Chapter 3

Domestic and International Management of the Radiofrequency Spectrum

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Chapter 3

Domestic and International Management of the Radio frequency Spectrum

From the earliest practical utilization of radio for ship-to-shore and ship-to-ship communications in the early 1900's it was apparent that international agreements were required to coordinate use of the electromagnetic spectrum and avoid interference. For full and effective use of radio communications there had to be common standards for equipment design and mutually consistent operating techniques. Most of all, there had to be agreement on ways to achieve interference-free, compatible use of the radio-frequency spectrum by radio systems whose radiated energy may overlap in various dimensions of space, time, frequency, and other characteristics of electromagnetic radiation.

Without such agreements radio communications would be chaotic. Mutual interference would make radio reception so unreliable as to be virtually useless. The history of spectrum management has been marked by increasingly complex mechanisms for the rational and economical exploitation of increasingly congested channels of communication. The success of these arrangements is a tribute to man's commonsense and ingenuity.

The Structure of Spectrum Management for the United States

Telecommunication is an essential element in the economic and social life of the United States and a vital factor in the effective functioning of virtually every department and agency of the Federal Government. Yet, despite the nationwide and worldwide importance of rapid, reliable, responsive telecommunications, the United States does not have a centralized means to oversee and coordinate national policy decisions.

There is no single U.S. Government organization responsible for overall frequency management, policies, and processes. Instead, there are several governmental organizations having key roles and responsibilities with the National Telecommunications and Information Administration (NTIA), the Federal Communications Commission (FCC), and the Department of State being the principal agencies. The procedures followed are both formal and informal, and there are an increasing number of diverse constituencies.

Spectrum management in the United States, including the development of policy, is divided, depending on whether the spectrum user is a Government or nongovernment entity. The Communications Act of 1934 assigns to the President the responsibility for management of the electromagnetic spectrum used by agencies and departments of the Federal Government. FCC is responsible for managing all nonfederal government use.

It is the status of the user, not the frequencies employed or the particular category of service, that determines whether the President (or his agent) or FCC has jurisdiction.

For example, spectrum use by the Department of Defense (DOD) and the individual military services is under the jurisdiction of the President, while spectrum use by common carriers such as AT&T and the Communications Satellite (COMSAT), by State and local governments, and by citizens and amateur radio operators, is the responsibility of FCC.

The Role of NTIA

Under Reorganization Plan No. 1 of 1977 and Executive Order No. 12046, of March 26, 1978, President Carter transferred his authority to assign frequencies to the Secretary of Commerce, who further delegated it to the Assistant Secretary of Commerce for Communications and Information (who is also the Administrator of NTIA).

Assisting the Administrator of NTIA is an advisory body called the Interdepartment Radio Advisory Committee (IRAC). IRAC has been in continuous existence since 1922, having been established even earlier than the Federal Radio Commission, which preceded the present FCC. It has performed essentially the same functions for the past 59 years, although the organization and structure of the executive branch, and the office, or department, or administration in which IRAC has been housed have been changed many times.

IRAC is made up of representatives of 20 Federal agencies and departments. FCC participates through a liaison representative appointed by FCC. The functions of IRAC include assisting NTIA in the development of the national table of frequency allocations, the assignment of frequencies to stations owned and operated by the U.S. Government, and in the development and carrying out of basic policies, procedures, programs, and technical matters pertaining to the management and employment of the radiofrequency spectrum.

IRAC has a secretariat that provides general support to all committee activities and a variety of specialized subcommittees and ad hoc or special working groups to deal with particular matters, such as frequency assignments, international notification, and preparations for international conferences. The subcommittees are concerned with ongoing activities whereas ad hoc groups deal with specific-term subject matter.

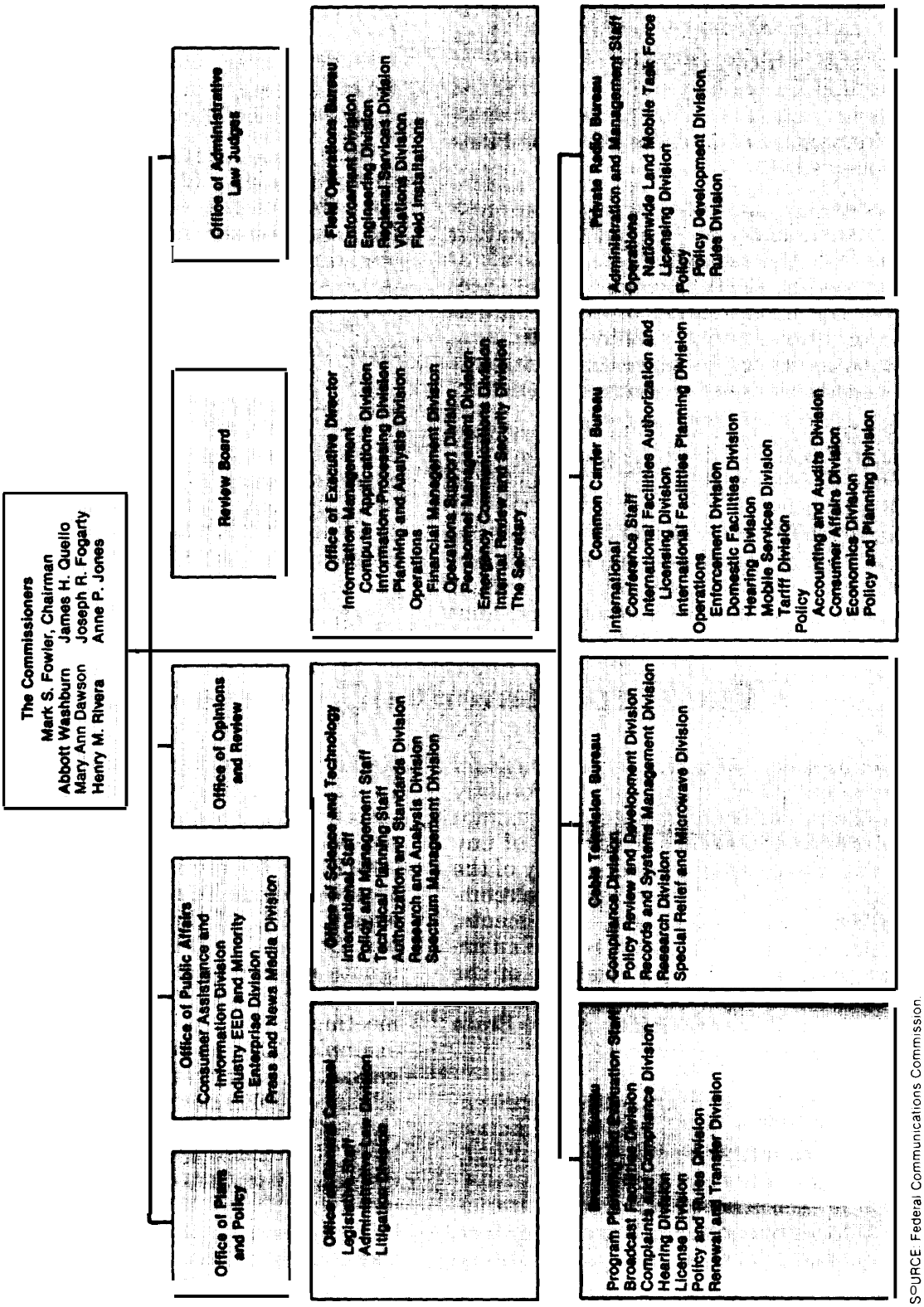
The Role of the FCC

As noted earlier, FCC, which is an independent Federal agency reporting directly to Congress, is charged with regulating interstate and foreign communications by means of radio, wire, and cable. This charter encompasses both economic regulation and the management and licensing of users of the radio spectrum.

