watched in the "Valle de Mexico," in and around the Federal District, as well as points north.[36] It may be viewed by some 2.3 million TV homes; 12 million individuals.[37] Entertainment and films are most often shown.[38]

Broken down into categories, TELEVISA networks program as follows:[39]

Categories of Programs	Monthly Transmission Hours			
	2	4	5	8
Culture	8	38:35	12	18:30
News/Information	112:55	1:40	57	3
Education	25	40	65:30	38
Social Action (Feedback)	13:30	119	2	2
Sports	17	20	16:15	21:30
Children's Programs	23	-	80	50:30
Drama	86	-	-	-
Musicals	39	-	2	-
Contests/Competitions	5	5	-	-
Comedy	18	-	-	-
Films (varied)	-	-	96:30	85:30
Movies	56:30	124:30	123	179
School Programs	-	-	30	-

TELEVISA news crews are found throughout Mexico and around the world; with approximately 150 journalists.[40] Cooperation exists between the company and international agencies, such as UPI, AP, EFE (Spain), AFP (France), and REUTERS.[41] A modern data processing system is used by the news department; retaining principal events in world and national news, consequently providing a good selection of background facts for TELEVISA compilers.

The TELEVISA organization also produces a wide variety of programs in several areas. Many productions are exported to Spanish-speaking media outlets around the world; especially the United States, where 24,000 hours annually are sent via the PROTELE and UNIVISION departments.[42] Programs originating at TELEVISA center, in Mexico City, are sent via microwave link to Houston, Texas, where the material is retransmitted via domestic

satellite to diverse points in the U.S.A. and Puerto Rico. The principal user of this television programming is U.S. based Spanish International Network (S.I.N.), which has close ties to TELEVISA, Mexico.

Cable television is also provided to residents of the Federal District, by a TELEVISA subsidary.[43] TV shows are picked up from the United States, and sent by microwave to the capital.[44] Additional services, such as a 24-hour news/weather channel, market prices, and transportation schedules are provided.

TELEVISA has produced a series of educational, historical and culturally edifying films and programs, in cooperation with Mexican education authorities.[45] Some of these programs have won international recognition for quality.[46]

The Secretaria de Educacion Publica also sends out didactic materials via television; in cooperation with the Instituto Politecnico Nacional.[47] Operating independently, but in association, are "Television Cultural de Mexico," a network which works with a relay system of 22 low-powered transmitters; and XEIPN-TV, channel 11 of Mexico City.[48] The latter is directly under auspices of the Instituto Politecnico Nacional. Cooperation from TELEVISA is also valuable, in that programs produced by the education system are often sent over the more comprehensive 2/4/5/8 networks.[49]

In parts of the country, cable television is important. We have already mentioned the TELEVISA system in the capital. Altogether, there were an estimated 162,585 cable subscribers in Mexico, working with 78 systems in 1980.[50]

Common Carrier Serivces:

Under the auspices of the Secretaria de Comunicaciones y Transportes, telecom services are operated by TELMEX, Telefonos de Mexico, a parastatal corporation.[51] There is close cooperation between these two organizations. At last count, there were some 3.3 million telephones in the republic having slightly more than 1 million subsets in Mexico City.[52]

Until comparatively recently, many parts of Mexico were without adequate telecommunications facilities. In fact, in the early 1970's, there were quite a few towns which still did not have regular telephone service, although the same places may have had direct lines to the state or federal capital.[53] Beginning in the mid-1960's, Telefonos de Mexico undertook a program of modernization and expansion, especially in terms of long distance services. TELMEX adopted the acronym of LADA (larga distancia automatica) for its trunk facilities.[54] At first, most long distance traffic was semi-automatic, requiring advance booking of calls. Totally automatic LADA was implemented in the Federal District and then gradually expanded outwards.[55]

A final scheme was drawn up, by which some seven billion Mexican Pesos (1967) were to be expended on telecommunications reconstruction.[56] The system was planned with the future in mind and used Mexican-made equipment wherever possible. Nearly one million telephone subsets were made available for connection, with approximately 220,000 set aside for places where service did not yet exist.[57] At the same time, many manual exchanges were replaced by appropriate automatic systems. The expansion affected

some 1,100 towns and small cities in the country, as well as larger population centers.[58] Modernization of existing exchanges and transmission facilities came about with priorites established on a case-by-case basis.[59] Step-by-step, motor-selector, rotary, crossbar and processor-controlled switching are all found in the Mexican telephone system, reflecting a wide variety of supply sources as well as "eras" of modernization.

TELMEX realized that the existing open-wire and cable transmission plant was insufficient for growth, and consequently opted for a comprehensive, national microwave system, linking almost every sector of the republic. Hertzian technology was deployed as follows:[60]

Eastern Route: Two paths linking the capital, Mexico City, and the port of Veracruz, via Puebla, Orizaba and Cordoba. One of the links is capable of carrying television signals in addition to multiplex telephony.

South-Eastern Route: Mexico City is linked with Oaxaca, Cd. Ixtepec, Tonala, Tapachula, Tuxtla Gutierrez, and Cd. Las Casas; as well as a spur from Cordoba to Coatzalcoalcos, Villahermosa, Escarcega, Campeche, Merida and Chetumal.

Southern Route: This line connects Mexico City with Chilpancingo and Acapulco, extending to Cuernavaca and Cuautla. Television and all signals may pass over these facilities excepting the section to Cuernavaca and Cuautla, which is for telecoms traffic only.

Western Route: Mexico City is connected with Guadalajara and on to Toluca, Morelia, Uruapan, Celaya and Leon.

North-Western Route: This path links with the Western Route at Guadalajara, providing service to the cities of Ensenada, Tijuana, Mexicali, Hermosillo, Ciudad Obregon, Culiacan, Mazatlan and Tepic. Spurs also run to Guaymas and Nogales, as well as to the cities of Ciudad Guzman and Colima. At Mazatlan, there is a connection with the Northern route.

Central Route: Ciudad Juarez, Chihuahua, Torreon, Zacatecas, Aguascalientes, Salamanca and Leon are linked with the Western Route. This path is good for all forms of communication.

Northern Route: This connects together the cities of Nuevo Laredo, Monterrey, San Luis Potosi, and Salamanca with the Western Route. A spur extends between Celaya, Iraputo, San Luis Potosi and Ciudad Valles, going on to Tampico.

North-Eastern Route: Mexico City is connected with Poza Rica, Tampico, Ciudad Victoria, Monterrey and Matamoros; along with a coastal path. Television may be included on this link, along with other forms of communications.

Trans-Isthmus Route: This circuit connects Ciudad Ixtepec with Coatzalcoalcos, enabling an extension of communications.

Northern Cross-Route: The North-Western, Central, Northern and North-Eastern Routes all meet in the form of this section; incorporating the cities of Mazatlan, Durango, Torreon, Monterrey, Reynosa and Matamoros. An additional circuit runs between Saltillo and Monterrey. Television, as well as other signals may be sent.

With these major systems, the Mexican nation is effectively connected together; providing not only a large number or circuits, but also great technical flexibility in the area of routing and transmission. The "typical" microwave system is based on 960 telephone circuits and television per RF carrier, although higher capacity paths do exist, especially with PCM digital equipment.[61] An interesting aspect is that at several locations, microwave paths are used to "hop" the Gulf of California, providing links to Baja.[62] Much of the microwave equipment works in the 6 gHz band and was manufactured by GTE-Lenkurt, ITT or other firms.[63]

Appropriate carrier multiplexing systems are employed, in order to gain the required number of channels. Telephone traffic is trunked via regional centers, mostly along the above-mentioned routes. Mexico is part of the North-American telephone system and presently makes use of two Area

Codes; 905 for the Federal District and surrounding areas, and 903 for Northwest Mexico, in areas along the western border region. Direct dialling is possible, especially between larger cities although calls tend to be expensive. Automatic access is provided to the United States and Canada, on microwave circuits via Matamoros, Nuevo Laredo, Ciudad Juarez, Nogales and Tijuana.[64] Southern paths extend from Oaxaca to Tapachula, to Quetzaltenango, Guatemala; subsequently going onward to connect with other Central American systems.[65] A line from Merida connects with the Belize telephone system.[66]

Mexican Telephone Zone Codes:[67]

(Major Cities)

City	Code
Acapulco	748
Mexico City	5
Guadalajara	36
Leon	471
Monterrey	83
Tampico	121
Toluca	721

International communications are sent out over paths previously mentioned, as well as trunked connections. Mexico maintains its own HF radio-telephone station, as well as a large INTELSAT earth station at Tulancingo.[68] This facility is located 129 kM north of the capital, and carries a major portion of Mexican international traffic. Tulancingo was put into operation in 1968 in time for the Olympic Games, held in the country. Working with Atlantic Ocean satellites, Tulancingo has two antennae of standard configuration.[69] Roughly 150 international telephone circuits are maintained as follows:[70]

Country	Number of Circuits
Argentina	4
Brazil	9
Chile	3
Colombia	3
France	13
Germany (BRD)	2 (via France)
Italy	9
Panama	5
Spain	25
Switzerland	4 (via France)
United Kingdom	7
Venezuela	14
Japan	3 (via U.S.A.)

Tulancingo transmits on a carrier frequency of 6281.25 mHz (center frequency) in terms of uplink and receives in the 3000-4200 mHz band.[71] The station works with three 8 and one 3 kW transmitters using tunable klystron tubes.[72] Receiving takes place via sophisticated equipment, incorporating cooled parametric amplifiers, having a noise temperature of 18° Kelvin.[73] Appropriate multiplexing and demultiplexing equipment permits a large number of channels, as well as trans-Atlantic television.[74] Mexico participates in the SPADE system, by which demand-access telephone circuits are provided to a very large number of countries, where there might not be a constant traffic load. A connection exists between Tulancingo and the Mexico City transit center, by way of which international calls are routed.

Electrical power is vital to the growth and interests of any country. Mexico is certainly no exception in this regard, and the Comision Federal de Electricidad assures that there is a sufficient electrical supply.[75] All electrical enterprises were nationalized in 1975.[76] Most power plants are thermal; fired by oil or gas.[77] Geothermal is also made use of, but to a

lesser extent.[78] Mexico's large hydro potential has already been exploited. It is interesting to note that a geothermal plant in Mexicali provides approximately 25 percent of the electrical needs of the state of Baja California.[79] A nuclear power plant was under construction at Laguna Verde near Veracruz, and when finished should provide some 670 MW potential.[80] At last count, 59 percent of all Mexican homes had electricity, and industry assumed 54 percent of the total generating output.[81] A major difficulty for Mexico has been the standardization of line frequencies throughout the country.[82] Although most places use 60 hZ, there were until recently plants fixed on the 50 hZ standard.

Overall Analysis:

Communications in Mexico have undergone a rebirth in a way that can be described as phenomenal. For many years, adequate facilities were restricted to the capital and larger population centers. Social communications were also somewhat underdeveloped; especially in the case of television. While telephones are still not found in every home, and while it is still at times difficult to call certain sections of the country, most populated areas have an adequate network. It would be fair to say that the trunk system is much more developed than is local service.

International trunk facilities are excellent in most cases permitting direct access to a number of countries. Mexican television and radio have a formidable relay network, reaching almost every city, town and village of the republic. Few countries have quite the number of choices in mass communications as has Mexico.

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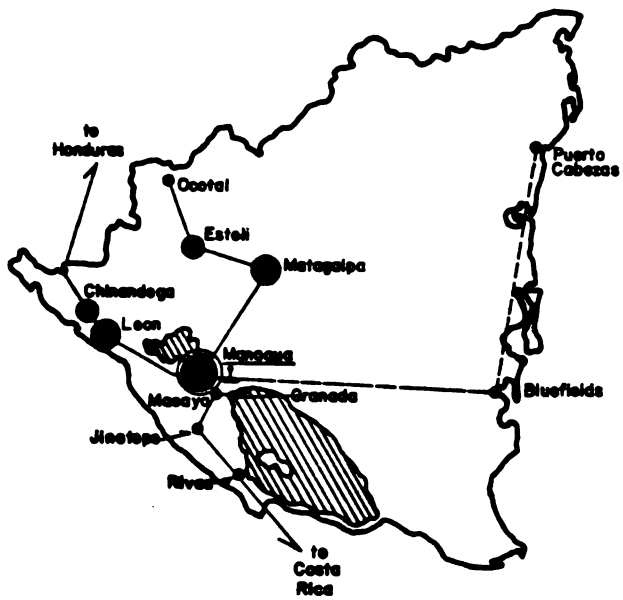
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FIGURE 17

Communication Networks in NICARAGUA



Transmitters

Radio	TV
33	3
5-7	1
1-3	

Satellite Station

Main Route

VHF Link

NICARAGUA

(Republica de Nicaragua)

Basic Information:[1]

Area: 130,000 kM^2
Population: 2.39 million (1978)
Population Density: 18.28 per kM^2
Capital: Managua
Major Cities: Managua, Leon
Language: Spanish
Religion: Roman Catholic
Gross National Product: US$ 1.8 billion (1976)
Per Capita Income: US$ 753
Literacy: 57%

Geographical Summary:[2]

Nicaragua is the largest of Central American republics and borders on Honduras and Costa Rica, as well as having coastline on the Caribbean Sea and Pacific Ocean. The country is divided into three segments; Western Coastal Plain, which gradually elevates into mountains; Interior, where the land is mountainous and very hilly, frequently forested with valleys and rivers; and the Eastern Coastal Plain, extending inland some 80 kM from the Caribbean littoral. Most of the population is centered in the interior region. Nicaragua is located at a site which is important for inter-American communications; acting as the only physical link between Honduras and Costa Rica. The Inter-American highway and Central American Microwave Network travel through the country.

Basic National Review:[3]

Nicaragua was conquered by the Spanish in 1552. Following colonization, the area was included in the Captaincy General of Guatemala. Independence

came in 1821 with Nicaragua becoming part of Mexico. Separating from Mexico in 1825 and joining the Central American Federation, Nicaragua later became fully independent in 1838. In 1856-57, the country was taken over by U.S. privateer, William Walker, who was later thrown out by combined forces of other Central American republics. Due to a long period of politcal instability, U.S. Marines were requested to help maintain order. In 1916, the Bryan-Chamorro Treaty was signed between Nicaragua and the U.S.A., giving the latter the right to construct a ship canal between the Caribbean and Pacific.

American troops left the country in 1925 but returned again in 1926 and 1933, due to continuing violence. In 1936, General Anastasio Somoza took power and governed the country with an iron hand. He was assassinated in 1956, being succeeded by his son, Luiz. Nicaragua was a primary signatory to the Central American Common Market, opening freer trade links between the republics. General Anastasio Somoza Debayle, brother of Luiz Somoza, became president at this time.

In 1972, a series of earthquakes destroyed a large portion of Managua and killed thousands. The entire country suffered greatly from this calamity.

General Somoza was re-elected in 1974, but increasing guerilla warfare resulted in a declaration of martial law in the following year. Nicaragua joined the Latin American Economic System, SELA, in 1975.

The Somoza government was overthrown in July 1979 with the Sandinista Front for Liberation taking control. A period of reconstruction was begun immediately.

Agriculture is the mainstay of the Nicaraguan economy; with approximately 10 percent of the total landmass being cultivated. Production of cotton, coffee, meat, mahogany, rosewood, cedar, gold and silver are all important. Cotton and coffee are major exports, with 28 percent being to the United States, followed by 13 percent to Japan.

Telecommunications Overview:[4]

International Prefixes: HTA-HTZ, YNA-YNZ
Number of Radio Broadcast Stations: 59
" " " Receivers: 725,000
" " " " per hundred: 30.33
" " Television Stations: 3
" " " Receivers: 120,000
" " " " per hundred: 5.02
" " Telephones: 55,264
" " " per hundred: 2.31
Electrical Generation Capacity: 365,000 kW
" Service: 60 hZ, 120 volts
Satellite Earth Stations: INTELSAT facility near Managua
International Communications: Via INTELSAT, Central American Microwave System, other terrestrial links to neighboring states, and HF radio
Ownership of Communications Media: Government, presently in a state of flux
Television Standard: System M, NTSC color
International Telephone Code: 505

Domestic Broadcasting:[5]

(Medium and Short-Waves)

City	Number of Transmitters	(kW) Combined Power
Managua	33	541.1
Matagalpa	7	32.5
Chinandega	6	18
Esteli	6	12.5
Leon	5	10
Ocotal	3	6.4
Jinotega	1	6
Rivas	2	4
Granada	2	3
Masaya	1	2
Jinotepe	1	1

(FM)

There are FM transmitters associated with stations in all major cities, most of which are rather low powered and have limited range.

(Television)

City	Channels	Network	(kW/ERP) Combined Power
Managua	2,6,12	TVN,TVCN,TCSA	106
Leon	9	TVCN	25
Matagalpa	9	TVCN	2

Networks:

TVN: Television de Nicaragua
TVCN: Televicentro de Nicaragua
TCSA: Television Comercial, S.A.

Trends in Boradcasting:

Until the recent overthrow of Nicaragua's long-lasting government led by General Anastasio Somoza, social communications in the country were primarily conducted on the basis of private ownership and commercial operations.

Excluded from this category are the government's central station, La Voz de Nicaragua, and Radio Catolica, the voice of the Catholic Church. Broadcasting was regulated by the Direccion Nacional de la Radio y Television.[6]

The Constitution of the Republic of Nicaragua guarantees creative rights - such as for authors, but does not specifically protect freedom of speech or of expression.[7] Also a provision exists in this document, which states that most rights may be suspended by the president in case of "estado de sitio," - state of siege.[8]

Radio is the major communications medium reaching most elements of the population.[9] In the past, a relatively few interests had widespread control over broadcasting, especially in the case of the Somoza family and associates. Several principal Managua stations owned facilities throughout the country.[10] Out of three television stations, one was directly owned by General Somoza, and the other two by a close associate.[11] Needless to say, with such a comfortable arrangement, cooperation with the government and General Somoza prevailed.

Major Nicaraguan radio stations include: La Voz de Nicaragua, already mentioned as being the government's main station; Radio Catolica; and Radios Mundial and Continental.[12] The latter two have extensive relay networks throughout Nicaragua.[13]

Radio Mundial		Radio Continental	
Managua:	930 kHz/10 kW	Managua:	860 kHz/10 kW
Matagalpa:	790 kHz/ 1 kW	Matagalpa:	1140 kHz/ 1 kW
Jinotepe:	790 kHz/ 1 kW	Rivas:	1140 kHz/ 1 kW
Esteli:	1010 kHz/ 1 kW	Chichigalpa:	1140 kHz/ 1 kW

Other broadcasters either serve the capital or the larger cities, with 18 being of primary significance: 11 with 10 kW power; 2 of 15 kW; 1 of 20 kW; 1 of 25 kW; 1 of 40 kW; 1 of 50 kW; and La Voz de Nicaragua, with 100 kW.[14] There are also two powerful shortwave transmitters in the country, of 50 and 100 kW, both belonging to the government station.[15]

In the past, programming has included large segments of music and entertainment, along with news and political information. Extensive coverage of important presidential events was commonplace.

Television came to Nicaragua in 1955, but it grew rather slowly due to expenses involved.[16] With the construction of the Central American Microwave System, interchange of TV programs between countries of the region became possible, and Nicaragua participated in this development.[17] The INTELSAT facility also became important for coverage of international events and special productions. Most of Nicaragua's television equipment is of U.S. origin in keeping with the fact that the American standard, NTSC-M, is utilized.[18] Television reception is confined to the major cities, due to transmitter power and geographical considerations. Televicentro de Nicaragua maintains retransmitters in the cities of Leon and Matagalpa.[19] All other facilities are restricted to the capital.

With the advent of guerilla warfare against the Somoza government, and significant intensification over the past two years, a clandestine radio operation materialized. Named "Radio Sandino," after a well-known and historic anti-Somoza fighter, the station was supposedly located in a remote part of southern Nicaragua.[20] The radio was first noticed in June 1978, operating in the 41 metre band.[21] Interestingly enough, this was the same band utilized by Fidel Castro's "Radio Rebelde" during the days of anti-Batista fighting in Cuba.

Radio Sandino programmed many political announcements, martial music, and instructions as to the manufacture of explosives and other war-related devices.[22] Over a period of months, the power and quality of the Sandinista station improved, noting additions of equipment. A variety of frequencies came into use and legitimate Costa Rican stations began relaying segments of Radio Sandino, hoping for news "scoops."[23]

A very interesting event occurred on May 11, 1979, at 2159 hours, GMT, when an USSR relay of Radio Habana Cuba (to the Mediterranean region) suddenly broadcast the opening of a Radio Sandino program.[24] Although taken off the air after a few minutes, the implications of this mistake are profound, indicating a close Cuban involvement in Radio Sandino.[25]

After some time, Radio Sandino began transmitting programs over two 41 metre band frequencies. The taped material used on each frequency was often minutes apart in timing and sometimes contained different programs altogether.[26] Accusations have been made that at least one transmitter

was actually located in Cuba.[27] At times jamming occurred, very probably from Somoza-controlled transmitters. According to reports, the jammers frequently played a Nicaraguan government song, "Viva la Guardia Nacional," (Long Live the National Guard!)[28]

In conjunction with Radio Sandino, a mysterious Costa Rican station, "Radio Noticias del Continente," began operations.[29] Using the 31 metre band, this station carried pro-Marxist information in Spanish. The exact nature of "Radio Noticias" has never been fully discovered.

Once the Somocista government had been done away with and Sandinista forces were in control, regular Nicaraguan broadcast stations integrated with the Sandino network. On "Liberation Day," July 19, 1979, Radio Sandino was even relayed over the Somoza family's own station, "Estacion X."[30] As for the exact locations of transmitters and production facilities, no concrete evidence exists, although there is much speculation. Comments made include the suggestion that the 41 metre band is just right for reliable propagation from a distance of 1300 kM, or so. This would be the exact Cuba-Nicaragua path. Considering the "mistake" made by Radio Habana Cuba in playing Radio Sandino tapes over the air, a relationship most probably did exist.

In the Habana daily "Granma," there was a brief item some two years ago dealing with Radio Sandino. In translation: "And Without a Doubt, It Exists: The director of Radio and Television of Nicaragua, Colonel Alberto Luna, recognized the existence of Radio Sandino, official voice

of the Sandinista Front for National Liberation. During much time, the dictatorship of Anastasio Somoza has tried to negate the existence of the station, which transmits from 'somewhere in Nicaragua,' and which is often heard in Costa Rica. It appears that Somoza has finally heard it."[31] After the appearance of this brief mention, more and more quotes from the station were carried in Habana media. It would not be beyond imagination if technical assistance were actually given by Cuba, perhaps including equipment; in addition to the possibility of direct transmissions - as evidenced by the famous May 11th "mistake."

Since the ouster of General Somoza and the installation of the new junta, communications have undergone a "purge." All properties formerly owned by Somoza and associates have been confiscated.[32] Radio Sandino, for example, now operates what was "Estacion X." Recently, several media organizations, including Managua-based "Radio Mil," have been nationalized, or closed, for counter-revolutionary activities.[33]

Making use of cine and sound recording has also become part of the Sandinista government media package. According to Cuban information, film units traveled with the Sandino forces during the fight against Somoza, recording for history the events and battles - amounting to 80,000 feet of 16 mm film.[34] A former commercial film producer and about the only one in Nicaragua, "Producine," was taken over by the new government and reconstructed under the auspices of ISCN - Instituto Sandinista de Cine Nicaraguense.[35] The new ISCN found itself with meager facilities; yet all that was to be had. A large stock of Somocista newsreels were

were discovered, along with military training films and TV commercials.[36] In terms of technical resources, ISCN inherited a small studio, an editing salon with two moviolas, a darkroom, soundroom, as well as a very few 16 and 35 mm cameras.[37] However, as processing and editing traditionally were accomplished outside of the country, ISCN is presently unable to realize major works.[38]

Audio productions have also taken place in an effort to preserve the history and emotion of the "changing of the guard." Most notable is a special edition recording "Guitarra Armada;" containing such specially motivating songs as "El Garrand," and "Que es el FAL," along with "Un Tiro 22," and "Las Municiones."[39] Interestingly enough, the lyrics of these musicals contain explicit instructions for the operation and maintenance of weapons, as well manufacture of high explosives.[40]

The new government is in firm control of the electronic media and has made it clear that stations and organizations have a cultural and educational part to play in the new order. As of yet, no overall reorganization has taken place, although it would not be surprising to find Nicaraguan stations modelled after the Cuban experience. La Voz de Nicaragua has already added its powerful voice to the Latin airwaves, programming to international audiences on short wave.

Common Carrier Serivces:

Telecom operations in Nicaragua are under the supervision of Direccion General de Telecomunicaciones y Correos, a government department.[41] At

last count, there were roughly 55,000 telephones in the country, with just over 11,000 in Managua.[42] It is interesting that these figures actually represent a substantial decrease from previous years.[43] This may be explained by the catastrophic earthquake which hit the country in 1972 and obliterated much of the capital city, not to mention communications facilities.[44]

Both automatic and manual exchanges are employed, with the former being mostly situated in Managua, Chinandega, Granada, Leon, Masaya and Matagalpa.[45] Smaller towns have a variety of equipment including "magneto" systems.[46] In the past, there were frequent complains about poor telephone service.[47] Also, there was a substantial waiting list for new installations.

The various regions of Nicaragua are linked together by a combination of terrestrial line and radio relay. North-south connections tend to be wire-line, while east-west count on radio relay due to geographical considerations.[48] The VHF circuit from Managua to Bluefields, on the Caribbean, is of great importance and the government has a plan to upgrade communications along the coast.[49] Wire telegraph systems also exist, although lacking efficiency at times. The Guardia Nacional had developed a comprehensive radio system, which links all parts of Nicaragua.[50] This network is pressed into service frequently when calls must be placed to destinations which are off the beaten path.

The Direccion General de Telecomunicaciones embarked on a program to bring subscriber trunk dialling to the country in conjunction with

INTELSAT international dialling.[51] The following is a listing of trunk codes for major cities:[52]

City	Telephone Zone Code
Chinandega	341
Granada	72
Jinotepe	41
Leon	31
Managua	2
Masatepe	44
Masaya	71
Matagalpa	6
Rivas	81

Nicaragua participates in the Central American Microwave Network, which runs north to south, throughout the country. Immediate circuits connect Managua to Tegucigalpa, Honduras, and San Jose, Costa Rica.[53] This permits direct connections to other countries of the region, as well as trunked calls. In the past, HF radiotelephone had also been employed, primarily by All American Cables and Radio, and Tropical Radio Telegraph (TRT).[54] There is an INTELSAT facility located not far from Managua, which works with Atlantic Ocean satellites.[55] NICTELSAT, a joint venture with COMSAT, operates the station.[56] At last count, there were approximately 100 telephonic circuits through this facility, as well as television capabilities.[57]

Electric power is the undertaking of ENALUF, the government's Empresa Nacional de Luz y Fuerza.[58] A few privately owned systems operated in smaller towns. The power grid is based on 60 hZ, 110 volts, poly-phase. Electrical services in the populated central region are adequate, while those in the eastern region leave much to be desired.[59] In the past, there was only one major plant in this area.[60] Approximately 34 percent

of the generating capacity is devoted to domestic usage.[61] At one time, there was consideration of power exchange interconnections between Nicaragua, Honduras and Costa Rica.[62]

Overall Analysis:

Without a doubt, Nicaraguan telecoms are in a state of unpredictable flux. The path or paths taken by the new government will have much to say about what form of electronic media one can expect for the future. Until now, indications have been that a consolidation process is underway, especially in a political sense. Should Nicaragua decide to embark on a more adventurous political road, it would not be surprising to find the media in a position to that of the Cuban stations in the early 1960's.

Common carrier services still require some work to make them completely adequate for national needs. The extent and emphasis of this section will also be determined by political considerations.