The seven commissioners of FCC are appointed by the President with the advice and consent of the Senate. They supervise all FCC activities, with delegation of responsibilities to boards and committees of commissioners, individual commissioners, and staff units. The commissioners are aided by a staff of some 2,000 regular employees, about a fourth of whom are engaged in field operations (see fig. 1).

There are five operating bureaus, reflecting the functional basis of FCC: broadcast,

Figure 1.—Federal Communications Commission Structure—August 1981



SOURCE Federal Communications Commission

cable television, common carrier, field operations, and private radio. In addition, there are six staff offices, including the Office of Science and Technology (OST), which is the focal point within the Commission for Spectrum Management, and the Office of Plans and Policy (OPP).

Broad policy questions, having some spectrum management or frequency allocation aspects (e.g., the use and status of the ultra-high frequency (UHF) portion of the spectrum or the investigation of interim provisions for broadcasting satellites, often referred to as direct broadcasting satellites) have been the subject of studies by OPP.

The primary focus for domestic spectrum management at FCC is in the spectrum management division within OST. This division, which is responsible for, among other things, the National Table of Frequency Allocations, obtains the views of the public (and corporate representatives) through publication of notices of inquiry (NOIS), advisory committees, and from the bureaus responsible for the several radio services. The table is amended after coordination with IRAC where necessary and issuance of notices of proposed rulemaking (NPRMs) (see fig. 2).

Once a frequency band has been allocated to a particular radio service, the bureau responsible for that service will develop rules for its use on the basis of information gathered through NOIs, NPRMs, and other FCC procedures.

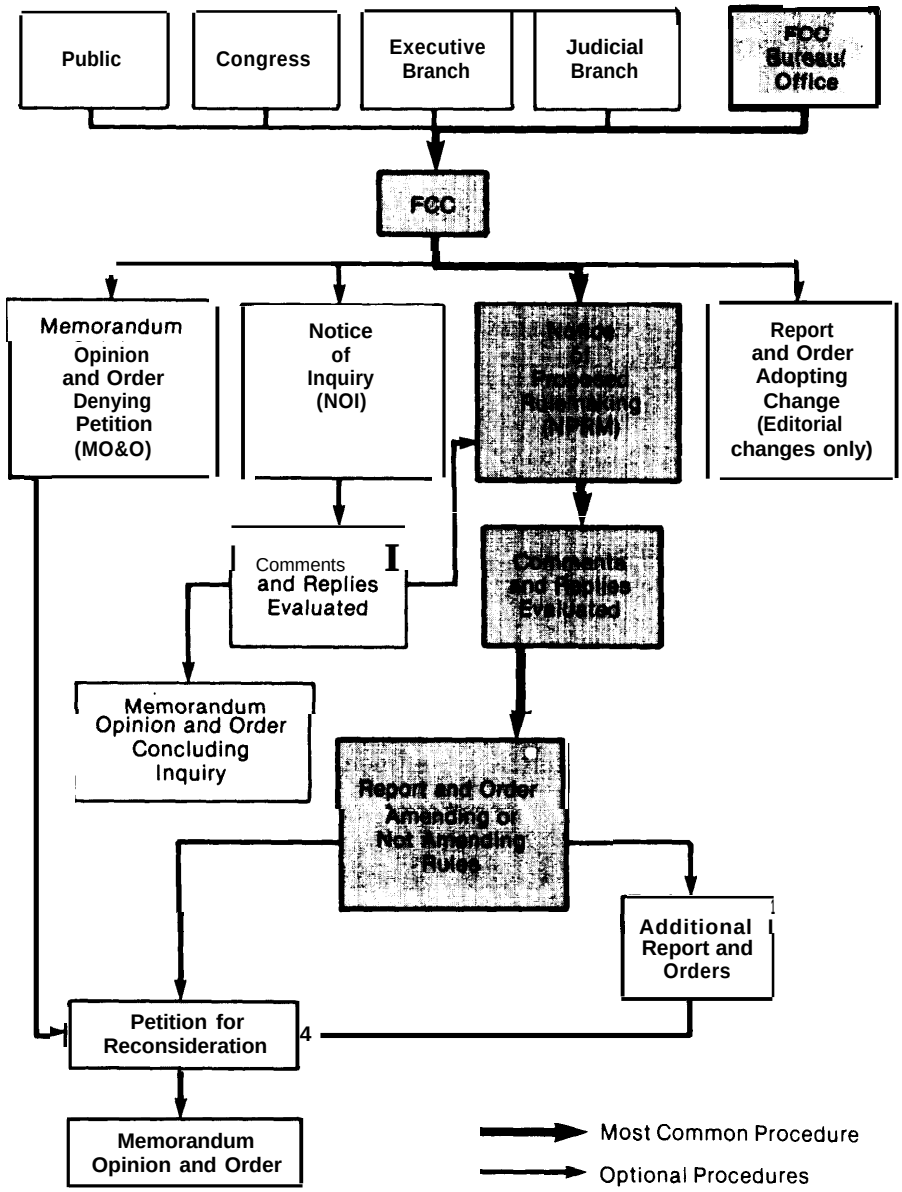
Spectrum management matters before international organizations (for example, proposals of the United States for changes to ITU radio regulations) are the responsibility of OST. This office works closely with the operating bureaus and other offices in FCC concerned with spectrum management matters. Moreover, the FCC liaison representative to IRAC is from OST. FCC's views and policies regarding its responsibilities for the private sector use of the spectrum are reflected within IRAC by this representative.

The Department of State's Role

It can be seen that policy for international telecommunication, including the orderly use of the radiofrequency spectrum, cannot be considered the exclusive concern of any single executive department or agency of the Federal Government. Nevertheless, telecommunications negotiations and agreements, both bilateral and multilateral, remain an important part of the foreign relations of the United States and therefore fall within the jurisdiction and responsibility of the State Department.

The Department of State, with recommendations from NTIA, FCC, and others, names delegations to international telecommunication meetings, whether sponsored by international organizations, such as the International Telecommunications Union (ITU) (and its permanent bodies, the International Radio Consultative Committee (CCIR), the International Telegraph and Telephone Consultative Committee (CCITT), and the International Frequency Registration Board (IFRB), or by regional bodies, such as the Inter-American Telecommunications Conference (CITEL) of the Organization of American States. The State Department can designate another agency or commission to represent the United States at a particular meeting or for a specified purpose. Thus, for example, FCC has been designated as the organization that transmits notifications and advance publication information required by the radio regulations to IFRB of ITU. Similarly, the Commission conducts bilateral meetings with Canada regarding nongovernment frequency use near the border, and DOD participates directly in the communications negotiations of the North Atlantic

Figure 2.—Actors Involved in FCC Rulemaking



SOURCE FCC *Communicator*, September 1975

Treaty Organization (NATO) and its subordinate bodies, such as the Allied Radio Frequency Agency.

Typically, U.S. delegations to international meetings in general, and ITU and its bodies in particular, have included individuals from Government agencies, and nongovernment organizations. As in the case of other specialized, highly technical international conferences and negotiations (meteorology, world health, agriculture, etc.) the State Department looks to other Government agencies, private sector organizations and companies, and individuals having knowledge of each field. In the case of international telecommunications, the State Department relies heavily on FCC, NTIA, and the na-

tional committees for CCIR and CCITT, as well as on individual agencies such as DOD, the National Aeronautics and Space Administration (NASA), and the Department of Transportation, as well as experts from the private sectors.

The Public Role

The Department of State may establish an advisory committee for specific conferences, as it did in the case of WARC-79. The public, including representatives of industrial groups and organizations, participate as individual members of such a State Department body. The public, industry, and private interests may participate in the decision-making process by filing comments and views with FCC through its public NOIS and NPRMs and in Government/industry advisory committees set up by FCC prior to many of the individual conferences. This public process to decide spectrum issues for the nonfederal government use of the spectrum is in contrast to the NTIA/IRAC nonpublic process to decide Federal use of the spectrum. Finally, individuals from industrial, scientific, research, manufacturing, and public interest organizations may be appointed to the U.S. delegations to such meetings.

U.S. international communication policy must reflect a coordinated balance of foreign and domestic policy considerations. Moreover, effective negotiations in the telecommunications field, including spectrum coordination, requires a combination of U.S. policymaking authority embodying essential features not easily combined. For example, there must be cooperation among mission-oriented Federal departments and agencies, extensive public and congressional participation, continuity over the years, and an overall sense of direction and purpose.

Past Critiques of U.S. Telecommunication Policymaking

These elements have not always been successfully brought together. A Communication Policy Board reporting to President Harry S Truman in 1951 identified five specific issues as being basic to the Nation's telecommunication problems. These were:

1. How shall the United States formulate policies and plans for guidance in reconciling the conflicting interests and needs of Government and private users of the spectrum space–that is, for guidance in making the best use of its share of the total spectrum?
2. How shall the United States meet the recurrent problem of managing its total telecommunications resources to meet the changing demands of national security?
3. How shall the United States develop a national policy and position for dealing with other nations in seeking international telecommunications agreements?
4. How shall the United States develop policies and plans to foster the soundness and vigor of its telecommunications agreements?
5. How shall the United States Government strengthen its organization to cope with the four issues stated above?

The policy board report emphasized spectrum usage, national security, and the maintenance of a sound industry as key subjects to be borne in mind when considering the issues quoted above. With regard to "inter-

national agreements, " the same report stated:*

> Just as the United States has no clear policy for dividing its share of spectrum space, so it has lacked satisfactory means of determining policy as a basis for negotiations with other nations for the world division of the spectrum. The United States, in preparing positions for international negotiations, has in effect asked Federal and other claimants to state their needs, and then presented the total as the United States requirement. In those portions of the spectrum where these totals have been small enough to fit within the world complement, our delegations to conferences have had a negotiable position. In some cases, however, the total stated requirements have exceeded not merely those which could reasonably be put forward as the proper United States share, but have actually exceeded the total physical content of the bands. Furthermore, there is no permanent mechanism by which the stated requirements of the United States users could be adjusted with equity and safety. The imperative need for means of making such adjustments hardly requires elaboration.

Sixteen years later in 1967, President Lyndon B. Johnson sent a message to Congress advising that a "Task Force on Communication Policy" was being established to examine a number of major questions in the communications policy area. While most of the thrust of the task force was aimed at the use of satellite and space technology, it was apparent that the problems identified in 1951 by President's Truman's Policy Board remained unresolved.

In chapter 9 of its report–entitled "The Roles of the Federal Government in Telecommunications, the task force stated:**

A. Traditionally, government has viewed telecommunications primarily as a mission-support function, rather than a focus for public policy. The result has been that policy has evolved as a patchwork of limited, largely ad hoc responses to specific issues, rather than a cohesive framework for planning. Government organization for the formulation and implementation of communications policies reflects this evolution.
   - Early government involvement in telecommunications often involved ad hoc responses to individual problems as they appeared.
   - The framework established by the Communications Act of 1934, although combining the broadcasting and common carrier regulatory functions, remains limited in scope.
   - The post World War I I period has been characterized by the growth of communications activities and a series of narrowly focused studies and limited organizational changes.

B. The patchwork nature of the present structure is not conducive to optimum performance of the telecommunications activities and requirements of the Federal Government.
   - Existing organizational arrangements make effective spectrum management difficult.
   - The absence of a central focus possessing the requisite technological and economic skills makes more difficult the development of a sound and forward-looking international telecommunications policy.
   - The policy coordination necessitated by the plethora of government telecommunications roles is inadequately performed by a multiplicity of committees.
   - Recent events have underscored the lack of an effective government capability for long-range telecommunications policy planning.

Thus, the 1968 report reiterates the issues raised earlier by President Truman's Communications Policy Board, and the reiteration is particularly applicable in the areas of Government organization and spectrum management. In January 1980, the U.S. Senate Committee on Commerce, Science, and Transportation requested the Chairman of the Office of Technology Assessment

*See *Telecommunications—A Program For Progress, a* report by the President's Communications Policy Board, dated March 1951, Irvin Stewart, Chairman.

**See Final *Report of the President 's Task Force onCommunications Policy,* Dec. *7, 1968.*

Board to address the following two questions:*

(1) In view of the original United States positions, what will be the probable impact of the decisions made at WARC-79 on the U. S.? How should the U.S. adjust its preparation and participation in future international telecommunications conferences in order to more effectively accomplish its objective?
(2) Should the United States modify its allocations procedures and tables in order to respond to the WARC-79 decisions? What are the major U.S. spectrum needs likely to be during the next twenty years and how will they be accommodated?

The request reflects a continued concern for the existing machinery and procedures for U.S. telecommunications policymaking and preparation for international telecommunications conferences. Similar expressions of concern in the past did lead to structural changes but with little apparent result. President Eisenhower eliminated the office of the "Telecommunications Advisor to the President" and replaced it with an "Assistant Director for Telecommunications" in the Office of the Director of Defense Mobilization. The duties assigned were focused on telecommunications policies and standards for the executive branch and the President's responsibilities for spectrum management.

Over the years, the job of "Assistant Director for Telecommunications Management" became, in 1970, the Director of the Office of Telecommunications Policy and then, in 1978, the entire telecommunications function was transferred out of the Executive Office of the President to the Department of Commerce (DOC) where the present NTIA is now located.

In the final analysis, one may conclude that, despite its worrisome deficiencies, the U.S. telecommunications policymaking and management machinery has worked. How well, and how efficiently, are matters of dispute. The good results rest on the fact that over the years highly dedicated, competent, career personnel made the system work. Since spectrum is the common denominator in all uses of radio, coordination has been essential for the various radio services to function in a compatible manner. It is this coordination, which over the years has become a very specialized and sophisticated function, that frequently bears directly on the policy decisions. The United States has been extremely fortunate in that, in the past, it has been able to send to international conferences representatives who were experienced and competent to deal with what have been essentially technical rather than political and economic matters.

*See joint letter signed by Senators Cannon, Packwood, Hollings, Goldwater, and Schmitt to the Hon. Morris K. Udall, Chairman, Office of Technology Assessment, dated Feb. 11, 1980.

Prospects for the Future

But today, more than ever, telecommunications encompasses far more than just spectrum management, and U.S. policy formulation in advance of international negotiations involves more than just those issues forced by the need for frequency coordination. The existing U.S. structure is inadequate in that the permanent, ongoing spectrum management mechanisms are not adequately equipped to review all stated requirements of Government and nongovernment spectrum users and objectively verify and adjust needs consistent with national policy objectives. There is no ongoing effective means of collecting data and developing guidelines to judge the merits of one spectrum use over any other.

In an international negotiating environment that has become increasingly political, U.S. spectrum management specialists have been called on to anticipate U.S. telecom-

munications requirements far into the future without adequate long-range analysis. The absence of such a strategic, long-term planning approach reflects the absence of concern for telecommunications issues at the highest levels of Government and hampers the effectiveness of U.S. negotiators.

Lack of high-level concern has also led to a shortage of trained and experienced engineering personnel to replace those retiring from Federal Government service. Nor has there been sufficient awareness of the need for personnel with supplementary economic, legal, and diplomatic skills, as well as foreign language proficiency.