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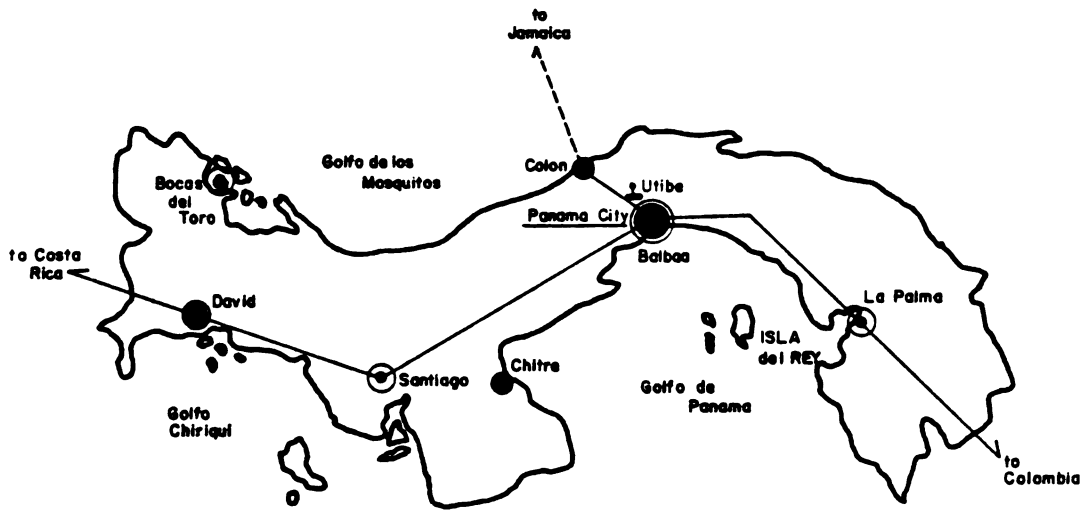
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FIGURE 18

Communication Networks in PANAMA



Transmitters

Radio	TV
29	2
7-9	1
1-4	

Satellite Station

Main Route

Submarine Cable

PANAMA

(Republica de Panama)

Basic Information:[1]

Area: 75,650 kM^2
Population: 1.82 million (1978)
Population Density: 24.05 per kM^2
Capital: Panama City
Major Cities: Panama City, Colon
Languages: Spanish, English - widely understood
Religion: 93 percent Roman Catholic, 6 percent Protestant
Gross National Product: US$ 2.0 billion (1976)
Per Capita Income: US$ 1,099
Literacy: 79%

Geographical Summary:[2]

Occupying much of the Isthmus of Panama, which separates the Pacific Ocean from Caribbean Sea, and also links North, Central and South America, is the Republic of Panama. The country is bordered on the north by the Caribbean; south by the Pacific; East by Colombia; and West by Costa Rica. With two parallel mountain ranges forming a "backbone," lands lessen in altitude as they extend toward both seas. The Eastern Region is very tropical, with much jungle. The southern part of the country is also rather tropical, lacking drier land of higher elevations. The Panama Canel separates the country into two segments. Almost 50 percent of the population resides in or around an urban area.

Basic National Review:[3]

The area which is now known as Panama was discovered in 1502 by the Spaniard, Rodrigo de Bastidas. In 1513, the isthmus came under control of Balboa, during his famous voyage to the Pacific. Following this, Panama

remained under the Spanish Crown until 1821, when it was absorbed by Colombia.

Panama was important to the California Gold Rush in 1848-49, as crossing the isthmus and then sailing to San Francisco was much shorter than a trans-Cape voyage. Interest was expressed in the possibility of a ship canal, crossing Panama, and permitting direct sailing between the two oceans. In the late 1800's, a French concern began construction of the first Panama Canal, but later transferred their interests to the United States. In 1903, Panama became an independent state, with aid from the U.S., and under terms of the Hay-Herran Treaty between the two countries, the U.S. was given rights to build a full-scale ship canal. The modern Panama Canal opened in 1914, just in time for World War I.

In 1959, a large number of Panamanian students invaded the Canal Zone, asking for revisions of the treaty. More violence occurred in 1964 over placement of the Panamanian flag on an equal status with the U.S. flag in the Canal Zone. Relations with the United States were temporarily suspended. The year 1967 brought a technical modification of canal status, with sovereignty being transferred to a joint Panama-United States Canal Authority.

The year 1968 brought considerable political instability and culminated in a takeover by the Guardia Nacional (National Guard). Brigadier Omar Torrijos Herrera emerged as national leader. Additional negotiations with the United States over canal rights continued. A new treaty was finally agreed upon by both sides in 1978.

The Panama Canal is a vital economic asset to the nation, as is the associated rail line. Registration of ships and administration of shipping companies are also important, owing to competitive costs and regulations. Panama exports many petroleum products, taking advantage of imported oil and ready labor. Agriculture is also notable, with exports of bananas, shrimp, and sugar leading. In recent years, the government has encouraged a diversification of the economy, with construction of a steel mill, manganese mine and other projects.

Telecommunications Overview:[4]

International Prefixes: HOA-HPZ
Number of Radio Broadcast Stations: 47
" " " Receivers: 280,000
" " " " per hundred: 15.38
" " Television Stations: 3
" " " Receivers: 206,000
" " " " per hundred: 11.32
" " Telephones: 154,598
" " " per hundred: 8.5
Electrical Generation Capacity: 600,000 kW
" Service: 60 hZ, 115/230 volts
Satellite Earth Stations: INTELSAT facility at Utibe
International Communications: Via INTELSAT, microwaves to adjacent countries, and submarine cable
Ownership of Communications Media: Government and private-commercial
Television Standard: System M, NTSC color
Telecommunications Administration: Direccion Tecnica de Telecomunicaciones (Panama City)

Domestic Broadcasting:[5]

(Medium Waves)

City	Number of Transmitters	Networks	(kW) Combined Power
Cd. Panama	29	RPC,LIB,OP,MIA	104
David	9	RPC,MIA,(LIB)	40
Chitre	7	RPC,LIB	29
Santiago	4	(LIB)	17
Ft. Clayton	2	AFRTS	11
Aguadulce	2	--	5.25
Colon	7	RPC,LIB,OP	4.6
Chorrera	1	--	3
Bocas del Toro	3	RPC	2.25

Note: ( ) Indicates an affiliated station which also programs independently.

(FM)

Transmitters are located in Chitre, Panama and David. More and more FM services have been introduced, primarily repeating main programs. Powers are quite low.

(Television)

City	Channels	Networks	(kW) Combined Power
Cd. Panama	2,4	RPC,TN	378
Sona	7	RPC	95
Las Margaritas	6,12	RPC,TN	45
David	6	RPC	25
Santiago	3	RPC	16
Bocas del Toro	12	RPC	10
Altamira	9	TN	8
Ft. Clayton	8	AFRTS	5
Ft. Davis	10	AFRTS	5
Volcan	4	RPC	2
Cerro de Piedra	2	TN	1.25
La Palma	5	RPC	1

Networks:

PRC:	Circuito RPC, Panama City
LIB:	Radio Libertad, Panama City
OP:	Onda Popular, Panama City
MIA:	Radio Mia, Panama City
AFRTS:	American Forces Radio and Television Service
TN:	Televisora Nacional, Panama City

Trends in Broadcasting:

Panama is at the meeting points of two continents, as well as two world oceans. It was formed by a variety of cultural and political influences, and continues to be molded by many such factors.[6]

The Constitution guarantees freedom of expression, although individuals may be held legally responsible for comments made.[7] At points in recent years, censorship has been imposed by Panamanian authorities, although this occurred at times of national stress.[8]

Radio is the primary form of communication, reaching most Panamanians. This is especially true in terms of the portable transistor receiver.[9] There are a large number of medium-wave stations throughout the country, although most are of moderate power. Major Panama City stations operate networks, which include relay transmitters located in other towns of the republic. The remaining broadcasters serve local or regional audiences. As noted in the listing of domestic broadcasting, main systems include: Circuito RPC, Radio Libertad (government), Onda Popular and Radio Mia.[10] As with several other Latin nations, multiple ownership of broadcast properties is quite common. RPC also operates Onda Popular, and Radio Libertad maintains several local affiliates, which are capable of program production.[11] Commercially supported programming is the norm, with much music, news and entertainment being aired.

Within the former Canal Zone, electronic media operations are maintained for the benefit of English-speaking employees. Radio stations are part

of AFRTS, American Forces Radio and Television Service.[12] Signals do reach nearby areas of the republic. There are also several culturally oriented boradcasters, including HOXO, La Voz del Istmo, which is operated by the same religious organization which has HCJB, Quito, Ecuador.[13] HOXO broadcasts inspirational programs in a variety of languages, for the reason that crews of passing ships are potential audiences.

According to available information, there are radio receivers in at least 80 percent of all Panamanian homes, thereby guaranteeing a widespread audience.[14] In the past, networks have relayed Voice of America newscasts, as well as special VOA news-feed transmissions.[15] This technique is employed in several countries, making international news available at low cost.

Broadcasts from the rest of the world are easily audible in the Panamanian Republic on both medium and short waves. An interesting fact is that the Greek Radio programs in the Hellenic language for workers in Panama.[16]

Television is operated on a commercial basis by two nationwide organizations, Circuito RPC Television and Televisora Nacional.[17] Both systems are headquartered in the national capital. Repeaters carry programming to major cities with sufficient power to reach adjacent rural areas. The AFRTS television stations in the canal area work with low power and short antenna masts, so as to restrict the signal.[18] Panamanian TV stations have carried many packaged U.S. programs, as well as those from other

Western Hemisphere and European sources.[19] The INTELSAT facility is especially useful for television interconnections. TV may also be exchanged over the Central American Microwave Network, of which Panama is a member. Television programs are sent out for approximately 13 hours each day.[20]

At the present time, there is no short-wave broadcasting in Panama; although stations have been on the air in the past. Approximately three years ago, HOXO - La Voz del Istmo, expressed interest in commissioning a short-wave transmitter of sufficient power so as to cover the national territory. This has not come about.[21]

Common Carrier Services:

Telecommunications facilities, other than broadcasting, are owned and operated by the national government, through the COMSA organization (Comunicaciones, S.A.) There were nearly 155,000 telephones in the country at last count, many of which operated on automatic exchanges.[22] The capital is equipped with roughly 80,000 telephone sets: Colon has 10,000 and David 3,000.[23] Some smaller towns are still using manual systems; and all in all, there are over 250 communities with telephone service.[24] In recent years, an emphasis has been made on the modernization of switching and transmission systems including sophisticated LM Ericsson AXE stored-program exchanges.[25]

Most national trunks are based on a broadband microwave system, which operates in conjunction with the Central American net.[26] Links run

as a "backbone;" that is - along the length of Panama. There are two side-by-side networks; one of previous construction (300 channels) and the newer one, with 960 circuits.[27] Television may also be sent. Connections extend into Costa Rica, from Santa Marta, Panama to Cerro Adams (Cost Rica).[28] Lines also connect with Colombia. Trunked connections into other countries of the region are possible.[29]

A submarine cable exists between Fort Sherman in the former Canal Zone, and Jamaica, where a corresponding cable links up with Florida.[30] This facility is owned and operated by ATT, Jamaican Telecoms, ITT and the Panamanian COMSA.[31] There are 128 voice channels possible.[32]

The INTELSAT earth station is located at Utibe, some 50 kM to the northeast of Panama City.[33] A government agency, INTERCOMSA, Intercontinental de Comunicaciones por Satelites, is responsible for operation of the facility.[34] Multiplex links exist between the republic and North America, as well as Europe and South America. There are regular television program relays, and extensive telephone interchanges. Utibe is equipped with a SPADE terminal, permitting occasional circuits to most parts of the globe.

Electric power in Panama comes mostly from hydro sources with the government's Instituto de Recursos Hidraulicos y Electrificacion coordinating efforts.[35] The major power company in the republic is the former American "Compania Panamena de Fuerza y Luz," which serves the capital and other large towns.[36] The demand for electric services has been growing by roughly 10 percent yearly, with expansion of facilities being

necessary.[37] In 1970, 87 percent of all electricity was consumed in the metropolitan regions; and only about 50 percent of the total population had access to the service.[38] Expansion of existing, and construction of new generating facilities are intended to ameliorate this situation. There is an extensive generating (hydro) system within the old Canal Zone; producing 168,000 kW.[39] Plants in the republic generate roughly 155,000 kW.[40] Among the major power projects is the Bayano River system, with an installed capacity of 150 MW.[41]

Overall Analysis:

Radio and television services in Panama are very comprehensive and growing. Common carrier facilities are also expanding, although it is presently impossible to meet the total demand, especially for telephone lines. Panama has expended much effort to improve national connections so that all parts of the country may be easily reached. International circuits are very good and improving.

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SOUTH AMERICA

Fourteen states make up what is known as South America. With a total land mass of nearly 18 million square kilometres, it is among the largest areas of the globe. Over 229 million individuals call themselves South Americans; people with diverse backgrounds, outlooks and futures.

Along with other rapidly developing regions, South America has taken great leaps forward; in terms of industrial and technological advancement, as well as social and educational feats. While there are still many hurdles to be overcome, the region as a whole is seen as having enormous potential for the future.

Regional Statistics:

Total Land Area: 17,818,490 kM^2
Total Regional Population: 229.24 million
Average Population Density: 12.87 per kM^2
Total Gross National Product: US$ 269 billion
Average Per Capita Income: US$ 1,173
Average Regional Literacy: 79 percent
Total Regional Number of Radio Broadcast Stations: 2,126
" " " " " Receivers: 56.28 million
" " " " " " per hundred: 24.55
" " " " Television Stations: 157
" " " " " Receivers: 26.53 million
" " " " " " per hundred: 11.57
" " " " Telephones: 9.92 million
" " " " " per hundred: 4.33
" " " " Electrical Generation Capacity: 46,973,250 kW
Countries in the 50 hZ Electrical Group: 50 percent
" " " 60 hZ " " : 29 percent
" " both 50 and 60 hZ " " : 21 "
Number of Countries Having Satellite Stations: 13
Countries in the System M (Mono/NTSC/PAL) Television Group: 57 percent
" " " " N (Mono/NTSC/PAL) " " : 29 percent
" " " " K-1 (SECAM) " " : 7 "
" Without Television " " : 7 "

In the early history of South America, communications were efficiently performed through an extensive network of couriers and post-roads. This was especially true of the Inca Empire, where runners could speed messages from one part of the realm to another in a matter of hours or days. Unfortunately, the life expectancy of such early communicators was rather short, and various forms of interference were to be expected. Nevertheless, the level of communications capability was quite remarkable.

During the mid-19th century, the telegraph began to be used; slowly at first, but spreading rapidly to many parts of the continent. The installation of submarine cables along the Atlantic and Pacific coasts, as well as between North and South America, brought the telegraph to fruition as a true medium of significance. Telegraphic cables with Europe have also been considered important, taking into account cultural-historical ties.

After the invention of the Bell telephone, South America became one of the first users of the new device. In fact, the Emperor of Brazil, Dom Pedro II, personally participated in a telephone demonstration, given by the inventor. Dom Pedro was so impressed that he asked for instruments to be provided at the palace. Telephone installation came about rapidly in many parts of South America, but mostly on a limited-service basis. True inter-urban and international connections required much time to construct. Advances in technology permitted expansion of the telephone network, including automatic switching and other improvements. By the early 20th century, most important centers on the

continent were provided with some form of phone system, and wire connections linked the major cities.

Considering the geographical and settlement tendencies of the region, it is not at all surprising to find that the introduction of wireless communication made a tremendous improvement in services, and also stimulated the eventual broadcast use of radio. As early as the 1920's, various international firms established large wireless networks; including RCA, General Electric, Transradio and others. While long-wave facilities were popular, at first, extensive shortwave links gained predominance after more was learned about reliability and propagational characteristics. For a long time, HF radio was the major communications link; both to the world and within the region.

Radio broadcasting has had an enormous role in South America. The oft-used term "factor of national integration" seems tailor-made to describe the importance of broadcast stations. In the largest cities, or thousands of kilometres from any city; without regard to literacy or local electrical supply; paying little heed to culture or language - is radio.

Television has also been a useful technology to be exploited in South America. Although not nearly as widespread as radio, TV has been accepted in all countries and territories, excepting Guyana and the Falkland/Malvinas Islands. The general situation is one with a majority of stations being commercial, but where the governments and educational institutions operate cultural or instructional stations, as well. There

are, of course, exceptions, with certain countries having no commercial television - and others having only private facilities. Presently a status symbol, the ownership of home receivers has skyrocketed over the past decade; now including substantial portions of the overall population.

As with telegraph and telephone, satellites came into use in South America after only a short period from initial development. Tracking stations at Tangua, Brazil and Longovilo, Chile, participated in early tests of U.S. satellites, such as project "SCORE." More and more countries added satellite earth stations, primarily for international connections. At present, all states except the Falklands/Malvinas have satellite facilities. In the past few years, extension of national communications has become a priority for most governments. Satellite services have not gone unutilized. Brazil, Chile, Peru and now other nations have implemented domestic satellite programs - intended to link remote parts of the respective countries with the rest of the world.

SOUTH AMERICA

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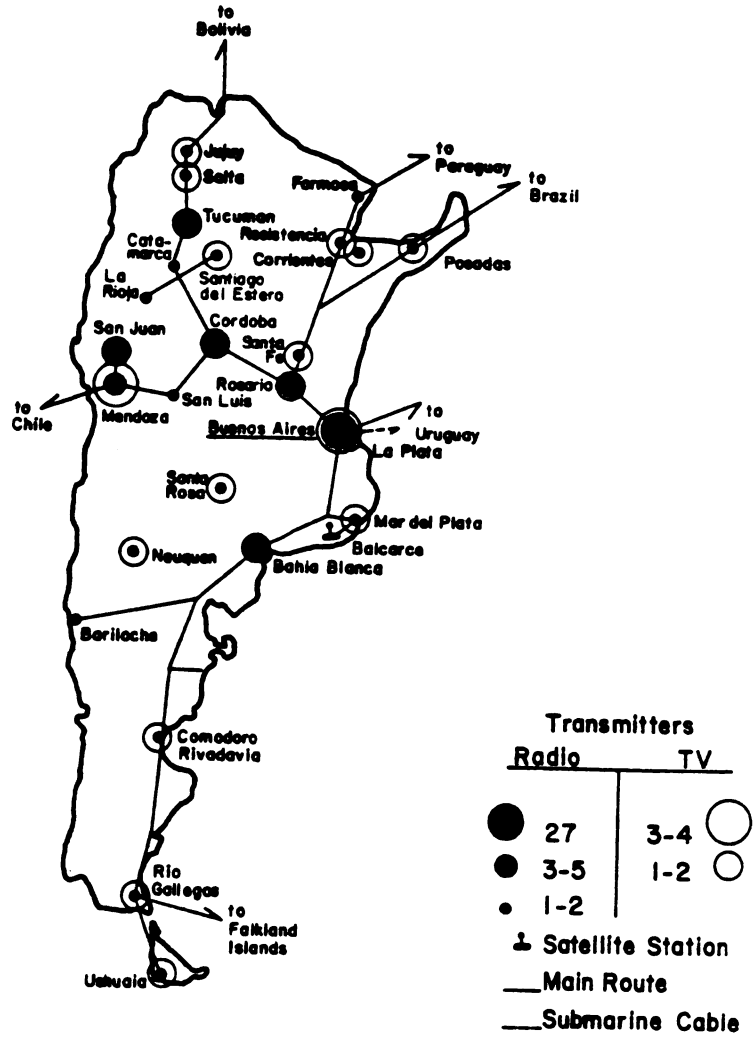
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FIGURE 19

Communication Networks
in
ARGENTINA



ARGENTINA

(Republica Argentina)

Basic Information:[1]

Area: 2,766,889 kM^2
Population: 26.4 million (1978)
Population Density: 9.54 per kM^2
Capital: Buenos Aires
Major Cities: Buenos Aires, Rosario, Cordoba, La Plata, Mendoza
Language: Spanish
Religion: Roman Catholic, some Protestant and others
Gross National Product: US$ 39.9 billion (1974)
Per Capita Income: US$ 1,511
Literacy: 93 percent

Geographical Summary:[2]

Making up most of South America's "southern cone," Argentina is the second largest country on the continent after Brazil. Borders are shared with Brazil, Chile, Paraguay, Bolivia and Uruguay. The country is divided into several distinct regions; with the Andes in the west; the swampy, forested Grand Chaco in the north; rolling Pampas in the middle and east; steppe - like Patagonia towards the south; and the forbidding Tierra del Fuego at the end of South America. Most of the population is located within the Pampas region.

Basic National Review:[3]

After a long period as a Spanish colony, Argentina gained its independence in 1810. This was followed by disorder, as rival factions vied for control. Modernization was prompted in the 19th century with large-scale immigration from Italy, Germany and Spain. A series of social and political reforms took place in the 1920's, but military governments prevailed

until 1946, when Juan Domingo Peron was elected president. Under General Peron and his famous wife, Evita, improvements were made in labor and social affairs, but with restrictions of freedoms and at a great financial cost. Peron was deposed in 1955 with several military and civilian administrations following. In 1973, General Peron once again became president but died some ten months later. His second wife, Isabel, became the first female head of state in the Americas. Widespread political and economic difficulties have troubled the nation in recent years. A program of economic expansion has been undertaken by the present administration.

Argentina's economy is based on agriculture with much stock-raising and farming. Approximately 40 percent of the land is devoted to pasture, and over ten percent is set aside for actual cultivation. Production of cotton, sugarcane, fruits and vegetables takes place, and Argentina is the world's largest producer of yerba mate. Food processing industries are vital to the nation, although there is also much manufacturing. Argentina imports most of its mineral fuels.

Telecommunications Overview:[4]

International Prefixes: AYA-AZZ, LOA-LWZ, L2A-L9Z
Number of Radio Broadcast Stations: 146
" " " Receivers: 6.5 million
" " " " per hundred: 24.6
" " Television Stations: 33
" " " Receivers: 4.51 million
" " " " per hundred: 17.1
" " Telephones: 2,539,535 (1977)
" " " per hundred: 9.62
Electrical Generation Capacity: 9,000,000 kW
" Service: 50 hZ, 220 volts
Satellite Earth Stations: INTELSAT earth station located at Balcarce, approximately 400 kM south of Buenos Aires
International Communications: Via the Balcarce earth station, also by HF radio and terrestrial links to neighboring countries
Ownership of Communications Media: Both government and private/commercial
Television Standard: System N, PAL color (currently monochrome)
International Telephone Code: 54
Telecommunications Administration: Secretario de Estado de Comunicaciones(Buenos Aires)

Domestic Broadcasting:[5]

(Medium and Short-Waves)

City	Number of Transmitters	(kW) Combined Power
Buenos Aires	27	1,053
Cordoba	4	125
San Juan	3	100
Mendoza	5	90
Bahia Blanca	4	80
Comodoro Rivadavia	2	50
Posadas	2	50
S. Salvador de Jujuy	2	50
Stgo. del Estero	2	50
Santa Fe	2	45
Rosario	4	40
Santa Rosa	2	40
La Plata	2	35
Salta	2	35
Rio Gallegos	2	30
Formosa	2	26
San Rafael	2	25.25
Bariloche	1	25
Corrientes	1	25
Mar del Plata	1	25
Puerto Iguazu	1	25
Resistencia	1	25
Neuquen	1	20
Pdte. Roque Saenz Pena	1	20

(FM)

Stations are found in most cities usually carrying a program which is simultaneously broadcast on medium and short-waves. Most facilities are of low power.

(Television)

City	Channels	(kW/ERP) Combined Power
Buenos Aires	7,9,11,13	318
La Plata	2	100
Rosario	3,5	97.5
Bahia Blanca	7,9	95
Mendoza	6,7,9	86
Cordoba	8,10	70
Cerro de las Rosas	12	43.5
Trenque Lauquen	12	40
Santa Rosa	3	36
Comodoro Rivadavia	9	20
Posadas	12	18
San Juan	8	16
Jujuy	7	12
Mar del Plata	8,10	12
Salta	11	12

Trends in Broadcasting:

Argentina, as with many nations in Latin America, operates a mixed private (commercial) and governmental system. Stations are divided into four categories; Radio Nacional (directly government operated); Official Stations - such as those belonging to universities, public institutions, provincial and local governments; Government Owned Commercial Stations, which were formerly private, but are now under government operation; and Private Stations, non-governmental and operated on a commercial standing.[6] As such, Argentina is covered by a multiplicity of radio broadcast services. At last count, there were 146 radio stations, divided as follows:[7]

Radio Nacional:	24
Official Stations:	11
Government Commercial Stations:	37
Private Commercial Stations:	74

Of the total number of stations, there are a few which could be classified as having national impact. They include:[8]

Radio Nacional, Buenos Aires:	(100 kW)
Radio Nacional, Cordoba:	(50 kW)
Radio Nacional, San Juan:	(50 kW)
Radio Municipal, Buenos Aires:	(100 kW)
Radio Mitre, Buenos Aires:	(50 kW)
Radio Belgrano, Buenos Aires:	(100 kW)
Radio Splendid, Buenos Aires:	(50 kW)
Radio El Mundo, Buenos Aires:	(100 kW)

It should be noted that all the above stations are owned by the state. Radios El Mundo, Belgrano and Splendid also operate nationwide networks through affiliates. Most broadcasters of the commercial type serve defined regional or local audiences and have moderate transmission powers. Radio Nacional and government commercial outlets also have shortwave frequencies, in order to serve all parts of the country.

There is a long history of government broadcasting, although private radio is also well established.[9] Present-day Radio Nacional stations generally function on an independent basis, placing emphasis on government news and Argentine culture. The instances of government involvement in electronic media have had mixed results.[10] Without a doubt, coverage is almost universal. On the other hand, people do not tend to trust the radio as much as the press.[11]

According to information available: "Because of its long history of government ownership, the radio has served as an excellent mouthpiece for various parties. Eva Peron used this medium to rally mass support for her husband in the early years of his career as secretary of labor..." "Such use of radio perhaps explains why Argentines - especially those in the higher socio-economic brackets - have less confidence in radio than newspapers as a source of news."[12]

Although censorship and government interference had been commonplace during the first Peronist government, relative press and broadcast freedom existed in recent times. With General Peron's return from Spain in 1973, laws were passed which effectively restricted the media in several areas.[13] Regulations stated that 75 percent of all music must be by Argentine artists, as well as requiring that stations must be owned by citizens, and that all employees should be nationals.[14] Consideration was given at the time to "measures to control radio transmissions from neighboring countries."[15] Government ownership of broadcast facilities was also strengthened by Peron.[16] The most noted change came in the form of Decree-Law, No. 587, of 1973, which mandated that foreign news organizations should not supply stories dealing with Argentina to the national media.[17] It was stipulated at the same time that 50 percent of all news coverage was to be focused on the Argentine, with offical news preferences being: Argentina, Latin America, and the rest of the world.[18] The once-independent TELAM news agency was purchased by the government in 1968, and is now the official source of information in the country.[19]

In 1973, it was estimated that audiences of 19 and 18 million existed for radio and television respectively.[20] Broadcasting is regulated under the Telecommunications Law of 1972, which highlights the following:[21]

a) The government grants licenses and may withdraw them.
b) Censorship may be applied in cases of national security.
c) Moral issues and ethics, as well as advertising time, may be regulated.

Television is widespread across the country with major cities and towns being served. This form of broadcasting is conducted on a commercial basis, and most stations are privately owned.[22] The government's Secretaria de Prensa y Difusion operates five facilities.[23] In the past, the state acquired the interests of some commercial telecasters; the reported reason being that the stations were in poor financial circumstances.[24] As of yet, there is no color television in Argentina, although the PAL system has been selected for introduction. A comprehensive television center was constructed in time for the 1978 World Soccer Championships in Buenos Aires. Although color facilities were used during the games, this was for the benefit of external viewers, as Argentines had only black-and-white signals.

Under Argentine laws, television networks are not permitted, but affiliations of stations may be arranged.[25] In 1973, it was decreed that at least 50 percent of all television programs would have to be produced in the country.[26] Restrictions were also put forth concerning dubbing of films.[27] Cine productions must receive a certificate of approval and classification, and the following regulations apply to theatres:[28] First-run theatres must show a locally produced film at least one week

in 13; second-run theatres, once in eight weeks. All black and white film must be printed and copied in Argentina, including foreign material.

All aspects of film are administered by the National Institute of Cinematography, a subsection of the Ministry of Government.[29] A taxation system operates, based on theatre-goer ticket purchases, with a national theatre lottery held.[30] A percentage of ticket revenues goes to the film institute.

RAE, Radiodifusora Argentina al Exterior, is operated by LRA (Radio Nacional), from the capital city. Short-wave transmitters of 100 kilowatts are located at the General Pacheco station. Programs are sent out in Spanish, Portuguese, Italian, French, English, German and Japanese, with directional antenna system utilized for appropriate target areas.[31] RAE transmissions have generally consisted of highlights of Argentine events, heavily laced with tango and music from the Pampas.[32] RAE is one of the world's oldest international broadcasters, successor to SIRA, which commenced operations in the 1930's. RAE's conservative frequency-choice policy has subjected to it heavy interference on the crowded short-wave bands.[33] Also, transmitters used for RAE broadcasts have a tendency to drift off the listed frequencies, and studios have an echo which reduces intelligibility.[34]

Common Carrier Services:

A combination of radio-relay, open-wire, cable and HF connect the various sections of Argentina together. As it is such a diverse country, different transmission types must be employed to overcome geographical obstacles.

In recent years, the nationwide microwave trunk system has been especially important.[35] Main circuits extend from Buenos Aires to Rosario, then to Cordoba and Mendoza in the mountainous west.[36] Paths lead from the capital to Mar del Plata and Bahia Blanca in the south, continuing to Trelew, Comodoro Rivadavia, Rio Gallegos and Ushuaia in the far south.[37] Also, there are circuits via microwave to points north, such as Tucuman, Salta, Jujuy and Reconquista, Formosa and Puerto Iguazu.[38] Coaxial cable and MW are used for the distribution of television programs.