The three principal players in conducting telecommunication negotiations are the Department of State, DOC (through NTIA), and FCC. Thus, within the executive branch there is a built-in fragmentation of telecommunications policy. The Department of State is clearly the focal point for the conduct of foreign relations but its Office of International Communications Policy is lightly manned and well down in the State Department's organizational structure. It is not in a strong position to make its influence felt in the upper echelons of Government and industry.

Under Executive Order No. 12046, NTIA is assigned functions that include developing and setting forth, in coordination with the Secretary of State and other interested agencies, plans and programs that relate to international telecommunications. From a practical standpoint, NTIA lacks sufficient resources and "clout" to fully carry out its mandate effectively. Moreover, the rather general wording of the Executive order leaves it ambiguous as to how far NTIA can go in its coordinating role, particularly when that mandate risks encroachment on the general regulatory responsibilities of FCC.

In his testimony before the Subcommittee on International Operations of the House Foreign Affairs Committee on July 31, 1980, Glenn O. Robinson, who was chairman of the U.S. delegation to the 1979 WARC, said he did not regard the fragmentation of U.S. policymaking to be a matter of great significance in preparing for future WARCs. Yet he went on to say:

> Of course, it is necessary to have some locus of final decision making; there must be some place, where in Truman's words, the "buck stops." So far as international policy is concerned the answer seems reasonably clear: the Secretary of State speaking for the President has, and must retain, the ultimate responsibility.
>
> The State Department's role extends beyond mere final review and approval of international policy positions. It also has a role to play in shaping policy positions—to ensure that international policy concerns are properly integrated into the policy making process from its inception and not merely layered on top of it at the point of final decision.
>
> An important element of future preparation will be developing appropriate linkages with other elements of international communications policy. Obviously radio spectrum use and management does not stand apart from other aspects of international communications and communications policy. Despite the highly specialized technical character of radio spectrum management which sets it apart from, say, U.N. or UNESCO debates over free-versus-balanced-flow of information or development assistance programs, the issues are often related.
>
> As a first step some permanent mechanism for intra-Departmental and interagency coordination is appropriate. Such a mechanism was developed in 1978 as a first attempt to bring together some of the major strands of international communications policy. Thereafter coordination was pursued more or less informally as part of the WARC-79 preparations. For the future, however, policy review and development ought not to be dominated by some specific major event such as WARC. The "big event" is probably of diminishing importance in international diplomacy. The process of continuing negotiations through a series of conferences has become predominant in almost all aspects of international affairs, including international communications policy. It follows that too great an emphasis on single

events, such as future WARCs, as a focal point for policy coordination could lead to a distorted perspective on policy issues and objectives.

As to what organizational structure might be needed to carry out the future role of coordinating international communications policy I have no specific recommendations. I do not think a large new office is required to handle the task, but the responsibility must be clearly recognized and given stature commensurate with its high importance.

Thus, the expressions of concern over the lack of permanent mechanisms for coordinating U.S. international communication policy persist to the present time. The present structure is not adequate to develop telecommunication policies, to effect long-range planning, and assure the achievement of U.S. goals.

International Management of the Spectrum – the ITU

ITU is the principal international institution for achieving agreement and cooperation among nations on the use of telecommunications. It is a unique organization that has managed to bring the merits of technical collaboration to a level where participating governments feel a vested interest in the agreements reached.

Adherence to ITU agreements is voluntary and cannot be enforced by higher authority. There are no sanctions to compel an ITU member to abide by ITU rules. However, membership in ITU entails a treaty obligation to conform to the collective decisions of its members. Its activities might be described by systems analysts as a nonzero or positive-sum game in which there are no winners or losers and where all the participants benefit. The mechanisms of ITU are designed to achieve the maximum utilization of the electromagnetic spectrum by the widest range of users, and to avoid a situation where one user is accommodated at the expense of another.

ITU was created in 1932 by the merger of two existing groups-the International Telegraph Union (founded in 1865) and the International Radiotelegraph Convention signatories. It has grown in breadth and scope over the years—surviving two world wars and the unprecedented diversification of communications technology.

An international agreement-making and rulemaking organization whose members adhere to many varied legal systems, it has avoided legal doctrine. Its fundamental governing principles are contained in the ITU Convention, a constitution first adopted in 1932 that remains subject to periodic revision. According to this convention the purposes of ITU are:

1. to maintain and extend international cooperation for the improvement and rational use of telecommunications of all kinds;
2. to promote the development of technical facilities and their most efficient operation with a view to improving the efficiency of telecommunications services, increasing their usefulness and making them, so far as possible, generally available to the public; and
3. to harmonize the actions of nations in the attainment of those ends.

The activities of ITU are organized for the attainment of specific objectives, the most important of which are:

- allocation, registration, and coordinated utilization of the radiofrequency spec-

trum to avoid harmful interference between radio stations of different countries;
- planned development of telecommunications facilities, particularly those using space techniques. Creating, developing, and improving telecommunication equipment and networks in developing countries;
- promoting collaboration in setting telecommunication rates as low as possible, while maintaining efficiency of services and independent financial administration; and
- conducting studies, collecting and publishing public information, adopting resolutions, and formulating regulations on matters relating to telecommunications.

ITU Structure

The ITU structure combines conferences, or policymaking bodies, and permanent organs. The plenipotentiary conference is the supreme body of ITU. It consists of the delegations of member countries meeting every 5 to 9 years to formulate general policies, establish budget guidelines, elect members and top officials, and conclude agreements between the ITU and other international organizations. Only the plenipotentiary conference can amend or revise the ITU Convention. The next such conference is scheduled for September 1982 in Nairobi, Kenya (see fig. 3).