Several new systems have either been recently installed or are planned for the immediate future.[39] These are all of high capacity and permit multi-channel television, while older MW paths frequently are good for only 300 telephone circuits and one TV channel.[40] Modern, digital multiplexing equipment is being installed on all major routes.[41] Along with new trunk facilities, Argentina is building a comprehensive STD network, incorporating seven interurban switching centers, located in Buenos Aires, Rosario, Mar del Plata, Mendoza, Resistencia, Bahia Blanca and Cordoba.[42] Telephone STD codes are as follows:[43]

City	Zone Code
Bahia Blanca	91
Buenos Aires	1
Cordoba	51
La Plata	21
Mar del Plata	23
Resistencia	711
Rosario	41
Santa Fe	42

An important part of the national telecoms network is sophisticated stored-program electronic and semi-electronic switching systems.[44] Much equipment has been tendered by the LM Ericsson concern.[45]

In order to insure communication with even the most remote villages, a nationwide HF radio system is in use, linking 29 centers.[46] Several 5 and 10 kW ISB transmitters were installed at the General Pacheco station for this purpose, as well as 70 1 kW HF transmitters for the individual towns and villages.[47] A very large number of 75 watt HF transmitters were sent out as well.[48] This network is capable of handling telephone and teletype traffic.[49]

With an eye towards modernization, Argentina has formed the "National Satellite Communications System Commission," in order to consider the problems at hand and their potential solution via satellite technologies.[50] Initial suggestions included earth stations at Campo Duran in the far north, and at Ushuaia, on Tierra del Fuego.[51] These would be equipped for 24 telephone circuits, as well as television.[52] Approximately 90 smaller earth receivers would be installed in various towns, capable of one or two telephone channels and TV.[53]

Argentina has also sought to improve the number and quality of subscriber telephone circuits, especially in areas of congestion. A specialized digital transmission and line concentration network was installed in the environs of Buenos Aires, in order to forestall service difficulties.[54] Tests of optical fibre inter-exchange links have also been carried out for this same reason.[55]

International communications are carried on three systems: terrestrial microwaves and lines; HF radio; and INTELSAT. A 960 channel microwave link connects Buenos Aires with Montevideo, Uruguay. Television may also be sent on this route.[56] An older submarine cable across the Rio de la Plata acts as a reserve.[57] Mendoza is linked to Santiago de Chile, and it was over this direct-dial line that the first reports of the 1973 Chilean coup were dispatched.[58] Argentina is connected with Encarnacion, Paraguay, via Formosa in the north.[59] Likewise, a circuit extends to Foz do Iguazu, Brazil, via Puerto Iguazu; and lines from Campo Duran in the far north, connect into Bolivian territory.[60] All terrestrial microwave links were upgraded in time for the 1978 World Cup Games in Buenos Aires, in order to carry television.[61]

HF radiotelephone connects Argentina with La Habana, Cuba, and on reserve circuits to Paraguay and Bolivia.[62] Shortwave transmitters used in the international service are located at the General Pacheco station, near Buenos Aires, and have powers up to 60 kW.[63]

The Balcarce INTELSAT station is located 400 kM to the south of the federal capital and has two 30 metre cassegrain antennae.[64] The 4/6 gHz band is employed in correspondence with Atlantic Ocean satellites.[65] Circuits in the assigned and SPADE modes are maintained with: Belgium, Canada, France, BRD, UK, Switzerland, Nigeria, Netherlands, and Nordic Countries: as well as Spain, Chile, Italy, Israel, Educador, Colombia, Brazil, Venezuela, Portugal, Panama, the U.S.A., Peru and Mexico.[66]

Owing to growing satellite traffic to the rest of the world, Argentina has planned the construction of a second international station near Cordoba (Bosque Alegre).[67] A very modernistic design has been submitted for the facility, which would work with INTELSAT Atlantic satellites.[68] Argentina predicts that by the year 1992, there should be at least 2,000 external telephone circuits via satellite.[69]

Consideration has also been given, along with 10 other countries, to the laying of a "super-cable" between South America-Africa-Europe.[70] This would relieve some of the strain currently imposed on the satellite systems by telephone traffic, and keep the satellites open for more essential, high-bandwidth signals.[71]

Argentine communications organizations have made it known that they view the microwave links to neighboring countries as very important and plan on extending them wherever possible.[72] This too would free up space on satellite links.

A large electrical generation capacity exists in Argentina. Of the 9,000,000 kW total, production types are broken down as follows:[73]

Petroleum Fired:	71 percent
Natural Gas:	20 "
Charcoal Burning:	6 "
Coal:	3 "
Hydro:	Growing, but still small

According to available information, Argentina has a very large hydroelectric potential, and the national government has taken measures to encourage exploitation and development. The "El Chocon-Cerros Colorados"

dam on the Limay River produces 1,200 MW; a 450 MW facility exists on the Neuquen River at Planicie Banderite.[74] The "Salto Grande" project, carried out jointly by Argentina and Uruguay, will ultimately have a potential of 1,890 MW.[75] In December of 1979, the second 135 MW turbo-generator was installed at Salto.[76] The "Concordia Dam" on the Uruguay River produces 1,620 MW.[77] Argentina also has embarked on a joint project with Paraguay for the construction of two large hydro installations, at Yacireta and Corpus on the Parana River.[78] Yacireta project is to be located in the area of Ayolas, Paraguay/Ituzaingo, Argentina; slated to have 20 turbines and be in operation by 1989.[79] Between Yacireta and the giant Brazilian-Paraguayan Itaipu project, also on the Parana, will be located the "Corpus" installation.[80] Also, a joint Argentine-Paraguay undertaking "Corpus" will take advantage of lost water power which comes after the Itaipu dam.[81] Downstream from Itaipu, the Iguazu River joins the Parana, thus increasing volume and flow.[82]

In 1973, Buenos Aires consumed approximately 75 percent of all electricity produced in the country.[83]

A 319 MW nuclear plant is in operation in Buenos Aires Province, with another under construction in Cordoba Province (600 MW).[84]

Overall Analysis:

The social and carrier communications services in the Argentine are sufficient for the present state of development, as the major urban areas are served satisfactorily. More remote sections of the country lack some

services, but this is not uncommon. It is probable that subsequent development of remote territories will also bring about an improvement in the respective communications availabilities.

ARGENTINA

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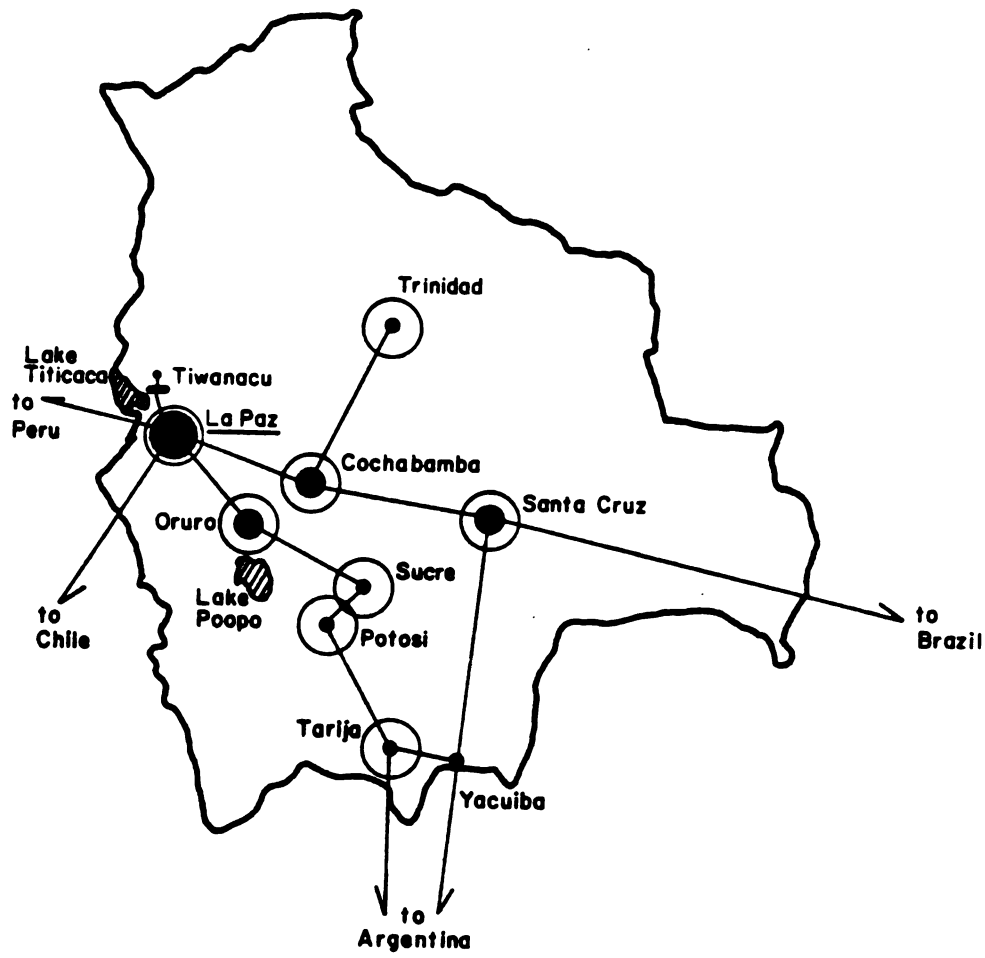
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FIGURE 20

Communication Networks in BOLIVIA



○ 1-2 TV
● 31 Radio
● 8-15 Radio
• 1-6 Radio
⊥ Satellite Station
___ Main Route

BOLIVIA

(Republica de Bolivia)

Basic Information:[1]

Area: 1,098,581 kM^2
Population: 6.11 million (53% Indian, 32% Mestizo, 15% White)
Population Density: 5.56 per kM^2
Capitals: Sucre (Judicial), La Paz (Administrative)
Major Cities: La Paz, Santa Cruz, Sucre, Cochabamba, Oruro
Languagues: Spanish, Quechua, Aymara
Religion: Roman Catholic (94%)
Gross National Product: US$ 2.3 billion (1974)
Per Capital Income: US$ 376
Literacy: 40%

Geographical Summary:[2]

One of the two landlocked countries in South America, Bolivia shares borders with Brazil, Paraguay, Argentina, Chile and Peru. The country is roughly divided into two sections; a plain in the eastern part which comprises 60 percent of the land; and a mountain-encircled high plateau in the west (the Altiplano). Most Bolivians live on the plateau, and the capital, La Paz, is also there. Many parts of Bolivia have very high elevations, averaging at 3700 metres.

Basic National Review:[3]

Part of the ancient Inca Empire, Bolivia came under Spanish rule, which lasted for 300 years. Independence was won in 1825, but the country lost much of its territory in a series of wars in the 19th century. Unrest has marred national life in recent years. The reformist government of Paz Estenssore (1951-64) nationalized tin properties and sought to better

the lives of the Indian majority, but was later overthrown by a military "golpe del estado." A variety of coups and countercoups have prevailed in the 1970's and into the '80s.

The Bolivian economy is based on mining, especially tin, lead, zinc, silver, bismuth and antimony. A growing petroleum industry is also important with emphasis being on natural gas. Although there is a good amount of cattle raising, Bolivia is not self-sufficient in foodstuffs. Bolivian trade with the rest of the world funnels through free ports in Chile and on the Amazon River.

Telecommunications Overview:[4]

International Prefixes: CPA-CPZ
Number of Radio Broadcast Stations: 126
" " " Receivers: 500,000
" " " " per hundred: 8.18
" " Television Stations: 2
" " " Receivers: 250,000 (15,000 color)
" " " " per hundred: 4.1
" " Telephones: 49,000
" " " per hundred: .8
Electrical Generation Capacity: 345,000 kW
" Service: 50 and 60 hZ, 120, 220/240 volts
Satellite Earth Stations: Recently installed INTELSAT station at Tiwanacu, on Lake Titicaca
International Communications: Via INTELSAT, HF radiotelephone, terrestrial circuits to neighboring states
Ownership of Communications Media: Government and private
Telecommunications Administration: Direccion General de Telecomunicaciones (GENTEL) La Paz
Television Standard: Systems N and M, PAL color (official), NTSC color
International Telephone Code: 591

Domestic Broadcasting:[5]

(Medium and Short Waves)

City	Number of Transmitters	(kW) Combined Power
La Paz	31	139.75
Santa Cruz	15	20.55
Cochabamba	9	14.25
Trinidad	5	13.5
Oruro	8	12.95
San Ignacio de Velasco	2	11
Montero	3	6.75
Sucre	6	5.25
Yacuiba	4	3.25
Potosi	3	2.25
Siglo Veinte	2	2

(FM)

There are stations in La Paz, Santa Cruz, Cochabamba, Sucre, Tarija and Oruro. These are of low power and limited range.

(Television)

City	Channels	(kW/ERP) Combined Power
La Paz	7	2
Oruro	8,10	1.1
Cochabamba	7,11	.6
Santa Cruz	9	.5
Bermejo	8	.1
Potosi	9	.1
Sucre	12	.1
Tarija	8	.1
Trinidad	10	.1

Trends in Broadcasting:

Bolivia, with its varied and difficult terrain as well as multi-lingual, multi-cultural society, certainly has no easy task in terms of broadcasting. A true development of mass media has been substantially inhibited by these very factors. Radio, however, reaches most of the Bolivian

population and is the most important communications medium. The majority of radio stations are privately owned and operate on a commercial basis. These broadcasters are often small and of limited range, frequently employing both medium and short waves in order to reach greater audiences.[6] Of 126 radio stations, there are only 22 which could be classified as powerful, and the largest of this group have only 10 kW.[7] There are many broadcasters operating with less than 1 kW power.[8] With a large number of stations and the less than fully developed national economy, most broadcast operations only reap modest returns. Other than commercial interests and the government stations, missionary radios - such as La Cruz del Sur - program especially for rural and Indian listeners.[9] Educational programs are also on the air by ERBOL - Esceulas Radiofonicas de Bolivia, which operates five stations throughout the country.[10] In 1974, it was estimated that Bolivian radio reached an average of three million listeners, weekly.[11]

During the post-coup period of July 1980, along with political difficulties and associated labor opposition to the Garcia Meza military government, an anti-junta broadcast system "Democratic Solidarity Radio Network" came on the air.[12] Facilities of several union-owned stations joined together, bringing calls for resistance to the new administration and military security measures.[13]

A substantial portion of broadcast time traditionally has been devoted to music. Television is operated by two organizations, both related to the government. Empresa Nacional de Television Boliviana (ENATV) and Consejo Nacional de Educacion Superior - Universidad Boliviana, have

headquarters in La Paz, and repeaters in the major Bolivian cities.[14] Interestingly enough, each group uses a different television system; ENATV having N, while Consejo Nacional operates in M.[15] Although PAL color is officially listed for use in Bolivia; the educational stations actually send out NTSC signals.[16] As the main difference between systems N and M is the number of scan lines, and thus, minor differences in synchronization, signals from either source can be received on most sets, with slight adjustments. Variations in power line frequencies throughout Bolivia are not, however, conducive to nationwide television. Broadcasts have generally been of a duration of seven hours, daily.[17] TV receivers are beyond the reach of many Bolivians.

Common Carrier Services:

Open-wire lines and radio-relay systems make up the Bolivian national telecoms picture.[18] Principal links extend from La Paz to Sucre (2 gHz), capable of 960 voice circuits and TV programs.[19] Also, important circuits go from Santa Cruz to Yacuiba in the Chaco region, as well as extensions of the microwave to Sucre, Tarija, Potosi and Santa Cruz; each TV capable.[20]

International terrestrial links connect La Paz to Puno, Peru (microwaves spanning Lake Titicaca), which can handle 960 telephone conversations, as well as television; a circuit extends from Santa Cruz to Puerto Suarez, and across the border to Corumba, Brazil.[21] Yacuiba, in the far south, connects with the Argentine city of Tartagal; and a link exists for service between La Paz and Arica, Chile.[22] Internal telephony has been relatively fragmented in past years, and local service is provided by

independent companies.[23] ABET, Asociacion Boliviana de Empresas Telefonicas, serves as a national coordinating agency for common carrier functions, with an eye toward modernization and development.[24] A variety of switching systems are used in Bolivia, including step-by-step, crossbar, motor-uniselector and modern processor-controlled exchanges.[25]

HF radiotelephone and telegraph are used extensively for international services, as well as to parts of the country not reachable by wire.[26] Bolivia recently installed an INTELSAT earth station at Tiwanacu, on Lake Titicaca.[27] This facility brought substantial modernization of the international links and operates via Atlantic Ocean satellites.

In the early 1970's, not more than five percent of the population had access to electric power.[28] This made the reliance on transistor radios rather great and prevented the expansion of television.[29] Most electricity is generated by hydraulic means, and studies have shown great potential in this field.[30] In 1970, 171 MW of a total of 252 MW was generated by hydro installation, with the remainder coming from thermal plants.[31] By 1972, statistics showed that 90 percent of all urban areas had electrical service, as did five percent of rural inhabitants.[32] Even so, 68 percent of Bolivians were still without any form of power.[33] A breakdown of electrical utilization indicates that 47 percent of the total goes to the mining industry, with residential use following at 30 percent.[34] Other sectors consume 23 percent of electrical resources.[35]

The cities of La Paz, Cochabamba, Oruro, Potosi, Santa Cruz, Sucre and Tarija have power systems operating at a line frequency of 50 hZ.[36]

Elsewhere in the country, electricity is supplied at 60 hZ.[37] The major electrical producer is government owned; ENDE - Empresa Nacional de Electricidad.[38] In recent years, interconnection of generating systems has been effected, as well as programs to extend the lines for a more complete national coverage.[39]

Overall Analysis:

Bolivia has a moderately developed broadcasting and common-carrier system; considering the fact that most cities are interconnected via high-capacity microwaves, and that towns of any size have broadcast stations. Connections to smaller towns are difficult or impossible to establish. Problems have existed with international traffic, although the recent addition of the INTELSAT facility has improved this situation.

BOLIVIA

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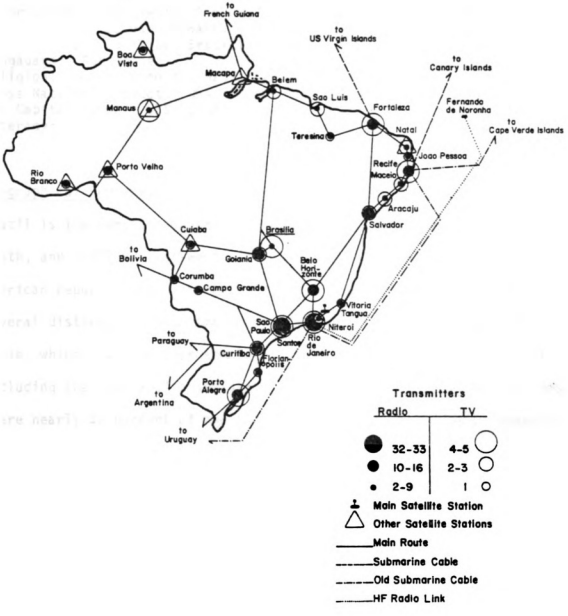
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FIGURE 21

Communication Networks in BRAZIL



BRAZIL

(Republica Federativa do Brasil)

Basic Information:[1]

Area: 8,511,965 kM^2
Population: 115.45 million (1978)
Population Density: 13.56 per kM^2
Capital: Brasilia, (Distrito Federal)
Major Cities: Sao Paulo, Rio de Janeiro, Belo Horizonte, Recife, Salvador (Bahia), Porte Alegre, Fortaleza, Belem, Curitiba, Brasilia
Langauage: Portugese
Religion: Roman Catholic (82%), Protestant sects, others
Gross National Product: US$ 144.92 billion (1978)
Per Capita Income: US$ 1,088
Literacy: 70%

Geographical Summary:[2]

Brazil is the largest country in South America, extending 4,772 kM north-south, and 4,331 kM east-west. The nation borders on all other South American republics, excepting Chile and Ecuador. Brazil is divided into several distinct regions; the north - dominated by the forested Amazon basin, which involves approximately half of the country; the north-east, including the "sertao," a semi-arid scrub plains, the south-central region, where nearly 50 percent of the population lives, and the most productive section; the south - having mixed highlands and pampas, rich in cattle raising. Brazil is truly several worlds; from crowded cities to sparsely populated interior regions, and the communications mixture reflects these differences.

Basic National Review:[3]

Brazil was discovered by the Portuguese and settled in the 16th century.

Colonists developed the country, gradually working their way from the coast to the interior. In 1808, Brazil was proclaimed a kingdom by the Portuguese Court-in-exile, and became an independent Empire on September 7th, 1822. Dom Pedro II, the second emperor, did much to modernize the country and ruled until 1889. At the time of Dom Pedro's abdication, a republic was established, under the name of the United States of Brazil. Getulio Vargas led the country, starting in 1930, and embarked on a program of national integration until 1945. Vargas was president once again, from 1950 to 1954. In a further attempt to unify the country, Brazil's capital was transferred from Rio de Janeiro to centrally-located Brasilia, at tremendous cost in 1960. Four years later, amidst economic, social and political upheaval and extremism, a military administration took control and initiated steps toward stability. A new constitution was ratified in 1967, which sought greater national unity, and renamed the country the Federative Republic of Brazil. In the early 1970's, Brazil underwent phenomenal economic growth with annual increases in the GNP of as much as 14 percent.

Brazil's economy is based on various forms of agriculture, although only four percent of the territory is under cultivation. The world's largest producer of coffee and sugar, Brazil is the third largest cacao exporter. There is also an enormous amount of livestock raising. In recent years, much industrialization has taken place, based on large mineral reserves.

Telecommunications Overview:[4]

International Prefixes: PPA-PYZ, ZVA-ZZZ
Number of Radio Broadcast Stations: 723
" " " Receivers: 35 million
" " " " per hundred: 30.32
" " Television Stations: 58
" " " Receivers: 16 million
" " " " per hundred: 3.86
" " Telephones: 3.99 million
" " " per hundred: 3.45
Electrical Generation Capacity: 22,800,000 kW (1976) Anticipated major expansion of capacity through the Itaipu hydro project
Electrical Service: 50, 60 hZ; 110/127/220 volts
Satellite Earth Stations: INTELSAT major station at Tangua (Rio de Janeiro), also new international station at Natal. Domestic sites in several interior cities
International Communications: Via INTELSAT, HF radio, submarine cables, and terrestrial circuits to adjacent countries
Ownership of Communications Media: Both government and private-commercial
Television Standard: System M, PAL color
International Telephone Code: 55
Telecommunications Administration: DENTEL - Departamento Nacional de Telecomunicacoes (Brasilia, D.F.)

Domestic Broadcasting:[5]

(Medium and Short Waves)

City	Number of Transmitters	(kW) Combined Power
Brasilia	11	1490
Rio de Janeiro	32	935
Sao Paulo	33	743.5
Porte Alegre	15	377
Salvador	11	220
Recife	12	198
Belo Horizonte	11	193.5
Goiania	13	138
Curitiba	16	133
Fortaleza	10	96
Manaus	9	76.5
Belem	6	60
Aracaju	7	48.5
Niteroi	2	35
Vitoria	7	34
Natal	6	33.5
Macapa	6	33.25
Florianopolis	6	32
Porto Velho	7	29
Joao Pessoa	3	21
Boa Vista	2	20
Maceio	6	19
Londrina	11	18.5
Riberao Preto	7	16.5
Campo Grande	3	16
Presidente Prudente	4	16
Rio Branco	3	16
Tefe	3	16
Ilheus	3	15
Santarem	2	15
Blumenau	5	13
Cuiaba	4	13
Anapolis	4	11.5
Governador Valdares	4	11.5
Benjamin Constant	2	11

(FM)

Most major cities have FM transmitters, which are generally low powered and usually repeat the programs of a main frequency or carry music.

(Television)

City	Channels	(kW/ERP) Combined Power
Sao Paulo	2,4,5,7	369.5
Porto Alegre	5,7,10,12	330
Recife	2,6,11,13	185
Belo Horizonte	2,4,7,12	100
Salvador	2,4,5	100
Rio de Janeiro	2,4,6,7,11	47
Brasilia	3,6,8,10	39
Curitiba	4,6,12	20
Uberlandia	8	20
Goiania	2,4,13	15
Fortaleza	2,5,8,10	14
Manaus	2,4,5,8,20	13
Sao Luis	2,4	11
Caxias do Sul	8	10
Juiz de Fora	10	10
Londrina	3	6
Bauru	2	5.7
Maceio	3,7	5
Cuiaba	4	2.5
Campo Grande	6	2
Uberaba	5	2
Vitoria	4	2
Aracaju	4,8	1
Florianopolis	6	1

Trends in Broadcasting:

Brazilian social communications operate on a mixed basis, with both government, educational-cultural and private-commercial stations on the air. Most stations are non-governmentally owned. Several major broadcasters, located in population centers, enjoy nationwide audiences:[6]

City	Station	Ownership	(kW) Power of Primary Frequency
Rio de Janeiro	R. Globo	Private	100
"	R. Tupi	"	100
"	R. Eldorado	"	50
"	R. Ipanema	Government	100
"	R. Nacional	"	100
"	R. Jornal do Brasil	Private	100
"	R. Mundial	"	100
"	R. MEC	Government	100
Sao Paulo	R. Panamericana	Private	50
"	R. Eldorado	"	50
"	R. Excelsior	"	50
"	R. Record	"	50
"	R. Tupi	"	120
"	R. Globo	"	200
Porto Alegre	R. Farroupilha	Private	100
"	R. Gaucha	"	100
"	R. Guaiba	"	50
Recife	R. Clube de Pernambuco	Private	100
Salvador-Bahia	R. Sociedade da Bahia	Private	100
Belo Horizonte	R. Inconfidencia	Private	100
Brasilia	R. Nacional	Government	250 x 3 300 x 2 (one = standby)

Due to the enormous territory of the country and the population settlement tendencies, both medium and short waves are used extensively. It is not uncommon to find a single station with a powerful MW transmitter, as well as several SW frequencies. FM is becoming popular with music-oriented listeners, especially in the larger cities.[7] Broadcast licenses are issued by DENTEL, the government's regulating agency, on technical, geographical, economic and moral bases.[8]

Four major networks interlink a number of stations. RADIOBRAS, the government owned system, serves the nation over facilities in Manaus, Tefe, Boa Vista, Sao Gabriel, Macapa, Benjamin Constant, Porto Velho, Rio de Janeiro,

and Brasilia.[9] REDE GLOBO, Rio de Janeiro, was inaugurated in 1965 and has five major stations, as well as 10 others relaying programs.[10] The rede has networks for both radio and television, with 15 facilities in the latter category.[11] REDE TUPI, headquartered in Sao Paulo, is composed of 19 radio stations and 16 television broadcasters.[12] REI-REDE DE EMISSORAS INDEPENDENTES is led by TV Record, Sao Paulo, and has nine TV affiliates, mostly in the larger cities.[13] DIARIOS E EMISSORAS ASSOCIADOS, formed by the well-known entrepreneur, Assis Chateaubriand, also has a substantial number of properties throughout Brazil.[14]

Using radio for information and literacy training, the national government sends out one and one-half hours of programming each evening. "A Voz do Brasil," produced by the Agencia Nacional, is a news magazine, while "Project Minerva" helps Brazilians learn to read and write.[15] Both programs are retransmitted by most stations in the country.[16]

Social communications are centered on major cities, and this has motivated the need for expansion through RADIOBRAS. More and more regional transmitters have been added in remote parts of the country, helping to further inform and integrate all people. Listening and viewing takes place in many different situations; individually, in groups and even in public places. It is not uncommon to find a group of Brazilians enjoying television programs in a home, or for broadcasts to be consumed along with a meal in a cafe. Radio especially has a far reach, entering into almost every part of the huge nation. As is the case elsewhere, Brazilian radio stations tend to specialize on areas of coverage. Consequently, we find that audiences select a favorite voice and very often stay with it.

Freedom of speech and expression are guaranteed by the 1967 Constitution.[17] At the same time, this legislation urges responsibility in public entertainment, underscores the right of reply, and encourages good judgment in matters which might offend on a religious or racial basis.[18] Individuals engaged in the production of pornographic or sexually explicit materials may be criminally liable.[19]

Most private broadcasting is financed by sales of commercial airtime. In 1975, television accounted for 38.63 percent of advertising investment, and radio held 18.74 percent, or a total of 57.37 for the electronic media.[20] By law, radio commercial time is limited to 15 minutes per hour.[21] Television advertising is very expensive, costing over US$ 2,000 for a 30 second spot.[22] This limits TV to the larger enterprises. Broadcast media ownership tends to be centralized, and it is not infrequent that large newspapers may have radio and television stations, or vice-versa.[23] The Rio daily, O Globo, is affiliated with Radio Globo (and the network), as well as several other powerful stations in the city.[24] Likewise, the Jornal do Brasil operates a large broadcast station.[25] This situation may be found in other cities as well.

Production facilities vary in capability, but the larger metropolitan stations generally are well equipped.[26] Brazil produces many of its own television programs, and almost all in the case of radio. Nevertheless, imported TV fare is very popular, as are foreign-made films. In previous years, TV Globo carried a Portuguese-language version of "Sesame Street."[27] Internationally-known films such as "O Tubarao" ("Jaws"); "O Poderoso Chefao" ("The Godfather"); "...E O Vento Levou" ("Gone With the Wind");

Inferno Na Torre ("Towering Inferno"); and "O Destino do Poseidon" ("The Poseidon Adventure") have all met with success in Brazil.[28]

Religious organizations frequently operate local radio stations, and in 1974, nearly 200 broadcast facilities fell under this category.[29] Radio Vera Cruz of Rio de Janeiro is the best-known Church station.[30]

A peculiar situation is the presence of a large number of unlicensed radio stations throughout the country.[31] In the past, some of these transmitters have been used for a variety of purposes, such as warning interior farmers of the pending arrival of tax collectors.[32] Although not especially a serious problem, DENTEL and other government agencies have sought to triangulate as many of these operators as possible.[33]

In 1972, Radio Nacional de Brasilia, located in the federal capital, undertook experimental overseas transmissions using domestic shortwave facilities (10 kW).[34] When tremendous response was received in the form of international correspondence, plans were laid out to begin a full-fledged external service.[35] Two years later, Radio Nacional acquired a 250 kW Swiss-made (Brown Boveri) shortwave transmitter, as well as two 300 kW medium-wave units.[36] At that time, it was anticipated that a total of nine SW senders would be installed at various points throughout the country, in order to serve distant target areas.[37] The initial transmitters were located at Parque Rodeador, some 55 kM from Brasilia, and the SW unit was associated with a specially-made rhombic antenna.[38] RNB's powerful MW outlets were intended for domestic programming, and the 300 kW strong signals went out on 980 kHz.[39] For a period of time, the MW transmitter was utilized as

an aero beacon for the federal capital during daytime hours.[40]

At first, overseas programs were begun in Portuguese, English, German, and Spanish.[41] Later reductions became necessary, including the temporary closure of Radio Nacional's international programming in 1977.[42] The powerful facilities were redirected towards internal, Amazonian audiences, who at times were without reliable reception.[43] After improvements were made in the domestic network, Radio Nacional resumed its overseas service in June of 1979, programming in English.[44] A second and third 250 kW transmitter have since been added at Parque Rodeador, and RNB services continue to improve in strength and quality.[45] Materials carried are designed to reflect current life in Brazil, as well as to acquaint listeners with the national culture.[46] If RNB's large-scale plans come about, we should not be surprised to hear much more from Brasilia.

Common Carrier Services:

Telecommunications technologies were brought to Brazil as soon as they were invented. The telegraph found immediate use, linking the vast country in the days of the Empire, and even participated in the war with Paraguay.[47] Dom Pedro II personally participated in one of Alexander Graham Bell's demonstrations of the nascent telephone at the 1876 Exposition in Boston. The Emperor remarked after holding the crude instrument to his ear: "My God, it talks!" Consequently, Dom Pedro asked that telephones by installed at the imperial palace and summer palace. These instruments, made by Bell himself, can still be seen, occupying a place of honor on the Emperor's desk.[48]

Until 1966, foreign concessions operated most communications in Brazil.[49] In that year, the largest companies were purchased by the federal government, following the Brazilian Telecommunications Code of 1962, which had stipulated government ownership of communications.[50] Subsequently, CONTEL, the National Telecommunications Council, was created, which in 1967, was replaced by the Ministry of Communications.[51]

By terms of the Telecoms Code, trunk services must be operated by the federal government.[52] For this purpose, EMBRATEL, or Empresa Brasileira de Telecomunicacoes, was created.[53] When EMBRATEL was formed, communications services were rather obsolete and haphazard. Some 877 small companies existed, but were unable to make necessary modernization due to the costs involved.[54] The majority of these mini-companies then joined TELEBRAS, a government holding company associated with EMBRATEL.[55] Some 51 percent of the stock in EMBRATEL is owned directly by the federal government of Brazil.[56] In 1972, EMBRATEL became a subsidiary of TELEBRAS, which itself operates under direct orders of the Ministry of Communications.[57] Financing is accomplished through the National Telecommunications Fund.[58]

Under Decree-Law No. 5792 of 1972, TELEBRAS is responsible for:[59]

a) Managing the resources of the National Telecommunications Fund.
b) Orienting and coordinating the growth of telecommunications in Brazil.
c) Acceleration of the national production of telecom equipment.

TELEBRAS may be compared with the operating company part of ATT, in the U.S., being composed of 26 subsidiaries, each serving a specific geographical region.[60] EMBRATEL, on the other hand, could be put into the

same category as ATT Long Lines; e.g. - providing the necessary trunk connections and facilities.[61]

In order to cover the vast expanse of the Brazilian nation, EMBRATEL has put into operation a sophisticated network, consisting of landlines, microwaves in visibility, tropospheric scatter and HF radio.[62] Along with this, appropriate switching and routing centers have been provided. National trunk routes may be roughly divided into four sections: South and South-Central - Porto-Alegre-Florianopolis-Curitiba-Sao Paulo-Rio de Janerio-Belo Horizonte-Vitoria; Northern Litoral - Vitoria-Salvador-Aracaju-Maceio-Recife-Joao Pessoa-Natal-Fortaleza-Sao Luis-Belem; Central - Belo Horizonte and Sao Paulo to Brasilia, leading to Belem and to Goiania, from where an extension goes onto Cuiaba; Interior - Cuiaba-Porto Velho- and Rio Branco-Manaus-Macapa, connecting with Belem.[63] In this way, the greater part of Brazil is effectively linked together.

As indicated earlier, the local telephone service is provided by regional organizations, all being part of the TELEBRAS group. More and more automatic equipment is being introduced, much of which is manufactured in Brazil. This includes modern, processor-controlled switching. Automatic DDD - Direct Distance Dialling is available between many Brazilian cities, based on a multi-digit zone code.[64] Likewise, DDI - Direct International Dialling, via EMBRATEL's new center in Rio de Janeiro, is provided to subscribers in major metropolitan areas.[65] Extensive telegraphic, telex and data transmission facilities are also available.[66] Much of the telex traffic is now automatic, and data channels can handle speeds of 4800 bits per second (synchronous operation).[67] There are approximately

four million telephones in the country, which represents a considerable improvement over the situation of days past.[68] TELEBRAS hopes to further increase this number of instruments as finances and technical resources permit.

(Brazilian Telephone Zone Codes)[69]

City	Code
Belem	91
Belo Horizonte	31
Brasilia, D.F.	61
Campinas	192
Curititiba	412
Florianopolis	482
Fortaleza	85
Goiania	62
Juiz de Fora	32
Londrina	432
Petropolis	242
Porto Alegre	512
Recife	81
Riberao Preto	166
Rio de Janeiro	21
Salvador (Bahia)	71
Sao Jose dos Campos	123
Santos	132
Sao Paulo	11
Vitoria	27

In many instances, the national EMBRATEL trunks are multi-purpose, permitting a variety of services over the same routes, including television. Broadcast signals are routed between cities on the coast and central regions, as well as to some northern points.[70] There are 28 TV control centers involved in this network[71] Manual routing is employed for television signals via EMBRATEL centers.[72] Besides broadcast TV, closed-circuit visual links are also possible.[73] These are useful for teleconferences, education and other matters.[74]

Because of forbidding terrain in certain parts of Brazil, which makes ordinary links very difficult, EMBRATEL has installed domestic satellite terminals.[75] At present, these are located in the cities of Boa Vista, Manaus, Cuiaba, Macapa, Porto Velho and Rio Branco, and connect with the central Tangua earth station near Rio de Janeiro.[76] A leased INTELSAT transponder is utilized, permitting television and 80 telephonic channels, via non-standard receivers.[77] Consideration has been given to the mounting of additional earth stations, as the technology represents a modern and efficient means of keeping contacts open with remote areas. Brazil has devoted a great deal of time and effort to satellite-use research as it suits national needs. Besides the EMBRATEL work, various institutions have investigated satellites; such as the INPE - Instituto Nacional de Pesquisas Espaciais, which cooperated with NASA in the area of direct-space-to-home reception (ATS-6 satellite), and tested Brazilian-designed television receivers for this technique.[78]

International circuits are provided via microwaves and landline to neighboring states; notably from Porto Alegre to Punta del Este, Uruguay, and on to Buenos Aires; Curitiba to Puerto Presidente Stroessner (Paraguay); and Corumba to Puerto Suarez, Bolivia.[79] Troposcatter connects Macapa with Cayenne, French Guiana.[80] HF radiotelephone is also used for paths to Bolivia, Paraguay and Uruguay, as well as for occasional circuits elsewhere.[81] Two high quality submarine cables link Brazil with Europe and North America; notably BRACAN - which runs from Recife to the Canary Islands, and hence to continental Spain; and BRUS - linking Fortaleza with St. Thomas, Virgin Islands, and on to Florida.[82] Both cables are coaxial, and equipped with modern multiplexing equipment.[83] BRACAN is capable of

160 telephone channels and has 137 repeaters.[84] BRUS, on the other hand, has 600 voice circuits.[85]

The Tangua international satellite station works with the INTELSAT Atlantic Ocean units and has two 32 metre antennae.[86] There are approximately 300 overseas satellite channels, as well as dedicated television circuits.[87] Direct contacts are maintained with: Federal Germany, Argentina, Canada, Chile, Colombia, Spain, the U.S.A., France, England, Israel, Italy, Japan, Mexico, Norway, Panama, Peru, Portugal, Switzerland, Uruguay, Venezuela and Sweden.[88] There are also 12 addressable circuits via the international SPADE access system.[89] Of course, trunked connections are possible via third parties. All overseas circuits are routed via EMBRATEL's 1500 line processor-controlled Metaconta exchange in Rio de Janeiro.[90] Frequent international television exchanges take place via the Tangua facilities. A secondary international earth station was recently constructed at Natal on the northern Atlantic coast.[91] This serves to handle major path demand.

Electrical energy plays a vital role in the modernization of Brazil. Consequently, great importance has been given to it by government and industry. Under the auspices of ELECTROBRAS, the national electro-energy concern, interconnection of power networks has been undertaken, providing reliable sources of electricity throughout Brazil.[92] At last count, the country had an installed generating capacity of 19,578 megawatts; with 16,193 MW coming from hydroelectric plants, and the remainder from various thermal sources.[93] Brazil has an enormous hydro potential and has done much to exploit it.[94] Representative of this is the mammoth joint

Brazilian-Paraguayan project at Itaipu on the Parana River.[95] This dam will have a capacity of over 10 million kilowatts.[96]

Nuclear energy has also been tapped, with the construction of the multi-unit power plant an Angra dos Reis near Rio.[97] The first reactor uses a pressurized water system (PWR) and three percent enriched uranium pellets.[98] A thermal potential of 1,876 MW exists, although Angra I is presently used at the 600 MW level.[99] Within the next few years, steps two and three of the Angra project will be commissioned, making use of enriched uranium and heavy water.[100] Both of the new units will produce 1,300 MW each, greatly assisting the central, industrial region with power requirements.[101]

Overall Analysis:

Brazil has one of the most developed radio broadcast systems in the world and reaches most parts of the national territory. More remote regions are served via a combination of local transmitters and high-powered short-wave. Television extends to the major cities and is expanding rapidly.

Common carrier communications are also developing at a hectic pace, and while not all areas are yet served adequately, the gap is narrowing. Populated regions are served with relatively modern and efficient systems.

Overseas connections are among the best in the world, especially via satellite and undersea cable. Direct international dialling is available to subscribers in many areas. Brazil has, without a doubt, recognized the

inherent importance of telecommunications to its development, and is therefore encouraging suitable progress, as with any section of the society as a whole.

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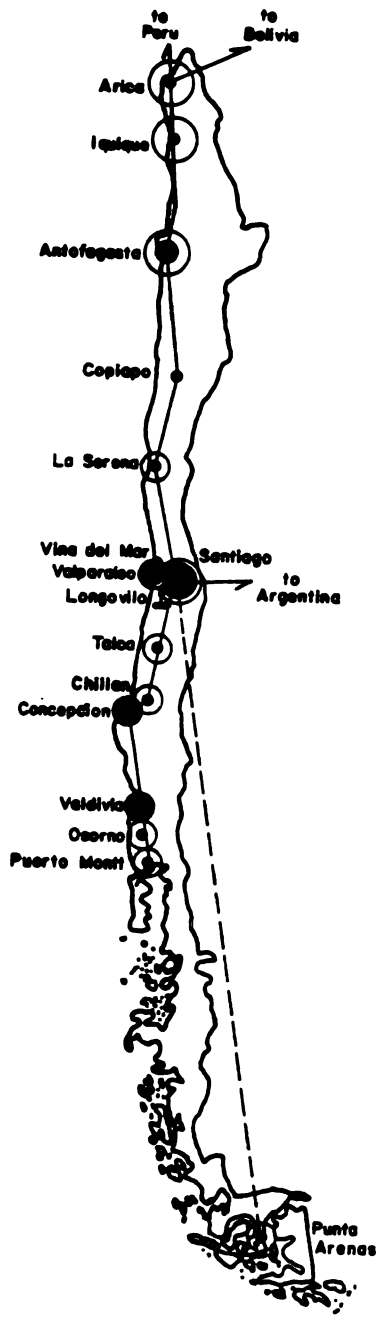
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FIGURE 22



Communication Networks
in
CHILE

Transmitters

Radio	TV
33	2-3
6-9	1
2-4	

Satellite Station
Main Route
Domestic Satellite Link

CHILE

(Republica de Chile)

Basic Information:[1]

Area: 756,945 kM^2
Population: 10.88 million
Population Density: 14.4 per kM^2
Capital: Santiago de Chile
Major Cities: Santiago, Valparaiso, Vina del Mar, Concepcion, Talcahuano
Language: Spanish
Religion: Roman Catholic, some Protestant
Gross National Product: US$ 11.1 billion (1974)
Per Capita Income: US$ 1,020
Literacy: 90 percent

Geographical Summary:[2]

Sandwiched between the high Andes mountains and the Pacific, Chile shares frontiers with the nations of Peru, Bolivia and Argentina. Approximately 2,900 kM in length and varying in width from 160 to 400 kM, one third of Chile is mountainous. The north holds the Atacama Desert, located between the Andes and coastal ranges. Central Chile has a long valley where much of the population lives. Farther south, a rugged and lesser populated region exists, which is currently a target for exploration and development. At South America's tip is the city of Puerto Williams, which also happens to be the southern-most city in the world. Some islands associated with Cape Horn also belong to Chile, as do the Juan Fernandez Isles and Easter Island, which is situated over 3,000 kM from the mainland.

Basic National Review:[3]

Long under Inca rule, Chile became a colony of Spain in the 16th century

and remained in this state until 1818. Chile defeated Bolivia and Peru in the 19th century War of the Pacific, winning valuable northern territories. Frequent attempts at social and economic reform took place throughout the early 1900's. Christian Democrat leader Eduardo Frei Montalva was elected in 1964 and effected many reforms. In 1970, Salvador Allende Gossens, a Marxist, became Chilean president. The Allende government undertook nationalization of foreign companies and did improve conditions for the very poor. Internal and external economic difficulties, as well as actions by political factions, eventually alienated many Chileans, leading to a military coup d'etat on September 11th, 1973. At that time, Allende committed suicide. The new government made substantial changes and stabilized rampant inflation, as well as doing away with serious shortages.

The Chilean economy is based upon rich mineral resources, especially copper and phosphates. Much of the world's iodine comes from Chile. The country also has large iron and coal deposits. Agriculture is important, especially that of the central valley region. There is much wheat growing, as well as fruit and vegetable production.

Telecommunications Overview:[4]

International Prefixes: CAA-CEZ, XQA-XRZ, 3GA-3GZ
Number of Radio Broadcast Stations: 140
" " " Receivers: 3.1 million
" " " " per hundred: 28.4
" " Television Stations: 5
" " " Receivers: 1.21 million
" " " " per hundred: 11.12
" " Telephones: 473,435
" " " per hundred: 4.35
Electrical Generation Capacity: 2,700,000 kW
" Service: 50 hZ, 220/380 volts
Satellite Earth Stations: INTELSAT station at Longovilo. Domestic station at Punta Arenas
International Communications: Land links to neighboring countries, HF radio, INTELSAT
Ownership of Communications Media: Government and private-commercial
Television Standard: System M, NTSC color
International Telephone Code: 56
Telecommunications Administration: Superintendencia de Servicios Electricos, de Gas y de Telecomunicaciones (Santiago de Chile)

Domestic Broadcasting:[5]

(Medium and Short Waves)

City	Number of Transmitters	(kW) Combined Power
Santiago	33	742.25
Concepcion	9	44.25
Antofagasta	9	34.25
Valparaiso	9	30.25
Valdivia	6	23.5
Punta Arenas	4	13
Vina del Mar	4	13
Temuco	5	12.75
Arica	4	12.4
Iquique	3	12
Osorno	3	12
Talca	3	7
Chillan	3	3
La Serena	3	3
Puerto Montt	2	2.5
Calama	2	2
Coyhaique	2	2
Talcahuano	2	2
Victoria	2	2
Los Angeles	2	1.25
Linares	1	1
Puerto Williams	1	1

(FM)

Stations exist in Santiago, Vina del Mar, Arica, Concepcion, Talcahuano, Valparaiso and Quillota.

(Television)

City	Channels	Networks	(kW/ERP) Combined Power
Santiago	7,9,13	TVN,UDC,UCC	114
El Roble	2	TVN	46
Concepcion	5	UCC	20
Talca	10	TVN	19
Chillan	6	TVN	15
San Fernando	3,5	TVN,UCC	14.4
Talcahuano	4	TVN	13.6
Antofagasta	3,6	TVN,UDN	11.6
Osorno	6	TVN	11
Puerto Montt	4	TVN	11
Temuco	5	TVN	7.4
Arica	5,10	TVN,UDN	7.1
Punta Arenas	6	TVN	7
Valdivia	3	TVN	6.2
La Serena	4	TVN	5.5
Iquique	10,12	TVN,UDN	4.7
Vallenar	12	TVN	2.4
Valparaiso	4,6	TVN,UCV	2.4
Maria Elena	7	TVN	2.3
Salvador	10	TVN	2

(Networks):

TVN: Television Nacional de Chile
UDC: Universidad de Chile
UCC: Universidad Catolica de Chile
UDN: Universidad del Norte
UCV: Universidad Catolica de Valparaiso

Trends in Broadcasting:

Social communications in the Republic of Chile began on a pattern similar to that of the U.S.A. and other western hemisphere nations, that being mostly commercial. Broadcasting is authorized under the Ley de Servicios Electricos, by which it was established that the government of Chile is

the owner of all frequencies.[6] Licenses are issued by the telecommunications administration. Many stations employ sets of frequencies in both the medium and shortwaves, in order to effectively cover this mountainous and varying country. Radio is the most important national medium, reaching into more than 90 percent of all homes.[7] Most towns and cities have at least one broadcast station, assuring nationwide coverage.[8] Major facilities include:[9]

City	Station	(kW) Primary Transmission Power
All in Santiago	R. Agricultura	50
	R. Chilena	50
	R. Cooperative Vitalicia	75
	R. Nuevo Mundo	50
	R. Mineria	50
	R. Nacional de Chile	100
	R. Diego Portales	50
	R. Universidad Tecnica	25
	R. Colo Colo	50

Many stations have shortwave transmitters, some of which are quite powerful. Among the outlets of major importance, there are:[10]

R. Universidad	Concepcion:	10 kW
R. Nacional de Chile	Santiago:	3 x 10, 2 x 30, 2 x 100 kW
R. Diego Portales	Santiago:	10 kW
R. Agricultura	Santiago:	10 kW
R. Cooperative Vitalicia:		10 kW

Television began in 1962, at the time of the World Cup Competitions in Santiago.[11] Three national universities were authorized to establish TV facilities.[12] Later on, under auspices of the Corporacion de Fomento de la Produccion (CORFO), Television Nacional de Chile, a quasi-governmental organization, was set up.[13] From the start, Chilean television has been directed along the lines of educational, didactic and cultural programming.[14] A variety of school classes are routinely telecast, as well as

supplemental materials designed to aid teachers. Typically, school programs are sent out in the morning hours on weekdays.[15] Topics frequently dealt with include: social science, natural science, mathematics, physics, and instructional improvement.[16] At other times, entertainment and informative programs are broadcast.

At present, five organizations contribute to Chilean television.[17] Television Nacional de Chile, the aforementioned government network, maintains a substantial relay system, connected by microwaves throughout the country.[18] The Universidad de Chile, based in Santiago, has a powerful station in the capital as well as a repeater in the port city of Valparaiso.[19] A coeval organization, Universidad Catolica de Chile, also in Santiago, has a small network; with stations in the capital, San Fernando and Concepcion.[20] The Universidad del Norte, located in Santiago, but serving the north, maintains transmitters in the distant cities of Antofagasta, Arica and Iquique.[21] Most recently, the Universidad Catolica de Valparaiso came on the air, serving that particular city.[22]

Under the Allende regime, an attempt was made to nationalize or control the media as much as possible.[23] Although this could never be fully carried out, several stations did align themselves with the government in its social and political ideals. At the time of the coming to power of the military administration in 1973, some pro-Allende stations broadcast messages from the Moneda Palace (presidential office), but the new leaders made it clear that this collaboration would not be tolerated.[24] After Radios Corporacion and Portales were taken off the air by the armed forces, Salvador Allende made his last remarks over Santiago's Radio Magellanes,

operating via portable equipment.[25]

It has been suggested by outside sources that powerful, mobile transmitters were in the hands of the military prior to and during the coup, which permitted a greater reliability for the new government's messages.[26] Accusations have been made that these same facilities were later used for the jamming of hostile, international broadcasts.[27] Whatever the case, it is certain that with the end of the Allende administration, various sweeping changes came about in the Chilean media. Stations which had supported the Marxists came under new management or joined government networks.[28] Broadcast regulations were also strengthened at the very critical post-coup time.

Information later released by the Chilean government shows that the Unidad Popular (Allende's political movement) had worked out extensive plans for the eventual taking of complete power in the country. Included in these documents were special details for the use of the media for public information and special instructions to agents. Quoting in translation from government documents:[29] "Musical Codes: State of the mobilization will be announced by "Radio Corporacion" transmitting the following musical codes:

ALERT 1: ADAMO: any of the songs interpreted by this singer will be broadcast according to the following schedule: 6 hrs. A.M.; 9; 13; 16; 19; 22; 0; 3. Each hour, the song will be changed, but always will be interpreted by ADAMO.

ALERT 2: LEONARDO FAVIO: any of the songs interpreted by this singer will be broadcast according to the following schedule: 6 hrs. A.M.; 9; 13; 16; 19; 22; 0; 3. Each hour, the song will be changed but there will always be one interpreted by LEONARDO FAVIO.

Further quoting in translation from documents captured from Unidad Popular offices by the Chilean authorities:[30] "F-1.-The CIR will apply a plan for broadcast transmission with the utilization of commercial radios controlled or with our own transmitters prepared especially for ZETA (Annex: plan 4-F-1); F-2.-L-6 will apply plans for the occupation and protection of broadcast stations found in Santiago, Valparaiso, Concepcion and Antofagasta (annex: plans 4-F-2); F-3.-Will put into function on an immediate basis an autonomous system of national communication by radio equipment, following previous plans (annex: plan 4-F-3); -4.-Will apply an immediate connection of communications systems and trunks in urban and regional areas, in accord with regional and zonal plans." Needless to say, the plans of the Unidad Popular did not come to fruition owing to the "golpe militar" of the 11th of September, 1973.

Chile today is the target of Spanish-language shortwave transmissions coming from a variety of sources, especially socialist countries. Radio Habana Cuba has sent out "De Chile y Para Chile" ever since 1973.[31] From the Soviet Union, a new "Radio Magellanes" calls Chileans, using very powerful transmitters. Regular Radio Moscow programs, such as "Escucha, Chile..." are also received.[32] Of course, other stations call in this general direction as well.

Radio Magellanes and special programs on Radio Moscow also serve as a "home service" for Chileans in exile, throughout the world.[33] Many broadcasts are devoted to revolutionary theme songs of the Unidad Popular, statements of solidarity, interviews, reports of missing persons, and

other materials. Denunciations of the Pinochet administration find a prominent place on the radios.

Although a target nation for international radio, Chile has its own worldwide voice, and certainly spares no lungpower to have its message heard. Radio Nacional de Chile's "La Voz de Chile" uses shortwave transmitters located near Santiago.[34] Programs are in Arabic, English, French, German, Italian and Spanish, with powers of 10, 30 and 100 kilowatts.[35] Normally, each language segment lasts for half an hour.[36] Extensive use of taped material is made, evidently with a well-coordinated master control system.[37] Programs are consequently taped in advance and repeated at appropriate intervals. On occasion, an incorrect tape has been played, but since 1977, "La Voz de Chile" has steadily improved the quality of production, as well as technical delivery.[38] Beautiful and addicting Chilean music is played between language segments. The typical program consists of extensive actualities and commentaries, stating the infrequently heard Chilean point-of-view. There are few topics which "La Voz de Chile" will not tackle.[39]

Common Carrier Services:

In order to develop a national communications service, ENTEL (Empresa Nacional de Telecommunicaciones, S.A.) was formed in 1970.[40] In conjunction with other common carriers, it began a renovation of existing facilities and the addition of many new ones. Considering the difficult geographical expanse of the Chilean nation, many problems were encountered in providing suitable service to all areas. Initially, HF radiotelephone links were used to connect the capital with more remote cities, such as

Arica, Iquique, Antofagasta, Puerto Montt, and Coyhaique.[41] Also, VHF equipment was deployed to connect Puerto Montt with Chiloe Island locations, and linking Santiago with Concepcion.[42] Microwave circuits were established as soon as possible and now link most points in Chile.[43] Some 40 terminal stations are involved in this network with a capacity of 960 telephone channels per carrier, as well as television.[44] Nationwide STD is possible using the following codes:[45]

City	Code
Concepcion	42
San Bernardo	2
Santiago	2
Talcahuano	42
Valparaiso	31
Vina del Mar	31

Principal microwave links are from Arica to Iquique, continuing to Antofagasta, Copiapo, La Serena and Santiago.[46] Most radio relay and microwave stations are situated appropriately atop high mountains and plateaus.[47] This permits maximum efficiency with minimum physical plant requirements.

Some internal telegraphic activity is carried out on lines pertaining to the Chilean State Telegraph Company, as well as the national railways, which use extensive wire-line and radio equipment between many points.[48] The rail line also maintains its own, comprehensive telephone network.[49]

A domestic satellite earth station (INTELSAT) was placed at Punta Arenas in the extreme south.[50] Using leased transponder capacity, adequate communications with the rest of Chile are maintained.

International communications are affected via microwave from Arica, to Temuco (Peru); Arica to La Paz (Bolivia); and Santiago to Mendoza (Argentina).[51] It is interesting to note that the first news of the 1973 coup d'etat was reported over the direct-dial circuit to Mendoza, while all other lines had been cut.[52] Trunked connections through these circuits to the rest of South America are possible.

An INTELSAT earth station is located at Longovilo, southwest of Santiago, and associated with Atlantic Ocean satellites.[53] A 30 metre Cassegrain antenna is used for international circuits, as well as an additional "dish" for domestic purposes.[54] Direct international dialling is possible to and from several countries, via the ENTEL trunk exchange in Santiago. Approximately 80 satellite channels are maintained, in contact with France, Federal Germany, Italy, Spain, Argentina, Brazil, Canada, Colombia, Ecuador, Mexico, Panama, Peru, the U.S.A., Uruguay and Venezuela.[55] HF radio is also used on some paths, emanating from the Batuco station near the capital.[56]

Electrical services in Chile are under the direction of ENDESA, a governmental-owned organization which has seen to the interconnection of many national generating plants, and produces most of the power in the country.[57] Chile has a very large hydroelectric capability, which is used to generate approximately 50 percent of the total demand.[58] Thermal (coal and other) plants produce the remainder, some of which are owned by particular mining companies.[59] Most populated sections of the country have adequate electrical services, although the demand has been rising.[60] Major plants include Rio Papel, with 280 MW; Lake Laja (Nuble

Province) - 400 MW; and the large, 650 MW coal-fired thermal station at Bacamina, Concepcion Province.[61]

Overall Analysis:

Chile possesses a well developed national communications system, especially in terms of broadcasting. Receiver concentration statistics show that Chile is certainly among the top nations in Latin America, in social communications. Common-carrier links to major cities and international circuits are excellent. Television does not yet cover the entire country, but may be expected to be upgraded within the scope of population and economic trends. Domestic satellite installations have added a helping hand in contacts with distant settlements, considering the terrestrial impediments to growth and integration.