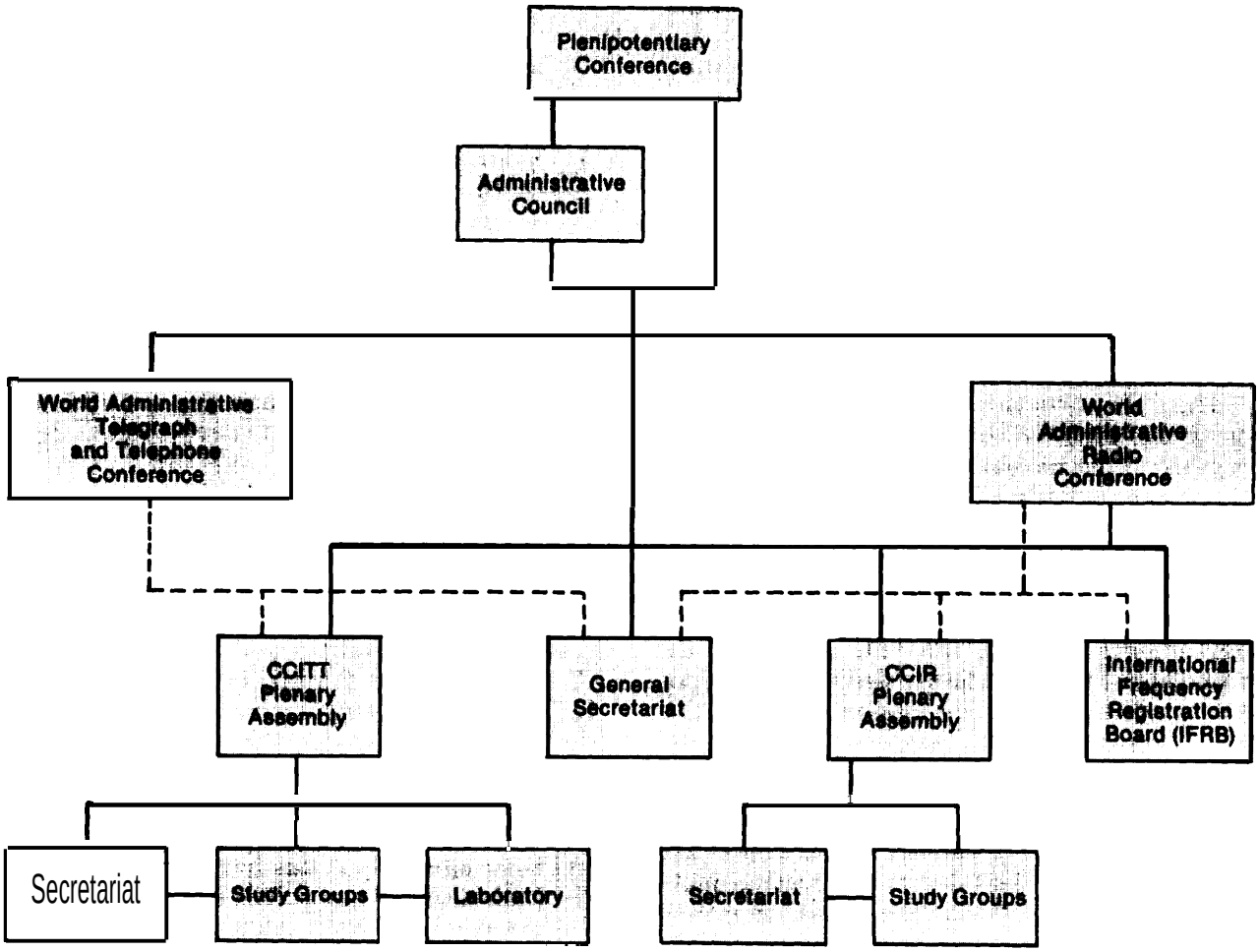
Administrative conferences are convened to consider specific telecommunication matters as the need arises. They may be either worldwide or regional in scope and participation. (ITU divides the world into three regions—region 1 covers Europe, the U. S. S. R., Turkey, Mongolia, and Africa; region 2 covers North, Central, and South Americas, the Caribbean and Greenland; region 3 covers South Asia, Australia, New Zealand, and the Pacific.) Conference agendas may concern all radio communications services and all frequency bands or may be restricted to a particular band and one or more services. Among the administrative conferences held in the 1970's were those dealing with space, maritime and aeronautical radio communications, satellite broadcasting, and WARC-79. The Final Acts of such conferences become treaties following ratification by ITU members.

In the intervals between plenipotentiary conferences, the administrative council acts on behalf of the entire membership in formulating policy and overseeing the work of ITU. First instituted in 1947 with 18 members (ITU then had 73 member states and an annual budget of 4 million Swiss francs), the council now has 36 members. (ITU has grown to 155 members and has a budget of 67 million Swiss francs, or approximately $31 million). Meeting each spring in Geneva, the council approves the annual budget, determines the size and grading of the staff, sets salaries and allowances, and determines the schedule of conferences and meetings and their agendas. It has become a forum for discussion of certain political issues such as the question of South Africa, Rhodesia, the Portuguese colonies in Africa, and the Middle East.

The council has also contended with the issue of the languages to be provided in interpretation and document translation at conferences. Interpretation and translation are provided in French, English, and Spanish, plus Chinese and Russian for all official documentation. In addition, there is interpretation in Arabic at plenipotentiary and administrative conferences.

The general secretariat has grown in size and responsibilities over recent years. Since 1965, the Secretary General of ITU has been chosen from among candidates from developing countries. The present Secretary Gen-

Figure 3.—Organizational Chart of ITU



SOURCE International Telecommunication Union

eral, Mohammed Mili of Tunisia, assisted by his deputy, Richard Butler of Australia, coordinates and supervises the day-to-day activities of ITU. He employs a multinational general secretariat staff to support the other permanent organs of XTU–IFRB and the two technical committees: CCIR and CCITT. The secretariat includes a technical cooperation department that assists developing countries, using funds provided by the United Nations Development Program (UNDP). (The current members of IFRB are from the U.S.S.R, Canada, Morocco, Japan, and the United Kingdom.)

Unlike other international organizations in which sole executive direction resides in a secretary general, there is a diffusion of authority among ITU's permanent organs leading to what is sometimes described as ITU's "Federal structure. " No one element of ITU's secretariat has overall responsibility for the operation of ITU. The Secretary General cannot dictate the registration of frequencies by IFRB nor does he have technical responsibilities for the activities of the International Consultative Committees (CCIs). Also, IFRB cannot dictate the technical findings of CCIs. Nevertheless, the Secretary General, IFRB, and CCIs are required to work together to meet the needs of the members. This sharing of executive power has given rise to certain conflicts and rivalries.

Led by five officials elected by the plenipotentiary conference, IFRB records the date, purpose, and technical characteristics of frequency assignments by member countries with a view to achieving international recognition. IFRB also records orbital positions assigned to geostationary satellites. It examines each frequency notification received for conformity with the international radio regulations and for the possibility of harmful interference. If the examination is favorable, the frequency assignment is entered in the master register; if not, it is returned to the notifying country with suggestions regarding a solution to the difficulty. Through reference to the master register and the board's weekly circulars, operators worldwide have access to a listing of all registered frequency assignments.

CCIR, which is currently headed by an American, and CCITT, whose director is French, are ITU's best known permanent organs. All member countries and certain private operating companies, scientific and industrial organizations can participate in their work. The ITU Convention prescribes the duties of CCIR as the study of technical and operating questions relating to radio communications and the issuing of recommendations. The CCITT members are to study and make recommendations regarding technical, operating, and tariff questions related to telegraphy and telephony.

The work of CCIs is conducted by a number of study groups whose members include experts in each of the specialized areas of interest to the study groups. The product of these study groups is the basis for standards and specifications that are generally accepted by all administrations and users.

In practice, CCIs have studied, issued reports on, and made recommendations concerning communication systems operations and advanced technologies as they have been developed. The member nations of ITU look to CCIs for information and guidance on the use of these techniques and their reports and recommendations are respected and generally accepted by member nations in the planning, design, and operation of telecommunication systems.

The responsibilities of ITU to lend assistance to developing countries and to study their special problems is a challenge to an organization whose principal purpose is agreement-making. The rationale is simple enough. For agreement-making to be effective, all participants must be in a position to participate and cooperate. The less developed countries need help in extending their telecommunications services and in developing appropriate administrative and technical skills. Thus, technical assistance promotes better global communications generally.

The challenge to ITU lies in extending this assistance without overtaxing its limited resources. The extraordinary growth of telecommunication technologies and services has already strained ITU's capacity to produce effective international agreements on a timely basis. Furthermore, ITU must compete with other organizations for the services of telecommunications specialists that it would like to assign to assist developing countries. The costs of ITU's administration of UNDP aid programs must be met by contributions from developed countries that may prefer to see ITU concentrate on its agreement-making functions.

Political Issues

At various times, member nations of ITU and signatories to the convention have been excluded from ITU conferences for political reasons. For example, this happened to Spain in 1947, and Rhodesia, South Africa, and Portugal were excluded from a 1973 con-

ference. There have also been occasions when efforts to exclude nations have failed to win approval of the membership.

In other instances, the structure of ITU has been flexible and pragmatic enough to assign country codes for worldwide automatic telephone dialing to nations that, at the time, were not members of ITU (e.g., East Germany, the Peoples Republic of China).

Unfortunately, ITU is not always successful at agreement-making. For example, in the postwar years three incompatible standards for color TV broadcasting were adopted in several parts of the world to the obvious detriment of international coordination and standardization. As a result, European TV set manufacturers must provide parallel circuitry to accommodate the different standards and international program exchange is seriously burdened by the conversion of standards at switching points.

A similar problem developed in the search for a standardized digital transmission system. European countries were able to select a single system from among almost 20 competing designs but North American interests, committed financially to a different design, were unwilling or unable to be accommodating enough to find a compromise single standard.

Overall, the achievements of ITU are impressive considering its inherent weaknesses and the complexity of its structures and procedures. Modern states are clearly unwilling to cede substantial power to any international organization. Yet, ITU has managed to maintain order in an environment that could easily have been chaotic. The growing needs for maritime and aeronautical communications have been met. Efficient international telegraph and telephone service would have been difficult without ITU or similar organizations. Despite the strong economic interests of national equipment suppliers, there was sufficient collaboration within CCITT to accomplish the shift from operator-assisted international phone service to automatic dialing, routing, and switching.

The Future of ITU

Whether ITU can continue to function effectively in the future is another question. The influx of "new" nations to membership in ITU in recent years has brought a different set of values and concerns to the organization. The new members have brought a heightened demand for programs of aid and technical assistance to developing nations. They have fostered regionalism and, most important, they have increasingly demanded equitable access and usage of spectrum and orbital slots for geosynchronous satellites.

The needs of these developing nations are often at odds with those of the developed world. For example, industrialized countries need considerable amounts of radio spectrum to support sophisticated worldwide radionavigation and radiolocation systems considered vital to their national security and safe international air travel. Developing countries have limited need for these "radar" systems. By the same token, there is contention between the developed and less developed countries over the use of high frequency (HF) bands. The developing countries depend on HF for domestic point-to-point communication in large measure whereas the developed countries are more likely to use the same frequencies for international broadcasting, mobile, and other services.

The principal issue of contention has been the so-called "first-come, first-served" principle used by ITU member countries to register radiofrequency assignments. Basically, "first-come, first-served" has meant that whoever develops a use for a given frequency first and notifies IFRB of this intended use

has established a claim to protection from harmful interference. This has meant that the bulk of the frequency assignments have been assigned to the developed countries. Moreover, some of those assignments, particularly those used for HF fixed (point-to-point) services, have been abandoned by the developed countries in favor of microwave and satellite systems but, it is charged, have not been given up for reassignment. (It should be pointed out that to a large degree the radio spectrum is reusable. This means that a frequency assignment made to one country does not necessarily preclude its use by another country.)

The developing countries, therefore, fear that when they are finally prepared to use radio services not needed at their present stage of development, the spectrum space will no longer be available. They have translated this fear into a demand for "equitable and/or guaranteed access" to the frequency spectrum. The developed countries have responded by insisting that the fears of the developing nations are groundless, that new technology will free up certain frequencies while allowing other frequencies to be shared by a greater number of stations and services. However, frequency-sharing usually requires more sophisticated and expensive equipment and increases the need and complexity of coordination to avoid interference. Most developing countries lack trained engineers sufficiently competent in frequency management to carry out complicated coordination procedures and also lack the required sophisticated and expensive equipment to avoid interference.

"Equitable access" also refers to communications satellites and the newer members of ITU frequently cite the 1967 U.N. Treaty on Outer Space that recognized the common interest of all nations, regardless of the degree of their economic or scientific development, in the uses of outer space and in the "nonappropriation" of outer space by any one nation. While each state has the right to the free and peaceful utilization of space, the treaty is viewed as implying a corresponding obligation of nations to avail themselves of these uses without prejudice to the interests of other nations.

Claims of the developing nations to "equitable access" were further underscored by Resolution No. Spa 2-1, adopted by the 1971 WARC (and included in the Final Acts of WARC-79), dealing with space telecommunications, which states:

> . . . *considering* that all countries have equal rights in the use of both the radio frequencies allocated to various space radio communication services and the geostationary satellite orbit for these services;
>
> . . . *taking into account* that the radio frequency spectrum and the geostationary satellite orbit are limited natural resources and should be most effectively and economically used;
>
> . . . *having in mind* that the use of the allocated frequency bands and fixed positions in the geostationary satellite orbit by individual countries or groups of countries can start at various dates depending on the requirements and readiness of technical facilities of countries;
>
> *Resolves*
>
> 1. That the registration with the ITU of frequency assignments for space radio communication services and their use should not provide any permanent priority for any individual country or groups of countries and should not create an obstacle to the establishment of space systems by other countries;
> 2. That, accordingly, a country or a group of countries having registered the ITU frequencies for their space radio communication services should take all practicable measures to realize the possibility of the use of new space systems by other countries or groups of countries so desiring;
> 3. That the provisions contained in Paragraphs 1 and 2 of this resolution should be taken into account by the administrations and the permanent organs of the Union.

This 1971 position was reinforced at ITU's Malaga-Torremolinos Plenipotentiary Conference in 1973 that amended the ITU Convention to include article 33, which reads:

In using frequency bands for space radio services members shall bear in mind that radio frequencies and the geostationary satellite orbit are limited natural resources, that they must be used efficiently and economically so that countries or groups of countries may have equitable access to both in conformity with the provisions of the radio regulations according to their needs and the technical facilities at their disposal.

The Changing ITU Environment

It is clear that the developing countries have also succeeded in establishing a resource management philosophy designed to protect their interests. Although ITU may remain a viable institution, there have been some subtle and important changes in the institutional framework under which the technical functions and work of ITU are carried out. Moreover, WARC-79 clearly showed the power of the Third World as a political force in ITU. Although the collective objectives of the developing countries were limited, they were generally achieved.

The struggle for power between the developed and the less developed nations must be expected to continue at future ITU conferences. In the most basic sense, the developing countries derive power from their collective numbers via the "one-nation, one-vote" principle. The developed countries derive their power from their technical competence, know-how, and leadership. The developing countries' power can most easily and usefully be exploited in the ITU legislative forums; the developed nations' through the technical administrative organs.

The developed country strength lies in the permanent organs of ITU and the delegation of authority and work efforts within that structure. Control, in the sense of inclusion or exclusion of issues and agenda items, and in the handling of budgetary matters, is most easily exercised here. It is natural for the developing countries to seek to change these administrative organs to advance their own interests and objectives. The 1982 plenipotentiary meeting could well see a furthering of this effort.

The success of ITU, as noted earlier, has been due in large measure to the willingness of its members to adhere voluntarily to commonly arrived at agreements and regulations. There is no compulsion to comply, except common usage, custom, and a perceived stake in international order. The inherent flexibility granted ITU members has also enhanced its effectiveness. Subject to a vote of disapproval by fellow members, any nation may serve notice through a footnote that it intends to allocate a particular frequency to some usage beyond that specified by other countries, or to specify a usage as primary or secondary. A member country may also take a reservation indicating that it cannot protect a particular spectrum allocation approved by an ITU conference.

The common desire of most countries to minimize the number of footnotes and exceptions to the international table of allocations was not realized at WARC-79. Eighty-three statements, representing reservations, were included in the final protocol of the WARC-79 Final Acts. The United States took six reservations. The remaining 77 statements, some of which bear the names of several countries (up to 20, in one case), can be grouped in three categories: general reservations, political reservations, and specific reservations.

Thirty-five reservations were "general" in that they were intended to reserve a government's right to take whatever steps it considered necessary to protect its radio communication services should other ITU members fail to observe the radio regulations. Other reservations were "political" in that

they related to territorial disputes or sovereignty claims that had little impact, if any, on the ITU or on spectrum use for radio communication purposes.

The remaining reservations of other countries were addressed to specific issues, principally the allocation of HF bands among the broadcasting, fixed, and mobile services. Some dealt with localized problems associated with UHF band use.