CHILE

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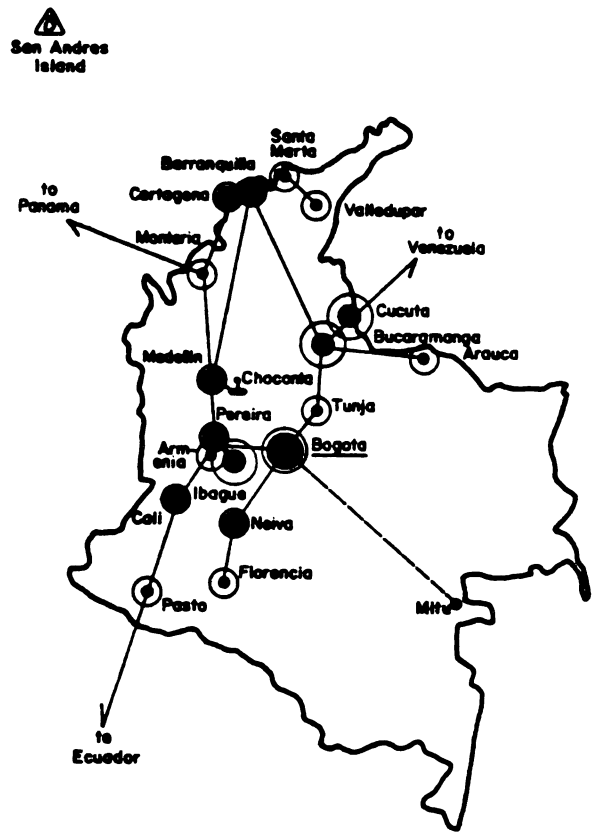
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FIGURE 23

Communication Networks in COLOMBIA



COLOMBIA

(Republica de Colombia)

Basic Information:[1]

Area: 1,138,914 kM^2
Population: 25.8 million
Population Density: 22.7 per kM^2
Capital: Bogota
Major Cities: Bogota, Medellin, Cali, Barranquilla, Cartagena, Bucaramanga
Language: Spanish
Religions: Roman Catholic, some Protestant
Gross National Product: US$ 15.4 billion (1976)
Per Capita Income: US$ 597
Literacy: 78 percent

Geographical Summary:[2]

Located on the northwest corner of South America, Colombia borders on both the Caribbean and Pacific. Frontiers are shared with Venezuela, Brazil, Peru, Ecuador and Panama. In western Colombia, segments of the Andes run north-south, with many corresponding valleys. The eastern section is jungle plain, with the rivers Amazon and Orinoco. An eastern section is very fertile and with its valley, holds most of the population. Communications are by no means simple in Colombia, owing to varied terrain.

Basic National Review:[3]

A Spanish colony for 300 years, Colombia won its independence in 1819. The Republic of Greater Colombia was formed, including Ecuador, Panama and other territories. This lasted until 1830, when separate nations resulted. During the late 19th century, an intense civil war occurred, with over 100,000 deaths and virtual ruin of the economy. With help of the U.S.A., Panama declared its independence from Colombia in 1903.

Political instability from the 1940's onward has made life difficult, with a more peaceful situation gradually forming. In 1969, Colombia joined the Andean Common Market.

Most of the population is supported by farming and cattle raising, although only a small percentage of the territory is actually cultivated. The principal crop is coffee, of a mild variety which does not compete with the Brazilian crioulo type. Manufacturing, such as food-processing, beverages, textiles and mineral industries are also important. Colombia is the third largest oil producer in Latin America, and holds rich deposits of platinum, emeralds and other materials. Forms of silviculture are also important.

Telecommunications Overview:[4]

International Prefixes: HJA-HKZ, 5JA-5KZ
Number of Radio Broadcast Stations: 293
" " " Receivers: 3 million
" " " " per hundred: 11.6
" " Television Stations: 28
" " " Receivers: 1.7 million
" " " " per hundred: 6.6
" " Telephones: 1,295,860
" " " per hundred: 5.0
Electrical Generation Capacity: 3,300,000 kW
Electrical Service: 60 hZ, 110/220 volts
Satellite Earth Stations: INTELSAT station at Choconta. Domestic terminal at San Andres
International Communications: Via INTELSAT, HF radio and terrestrial links
Ownership of Communications Media: Both government and private-commercial
Television Standard: System M, NTSC color (monochrome at present)
International Telephone Code: 57
Telecommunications Administration: Ministerio de Comunicaciones
Direccion General de Radiocomunicaciones (Bogota)

Domestic Broadcasting:[5]

(Medium and Short Waves)

City	Number of Transmitters	(kW) Combined Power
Bogota	51	1,122
Medellin	29	400
Cali	28	389
Barranquilla	16	210
Magangue	4	127
Zambrano	1	100
Cucuta	9	98.5
Bucaramanga	12	71
Manizales	9	69
Villavicencio	12	61
Cartagena	12	57
Neiva	9	55.5
Tunja	6	55
Santa Marta	7	54.5
Pereira	9	50
Ibague	8	49
Valledupar	6	45
Monteria	6	37
Pasto	5	32
El Sulia	1	30
Armenia	6	24
Barrancabermeja	5	22
Espinal	3	21
Florencia	5	16
Arauca	3	13.5
Duitama	3	12
Santa Barbara	2	11

(FM)

There are stations in all major cities and many towns.

(Television)

City	National Networks	Channels	(kW/ERP) Combined Power
San Lorenzo	1	2	900
Padre Amaya	1,2	3,13	610
Tibito	1,2,3	3,5,13	601.95
Jurisdicciones	1	6	600
Saboya	1	13	600
Pan de Azucar	1,2	8.13	220
Manjui	1,2,3	7,9,11	120
El Ruiz	1,2	10,12	110
Cerro Neiva	1,2	10,12	100.6
Carman de Bolivar	1	9	100
Monteria	1	7	100
Galeras	1	12	80
La Rusia	1	10	50
Munchique	1	10	40
Cerro Kennedy	1	12	25
La Popa	1	7	25
Madrono	1	9	20
Planadas	1	4	20

(All networks belong to INRAVISION)

Trends in Broadcasting:

Colombia has a very interesting broadcast system, mixing state and private interests in radio, and a government-operated TV network, which also carries commercial announcements. The electronic media are regulated and encouraged by an official organization, INTRAVISION (Instituto Nacional de Radio y Television).[6] It is rare to find a town which does not have at least one radio station and a large number of television transmitters have been installed in order to serve most parts of this nation.[7] It should be noted that Colombian television transmitters are among the most powerful in the world, frequently located atop high mountains, in order to penetrate into valleys and hop ranges.[8]

By legislation, the electromagnetic spectrum is at the disposal of the national government, and consequently, stations may be called up in terms of need.[9] Likewise, a number of hours each week may be set aside for the transmission of cultural and educational programming.[10] Also, the ownership and operation of broadcast facilities is a privilege reserved only for Colombian citizens, and stations are encouraged to air the works of national artistes.[11]

The battery-powered transistor receiver has played an important role in making radio a potent force in Colombian society.[12] At last count, there was a radio audience of approximately 20 million; compared with a potential of 7.5 million for television.[13]

Other than independent radio broadcast stations, there are several networks serving Colombia. These include: CARACOL (Primera Cadena Radial Colombiana), with 30 stations; TODELAR (Circuito Todelar de Colombia), having nine affiliates; RCH (Radio Cadena Nacional) - 42 stations; SUPER RADIO - with 28 members; RADIO SUTATENZA/ACP - 5 stations; RADIO SISTEMA RADIAL: CARAS (Cadena Radial Sanmiguel); CADENA LIDER DE COLOMBIA: and CORAL (Corporacion Radial Colombiana) - each with two affiliates.[14] These networks are centered in Bogota, Cali, Medellin and Barranquilla.[15] Flagship stations are often very powerful and have duplicate frequencies on the shortwaves. Major stations include:[16]

Radio Nacional	Bogota	100 kW
Radio Sutatenza	Medellin	100 kW
Radio Libertad	Barranquilla	50 kW
Radio Nacional	Zambrano	100 kW
Radio Sutatenza	Cali	120 kW
Radio Sutatenza	Bogota	250 kW
Radio Melodia	Bogota	50 kW
La Voz de Antioquia	Medellin	50 kW
La Voz del Rio Cauca	Cauca	50 kW
Emissora Neuvo Mundo	Bogota	50 kW
Radio Sutatenza	Magangue	120 kW

Television is administered on a slightly different basis than radio. Instead of having several independent systems, a nationwide network is operated by INRAVISION, which then makes time available for commercial program contractors, through competitive bidding.[17] Technical facilities are the direct responsibility of INRAVISION, with cooperation from the telecoms administration.[18] Television operates on system M and presently in monochrome.[19] VHF channels are used exclusively, and the various transmitters are interconnected by microwave links.[20]

The use of the electronic media for educational and cultural purposes is widespread, especially in reference to the Radio Sutatenza system, operated by Accion Cultural Popular.[21] This network devotes a large percentage of airtime to the instruction of rural Colombians and operates very powerful outlets in the medium and shortwaves, reaching not only Colombia but much of the hemisphere.[22]

As there are many shortwave receivers in the hands of the Colombian people, listenership to external stations is quite frequent. In a 1970 survey, it was reported that of non-Colombian broadcasts listened to, the most popular were: La Voz de los Andes (HCJB), Quito, Educador; Voice of

America; and Deutsche Welle (BRD).[23] Personally collected data have revealed that there is also a substantial listenership to the Spanish-language transmissions of Radio Habana Cuba, and the Voice of the Organization of American States.[24]

FM stations have become increasingly popular in recent years due to the suitability for high-fidelity music and cultural programming.[25] Most such stations are located in metropolitan areas and are associated with standard broadcasters.

Common Carrier Services:

There are over a million telephones at the service of Colombia, connected to roughly 110 automatic and 360 manual exchanges respectively.[26] Colombia is linked together by means of an extensive microwave and VHF system; many parts of which are capable of multiple-channel television transmission.[27] Major trunks extend from Bogota to Bucaramanga; Bogota to Cali; and continuing on to Popoyan, Pasto and Tulcan; Bogota to Medellin.[28] Automatic direct distance Dialling (STD) is available on the major routes, conforming to the following zone codes:[29]

City	Code
Armenia	60
Barranquilla	5
Bogota	2
Bucaramanga	71
Cali	3
Cucuta	70
Ibague	82
Manizales	69
Neiva	80
Palmira	31
Pasto	301
Pereira	61

International circuits run from Bucaramanga to San Cristobal, Venezuela; Tulcan to Quito, Ecuador; and Medellin to Panama.[30] Colombia can take advantage of trunked third-party connections, as well as submarine cables which land at sites in Panama and Venezuela.[31] The INTELSAT earth station at Choconta is of the standard type, working through Atlantic Ocean units.[32] Direct international dialling is available to and from the following places in Colombia via the Choconta satellite station: Armenia, Barranquilla, Bogota, Bucaramanga, Cali, Cucuta, Ibague, Manizales, Neiva, Palmira, Pasto and Pereira.[33] These cities incidentally also constitute the main centers of the national trunk network. There is also a newly installed domestic satellite station at distant San Andres Island.[34] HF radiotelephone is also frequently employed for connections both to remote parts of Colombia and outside points.[35]

Local telephone services in the nation are provided by independent companies, while the trunk network is under the auspices of TELECOM, the government's agency.[36] Not all places have adequate common carrier services, and this is a priority of TELECOM.

As with communications, electricity does not yet reach all areas of the Colombian republic.[37] In 1975, approximately 35 percent of the population had access to power, but 25 percent did not have a continuous supply.[38] With the existing difficulties in mind, a special organization was created in 1967 - namely, ISA (Interconexion Electrica, S.A.), with a view towards linking together the various power systems into a national grid.[39] ISA hopes to reach up to 95 percent of Colombian homes within

the foreseeable future.[40] Over 70 percent of electric power comes from hydraulic installations, although this exploits only a small fraction of the total Colombian hydro potential.[41] In the northern part of the country, where water power is not as prevalent, it is necessary to utilize thermal (coal and petroleum) installations.[42] It is not infrequent to find totally independent local generators of varying standards - providing current in places not otherwise served.[43]

Overall Analysis:

Communications are undergoing a great deal of change in the Colombian Republic. At one time, it was not always possible to place a call to certain cities within the country and certainly was out of the question to watch television in distant places. Now, a nationwide microwave network provides basic and specialized services by taking advantage of Colombia's high terrain. Radio receiver ownership is high, and the penetration of television sets is above average.

COLOMBIA

1. Information Please Almanac, 1979, 33rd ed., s.v. "Countries, Territories, and Dependencies - Colombia;" U.S., Central Intelligence Agency, National Basic Intelligence Factbook, 1980 (Washington, D.C.: Government Printing Office, 1980), p. 37; Reader's Digest 1980 Almanac and Yearbook, s.v. "Nations of the World - Colombia;" The Caribbean Year Book 1977-78, 48th ed., s.v. "Colombia;" The People's Almanac #2, s.v. "Nations and their Rulers - Colombia;" The World Almanac and Book of Facts, 1979, s.v. "Nations of the World - Colombia."

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5. Frost, World Radio TV Handbook, pp. 348-355, 418-419.

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7. Ibid., pp. 348-355, 418-419.

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9. Howard I. Blutstein et al., Area Handbook for Colombia, Foreign Area Studies, The American University (Washington, D.C.: Government Printing Office, 1977), p. 248.

10. Ibid.

11. Ibid.

12. Ibid.

13. Ibid., pp. 248-249.

14. Frost, World Radio TV Handbook, pp. 348-355.

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17. Blutstein et al., Area Handbook for Colombia, p. 249.

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39. Ibid.

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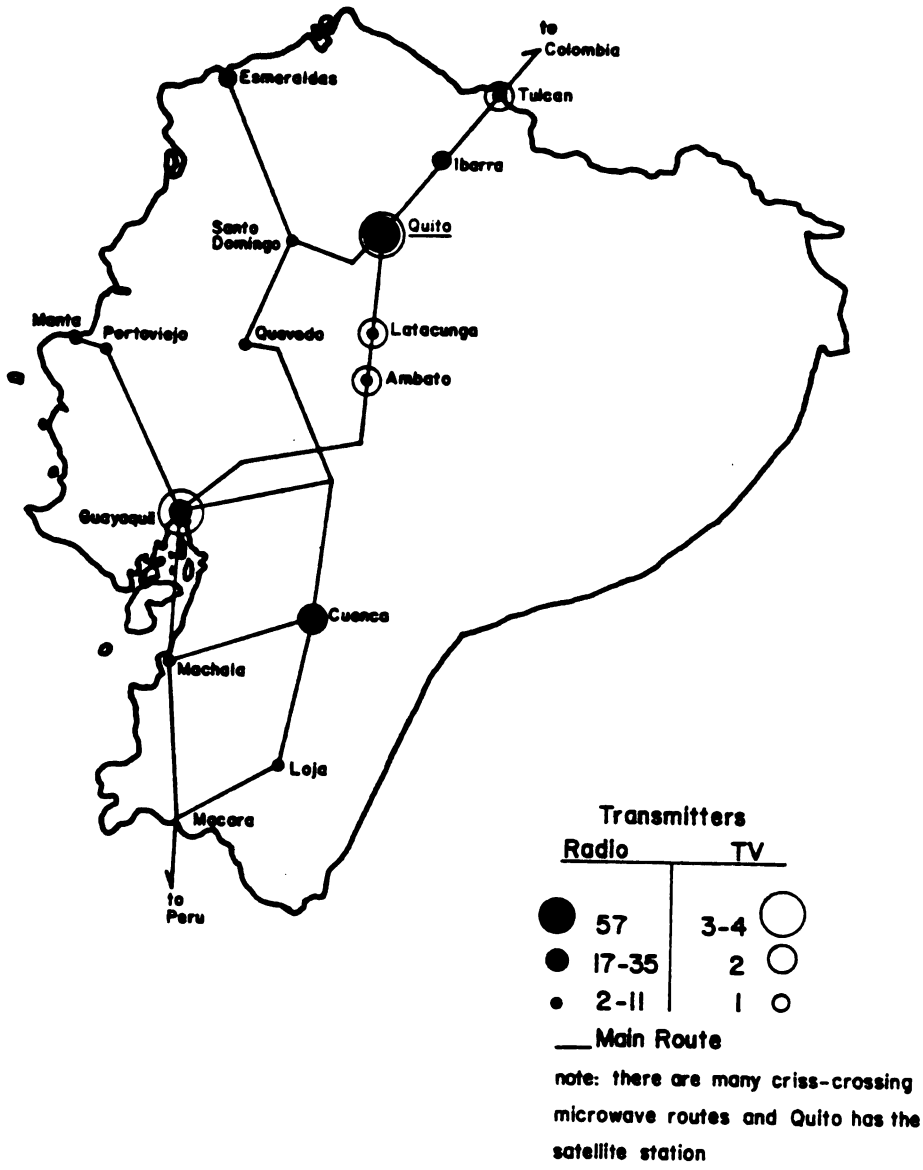
41. Ibid.

42. Ibid.

43. Ibid.

FIGURE 24

Communication Networks in ECUADOR



ECUADOR

(Republica del Ecuador)

Basic Information:[1]

Area: 283,561 kM^2
Population: 7.825 million (1978)
Population Density: 27.60 per kM^2
Capital: Quito
Major Cities: Guayaquil, Quito, Cuenca
Languages: Spanish, Quechua, Jibaro
Religions: Roman Catholic, Protestants
Gross National Product: US$ 4.8 billion (1976)
Per Capita Income: US$ 613
Literacy: 75%

Geographical Summary:[2]

Situated in the northwestern part of South America, the Republic of Ecuador shares common borders with Colombia and Peru. A lengthy coastline on the Pacific and insular possessions have ensured Ecuador a maritime outlook. Divided into three regions by branches of the Andes, the country is indeed diverse: coastal lowlands give way to mountains and highlands. After more mountains, a tropical region is found. Ecuador's port city, Guayaquil, is the largest metropolitan area, followed by the capital, Quito.

Basic National Review:[3]

Long a colony of the Spanish Crown, Ecuador broke away in 1822. A brief membership in the Greater Colombian Republic followed. Conservative governments held sway until 1895, when more liberal republican administrations have been the norm. In recent years, politics have shown nationalistic tendencies.

The Ecuadorian economy is primarily based upon agriculture, with cacao being the main crop. Petroleum production, from Ecuador's Amazon region, has become more and more important for the country, which is a member of OPEC. Mining, textiles and silvicultural products also merit note.

Telecommunications Overview:[4]

International Prefixes: HCA-HDZ
Number of Radio Broadcast Stations: 244
" " " Receivers: 1.7 million
" " " " per hundred: 21.73
" " Television Stations: 7
" " " Receivers: 400,000
" " " " per hundred: 5.11
" " Telephones: 174,076 (1976)
" " " per hundred: 2.22
Electrical Generation Capacity: 410,000 kW
Electrical Service: 60 hZ, 110/220 volts
Satellite Earth Stations: INTELSAT station at Quito, using the Atlantic Ocean satellites
International Communications: Via INTELSAT, HF radio, and terrestrial links to neighboring states
Ownership of Communications Media: Mixed government and private-commercial
Television Standard: System M, NTSC color
International Telephone Code: 593
Telecommunications Administration: Instituto Ecuatoriano de Telecommunicaciones (Quito)

Domestic Broadcasting:[5]

(Medium and Shortwaves)

City	Number of Transmitters	(kW) Combined Power
Quito	57	770.06
Guayaquil	35	228.05
Santo Domingo	7	30.5
Ambato	11	24.1
Portoviejo	11	17.5
Cuenca	17	17.4
Quevedo	6	15
Esmeraldas	8	13.35
Loja	8	13.25
Manta	6	12.85
Machala	5	10.25
San Cristobal	2	10
Riobamba	14	9.25
Latacunga	8	7.75
Tulcan	2	7
Santa Rosa	3	4.2
Ibarra	5	4.07
Zamora	2	3.25

(FM)

FM transmitters are frequent, notably in Quito, Guayaquil, Riobamba, Santo Domingo and Ambato.

(Television)

City	Channels	Networks
Guayaquil	2,5,6,10	CET, TAM, CADEQ
Quito	2,4,8	TVP, TAM, TNAC
Cuenca	5,11	TAM, TOA
Ambato/Latacunga	5,7	TAM, TNAC
Tulcan	6,10	TNAC, TAM
Ibarra	13	TAM
Riobamba	3	TNAC
Esmeraldas	6	TESEM

Networks:

CET: Corporacion Ecuatoriana de Television
TVP: Television del Pacifico
TAM: Telemazonas
TOA: Tele Ondes Azuyas
TNAC: Televisora Nacional
CADEQ: Cadena Ecuatoriana de Television
TESEM: Television de Esmeraldas

Trends in Broadcasting:

Ecuadorian social communications are organized on the basis of both private-commercial and governmental operation, although the vast majority of stations are of the former category. Broadcasters offer a diverse programming fare, and some tend to specialize in coverage, such as news, sports and music.

The Ecuadorian Constitution of 1945 (sec. 10, Art. 141) guarantees freedom of opinion, without limitation, as to means of expression.[6] Generally, this is upheld, although past administrations have ignored these provisions at times. Broadcasters are licensed by the government, through the Instituto Ecuatoriano de Telecommunicaciones.[7]

The large-scale importation of transistor radio receivers has revolutionized Ecuadorian society, and has placed the electronic media in a position of great influence.[8] Besides individual stations, several radio networks exist:[9]

Cadena Nacional Equatoriana
Cadena Amarillo, Azul y Roja
Cadena Radio Ecuatoriana
Cadena Catolica
Circuito HCMQ

Television networks have been previously listed under the heading of domestic broadcasting.

Radio usually takes advantage of frequencies in both the medium and shortwaves. Available information indicates that at least 50 percent of all

Ecuadorian receivers have shortwave bands.[10] In the metropolitan regions, interest has been growing in FM stereophonic broadcasts, especially among the more affluent segments of the population.[11] Likewise, color television has been made available to many parts of Ecuador.[12] There are so many radio stations that the competition for advertising revenue is rather fierce. This has resulted in the presence of marginal operations.[13] Another factor resulting from an overabundance of stations is electromagnetic pollution. In past years, so many powerful transmitters were situated in populated areas that serious interference problems were commonplace. Consequently, the national telecommunications authorities requested that all transmitters be removed beyond city limits.[14]

Radio has permeated almost every facet of Ecuadorian life, and it is common to find both individual and group listenership. Public buildings, cafes, and other areas are often equipped with receivers.[15] Television broadcasting is also commercially operated and presents a variety of offerings. Among the favorite TV program types in Ecuador are the "Tele-Novelas;" programs designed on the episode basis.[16] This is also a common program style in other Latin nations.

Religious and cultural broadcasters play an important role within Ecuador, such as the well-known HCJB - La Voz de los Andes; the Cadena Catolica-Radio Xavier; and Radiodifusora Casa de la Cultura Ecuatoriana.[17]

Foreign Service:

Although the Republic of Ecuador does not have an official international voice, HCJB - La Voz de los Andes, transmits to points around the globe and in a variety of languages.[18] Broadcasting from Quito, HCJB counts on two 10, four 50, and three 100 kW shortwave units; as well as a 50 kW medium wave transmitter.[19] Two powerful FM stations serve local audiences in the capital and in Guayaquil.[20] An interdenominational Christian organization, HCJB primarily concerns itself with spiritual and social welfare, although it also mirrors life in Ecuador.[21]

La Voz de los Andes is very interested in improving its reach, and has constructed a mammoth 500 kW transmitter, as well as sophisticated antenna systems.[22] HCJB is one of the best equipped stations in Latin America with modern studios, an automated program control system, multi-channel STL systems which connect Quito with the Pifo transmitters, and even its own hydroelectric plant at mountainous Papallacta.[23]

Besides international programming, HCJB is also a major force in Ecuadorian domestic radio and television, producing many programs and operating tape relay networks with other stations.[24]

Common Carrier Serivce:

Telecommunications in Ecuador are under the direction of IETEL, Instituto Ecuadoriano de Telecomunicaciones, a governmental agency.[25] Close to 200,000 telephones are operated, many on an automatic basis.[26] The

national territory is roughly divided in half, between ETN (Empresa de Telefonos del Norte - Quito) and ETS (Empresa de Telefonos del Sur - Guayaquil), both of which operate in coordination with IETEL.[27] At last count, there were roughly 50,000 telephones in each of these major cities.[28] Outlying areas are served by one of the three organizations.

A nationwide network of open-wire lines has existed for many years and carries both telephone and telegraphic messages.[29] Due to low capacity and high maintenance costs, this system has gradually been replaced by more modern techniques.[30] The country is also linked together via HF radio, which also serves the Galapagos Islands.[31] A 960 channel voice plus television microwave system (6 gHz) connects Quito with Guayaquil, providing very modern communications.[32] A dual-path system is used, having one trans-mountain route and one segment via a more coastal route.[33] Intermediate cities are also interlinked in this network, and trans-frontier circuits connect with Piura, Peru and Tulcan, Colombia.[34] Medium capacity VHF and UHF radio provide service to other areas.[35] Direct subscriber trunk dialling is possible on the main routes, using the following designation codes:[36]

City	Code
Ambato	2
Cuenca	4
Esmeraldas	2
Guayaquil	4
Ibarra	2
Loja	4
Machala	4
Manta	4
Portoviejo	4
Quito	2

Local services have been substantially improved in recent years by the installation of modern crossbar and processor-controlled exchanges (LM Ericsson), as well as the addition of carrier facilities on many lines.[37]

International services are provided via the aforementioned terrestrial facilities, as well as HF radio and INTELSAT. The radio installation at El Beaterio, near Quito, connects with several countries.[38] Ecuador's INTELSAT station at Valle de los Chillos (Quito) provides very modern and comprehensive services, via the Atlantic Ocean satellites.[39]

According to available information, approximately 40 percent of Ecuadorian homes have regular electrical service.[40] Power generation capacity has not been able to keep up with the demands in recent years, although a great attempt has been made to rectify this situation.[41] Also, the main electrical centers are not interconnected, so as to be able to share power when and where needed.[42] INECEL (Instituto Ecuatoriano de Electrificacion) is primarily responsible for the country's power system and hoped to provide electricity for at least 66 percent of the population by 1980.[43] More than 1,000 generating plants are used nationwide, and certain industries also produce their own power.[44] Ships have been anchored off coastal cities in order to generate needed electricity in this interesting fashion.[45] In the past, frequent blackouts have occurred, but new installations should overcome this problem.

Overall Analysis:

Ecuador possesses social and common-carrier communications systems which have steadily improved in the past few years. In terms of broadcasting,

very few countries have as many diverse sources of public information as does Ecuador. Likewise, considering the rugged terrain and many relative isolated areas, mass communications play a vital role in national development and integration. Monitoring has shown that news coverage of international events is not quite as developed as national reporting, with the exception of HCJB. International communications are now excellent, thanks to Ecuador's participation in INTELSAT.

ECUADOR

1. Information Please Almanac, 1979, 33rd ed., s.v. "Countries, Territories, and Dependencies - Ecuador;" U.S., Central Intelligence Agency, National Basic Intelligence Factbook, 1980 (Washington, D.C.: Government Printing Office, 1980), p. 51; Reader's Digest 1980 Almanac and Yearbook, s.v. "Nations of the World - Ecuador;" The People's Almanac #2, 1978, s.v. "Nations and their Rulers - Ecuador;" The World Almanac and Book of Facts 1979, s.v. "Nations of the World - Ecuador."

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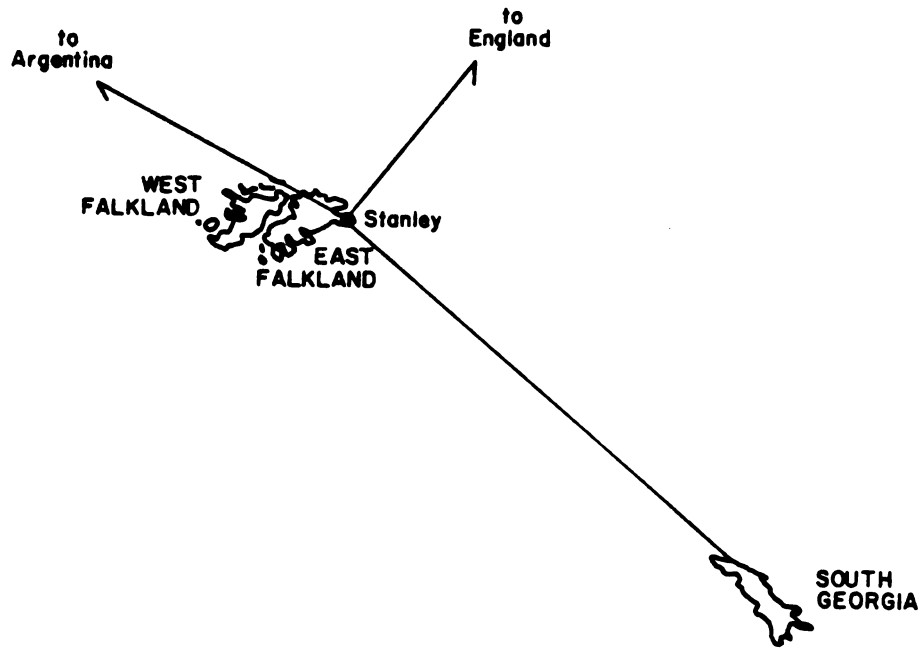
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FIGURE 25

Communication Networks in FALKLAND ISLANDS (MALVINAS)



● I Radio
— Radio Link

FALKLAND ISLANDS

(Islas Malvinas)
(Dependency of the U.K.)

Basic Information:[1]

Area: 12,168 kM^2
Population: 2,010
Population Density: 16.5 per kM^2
Capital: Stanley (Puerto Stanley)
Major Cities: Stanley
Language: English
Religion: Church of England
Gross Domestic Product: US$ 3.28 million
Per Capita Income: US$ 1,632
Literacy: Universal

Geographical Summary:[2]

Located some 770 kM northeast of Cape Horn, the Falkland Islands (Islas Malvinas) are a Crown Colony of the United Kingdom, although claimed by the Argentine Republic. The principal islands are East and West Falkland, although there are roughly 200 smaller islets. The South Sandwich, South Georgia, and Shag and Clerke Islands are dependencies of the Falklands. The climate is maritime and cold, with much rain and winds.

Basic National Review:[3]

Discovered in the 16th century by the British, the Falklands were first settled by the French in 1764. A year later, a British post was constructed, but both sites were later abandoned. The Argentine took over the Falklands in 1820, but in 1832, British forces resumed control.

Sheep raising, whaling, fishing and light vegetable growing account for economic activity. Assistance is received from the British Government.

Telecommunications Overview:[4]

Number of Radio Broadcast Stations: 1
" " " Receivers: 1,100
" " " " per hundred: 54.72
" " Television Stations: None
" " " Receivers: None
" " Telephones: 650
" " " per hundred: 32.33
Electrical Generation Capacity: 1,250 kW (1976)
" Service: 50 hZ, 240 volts
Satellite Earth Stations: None
International Communications: Via HF radiotelephone
Ownership of Communications Media: Government
Telecommunications Administration: British Post Office

Trends in Broadcasting:[5]

The Falkland Island Broadcasting Service is a government department, which provides sound broadcast programming to the people of the islands. Transmitting from Stanley, the station has a 5 kW sender on 536 kHz, medium wave, and a 2.5 kW transmitter on 2385 kHz, 120 metres, short wave. The station is on the air for periods of the day, frequently relaying BBC World Service. The BBC maintains special broadcasts for the islands, using appropriate shortwave channels.[6] Most programming is of a local nature, including shipping forecasts and weather-related information. Reception of outside broadcasts is common, especially on shortwave. There is no television in the Falklands.

Common Carrier Service:

A telephone system with about 650 subsets is operated by the government, with radio relay between the populated islands.[7] Switching is via small, electromechanical exchanges; with outdoor plant specially weatherproofed to withstand the rigorous climate.[8] Calls to locations outside of the

islands are placed via radio VPC in Port Stanley, where a 7.5 kW ISB transmitter is in use.[9] Traffic is worked with the U.K. and other stations, as required.[10] In its current telecommunications plan, Argentina has expressed a desire to expand telephone (via radio) circuits to the Falklands (Malvinas).[11]

Electricity is generated by diesel, at a capacity of slightly more than one megawatt. This suffices for the present time.[12]

Overall Analysis:

The Falklands/Malvinas have an adequate social and common carrier system for the present. Considering the out-of-way location and the low population concentration, there is little need for immediate expansion of services. A satellite terminal would improve external communications.

FALKLAND ISLANDS

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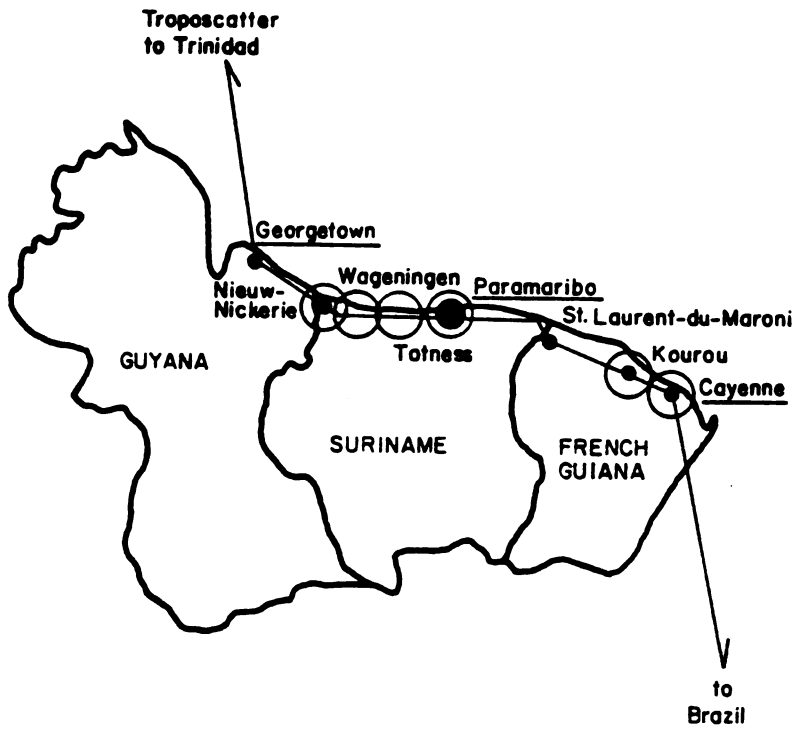
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FIGURE 26

Communications Networks in GUYANA, SURINAME, and FRENCH GUIANA



○ 1 TV

● 5 Radio

• 1-2 Radio

—— Main Route

Satellite Stations:

Guyana--Georgetown

Suriname--near Paramaribo

French Guiana--near Cayenne

FRENCH GUIANA

(Guiana Francaise)
(Departement de la Republique Francaise)

Basic Information:[1]

Area: 91,000 kM^2
Population: 62,000 (1978)
Population Density: 0.68 per kM^2
Capital: Cayenne
Major Cities: Cayenne
Language: French
Religion: Roman Catholic
Gross National Product: US$ 40 million (*territorial income)
Per Capita Income: US$ 645
Literacy: 73%

Geographical Summary:[2]

Located on the northeast littoral of the South American continent, the French Department of Guiana shares common frontiers with Suriname and Brazil. With over 320 kM of Atlantic coastline and numerous off-shore islands, Guiana counts on a variety of ocean resources. Along the littoral is a low plain which extends several miles inland. It is here that the majority of arable land is found. The interior is mostly a rolling plateau, covered by rain forest. The vast majority of the population lives in the coastal region, with the interior being inhabited by Indian tribes and bush negroes.

Basic National Review:[3]

Settled in the 17th century, Guiana has remained in the French fold to this day. For a long time the area was famous for its penal colonies, such as Devil's Island. These institutions no longer exist. At the

beginning of World War II, French Guiana was loyal to the Vichy regime, but later came under the Free French. In a 1958 referendum, Guiana accepted the constitution of the Fifth Republic and continued its status as an overseas department of France. In 1975, France announced a development scheme for the region and has set about implementing it. French missile and satellite launchings take place from the base at Kourou.

Guiana has an extensive seafood industry, as well as silviculture, gold mining and forms of agriculture.

Telecommunications Overview:[4]

Number of Radio Broadcast Stations: 1
" " " Receivers: 17,500
" " " " per hundred: 28.23
" " Television Stations: 1
" " " Receivers: 5,000
" " " " per hundred: 8.07
" " Telephones: 8,400
" " " per hundred: 13.5
Electrical Generation Capacity: 29,000 kW
Electrical Service: 60 hZ, 127/254 volts
Satellite Earth Stations: Trou-Biran (Cayenne) INTELSAT installation
International Communications: Via satellite, HF radio and terrestrial circuits to Suriname and Brazil
Ownership of Communications Media: Government
Telecommunications Administration: Secretariat d'Etat aux Postes et Telecommunications (Paris)
Television Standard: System K-1

Domestic Broadcasting:[5]

The Societe Nationale de Programmes-Radio France, Regions 3, provides social communications in French Guiana by way of a station located in Cayenne. Seven transmitters carry programs to the department; two medium wave, three short wave and two FM. Besides locally produced material,

Common Carrier Services:

Telecom services in French Guiana are based on an openwire network of limited capacity, as well as some radio relay.[6] Most routes are along the coast. Troposcatter links extend from Cayenne to Macapa, Brazil, and microwaves in visibility connect with Paramaribo, Suriname, from where the connection extends to Georgetown. Guyana.[7] Local telephone service totals approximately 8,000 sets; mostly in Cayenne.[8] International communications are handled via the terrestrial circuits, as well as by the Trou-Biran satellite station.[9] This INTELSAT station is equipped with a 14.5 metre dish, capable of television reception and multiplex telephone interchange.[10] According to available information, the Cayenne station is equipped with 32 telephone channels; some of which have been extended via microwave to Suriname.[11]

The Kourou facility is equipped with sophisticated satellite tracking and communications equipment; used in conjunction with European space research. A HF radiotelephone station at Cayenne provides connections with Paris and Martinique, as well as internal communications.[12] ISB equipment of 6 and 20 kW is utilized.[13]

The Cayenne electrical system was rebuilt after World War II and provides 220 volts for equipment service and 127 volts for lighting needs, all at 50 hZ.[14] Generating capacities are: Cayenne: 15 MW; Kourou: 12 MW; and Saint Laurent: 2 MW.[15]

information relayed from Metropolitan France is also carried; the purpose of Cayenne radio being to link Frenchmen with France. The MW and FM outlets cover the capital and populated areas along the coast, while shortwave signals ensure reception not only in Guiana, but in many parts of northern South America.

Transmitter Location	Frequency	(kW) Power
Cayenne	1070 kHz	20
St. Laurent du Maroni	1090	50 watts
Cayenne	3395	4
"	4972	1
"	6170	4
"	94.0 mHz	50 watts
"	96.3 mHz	50 watts

Television in French Guiana is based on the K^1 system, widely utilized throughout French overseas territories. This is the only location in South America to be equipped in this manner. Approximately five hours of programs are sent out every day from Cayenne, using many recorded French productions. A license fee is required for those individuals having television. The Cayenne transmitter operates on Channel K-4 (172.25-181.75 mHz) with 100 watts power. Kourou radiates on Channel K-6 (191.25-197.75 mHz) using 65 watts.

It should be noted that Channel K-4 is roughly equivalent to Channel M/N-7, while Channel K-6 is similar to M/N-10. At this time, no color is used, but should it be added, the SECAM system would be employed. It is interesting to note that the FM and television facilities at Kourou are intended for the entertainment of personnel at the French missile base.

Overall Analysis:

French Guiana is sparsely populated and has limited international involvement. However, the settled regions of the country are provided with adequate common carrier facilities and a good radio broadcast capability. Outside of the coastal areas, communications are primarily relegated to HF radio. Connections with neighboring countries are adequate for the time being and form an important link in the Latin American telecoms network. The INTELSAT circuits are a notable improvement for overseas communications. In keeping with proposed telecoms modernization throughout the French world, it is possible that Guiana may also benefit from upgraded services in the near future.

FRENCH GUIANA

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GUYANA

(Cooperative Republic of Guyana)

Basic Information:[1]

Area: 214,969 kM^2
Population: 825,000 (1978)
Population Density: 3.84 per kM^2
Capital: Georgetown
Major Cities: Georgetown
Languages: English, Hindi, Urdu, various others to a lesser extent
Religions: Christianity (Protestant and Roman Catholic), Islam, Hinduism
Gross National Product: US$ 430 million (1976)
Per Capita Income: US$ 521
Literacy: 85%

Geographical Summary:[2]

Located on the northeast littoral of the South American continent, Guyana is sandwiched between Brazil, Venezuela and Suriname. The coastal region is rather low-lying, protected against the ravages of the sea by a 300-year old dike system. Most of the population resides in this area. The interior is densely forested, with valuable timber reserves. In the south and west, mountains and varied plains predominate.

Basic National Review:[3]

Settled by the Dutch and then a British possession since the 17th century, Guyana, formerly British Guiana, was organized along colonial lines. Large numbers of African and Asian workers were imported for local industries and now comprise main segments of the nation's population. After gaining independence in 1966, Guyana has followed a path of a "cooperative republic," approximate to local socialism. Foreign-owned enterprises

and industry have been mostly nationalized. Closer contacts with the states of the Caribbean have marked recent years.

Guyana produces large quantities of bauxite and alumina, essential to the making of aluminum. Sugar is also an important industry, with timber and rice production being substantial as well. Precious stones and various agricultural goods are also exported.

Telecommunications Overview:[4]

International Prefixes: 8RA-8RZ
Number of Radio Broadcast Stations: 2
" " " Receivers: 301,000
" " " " per hundred: 36.48
" " Television Stations: None
" " " Receivers: None
" " Telephones: 22,526
" " " per hundred: 2.73
Electrical Generation Capacity: 175,000 kW
Electrical Service: 50 hZ, 110/220 volts
Satellite Earth Stations: INTELSAT Atlantic Ocean station under construction in Georgetown
International Communications: Via terrestrial links with adjacent countries, radio relay to nearby islands and HF radiotelephone. Planned use of satellite for international circuits.
Ownership of Communications Media: Government
Telecommunications Administration: Ministry of Works and Government
International Telephone Code: 592

Domestic Broadcasting:[5]

Station	(kHz) Frequency	(kW) Power
GBS	560	10
"	700	10
R. Demerara	760	10
"	3265	2
GBS	5950	10
R. Demerara	5980	2
GBS	16454	3.5 (occasional use only)
"	102 mHz	50 watts

Note: All stations are located in Georgetown

Trends in Broadcasting:

Social communications in Guyana are effected by two organizations, both now belonging to the national government. The Guyana Broadcasting Service, once part of the Rediffusion group, was later taken over by the state, and for a long time competed with the remaining Rediffusion outlet, Radio Demerara.[6] Recently, the London-based company entered into an agreement with the Guyanese administration for the sale of Demerara.[7]

Guyana was one of the first areas in South America to have a broadcast station. This was back in the late 1920's. Broadcasting today is conducted in English, as well as minority languages using frequencies in the medium and short waves, as well as FM. Coverage of the populated regions of the country is rather complete, and the HF channels can be received outside of the national territory.[8] GBS uses a moderate power HF SSB transmitter to feed programs to remote sites and for other specialized services.[9] This point-to-point feed is often heard in North America. The government has urged programs to be of a socially-responsible nature in keeping with its goals. However, both Georgetown stations still have a certain amount of advertising.

It is interesting to note that in the process of competing with Radio Demerara, GBS mirrored its sister station in frequencies, times of operation, and even postal address.[10] For example, GBS uses P.O. Box 560, while Demerara has 561; GBS' cable indicator is "Guycast;" that of Demerara -"Broadcast." The GBS' primary frequencies on MW are 560 and 700 kHz; Radio Demerara - 760 kHz; GBS - shortwave - 5950 kHz; Demerara - 5980 kHz.

Signals from broadcasters outside of Guyana are also received on a regular basis. This has apparently been a source of worry to official circles, as evidenced by an article in the Guyana Chronicle and reprinted by the Havana daily, Granma.[11] Quoting from the article: "The denunciation that Radio Antilles, on the Caribbean Island of Montserrat, forms part of a West German plan against the progressive governments of the region, has provoked worry in political and journalistic circles. The daily Guyana Chronicle, indicated that Radio Antilles is only one way by which Federal Germany continues its' 'radio cold war' in Europe, Africa and the Caribbean. The director of the powerful broadcast station is the West German citizen, Christian Knaak." It should be noted that the station in question operates on 930 kHz with 200 kW power; more than sufficient to blanket nearby Guyana.[12]

In recent years, Guyana has had relatively close cooperation with Cuba in cultural and social communication matters, including the exchange of delegations.

Common Carrier Services:

The Guyana Telecommunication Corporation operates common carrier facilities, in conjunction with the Post Office Department and the Ministry of Works and Communications.[13] The overall system was designed and made possible by British interests and uses equipment of their manufacture. Services center around the exchange in Georgetown, where a large automatic switching facility is located.[14] Trunk lines extend to most parts of the country, via radio relay and open-wire lines.[15] STD connections

are available between Georgetown and New Amsterdam, Linden, Leonora, Beterverwagting, Mahaica and adjacent areas.[16] Radio circuits are provided from Georgetown to parts of the interior.[17] In recent years, a network of portable radio transceivers has been established, in order to provide much-needed emergency services to the populations of villages and settlements, which are "off the beaten path."[18] Standard "citizen's band" radios are used, as they are inexpensive and can be simply replaced, rather than repaired at greater cost.[19] Also, little technical know-how is required for their operation.

Tropospheric scatter links extend from Georgetown to Paramaribo, Suriname, and to Morne Bleu, Trinidad.[20] The Trinidad circuit operates in the 900 mHz band with a capability of up to 64 voice channels.[21] A new microwave project within neighboring Suriname runs up to the Guyana border at Nieuw Nickerie, and has the potential for upgrading links between the three Guianas.[22] International telecoms services have been operated by Cable & Wireless in conjunction with GTC, through radio relay with Trinidad and HF radio facilities at Georgetown.[23] Guyana has access to the Trinidad INTELSAT station, as well as trunked submarine cable and other routed connections, via the West Indies and Venezuela.[24] Maritime traffic is worked through Demerara Radio, station 8RB.[25] A new INTELSAT earth station is in stages of completion at Georgetown, which will give Guyana its' own "window on the world."[26]

Electrical generation is under the auspices of the Guyana Electricity Corporation, a government statutory body.[27] Municipal authorities also

take part in the production but to a lesser degree.[28] Main power plants are located at Georgetown, Versailles, West-Bank/Demerara, Ruimveldt (East-Bank/Demerara), Anna Regina, Onverwagt and Corentyne.[29] Turbine and diesel installations supply most of the power.[30] Electrical service is provided at 110/115 and 230/240 volts, 50 hZ, throughout the country; with the exception of the New Amsterdam region, where the line frequency is 60 hZ.[31] Adequate power supplies are normally located in population centers and surrounding territories.

Overall Analysis:

Social communications in Guyana are undergoing a remolding, in keeping with national policies. One of the pirmary goals of the government is to own all major industries and organizations. Radio plays a vital role in the integration of the country, and the government very well realizes this. Guyana has a modern telecom system which is expanding into lesser-populated regions through innovative developments. International connections are of good quality, although they have been dependent upon the goodwill of neighboring states and various international common carriers. The new satellite station will provide a greater degree of communications independence.

GUYANA

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10. Frost, World Radio TV Handbook, p. 362.

11. Granma, 3 March 1977.

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17. Ibid.

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23. The Caribbean Year Book 1977-78, s.v. "Guyana."

24. Ibid.

25. Ibid.

26. Communications Satellite Corporation (COMSAT), COMSAT Guide to the Intelsat, Marisat and Comstar Satellite Systems (Washington, D.C.: Communications Satellite Corporation (COMSAT), 1979), p. 16.

27. The Caribbean Year Book 1977-78, s.v. "Guyana."

28. Ibid.

29. Ibid.

30. Ibid.

31. Ibid.

SURINAME

(Republiek van Suriname)

Basic Information:[1]

Area: 163,265 kM^2
Population: 460,000 (1978)
Population Density: 2.82 per kM^2
Capital: Paramaribo
Major Cities: Paramaribo
Languages: Dutch (official); English, Javanese, Chinese, Hindi, Taki-Taki
Religions: Hindu (24%); Islam (23%); Roman Catholic (21%); Moravian Christian (17%); Reformed Church and Lutheran (6%); with the remainder divided between Confucianism, Jainists and Animists
Gross National Product: US$ 503 million (1975)
Per Capital Income: US% 1093
Literacy: 80 percent

Geographical Summary:[2]

Situated on the northeastern coast of South America, Suriname has a northern coastline on the Atlantic Ocean, borders Brazil on the south, French Guiana on the east, as well as Guyana on the west. There is a coastal plain, which is very fertile. Most of the population is located here. The interior is covered by dense jungle and forest. Suriname's climate is exceptionally hot and rainy, with roughly 213 cm of annual rainfall.

Basic National Review:[3]

Discovered by European explorers in the 16th century, Suriname was once peopled by members of the Arawak, Tupi, and Caraiba Indians. At the end of the 17th century, Dutch colonization began with rule switching from Dutch to English and back to Dutch again. Beginning in 1828, Suriname came under a colonial administration, which also looked after the

Netherlands Antilles. Slavery was abolished in 1863 with many slaves abandoning their erstwhile plantations and migrating throughout the land. In 1870 a contract was signed with the British, in order to obtain Indian workers for Suriname. By 1917, over 30,000 Indians had been brought to Suriname. Beginning in 1890, there was a large Javanese migration to Suriname, increasing the Asian content of society.

In the early and mid-1900's, large plantations gave way to smaller holdings with intensive agriculture being practiced. In 1954, home-rule was given Suriname by the Dutch Crown and fully incorporated the territory into the Kingdom on an equal basis with European Netherlands and the Antilles. Suriname thereby became a member of the EEC. In the period 1967-70, certain aspects of the border with Guyana came under dispute but were partially resolved. After elections, Henck Arron became Prime Minister in 1973, leading the country to independence in 1975.

As part of the independence package, the Netherlands granted Suriname a substantial monetary endowment. which has helped to establish nationhood. Also, Dutch administrative and technical assistance is available.

On February 25, 1980, the military took control of the government in Suriname, putting an end to the government of Mr. Arron. A National Military Council was formed under the direction of three sergeants. New elections have been planned.

Suriname is one of the largest bauxite producers in the world with large deposits of the mineral. Bauxite earnings make up over 90 percent of

national income. Rice, gold and timber are also produced. A growing aluminum processing industry is important for the country.

Telecommunications Overview:[4]

International Prefixes: PZA-PZZ
Number of Radio Broadcast Stations: 6
" " " Receivers: 186,000
" " " " per hundred: 40.43
" " Television Stations: 1
" " " Receivers: 40,000
" " " " per hundred: 8.7
" " Telephones: 18,566 (1977)
" " " per hundred: 4.04
Electrical Generation Capacity: 320,000 kW (1976)
Electrical Service: 60 hZ, 110/115/127 volts
Satellite Earth Stations: Partes, near Paramaribo; also planned for Santo Boma
International Communications: Via INTELSAT, HF radio, and terrestrial links to neighboring states
Ownership of Communications Media: Government and private
Television Standard: System M, NTSC color
Telecommunications Administration: Lands Telegraff en Telefoons Bedrijf (Paramaribo)

Domestic Broadcasting:[5]

(Medium and Short Waves)

City	Number of Transmitters	(kW) Combined Power
Paramaribo	6	86
Nieuw Nickerie	1	1

(FM)

There are FM transmitters in Paramaribo associated with two broadcasting organizations.

(Television)

City	Channels	(kW/ERP) Combined Power
Paramaribo	8	6
Nieuw Nickerie	12	1
Totness	10	1
Wageningen	7	.1

Trends in Broadcasting:

Suriname has a very complicated and delicate social-cultural mixture, which is amply reflected in broadcasting conditions. All but one stations are located in the capital, Paramaribo, and all but one are likewise privately owned. The main broadcast voice is that of SRS, Stichting Radio Omroep Suriname, which belongs to the national government.[6] SRS operates three transmitters; one 50 kW medium-wave (725 kHz); one 10 kW shortwave (60 metre band); and a one watt FM channel.[7] Coverage on the MW and HF outlets is usually very good with occasional reception in many parts of northern South America and the Caribbean. The shortwave is a recent addition, intended to extend reliable signal grade into the interior of the country. Radio SRS programs in Dutch, Taki-Taki, Hindustani and Indonesian.[8]

Four private-commercial stations also operate out of Paramaribo; two being 10; one 5 and one 1 kW[9]. Programming trends follow those of SRS, with a multiplicity of languages being employed. The facility in Nieuw Nickerie is local in nature but similar to the other broadcasters in Suriname.

Television uses system M with NTSC color.[10] There is one TV organization, Surinaamse Televisie Stichting, part of the SRS group.[11] Studios and central facilities are located in the capital with a relay network serving the towns of Nieuw Nickerie, Totness and Wageningen.[12] Interconnections for TV are via microwave relay. Programs are sent out for approximately six hours daily with some commercial matter inserted.[13] There is much use

of videotaped and filmed material, some of which comes from the Netherlands. Radio Nederland Wereldomroep, the NOS - Nederlandse Omroep Stichting, and N.V. Philips all maintain forms of training and orientation, in which Surinamese students have participated.[14]

Reception of radio broadcasts from outside Suriname is possible, with Radio Nederland and Trans World Radio being prominent.[15]

Common Carrier Services:

Paramaribo and major towns are equipped with an automatic telephone system, linked together in a limited STD system via microwave relay.[16] A 960 channel microwave network capable of television links Paramaribo with Nieuw Nickerie and Albina; as well as a new system from Nieuw Nickerie to Apoera and Avanavero in the interior.[17] Connections extend from Albina to French Guiana and from Nieuw Nickerie to Guyana.[18] Much of the relay equipment is of GTE provision, while the telephone apparatus tends to be from Philips.[19] For places outside of the relay network, HF radiophone is used extensively.

Other than the two international terrestrial circuits mentioned above, Suriname has at its disposal an HF radio station and a new INTELSAT earth station at Partes, near the capital.[20] This facility can provide connections to Europe and North America. In the past, circuits have been extended from the INTELSAT station in French Guiana to Suriname, permitting links with Europe.[21]

From Guyana, trunked connections are possible to Trinidad and the West Indies, as well as Venezuela.[22] From French Guiana, it is possible to make use of the troposcatter link to Brazil.[23]

Hydroelectric potential is great in Suriname, with advantage being taken of its large rivers. Plants include: Afobakka with 281 MW capacity (Brokopondo Region); Avanayero; Kalebo; and Manbari, which provide needed power for the aluminum industry as well as other needs.[24] At last count, nearly 90 percent of the total electrical output went to bauxite and aluminum processing, which are crucial for the Surinamese economy.[25] Power is supplied as 127 volts, 50 hZ in Paramaribo; 115 volts, 60 hZ, elsewhere in the country.[26]

Overall Analysis:

Suriname is in a state of development, desirous of growth in mineral and other industries. As such, its telecoms are vital for national expansion and integration. Radio broadcasting is very important, while television holds less of an influence, being restricted to the main cities. The telephone system is growing to include all zones of major economic importance, via microwave relay, and via HF to all other areas. International links were substantially improved with the addition of the INTELSAT station. Suriname has planned the installation of a domestic satellite station at Santo Boma in the interior, although this has not yet taken place.

SURINAME

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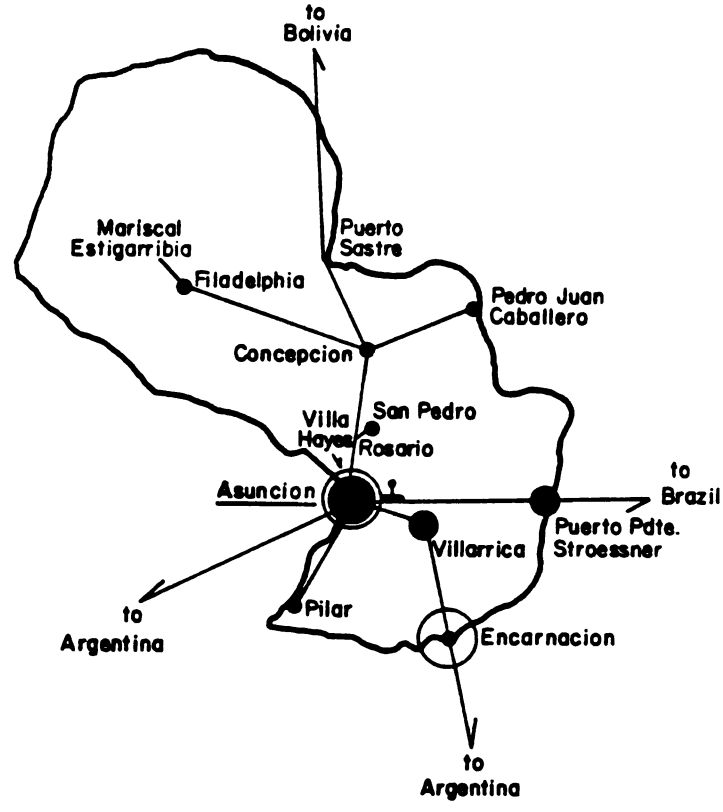
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FIGURE 27

Communication Networks in PARAGUAY



PARAGUAY

(Republica del Paraguay)

Basic Information:[1]

Area: 406,752 kM^2
Population: 2.87 million
Population Density: 7.05 per kM^2
Capital: Asuncion
Major Cities: Asuncion, Encarnacion, Puerto Pdte Stroessner, Concepcion, Filadelfia
Languages: Spanish, Guarani
Religion: Mostly Roman Catholic, some Protestant minorities, including a Mennonite colony
Gross National Product: US$ 1.7 billion (1976)
Per Capita Income: US$ 592.33
Literacy: 74 percent

Geographical Summary:[2]

Located in the central-southeast of the South American continent, the Paraguayan Republic shares frontiers with Brazil, Argentina and Bolivia. The country is divided 60-40 by the River Paraguay into two very distinct regions. On the east bank of the river is hilly, forested land and some fertile pastures. Ranching and timber industry predominate. Most of the population also remains in this eastern sector. On the western side of the river is the Grand Chaco, a low plain covered with scrub and having rather dry conditions. Very few inhabitants are located in the Chaco Region. Grazing of cattle is the primary industry. The location of Paraguay assists communications geographically, although technical resources have not been developed as much as possible.

Basic National Review:[3]

Settled by Indians of the Guarani, Chaco and Amazon Valley tribes, Paraguay

was an agricultural producer long before the Spanish conquest with many large farms. After the arrival of the Spanish forces in the 16th century, what is now Paraguay was made part of the La Plata Regency and later transferred to a sector of the Vice-Royalty of Buenos Aires. In the period 1811-13, Paraguay broke away from Spanish control and also rejected ties with Buenos Aires.