It would be going too far to say that the taking of numerous reservations at WARC-79 signaled a sharp decline in ITU effectiveness. But it should be noted that the reservations, when coupled with the widespread use of footnotes to denote unwillingness to protect a particular frequency allocation in a particular locale, resulted in degrading of the table of allocations and thus makes future coordination more difficult.

Throughout the 1970's, repeated efforts were made both within and outside ITU to assess the competing demands being made on the radio spectrum. In addition to the various CCIR study groups that addressed the growing requirements of different services, there was a CCIR plenary assembly in Kyoto, Japan and the CCIR interim working party (4/1) in Tokyo; both met in 1978, the latter being directed primarily toward fixed satellite service considerations. In October/November 1978, the WARC special preparatory meeting (SPM) was held in Geneva.

Among some Third World countries there was a feeling that SPM was dominated by the developed countries because of its technical nature, and therefore was to be treated with some suspicion. It was natural, then, that other preparatory meetings should take place outside the framework of these traditional ITU entities. One of these was a May 1979 gathering of the nonalined movement (NAM) in Yaounde. Two specific resolutions produced at this gathering called for a future satellite planning conference and specified working arrangements for WARC-79. The vice-chairman of this meeting was Dr. M. K. Rao of India, the country selected to coordinate satellite issues for NAM.

The NAM Yaounde meeting was a clear indication that these countries will be preparing for future conferences on a collective basis, seeking to make the most of their bloc voting strength.

There were only a few collective objectives sought by the Third World at WARC-79:

- control of the selection of the conference chairman;
- a large allocation of HF frequencies to the fixed service;
- satellite planning and HF broadcasting planning conferences;
- a bar to the encroachment of land mobile and other services into frequencies reserved for broadcasting at UHF in region 1; and
- continued technical assistance.

These goals were generally achieved with the exception of the first; after a week of disagreement, the conference had to settle for a compromise chairman from Argentina who was not a candidate of either the developed or less developed nations. Overall, WARC-79 did demonstrate the increasing influence of the Third World in ITU.

The results of the OTA-sponsored survey* shows that 74 percent of the U.S. delegates to WARC-79 and 67 percent of the nondelegates responding to the survey believe that the relative influence of the Third World countries at ITU conferences has increased

*The OTA-sonsored survey consisted of a questionnaire of 51 questions mailed to 169 individuals involved directly or indirectly with preparations for WARC-79, and/or with implementation of the results of WARC-79. A total of 110 questionnaires were completed and returned: 55 from U.S. delegates to WARC-79: 29 from nondelegate Government personnel; 18 from nondelegate members of the advisory committee to the U.S. delegation; 26 from nondelegate industry personnel; and **41** from nondelegate individuals in the private sector. In addition, 20 in-depth face-to-face interviews were conducted with 13 Government officials and 7 industry officials. The results of the survey and an analysis of the answers and information received through the survey and interviews are presented in the report prepared by Kappa Systems, Inc., under contract to OTA. The report can be found in app. A to this report.

greatly over the past 5 years. Another 23 percent of those responding believe there has been only a slight increase in the influence of the Third World countries. During the same time, 51 percent of the U.S. delegates and 59 percent of the nondelegates surveyed believe there has been some decrease in U.S. influence, though only 12 percent and 18 percent of the delegates and nondelegates, respectively, saw this as a major decrease. Looking ahead, the respondents see U.S. influence from now through 1985 remaining about the same (39 percent) or slightly decreasing (45 percent). Some increase in U.S. influence is foreseen by some respondents (14 percent), while a major decrease is foreseen by only a small number (2 percent).

The interests that guide many of the less developed countries in their approach to international telecommunications issues are quite different, and often hostile, to those of the United States. As traditional advocates of the free flow of information, the United States is opposed to prior censorship of either television or radio broadcasts. Therefore, the United States rejects the idea that any country should obtain prior consent before broadcasting a radio or TV signal to another country. The issue has not been raised for HF radio broadcasting because so many countries engage in international broadcasting. The added impact of television, however, has kept the issue of prior consent at the forefront of debate on international communications within the U.N. Educational, Scientific, and Cultural Organization (UNESCO) and the U.N. Committee on the Peaceful Uses of Outer Space (COPUOS).

Other International Organizations Involved in Telecommunications

U.S. national interests in telecommunications are interwoven with a broad range of specialized international organizations. In addition to ITU, they include, UNESCO, the U. N., the World Intellectual Property Organization (WIPO), the Universal Postal Union (UPU), the Intergovernmental Bureau of Informatics, the Intergovernmental Maritime Consultative Organization (IMCO), the International Civil Aviation Organization (ICAO), CITEL, and the Organization for Economic Cooperation and Development (OECD).

UNESCO's jurisdiction is extremely broad and the organization has taken an active interest in communications through the adoption of resolutions, by publishing studies, and by sponsoring and attending specialized seminars and conferences. It has participated at ITU conferences in an observer status, for example, in an effort to promote shortwave broadcasting as a means of furthering international peace and understanding.

More recently, UNESCO has become involved in studying the potential uses of direct broadcasting satellites and has adopted a set of norms regarding their use. Within the past few years, UNESCO's International Commission for the Study of Communication Problems (commonly known as the MacBride Commission because of its chairman Sean MacBride) has focused attention on the so-called "New World information order" and Third World complaints about the imbalance in news flowing in and out of less developed countries and the need to develop a communications infrastructure in the Third World.

U.N. involvement in communications issues has surfaced most prominently within COPUOS and the Working Group on Direct Broadcasting Satellites. COPUOS and its

subcommittees on legal, scientific, and technical matters have been significant forums for the discussion of guidelines to govern the use of the geostationary orbit for radio communication. A conference on the peaceful uses of outer space is scheduled for 1982 and will consider and discuss means to resolve such issues as whether there need be prior consent obtained before one nation uses satellites in space to broadcast a signal which extends beyond its own borders into other countries. The United States opposes prior consent in principle. It is technically impossible to avoid some "spillover" when broadcasting to one's own country via space satellite. If prior consent were to be strictly enforced, it would be impossible for the United States to develop a domestic system for direct broadcasting by satellite without the prior consent of its neighbors (e.g., Cuba).

Increasingly, the United States finds itself at odds with Third World and other countries that seek to impose restrictions on the flow of information across national frontiers and on the information-gathering activities of journalists. The "New World information order" being demanded by many less developed nations within UNESCO appears to many in the United States to be adverse to commercial information gathering and dissemination that is not under tight government control.

WIPO administers a number of international conventions intended to protect the intellectual property rights of the authors of information that is stored, disseminated, or displayed through electronic systems. In recent years, WIPO and UNESCO have jointly sponsored working groups to study satellite program distribution, cable TV, and national copyright and patent legislation for developing countries.

UPU was established in 1874 and is the second oldest existing international organization. It has become embroiled in communications issues because of the rapid evolution of electronic information and communication systems, including "electronic mail." UPU is also involved in the controversial issue of the subsidization of costly mail delivery systems through high tariffs on electronic communication systems. This cross-subsidization, which is common among countries that have integrated government administration of postal, telephone, and telegraph systems, has impacted severely on transnational corporations heavily dependent on international communications.

The Intergovernmental Bureau for Informatics is a Rome-based organization, outside the U. N., which holds periodic conferences to consider broad policy and legal questions related to transborder data flows and related electronic information issues. It is influential among developing countries and its resolutions have wide impact.

IMCO has several components that consider telecommunications issues relating to maritime navigation and ICAO does the same with respect to air navigation. The most important regional organization in which the United States deals with communications matters is CITEL which seeks regional agreements and develops a consensus on common positions for Western Hemisphere countries prior to meetings of ITU. OECD, though largely oriented toward Europe, seeks to harmonize the differing views of all industrialized countries on such controversial communications issues as control of transborder data flows.