The War of the Triple Alliance, 1865-70, was disastrous for Paraguay, resulting in the loss of a large part of its territory to Argentina and Brazil and the death of over 500,000 people. In the period 1932-35, a war with Bolivia broke out over territorial claims in the Chaco. Although Paraguay defeated the meagre Bolivian forces, its own economy and livelihood were drained.

Political strife occurred between 1940-48, involving different national factions. Order was restored but at great cost. General Alfredo Stroessner, conscious of the unstable situation and his own military capabilities, took power in a well-organized coup d-etat in 1954. Under the Stroessner government, a new constitution was adopted in 1967 and Congress was reformed. President Stroessner has been re-elected since 1954.

In 1973, an accord was signed between Paraguay and Brazil for the construction of the world's largest hydro plant at Itaipu. When completed in the mid-1980's, the facility will have a capacity of 10,710,000 kW, providing electric power to much of South America.

Telecommunications Overview:[4]

International Prefixes: ZPA-ZPZ
Number of Radio Broadcast Stations: 33
" " " Receivers: 185,000
" " " " per hundred: 6.45
" " Television Stations: 3
" " " Receivers: 56,000
" " " " per hundred: 2.0
" " Telephones: 41,644
" " " per hundred: 1.45
Electrical Generation Capacity: Currently 280,000 kW, but will substantially increase through several new hydro projects due to be completed
Electrical Service: 50 hZ, 220/380 volts
Satellite Earth Stations: An INTELSAT station at Aregua, located southeast of Asuncion
International Communications: Via terrestrial links to neighboring countries; HF radiotelephone and INTELSAT
Ownership of Communications Media: Government and private-commercial
Television Standard: System N, monochromatic
International Telephone Code: 595
Telecommunications Administration: ANTELCO (Asuncion)

Domestic Broadcasting:[5]

(Medium and Short Waves)

City	Number of Transmitters	(kW) Combined Power
Asuncion	14	293
Pto. Pdte. Stroessner	2	35
Caacupe	1	25
Encarnacion	1	25
Luque	1	25
Villarrica	3	13
Pedro Juan Caballero	2	11
Coronel Oviedo	1	10
Filadelfia	1	10

(FM)

There are FM channels in Asuncion, Villarrica and Encarnacion, most of which are very low powered.

(Television)

City	Channel	Station	(kW/ERP) Power
Asuncion	9	Television Cerro Cora	60
	8	" del Este	25
Encarnacion	7	" Itapua	60

Trends in Broadcasting:

Radio and television in Paraguay are overseen by the Administracion Nacional de Telecomunicaciones, ANTELCO, which is also responsible for common carrier services.[6] Most stations operate on a commercial basis with the exception of Radio Nacional, the government's voice. At last count there were eight stations of 10, six of 25 and one of 100 kW power, or 15 broadcasters in a major category out of 33 total.[7] Medium wave is the mainstay in Paraguay, although some shortwave transmitters parallel regular programs. There are also an increasing number of FM channels being activated, mostly of limited range.

Considering the unique population and social composition of Paraguay, broadcasting schedules are conducted in several languages. Therefore, one finds extensive bi-lingual, Spanish/Guarani programming. German and Japanese material also finds its way on the air, owing to a large number of settlers.[8] It is highly probable that other languages will also be added; as refugee groups have recently chosen to settle down in Paraguay; including Vietnamese and other Asian peoples. Television is conducted in Spanish.

Radio Nacional acquired a 100 kW shortwave transmitter in the early 1970's with an aim of improving national and external reception. This

facility has been operated rather irregulary, however. While most Paraguayan broadcast signals are of local or regional nature, Radio Nacional's 100 kW medium and shortwave equipment is capable of providing a truly national service.

Transmissions from outside of the country are clearly heard within Paraguay; especially on short waves. Argentine, Brazilian, Uruguayan and other Latin stations come in well; also - signals from more distant stations. Radio Habana Cuba, Radio Moscow, and Radio Stations Peace and Progress all make special efforts to reach the Paraguayan listener.[9] Shortwaves of high power are employed using programming in the Spanish and Guarani languages.[10] La Habana has an hour in Guarani each day, with material which is highly critical of the Stroessner government.[11]

Radio Habana Cuba has long been rather proud of its efforts in the Paraguayan Republic.[12] Quoting from available information: "The Paraguayan Chancellor, Raul Sapena Pastor, has publicly expressed his ire at the accusations made against his regime by Radio Habana Cuba, and came to state that if the OAS were ready to consider the "Cuban case," they should force that country to halt its broadcasts destined for the Paraguayan people. On a trip to Lima (Peru), on February 4th, 1974, and being questioned by Peruvian journalists concerning the 'Cuban intervention in Paraguay,' Sapena Pastor declared: 'I listen daily to Radio Havana,' and he also recommended that the Peruvian journalists do likewise."[13]

The Paraguayan News Agency (La Agencia Noticiosa Paraguaya) reported in January 1975, that: "Radio Habana Cuba is much listened to by the Paraguayan people, especially by peasants who account for 64 percent of the population. Transmissions most listened to are those in Guarani." The agency also stated that "as well, the Spanish transmissions are heard in this country with the strength of a cannonade."[14]

Until very recently, Paraguay had a single television station operational from the capital. Asuncion now has two TV outlets, albeit operated by the same concern; as well as an independent station located in Encarnacion on the border with Argentina.[15] Outside of these two cities, however, television has almost no impact.

Common Carrier Services:

Telecommunications are helping to rebuild the Paraguay of today. Up until recently, communications lines were underdeveloped and most certainly failed to meet national needs. Owing to the fact that much of the country is sparsely populated, especially in the Chaco Region, large scale telecoms have traditionally been restricted to the capital, Asuncion. Quoting from available information: "Because of the extremely low population density in the Chaco, a public telecommunication network could not yet be established, and private HF radio stations have to handle traffic with Asuncion with all the deficiencies of such a service. In the east, the great difference between the more developed area around the capital and the thinly populated interior is reflected in the country's present public telecommunications."[16]

Recognizing that development of Paraguay would be quite impossible without modern and adequate communications resources, the government created ANTELCO, Administracion Nacional de Telecomunicaciones, responsible for modernization and extension of Paraguayan telecoms.[17] The Administration first concentrated on upgrading international circuits via HF radiotelephony in correspondence with stations in New York, Hamburg, Buenos Aires, Rio de Janeiro and Montevideo.[18] Also, the Asuncion telephone system was improved; including the installation of new, automatic switching equipment and required subsets.[19] A new telex exchange was also arranged, as well as expansion of trunk lines for calls to provincial centers.[20]

At the time of ANTELCO's start of reconstruction, it was written that: "The old network, laid out in technical standards of the past, is not flexible enough to be adapted easily to the present situation. This network generally consists of open-wire lines which follow the roads radiating from Asuncion and connect the ANTELCO telecommunication offices of the villages and towns along the road by the same voice frequency wire pair."[21] The report went on to state: "In many cases, the ANTELCO office houses the only telephone station of a settlement; sometimes there is a small manual switchboard of magneto type for 25 or 50 subscribers."[22]

At the same time, only four automatic telephone exchanges were in service. Likewise, rural telecoms offices often did not "pay their way," and required extensive financial support, due to low traffic volume.[23] In

an effort to bring Paraguayan communications out of this lethargic state of affairs, ANTELCO devoted much time to the reconstruction of open-wire lines and equipping the same with three and 12 channel FDM carrier systems.[24] Old-fashioned iron wire using ground return was phased out where possible, as there is little hope of improvement within this technology.[25] It was decided at the same time to integrate the national telegraphic service with the telephone system; permitting a rational utilization of connecting facilities. Assistance and advice were brought in from ITU (International Telecommunication Union) experts.

ANTELCO studied the various problems of rural telephony and found that the large number of manual, local-battery exchanges were operating well below capacity.[26] It was decided, consequently, to make use of subscriber-carrier equipped wirelines, and link rural telephones directly to the nearest automatic exchange.[27] As a result, a large number of small villages became connected to a single local exchange, although in cases, substantial distances are involved.[28] Satellite exchanges; that is to say -tributary; are utilized in some instances.

Traffic studies showed that calls between rural centers were relatively few, while communications with the national capital accounted for a substantial volume. Therefore, the Paraguayan national network is centered around Asuncion. Calls between distant provincial zones are routed via the capital.[29] This means that while much of the local telephone traffic is being converted to automatic switching, most of the interurban calls remain manually switched. Many Paraguayan trunk lines are still on open wire lines; subject to damage and requiring much maintenance.[30]

ANTELCO has also decided to opt for a more centralized operator assistance scheme, in the case of connections which are most reliably provided for manually. This removes telephonist positions from the regional or rural exchanges. It was also decided that existing and renovated trunk circuits should be equipped with carrier, at the 12 "plus" three channel level; giving 15 voice circuits per pair.[31] This practice eliminates the need for wasteful VF circuits. Also, in the area of trunk circuits, ANTELCO has opted for greater usage of microwaves and radio relay. Preference was given to the establishment of a link between the capital, Asuncion and Concepcion.[32] This facility also connects with Puerto Rosario. Equipment in the 7 gHz band was chosen, initially outfitted with 12 carrier channels.[33] Microwave circuits in the 2 gHz band link Asuncion-Concepcion-Paraguari-Cnel.Oviedo-Union-Itacurubi del Rosario-San Pedro-Guardia-and Cue.[34] Dual diversity reception was provided for, permitting 300 voice circuits, if required.[35] In the case of repeaters or remote terminals, emphasis has been placed on simplicity and reliability of operation: concentrating on fully semi-conductor equipment, requiring little electricity.[36] These microwave links multiply by many times the capabilities of the old, open-wire lines.

The communications resources of the Chaco Region have been substantially improved with the construction of a new open-wire line between Asuncion-Mariscal Estigarribia-Filadelfia, which is equipped with carrier.[37] The distant settlement of Mennonites will especially benefit from this new facility.[38] Thought has been given toward the establishment of a VHF

radiophone network in the Chaco, replacing the numerous and often antiquated HF stations.[39]

In the capital, a great deal of telecoms reconstruction has taken place in the past few years. From a state of poor reliability, the Asuncion local network has been re-equipped with seven automatic exchanges using modern switching with the local wire plant also being rebuilt.[40] New telephone subsets were purchased for the capital, with the older telephones being transferred to rural exchanges.[41]

Primary international routes run from Asuncion to Formosa, Argentina; Asuncion to Puerto Presidente Stroessner, and across the Parana River to Foz do Iguacu, Brazil; from where circuits extend to Curitiba and the main Brazilian network.[42] A new microwave link between Paraguay and Brazil was recently installed, replacing the old cable running beneath the river.[43] The new facilities are capable of providing 1820 telephone channels, as well as television.[44] Improvements in the circuits to Argentina were made in time for the 1978 World Cup Soccer Championships in Buenos Aires.[45]

A giant leap forward was scored in Paraguay, with the recent installation of an INTELSAT earth station at Aregua, some 40 kM southeast of Asuncion.[46] Operating with the Atlantic Ocean satellites, much improvement has been noted in important international circuits.

Electrical production in Paraguay has not always been adequate for domestic needs. Until 1965, only 18 cities had any form of electricity.[47] A 45 MW

hydro plant was built on the Acaray River in 1968, providing relief for the situation.[48] At present, three major hydro projects are underway involving Paraguay and neighboring states. The enormous Itaipu plan with Brazil is located on the Parana River and will ultimately produce over 10,700 MW; the largest such installation in the world.[49] The Yacireta-Apipe complex is also under construction, jointly with the Argentine Republic and will have 20 turbines -capable of 3,200 MW.[50] The Corpus project also with Argentina is located downstream from Itaipu; taking advantage of waters of both the Parana and Iguazu Rivers with 2,700 MW capacity.[51] These hydro plants will ultimately make Paraguay, once poor in electrical resources, a major power exporter.

Overall Analysis:

Paraguay is served by a moderately adequate radio broadcast system and by a limited television facility. Radio alone could be considered a national medium. The common carrier facilities have drastically improved over the past few years, but still fail to meet demands. The recent addition of Aregua INTELSAT station was a notable event for Paraguay.

The new hydroelectric plants underway in the republic will completely change the energy picture; not only for Paraguay, but for much of South America. Tremendous economic growth should be possible, as the hydro-power will permit substantial reductions in imported fossil fuels.

PARAGUAY

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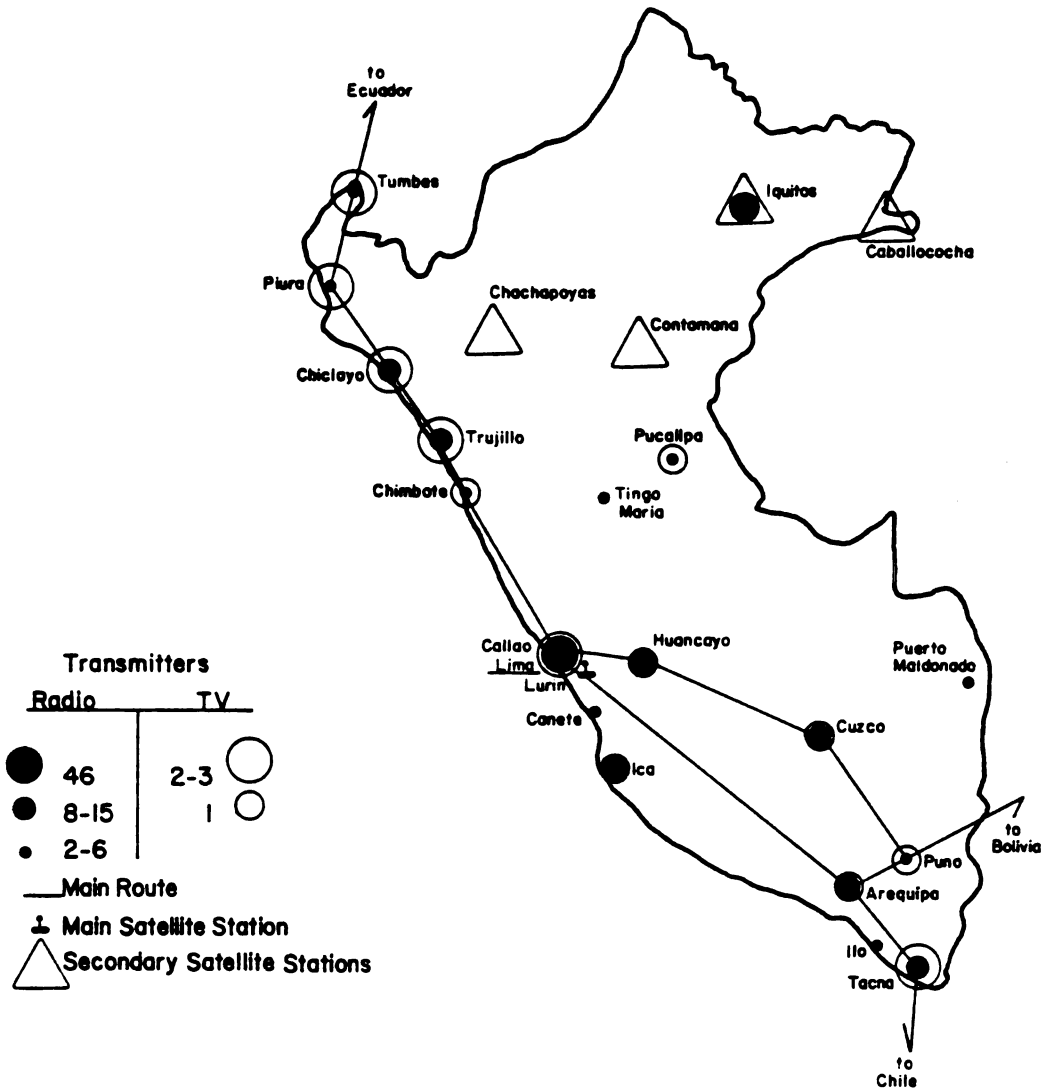
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FIGURE 28

Communication Networks in PERU



PERU

(Republica del Peru)

Basic Information:[1]

Area: 1,285,215 kM^2
Population: 16.58 million (1977)
Population Density: 12.9 per kM^2
Capital: Lima
Major Cities: Lima, Arequipa, Callao, Trujillo, Chiclayo
Languages: Spanish, Quechua, Aymara
Religion: Predominately Roman Catholic
Gross National Product: US$ 13.2 billion (1976)
Per Capita Income: US$ 796
Literacy: 72 percent

Geographical Summary:[2]

Situated on the west coast of the South American continent, Peru has borders with the republics of Ecuador, Colombia, Brazil, Bolivia and Chile. There is roughly 2,400 kM of Pacific coastline. Peru is an interesting mixture of terrain. Forests and jungle of the Amazon Basin cover over 50 percent of the country. The Andes and sub-parts account for nearly 30 percent of the national territory; leaving the remainder as either arid coastal plain or moderate uplands. Much of the population lives within the coastal region.

Basic National Review:[3]

Up until Spanish conquest, Peru was the center of the famous Inca Empire, which extended into northern Ecuador and central Chile. Under colonial rule, the Indian population was utilized for labor in the mines or searching for other forms of exportable wealth.

Spanish control was ended in 1824 by forces under the leadership of Generals Jose de San Martin and Simon Bolivar. Throughout much of the 19th century, Spain attempted to regain territory, but finally recognized the independence of Peru in 1879. In the War of the Pacific (1879-84), Peru faced Chilean forces in a territorial dispute. Along with Bolivia, Peru lost substantial land areas upon defeat. Tacna was returned to Peru in 1929.

APRA - Alianza Popular Revolucionaria Americana - was formed in 1924 as a political movement based on populist and nationalist grounds. This organization has played major roles in subsequent elections and other affairs. The Peruvian military has intervened several times in recent years.

In 1969, U.S. petroleum interests were nationalized by the miliary junta. A dispute with the U.S. over tuna fishing rights also helped worsen relations between the two countries. In 1971, U.S. copper concessions were terminated by Peru. The year 1975 brought General Francisco Morales Bermudez to the presidency, as well as Peru joining the SELA - Latin American Economic System.

Military advisers from the U.S.S.R. have been a subject of concern over the past few years. Fighter aircraft and other technical resources have also been obtained from the Soviets and Eastern Europe. At the same time, ties have continued with the West.

Peru has enormous mineral wealth, including petroleum, coal, iron ore, copper, tungsten, zinc, silver, gold and lead. Various forms of agriculture are also practiced, with cotton cultivation and stock-raising being notable. The wool of llamas, vicunas, and alpacas is exported; known for fine quality. Fishing is exceptionally important to Peru, with the country netting roughly one sixth of total world catch. Anchovies are caught in large quantities and used for fish-meal.

Telecommunications Overview:[4]

International Prefixes: OAA-OCZ, 4TA-4TZ
Number of Radio Broadcast Stations: 187
" " " Receivers: 2.01 million (1975)
" " " " per hundred: 12.12
" " Television Stations: 4
" " " Receivers: 500,000 (1977)
" " " " per hundred: 3.02
" " Telephones: 295,224 (1977)
" " " per hundred: 1.8
Electrical Generation Capacity: 2,413,000 kW (1976)
Electrical Service: 60 hZ, 220 volts
Satellite Earth Stations: INTELSAT station at Lurin, using Atlantic Ocean satellites. Domestic station (INTELSAT) at Iquitos. Additional domestic sites planned for Chachapoyas, Caballococha and Contamana.
International Communications: Via INTELSAT, terrestrial links to neighboring states and HF radio.
Ownership of Communications Media: Both government and private.
Television Standard: System M, currently monochromatic.
International Telephone Code: 51
Telecommunications Administration: Direccion General de Comunicaciones, Ministerio de Transportes y Comunicaciones. (Lima)

Domestic Broadcasting:[5]

(Medium and Short Waves)

City	Number of Transmitters	(kW) Combined Power
Lima	56	436.6
Iquitos	15	38
Tacna	8	24.95
Arequipa	11	23.37
Chiclayo	8	22
Piura	4	16.5
Cuzco	9	16.35
Tumbes	5	15
Pucallpa	6	14
Trujillo	9	14
Huancayo	14	9.7
Quillabamba	4	7

(FM)

There are FM transmitters in the larger cities, most of which are low powered.

(Television)

City	Channels	Networks	(kW/ERP) Combined Power
Lima	4,5,7	ENRAD,CPR,PAN	288
Arequipa	2,6	PAN,RCSA	10
Chiclayo	2,4	CPR,PAN	.2
Piura	2,7	CPR,PAN	.2
Tacna	2,9	CPR,PAN	.2
Trujillo	6,7	CPR,PAN	.2
Tumbes	5,7	ENRAD,CPR	.2
Abancay	6	ENRAD	.1
Ayacucho	7	ENRAD	.1
Chimbote	9	PAN	.1
Cuzco	9	PAN	.1
Huancayo	2	ENRAD	.1
Iquitos	7	ENRAD	.1
Pucallpa	13	PAN	.1
Puno	2	ENRAD	.1

Networks:
ENRAD: Empresa Nacional de Radiodifusion del Peru
CPR: Compania Peruana de Radiodifucion, S.A.
PAN: Panamericana Television, S.A.
RCSA: Radio Continental, S.A.

Trends in Broadcasting:

Radio broadcasting plays an important task in the Peruvian Republic. Owing to the geographical and cultural isolation of various regions, it is no easy feat to maintain adequate national communications. Consequently, the power of radio leaps the mountains and jungles of the country in order to serve as a factor of national integration and identity. The capital, Lima, has by far the largest number of broadcast facilities and tends to dominate the scene.[6] In terms of technical resources, Peru is not especially wealthy. Out of the 187 stations in the republic, there are only 30 transmitters of any power; that is to say, 10 kW or more.[7] The largest facility has 50 kW.[8] The vast majority of radio stations operate with low power; not infrequently less than a single kilowatt.[9]

Both medium and short waves are employed for national coverage with the latter being important in terms of real outreach. Radio Nacional, the government station, employs several moderately powerful HF transmitters, which duplicate programs for the more distant listener.[10] Major stations frequently have several shortwave frequencies in addition to one or more medium-wave outlets.

Stations of National Importance:[11]

Radio del Pacifico	Lima
Radio Continental	Arequipa
Radio Nacional	Lima
Radio Union	Lima
Radio El Sol	Lima
Radio Panamericana	Lima
Radio Nacional-Mil Ochenta	Lima
Radio La Cronica	Lima
Radio Inca del Peru	Lima
Radio America	Lima
Radio Victoria	Lima

The Radio Nacional system includes outlets in the larger cities of Peru, including Tacna, Tumbes, Iquitos, and the capital.[12] The outlying stations also maintain shortwave transmitters.

According to available information, one of the most listened to stations is Radio La Cronica, owned by the La Cronica newspaper.[13] This Lima station programs a mixture of information, music and dramatic entertainment. Other stations tend to specialize in coverage with music, sports, news, and ethnicity being important.

There is a great deal of competition on the airwaves, both for audience and the related commercial airtime sales. There are many instances of smaller broadcasters which are marginal in nature; finding it difficult or impossible to compete with the larger, better outfitted facilities. In the past, many stations have carried news and features from the Voice of America, or USIA sources.[14] The VOA transmits special newsfeeds in Spanish, which can easily be recorded and later used.[15]

Television started in Peru in 1958 when the Ministry of Education constructed a 100 watt transmitter with UNESCO assistance.[16] This facility has evolved into ENRAD -Empresa Nacional de Radiodifusion del Peru, a government organization.[17] Educational and cultural programming is stressed and is diffused over an extensive network of repeaters.[18] Other organizations which are involved in television have come about since the creation of ENRAD, making for a total of four networks.[19] Programs typically run for 10 hours each day, making use of much videotaped and filmed material.[20]

Peru does not have an official international voice, although some of the Radio Nacional shortwave frequencies are heard in the exterior. Even the smaller, local voices on HF are occasionally picked up around the world, owing to the high elevation and suitable propagation conditions in certain areas.

With the advent of the INTELSAT station at Lurin, and the later domestic terminal at Iquitos, Peru entered the club of international television.[21] At the time of the World Cup Championships, in Buenos Aires (1978), special effort was made to bring live television coverage to the Peruvian viewer.[22]

Common Carrier Serivce:

Common carrier operations vary as much as the terrain in Peru. This is not surprising, considering the differing requirements and modes of interconnections. The Ministerio de Transportes y Comunicaciones is the responsible body for telecoms in Peru.[23] The major operating company for telephones is the Compania Peruana de Telefonos, formerly owned by ITT.[24] Along the coast and in other major population regions, communications are adequate. However, it is rather difficult to establish contact with certain remote areas.

Main trunks run from Tacna and Puno on the frontiers of Chile and Bolivia, respectively, to Arequipa, Lima, Trujillo and Piura in the far north.[25] Much use of microwave relay is made.[26] International circuits are routed via the radio relay network as follows: Piura to Guayaquil, Ecuador;

Tacna to Arica, Chile; and Puno, to La Paz, Bolivia.[27]

Much effort has been undertaken to improve the telephone system in Peru's major cities. This started in the late 1960's, with understandings reached with the then-ITT Compania Peruana de Telefonos.[28] New automatic exchanges and appropriate wire plant were procured and installed.[29] A special shareholding redemption and investment scheme was arranged, so as to ensure eventual nationalization of the company. This was accomplished in 1970.[30]

Since nationalization, much new equipment has been added, including over 70,000 lines of the very modern Philips' PRX processor-controlled exchanges.[31] These units permit a variety of sophisticated functions, including MFC - "touch tone" dialling. Out of the total 295,000 telephones in Peru, over 155,000 are located in Lima, the capital.[32] An automatic STD network is in effect as follows:[33]

City	Zone Code
Arequipa	542
Callao	14
Chiclayo	7423
Chimbote	4432
Cuzco	8423
Huancayo	6423
Ica	3423
Lima	14
Piura	7432
Trujillo	44

The use of longer than usual zone indicators is required, owing to routing restrictions imposed by some of the older equipment still in service.

A nationwide telex network was installed in Peru in 1974 by Siemens.[34] The system counts on 18 exchanges with 2,400 terminals.[35] The various centers are routed in a tributary fashion, in reference to zone control exchanges in Lima, Arequipa and Trujillo.[36]

Peru has facilities for HF radiotelephone and telex circuits using Philips' ISB equipment.[37] The teleprinter channels are equipped with TOR -error protection devices. Circuits are maintained as required with various locations in South and Central America, as well as other parts of the world.

Peru has an INTELSAT earth station at Lurin, near the capital, which corresponds with the Atlantic Ocean satellites.[38] There are two antennae at present; one in the international traffic, while the second is dedicated to domestic work. Circuits are maintained with much of Latin America, as well as North America and Europe. There are provisions for trunked connections and SPADE access.[39] At the start of 1980, a contract was awarded by the Peruvian Government to the Philips' enterprise for the provision of three domestic satellite stations, as well as coordinating equipment at Lurin.[40] The stations are containerized and will be located at Chachapoyas (Andes); Caballococha (Amazon area); and Contamana.[41] Each station will have an independent power supply, provided by diesel generators.

The domestic stations are identical in equipment; a 12 metre parabolic (Cassegrain) antenna, and contain terminal capacities for six telephone

and one television (one-way) channels.[42] All circuits are permanently in contact with Lurin.[43] FDM -frequency division multiplexing was chosen for the system, employing SCPC, Single Channel Per Carrier.[44]

Each domestic station will have a 6 gHz transmitter capable of 400 watts power.[45] Signals are received in the 4 gHz band, with a cooled LNA - low noise amplifier, at 55^{o} K, for best results.[46] Dual redundancy in equipment was provided for, giving immediate reserve capacity in case of failure. It is possible to operate all three stations by remote control from Lurin, thereby removing the need for engineering personnel to be located at the sites.[47]

Electricity in Peru is the overall responsibility of ELECTROPERU, a government entity.[48] More than 75 percent of power generation is by hydro, having roughly a 6 million kW capacity.[49] Among the various large hydro installations are Mantaro, with 400 MW capability; the Maracapomacocha Project, which turns the east-flowing Andean waters westward into the Rimac and Santa Eulalia valleys, via a six-mile-long tunnel located more than 4,500 metres in the high Andes; the planned 120 MW dam at Machu Picchu; and the project at Canon del Pate, with 100 MW.[50] Having an abundance of hydraulic energy helps Peru to avoid highly expensive fuel importation, which has damaged the economies of several Latin nations.

Overall Analysis:

Peru has a very widespread and comprehensive sound broadcasting system. This radio capability is a lifeline to the republic. Television is less

developed and certainly does not have the same impact as radio, but is nevertheless influential, especially in the metropolitan areas. The Peruvian telecoms system is improving rapidly with the installation of very modern facilities, such as the PRX exchanges, new transmission equipment, and the use of domestic satellite in order to connect with remote settlements.

While common-carrier facilities do not yet serve all segments of the population at an adequate level, much progress has been made in bringing connections to many parts of the country.

Peruvian hydro schemes are among the most comprehensive in the world and have definite potential for future growth.

PERU

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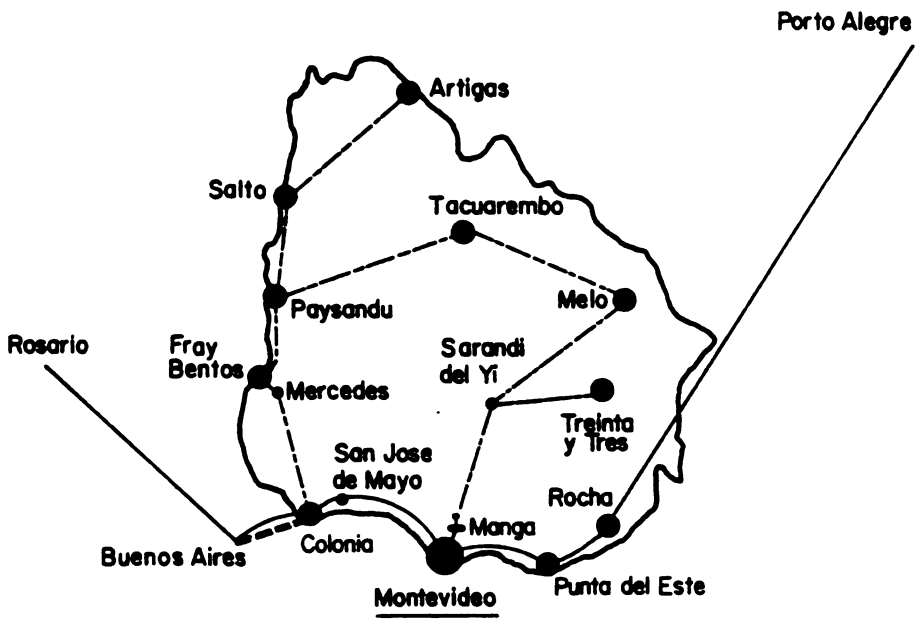
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FIGURE 29

Communication Networks in URUGUAY



- 4 TV
- 1-2 TV
- Radio only
- Satellite Station
- Main Route
- Secondary Route
- Submarine Cable

note: major cities have several radio stations

URUGUAY

(Republica Oriental del Uruguay)

Basic Information:[1]

Area: 176,215 kM^2
Population: 2.825 million (1978)[2]
Population Density: 16.03 per kM^2
Capital: Montevideo
Major Cities: Montevideo, Salto, Paysandu
Language: Spanish
Religion: Predominantly Roman Catholic
Gross National Product: US$ 3.9 billion (1976)
Per Capita Income: US$ 1,381
Literacy: 91%

Geographical Summary:[2]

Located on the southeast coast of South America, the Oriental Republic of Uruguay is bordered on the north by Brazil, on the east by the Atlantic, and on the south by the Rio de la Plata estuary, as well as by Argentina on the West. Much of Uruguay is composed of low hills and rolling plains with some forested lands. There are many rivers, including the Uruguay, Negro and Plata.

Basic National Review:[3]

Populated by fierce Indian tribes until Spanish conquest, in 1624, Uruguay later came under Portuguese rule, returning again to Spain in the 18th century. At the time of the Napoleonic Wars in Europe, Uruguay was under English occupation for a short period. The year 1810 brought the start of the independence movement led by Jose Gervasio Artigas. In 1814, with help from Argentina, freedom from Spain was accomplished.

For a while, Uruguay was part of the Brazilian Empire. In the year 1825, a patriotic group known as the "33 immortals" proclaimed the country as an independent republic; acting as a buffer state between Brazil and Argentina. Uruguay joined Brazil and Argentina in the 1865-70 war against Paraguay.

In the period 1911-15, President Battle y Ordonez opened social and economic reforms, leading to the acquisition of much industry by the state. In 1951, the post of President was totally done away with, replacing it with a council of nine. A vote in 1966 restored the presidential system. Violence and kidnappings by the Tupamaros, a guerilla organization, resulted in restrictions on freedoms by the Uruguayan government. Included with those taken by guerillas were the Brazilian Counsul, two American technicians, and the British Ambassador. In 1971, over 100 Tupamaros escaped from a large prison, many remaining at large. A state of "Internal Warfare" was declared by the government in order to combat terrorism.

President Juan Maria Bordaberry closed down Congress and suspended the Constitution in 1973, creating a mixed military-civilian Council of State. He immediately began a campaign to halt violence and disorder.

Following several killings of prominent Uruguayans, President Bordaberry tightened controls over many sectors as well as increasing security and police capabilities. Bordaberry himself was removed from office in 1976 by the Armed Forces, being replaced by Aparicio Mendez.

Agriculture is the mainstay of the Uruguayan economy; with cattle-raising, sheep-herding, meat and wool processing being important. Wheat is the principal crop. Textiles, footwear and cement are also major industries.

Telecommunications Overview:[4]

International Prefixes: CVA-CXZ
Number of Radio Broadcast Stations: 76
" " " Receivers: 1.63 million
" " " " per hundred: 57.7
" " Television Stations: 15
" " " Receivers: 361,000
" " " " per hundred: 12.8
" " Telephones: 257,624
" " " per hundred: 9.12
Electrical Generation Capacity: 700,000 kW (1976) *Expected to increase markedly with new hydro projects underway
Electrical Service: 50 hZ, 220 volts
Satellite Earth Stations: New INTELSAT facility at Manga, near Montevideo
International Communications: Via terrestrial link with neighboring states, HF radio, and INTELSAT
Ownership of Communications Media: Government and private-commercial
Television Standard: System N, monochromatic
Telecommunications Administration: Division Control de Servicios Radioelectricos (Montevideo)

Domestic Broadcasting:[5]

(Medium and Short Waves)

City	Number of Transmitters	(kW) Combined Power
Montevideo	37	464.1
Melo	5	34.5
Tacuarembo	2	11
Duranzo	4	8
Paysandu	4	7.6
Artigas	4	6.25
Colonia	3	5.95
Salto	5	5.75
Rocha	2	3.1
Carmelo	2	3
Treinta y Tres	2	2.75
Mercedes	4	2.6
Las Piedras	2	2.5
Rivera	4	2.4

(FM)

There are FM channels in the major towns.

(Television)

City	Channels	(kW/ERP) Combined Power
Montevideo	4,5,10,12	214
Rosario	8	75
Fray Bentos	12	20
Punta del Este	11	5
Paysandu	3	3
Salto	8	2
Melo	8,12	1.5
Colonia	3	1
Treinta y Tres	12	1
Artigas	3	0.5
Rocha	7	0.5
Tacuarembo	7	0.5

Trends in Broadcasting:

Uruguay has an interesting combination of government and private broadcasting with longstanding traditions in both cases. Most radio stations are regional or local in nature, working with moderate transmission powers.[6] Of the 76 Uruguayan stations, 18 have powers of 10 kW or more.[7] Other than the single government network, SODRE (Servicio Oficial de Difusion Radioelectrica), all stations are privately owned and commercial.[8] The larger stations are almost always located in the capital and include:[9]

Radio SODRE
Radio Sarandi
Radio Continente
Radio Oriental
Radio El Espectador
Radio Carve
Radio Monte Carlo
Radio El Tiempo

Almost all homes have receivers, and the medium serves as a source of news and information distribution, in a manner comparable to the printed press.[10] Licenses for broadcasting are obtained from the Division Control de Servicios Radioelectricos, and normally are valid for one year, with automatic renewal possible.[11] Only if questions occur in relation to performance or technical matters does the licensee come under scrutiny.[12] Under the provisions of Law No. 8390 of 1928, a license also indicates examination and approval by the Ministry of Defense.[13]

Uruguayan regulations permit the same enterprise to maintain up to two radio stations in any given locality, with the exception of SODRE, which has more.[14] The Radio El Espectador group also has Radio Libertad

Sport; Radio Carve operates Radio El Tiempo; all of which are in the national capital.[15]

There are 15 television stations in the country, most of which are independent and serve certain towns and cities.[16] Major TV facilities are:[17]

Station	Channel	City
Monte Carlo TV	4	Montevideo
	8	Rosario
	11	Punta del Este
Televisora Larranaga	12	Montevideo
	12	Fray Bentos
SODRE TV	5	Montevideo
	8	Melo

Many imported programs have been aired on Uruguayan television, including material from Argentina and the U.S. International telecasts can be routed via the Balcarce earth station in Argentina and sent to Montevideo on microwaves.[18] There is presently no color TV in the country. At last count, there were 361,000 TV sets; making for an audience of roughly one million.[19]

Three television enterprises have transmitters in more than one city; effectively making small networks.[20] The remainder are not interconnected on a regular basis, although cooperation has been noted in areas of program interchange. It is possible to pick up radio broadcasts from various parts of South America and the world, especially from Argentina and Brazil. TV from across the River Plate and from southern Brazil also penetrates the Uruguayan frontiers in certain areas. The short-wave signals from SODRE and other organizations, as well as the powerful

medium-wave transmitter of Radio Oriental, are heard often abroad. In fact, SODRE has aired occasional programs in English on their HF frequencies, although the irregularity of this and low transmission powers prevent consideration as a full-fledged international voice.[21]

Common Carrier Services:

Utilities and common carrier services are a state monopoly in Uruguay, by terms of legislation of the late 19th and early 20 centuries.[22] The Administracion Nacional de Telecomunicaciones (ANTEL) is responsible overall for telecoms.[23] There is a concentration of facilities in Montevideo, with roughly 75 percent of all telephones installed being in that city.[24] Approximately 260,000 telephone instruments are in use across the country.[25]

The telephone system has been overloaded for a long time.[26] Most international traffic has been traditionally routed via Buenos Aires, with delays of many hours possible.[27] According to information on hand, one must pay three times the normal call rate for a connection made to Buenos Aires within half an hour.[28] Inter-city traffic within Uruguay also requires some time to complete, on occasion.[29]

Wirelines and a growing radio relay network connect Montevideo with other cities in the republic, based on three trunk routes emanating from the capital.[30] In terms of the microwave system, equipment in the 6 gHz band has been used, much of which has been of GTE or Telettra (Italian) manufacture.[31] Microwaves are extensively used on the main

paths linking Montevideo with Punta del Este and Colonia, as well as the circuits which extend to Brazil and Argentina.[32] Channel capacity ranges from 300 to 960 voice circuits as well as television.[33] The internal telephone network is not yet fully automatic, although over 90,000 lines of Siemens EMD switching equipment was installed in the late '60s. Montevideo and 23 other cities benefit from these exchanges. STD, where applicable, is also based on EMD equipment.[34]

Uruguay's main international line extends from Montevideo to Buenos Aires, Argentina, by way of the cities of Rosario and Colonia.[35] This microwave relay route is equipped for 960 voice circuits, as well as television, and permits automatic and semi-automatic trunk calling.[36] Equipment works in the 7 gHz band, with diversity reception to overcome fading across the Rio de la Plata estuary.[37] An old submarine cable under the river provides only 24 voice and 24 telegraph channels.[38]

An international trunk circuit on microwaves extends from Punta del Este to Porto Alegre, Brazil; also capable of 960 channels.[39] Calls may be made into the Brazilian network via this facility.

An internal telex network was installed between the major cities of Uruguay in the mid-1960's, with external circuits to the Rome Intercontinental Exchange, via submarine cable and HF radio.[40] The cable was laid by Italian interests in 1924, and connects Montevideo with Rome, by way of Brazil (Rio and Recife); Sao Vicente, Cape Verde; the Canary Islands; and Malaga, Spain.[41] This submarine cable is

sufficient in capacity only for telegraphy.[42] HF radiotelephone is also used.

An INTELSAT earth station was recently installed at Manga near Montevideo for modernized international connections.[43] With the advent of the new facility, Uruguay has gained an increase in flexibility and options; vis-a-vis worldwide communications.

The government's Administracion General de las Usinas Electricas oversees electrical production in Uruguay.[44] Approximately 90 percent of the total generating capacity is from hydropower, with large dams installed; notably, the Rincon del Bonete (128 MW); Rincon de Baygorria (103 MW); Palmar Hydro; under construction for 480 MW; and the large Salto Grande complex on the Rio Uruguay.[45] The latter is a joint project with Argentina and will have 1,890 MW capacity with 14 turbines.[46] Interestingly enough, the turbines were imported from the Soviet Union.[47] Consideration has been given to a joint Uruguay-Brazil hydro plant at Laguna Merin.[48] There is a substantial high tension grid across much of the country and into neighboring states.[49]

Overall Analysis:

Uruguayan social communications have a multiplicity found in few nations of the world. There are many independent sources of information, from within and without of the country. The function of SODRE, the government broadcaster, is more additive than negative; that is - a cultural/educational role which encourages national growth.

The telecoms services are presently adequate for most needs but would benefit from modernization. Much progress in this field has been logged in the past few years. The construction of the new INTELSAT terminal has been a great step forward for Uruguay.

URUGUAY

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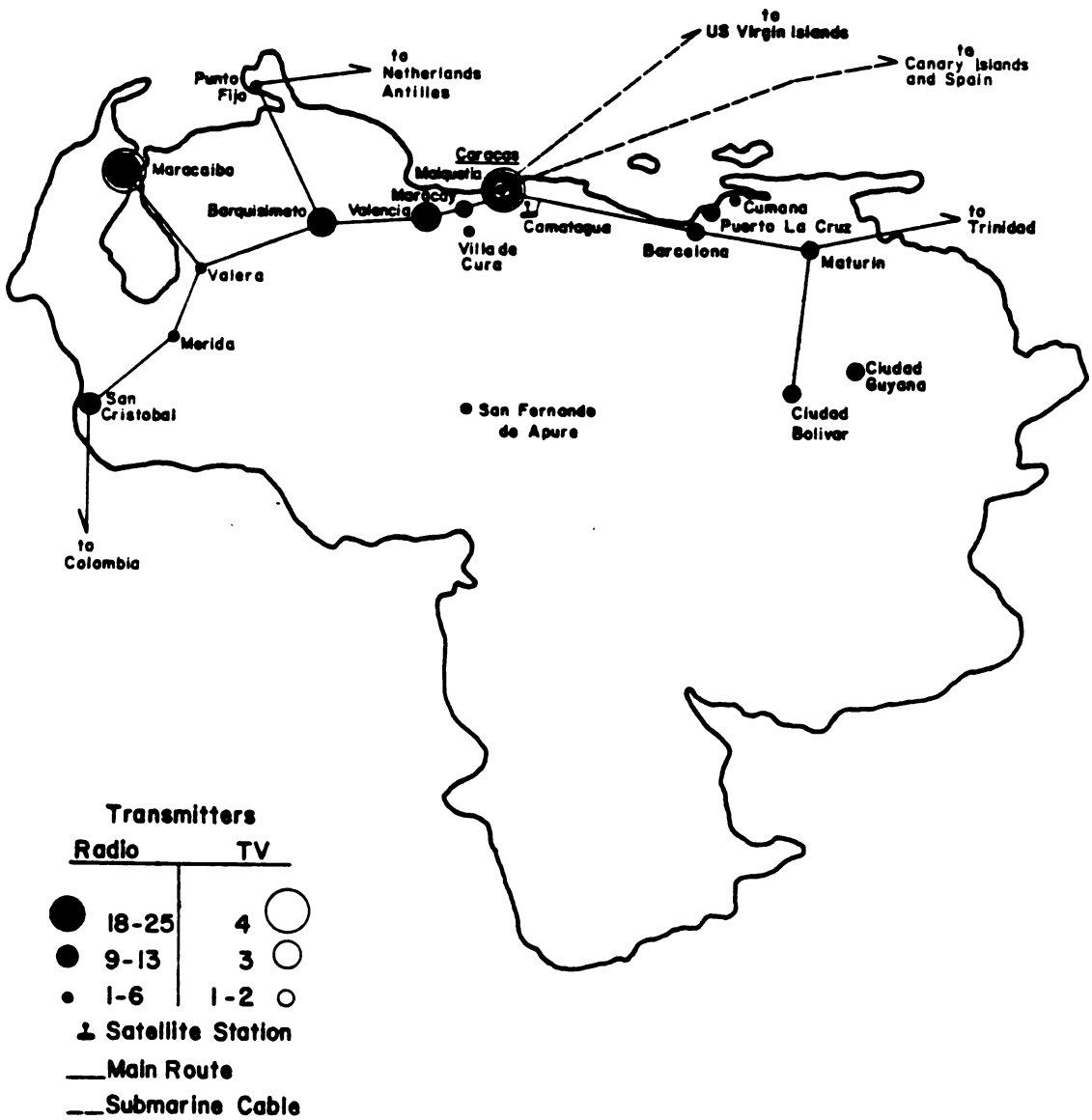
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FIGURE 30

Communication Networks in VENEZUELA



VENEZUELA

(Republica de Venezuela)

Basic Information:[1]

Area: 912,050 kM^2
Population: 13.15 million (1978)[2]
Population Density: 14.42 per kM^2
Capital: Caracas
Major Cities: Caracas, Maracaibo, Valencia, Barquisimeto
Language: Spanish
Religion: Predominately Roman Catholic
Gross National Product: US$ 31.1 billion (1976)
Per Capita Income: US$ 2,365
Literacy: 82%

Geographical Summary:[2]

Situated on the northern coast of the South American continent, Venezuela shares common borders with Guyana, Brazil, and Colombia; and neighbors Trinidad and Tobago and the Netherlands Antilles. Venezuela has a substantial Caribbean coastline, as well as the near-Atlantic. The country is divided into several segments; the Andes mountains and adjacencies; the coastal area north of the mountains - extending to the Caribbean; the rolling hills and plains of the "llanos" extend from the Andes to the south and east. The Orinoco River is very important to the country.

Basic National Review:[3]

Until conquest by the Spanish in the 16th century, what is now Venezuela was peopled by Indians of the Arawak and Caraibas tribes. A very unique event was the granting of exploratory rights by the Spanish Emperor to a

German bank; giving the company carte blanche in Venezuela. The bank never carried out the intentions and the grant was later rescinded. Exploration and settlement by the Spanish Crown took place in the mid-1500's.

In 1811, forces under Francisco de Miranda proclaimed the independence of Venezuela but were overpowered by Spain. In the period 1812-21, a full-scale war was conducted against Spain by the armies of Simon Bolivar, creating the independent state of Gran Colombia, which included Venezuela, Colombia, Panama and Ecuador. Venezuela left the confederation in 1830 but was torn apart by internal violence. In 1895, there was a violent border conflict with British Guiana, resulting in loss of territories to the British. Between 1906 and 1945, various periods of dictatorial rule prevailed; at times exceptionally repressive in nature. During this same period, the first oil concessions were granted, with the industry taking form.

The year 1945 brought a liberal revolution and installed Romulo Bettancourt as president. Social and economic reforms were effected. A military coup in 1948 brought to power Colonel Perez Jimenez, who ruled until 1958.

Steps were taken towards oil industry nationalization in the late 1960's.

In 1970, Venezuela and Guyana declared a 12 year moratorium on border disputes. 1973 brought a new presidential election, the fifth free one

in 144 years of republican power. Two years later, President Carlos Andres Perez nationalized the iron and petroleum industries in Venezuela. The country also joined SELA - the Latin American Economic System.

Petroleum is very important to Venezuela, especially in the Maracaibo area, where there are many producing fields. Agriculture is also notable, with coffee being the largest crop with thousands of plantations. Stock raising in the llanos and near the Lake of Maracaibo produces much beef and mutton. Textiles, tobacco and wood products are manufactured along with petroleum processing.

Telecommunications Overview:[4]

International Prefixes: YVA-YYZ, 4MA-4MZ
Number of Radio Broadcast Stations: 148
" " " Receivers: 2.15 million
" " " " per hundred: 16.35
" " Television Stations: 4
" " " Receivers: 1.5 million
" " " " per hundred: 11.41
" " Telephones: 742,050
" " " per hundred: 5.6
Electrical Generation Capacity: 4,500,000 kW (1976)
Electrical Service: 50 and 60 hZ, 120/240 volts
Satellite Earth Stations: INTELSAT station at Camatagua, south of Caracas
International Communications: Via INTELSAT, submarine cables, terrestrial links to adjacent countries and offshore islands, HF radio
Ownership of Communications Media: Government and private-commercial
Television Standard: System N, NTSC color
International Telephone Code: 58
Telecommunications Administration: Ministerio de Comunicaciones
Direccion de Telecomunicaciones
(Caracas)

Domestic Broadcasting:[5]

(Medium and Short Waves)

City	Number of Transmitters	(kW) Combined Power
Caracas	25	587
Maracaibo	18	217
Villa de Cura	2	210
Barquisimeto	13	166
Valencia	9	107
San Cristobal	11	97
Maracay	4	80
Puerto La Cruz	4	71
Rosario	2	70
S. Antonio de los Altos	2	55
Maturin	6	36
S. Fernando de Apure	6	32
Punto Fijo	2	30
S. Juan de Manapiare	1	25
Ciudad Bolivar	5	23
Barcelona	4	22
Valera	4	22
Cumana	3	21
Puerto Ordaz	2	20
Merida	5	15.5
Maiquetia	1	10

(FM)

There are FM channels in all major cities and towns.

(Television)

City	Channels	Networks	(kW/ERP) Combined Power
Valencia	7,9,11	RCT,VEN,VTV8	527
Caracas	2,4,5,8	VTV5,RCT,VEN,VTC8	440
Tachira	7,9,13	VTV5,RCT,VEN	337
Falcon	10	RCT	330
Maracaibo	2,4,6,8	VTV5,RCT,VEN,VTV8	306
Maturin	3	RCT	300
Cd. Guyana	3	RCT	275
Barquisimeto	3,6,7	RCT,VEN,VTV8	245
Litoral Central	7,9,11	RCT,VEN,VTV8	197
Barcelona	3,7	RCT,VEN	130
Margarita	5,8	VTV5, VTV8	130
Anaco	11	VTV8	100
Los Olivos	13	VTV5	100
Puerto La Cruz	11,13	VTV5, VTV8	98
Aleton	6	VTV5	90
Maracay	6	VTV5	68
Carupano	7	RCT	50
Cd. Piar	11,13	VTV5,VTV8	40
Cd. Bolivar	6,8	VTV5,VTV8	38
Bocono	8	VTV8	20

Networks

RCT: Radio Caracas Television
VEN: Venevision
VTV5: Venezolana de Television "5"
VTV8: Venezolana de Television "8"

Trends in Broadcasting:

Mass communications in Venezuela are organized on a mixed government and private basis. While most stations are private, the government has one radio and two television networks.

The legal basis for broadcasting comes from the Communication Regulations of 1941 under the auspices of the Ministerio de Comunicaciones.[6] Licenses are obtained from this body and are in effect for five years.[7]

Broadcast properties must be under the ownership of Venezuelan nationals, or enterprises with at least 80 percent Venezuelan financial participation.[8] As a rule, new stations must undergo a period of scrutiny and provisional operation before being permitted to assume full-time broadcast schedules.[9]

Radio stations are found in nearly every community, most of which have sufficient resources to serve a particular region. Out of 148 stations, 116 (78 percent) have transmission powers of 10 kW or more.[10] This is a tendency found in few other Latin nations. Both medium and short waves are used extensively, along with FM for more local use.

Radio Nacional, the government network, maintains stations in several cities across the nation, as well as three shortwave outlets.[11] Limited international programming has been carried by this organization.

Radio Nacional[12]

City	(kHz) Frequency	(kW) Power
Caracas	630	10
	1050	10
	5020	1
	6170	20
	15400	30
S. Fernando de Apure	630	1
S. Cristobal	630	10
Valencia	770	50
Pto. La Cruz	1300	10

Circuito RADIOVISION also operates a nation-wide network with stations in Maracay, Porlamar, Valencia, San Cristobal, Caracas, Maturin, Cd. Ojeda, Caja Seca, Cumarebo and Guacara.[13] The major facility is Radio Vision, Caracas, which works with a 100 kW transmitter.[14] In addition, the RADIO RUMBOS organization has a national reach, using powerful equipment (200 and 100 kW) situated in the national capital and Villa de Cura.[15] This station is frequently heard overseas on shortwave,[16] and its powerful medium-wave signals are common throughout the Caribbean basin.[17]

Television in Venezuela is operated by four distinct organizations; which have repeaters in the major population centers.[18] Venezolana de Television "5" and "8" are both government owned and relay programs to a combined network of 20 outlets in 15 cities.[19] The first program goes out for roughly 17 hours daily, while the second is for 14 hours.[20] Besides the government networks, there are two independent commercial systems; Radio Caracas Television and Venevision, which operate from the national capital.[21] RCT serves 13 cities for approximately 18 hours per day.[22] Venevision has 9 cities with 15 hours each day.[23] Venezuela's television audience is concentrated in the Western Coastal region, from Caracas to Maracaibo.[24] Regulations require that 50 percent of television programs must be either live or videotaped.[25] Throughout the country, television is a popular form of entertainment and information; with set ownership considered as a status symbol. During the daytime hours, programs are sent out for the younger audience, as well as housewives.

Common Carrier Services:

Under the auspices of the Ministerio de Comunicaciones, the semi-autonomous government company, CANTV (Compania Anonima Nacional Telefonos de Venezuela) operates the majority of communications systems in Venezuela.[26] At last count, there were over 740,000 telephone instruments in use; attached to roughly 200 exchanges.[27] The capital, Caracas, is equipped with nearly 300,000 telephone subsets.[28] In the mid-1970's, it was estimated that a quarter of the population had access to phone service, although this figure is growing with major expansions of the system.[29]

In 1974, at least 50 percent of the demand for new telephone service could not be met, even with new exchanges and other facilities being installed.[30] Much new Ericsson crossbar switching has been installed in recent years, along with ITT Metaconta crossbar.[31] Special attention has been given to STD dialling provisions for direct interconnection between the major population centers.[32] The zone coding scheme which follows is employed:[33]

City	Zone Code
Barcelona	81
Barquisimeto	51
Cabimas	64
Caracas	2
Cd. Bolivar	85
Coro	68
Cumana	93
Maracaibo	61
Maracay	43
Maturin	91
Merida	74
Pto. Cabello	42
San Cristobal	76
Valencia	41

Main trunk lines are based on microwave relay and use multi-carrier 960 voice channel and television capability.[34] Routes are from Caracas to Altamira/Maracay/Valencia; continuing to Barquisimeto and Valera; from where links extend to Maracaibo; and on to Merida and San Cristobal.[35] There are also paths from Caracas to Ciudad Guyana continuing to other coastal locations.[36] Venezuela has a very modern microwave network.[37]

Telex and telegraph services also connect most points, frequently over the same routes as telephone traffic.

Considering the importance of petroleum production in Venezuela, it is not surprising to find an extensive oil company network for diverse communications needs. Most facilities are found in the Maracaibo, Punta Cardon and Caracas areas, with seventeen telephone exchanges in an automatic trunking scheme.[38] Sizes of these centrals extend to 1500 lines.[39] Multi-channel radio relay is extensively used for interconnections, supplied with carrier equipment for 300 voice circuits per RF channel.[40]

International connections are made into neighboring Colombia, Trinidad and Tobago, and Guyana by extensions of the national microwave network.[41] San Cristobal connects with Bucaramanga, Colombia; and Ciudad Guiana links with Trinidad, and Georgetown, Guyana.[42] These facilities form part of the overall Latin American network. Venezuela also has a modern HF radio station at Peraza, near Caracas, which is equipped with

30 kW transmitters.[43] ISB international circuits can be worked with any part of the world.

Two large submarine cables connect Venezuela with the outside world. The first runs from Maiquetia to Magens Bay, U.S. Virgin Islands, from where routing may take place to other parts of the hemisphere.[44] There are 83 circuits on this cable, with 22 repeaters used for the 877 kM.[45] The second cable is called "COLUMBUS 1" and runs from the Canary Islands (Spain) to Maiquetia.[46] This is outfitted with 1840 telephone channels, and provides trunking service to Europe and North Africa.[47]

An INTELSAT station is in operation at Camatagua, south of the national capital.[48] CANTV operates this facility, in correspondence with other stations in the Americas and Europe.[49] Camatagua is especially important for television exchanges.

Electrical services are available in most locations in Venezuela. CADAFE, a government organization, is responsible for the overall development of power.[50] In 1975, all electricity companies were nationalized.[51] Much of Venezuela's energy comes from hydropower, especially from the River Caroni, where the giant Guri project and the Macagua dam are located.[52] When totally completed, Guri will have a generating capacity of over six million kilowatts; while Macagua is designed for 370 megawatts.[53] Important to industry and national growth, the Caroni plants supply nearly 70 percent of Venezuela's electricity.[54] It should be noted that Guri is only slightly smaller than the enormous Itaipu

project in Brazil/Paraguay.[55] Venezuela has also undertaken a comprehensive rural electrification program.[56] Planned is another larger hydro scheme at Santo Domingo, in order to serve the Andes region.[57]

Overall Analysis:

Venezuelan social communications are well developed and extensive. There is a great degree of choice within the country and from outside sources. The common-carrier network is developing rapidly but is still overloaded in some instances. Electrical services are also growing, with very modern production facilities being constructed.

In order to accommodate growing traffic between Venezuela and the U.S.A., a new submarine cable was laid between Maiquetia and St. Thomas, Virgin Islands. It has 640 voice circuits and interconnects with the North American telecoms network.[58]

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