U.S. representation to these organizations comes from many levels of Government, both within and outside the Department of State. Within the department, two bureaus play major roles in the determination of international communications policy: the Bureau of International Organization Affairs and the Bureau of Economic and Business Affairs. Other State Department components that play ancillary roles are the Under Secretary for Security Assistance, Science and Technology, the policy planning staff, and the Legal Advisor's Office.

For 30 years there has been mounting concern in the United States over Government procedures for developing telecommunications negotiations. The absence of centralized management and policy coordination has frequently been noted and it would appear that the United States was fortunate to preserve its essential interests up to and through WARC-79. The question remains—will the procedures, mechanisms, and processes that gave a margin of success in the past continue to work in the future?

The United States spent approximately 5 years formulating the proposals and position papers for WARC-79. Some 800 people were involved in one way or another. It is estimated that the State Department alone spent about $1 million in preparing for WARC-79 and this amount does not include the expenses of other Government agencies involved, nor of private industry organizations. By its very nature, this was a complex and time-consuming process. With the large number of international telecommunications conferences and meetings scheduled for the 1980's and 1990's, it is clear that a more expeditious procedure for the preparation, coordination, and adoption of U.S. proposals and positions is needed.

U.S. Preparations for WARC=79

The 20-year period between the previous general World Administrative Radio Conference in 1959 and WARC-79 was one of vast change. The number of nations belonging to ITU almost doubled–from 87 to 155. There were tremendous advances in telecommunication technology, including the development of satellite communications. Worldwide demands for improved communications had greatly increased. As an added incentive to convene a general WARC, it was widely recognized that inconsistencies had developed in the general regulations having application to more than one of the individual radio services. The fact that a number of specialized radio conferences had been held since 1959 resulting in decisions not entirely consistent with each other also suggested the need for a comprehensive conference.

The United States expected WARC-79 to take place in a contentious atmosphere. The rising economic aspirations of the developing countries, coupled with their perceived requirements for a fair share of the radio spectrum and the geostationary satellite orbit made confrontation appear inevitable.

The decision of ITU in 1973 to follow U.N. General Assembly precedent and grant observer status to the Palestine Liberation Organization, and the rhetoric at the NAM conference in Havana immediately prior to WARC-79 generated further concern that telecommunication and spectrum issues were to be politicized.

As noted earlier, ITU, like the U.N. General Assembly, operates on the principle of "one-country, one-vote." The United States and other, large developed countries have no more voting power than Haiti or Vatican City. However, in practice, ITU attempts to resolve technical issues and reach decisions by consensus and reverts to voting only when a consensus cannot be obtained. Therefore, the United States embarked on an early effort to direct the focus of the conference to the major technical issues and away from extraneous political matters.

U.S. preparatory work for WARC-79 proceeded under the following broad guidelines:

- *Flexibility.*—The primary goal was to maintain flexibility to meet the future needs of users in telecommunication matters within the framework of the international radio regulations.
- *Minimal change.*–The preparatory efforts should result in proposals for only those changes to the radio regulations

that were absolutely required in order to meet the needs of users.

- *Defensible positions.* —The proponents of new requirements should be in a position to defend the required revisions of the radio regulations, including allocations, using sound and fully developed technical arguments, including accurate and current listings in the master international frequency list.
- *Accommodate world needs.* –The preparatory work should take into account the proposals for changes to the radio regulations advanced by other nations and should resist only those that might impede our national flexibility to an unacceptable degree.
- *Point of no retreat.* — Where it was apparent that proposed U.S. changes to the radio regulations, including modified, allocations, are likely to be opposed, the preparatory work must develop, in advance of the conference, final fall-back positions.

U.S. preparations involved broad participation by Government agencies, the telecommunication industry, and the public. There was active U.S. participation in planning sessions held under the auspices of such international organizations as CCIR, as well as in multilateral forums such as NATO, the Conference of European Post and Telecommunication Administrations, and CITEL.

Within the United States, FCC, as the body responsible for the regulation of nongovernment uses of the radiofrequency spectrum, established docket 20271 as early as January 1975 to develop the nongovernment U.S. proposals for the conference. NTIA, through IRAC established Ad Hoc Committee 144 to develop the proposals of the United States affecting Government users of spectrum. IRAC also participated in Ad Hoc Committee 144. Eventually, FCC issued nine NOIs that drew comments from many segments of the telecommunication industry and the public. Through this process FCC developed and adopted the proposals for commercial, private, and non-federal government use of the spectrum.

Ad Hoc Committee 144 of IRAC had representation from all Federal agencies with a major interest in radio communications and spectrum use. It was responsible for developing recommended U.S. proposals for WARC-79 concerning Government use of the spectrum. Both FCC and NTIA staff experts were involved in commenting on the proposals of other administrations and developing position papers for the delegation to the conference, including compromise or fall-back positions.

Recommended U.S. proposals adopted by FCC (nongovernment) and NTIA (Government) were fully coordinated and submitted to the Department of State which was itself aware of the proposals as they *were* being developed through participation in FCC and NTIA processes. Therefore, the State Department was knowledgeable about large areas of agreement as they were reached, as well as the fewer areas of disagreement. Almost all the differences concerning the proposals to be made by the United States were successfully resolved between FCC and NTIA. Only one issue (proposed allocations for international broadcasting in the HF bands) was carried to the President through the National Security Council.

Industry proposals and views or those of nongovernment service suppliers or organizations are treated within the FCC mechanism. FCC, barring appeals to the courts, has the final responsibility and authority for regulating the nongovernment use of the spectrum. Therefore, FCC develops nongovernment proposals under the open and due process procedures of the Administrative Procedures Act. FCC must decide among competing and often conflicting proposals advocated by various segments of the communication industry, other commercial users, private and public users, as well as State and local government users.

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Advance preparations for WARC-79 got underway at the State Department as early as 1975 when it began work on obtaining funds for the delegation, the selection of the head of delegation and of other members. In 1977, the State Department sought information on the views of other governments and the positions likely to be taken by them. Requests for information were cabled to U.S. embassies abroad but the results were not satisfactory for several reasons. The United States has only one telecommunication attaché (based permanently in Geneva). Embassy personnel in many posts apparently lacked the necessary expertise to discuss the subject with responsible foreign officials and effectively gather information. The reporting task was rendered even more difficult by the fact that many proposals of the Third World countries were not fully developed until shortly before the conference began.

In 1978, the State Department established a public advisory committee for WARC-79 consisting of 38 members from industry and the general public. Several public interest groups, researchers, educators, and minority interests were represented. The purpose of the advisory committee was to advise the State Department and the head of the WARC delegation in all areas related to the conference and to help develop positions and negotiating strategies. There was some criticism of the role of this advisory committee from both members and nonmembers. Some of its members felt that their views had little or no impact.

Beginning in 1977, the State Department arranged for international consultation to communicate and explain the U.S. views and proposals as they were being developed for the conference. Bilateral discussions were held in 48 countries by teams of U.S. experts involved in the preparation process. In addition, the United States participated in multilateral forums. Proposals of interest to the U.S. military were also described and coordinated through NATO and its Allied Radio Frequency Agency.

CCIR and other ITU activities also provided an opportunity for the United States to discuss its views in international forums. CCIR held an SPM in 1978 to prepare a technical base for the guidance of the conference and for administrations then preparing their own proposals. ITU itself held three seminars (in Kenya, Panama, and Australia). These seminars were primarily for the benefit of the developing nations—to acquaint them with the issues they would face in the conference and with the technologies that had been developed most recently in the radio-telecommunication field.

In January 1978, Glenn O. Robinson, professor of law at the University of Virginia and a former FCC commissioner, was named head of the U.S. delegation to WARC-79. Professor Robinson was given the rank of Ambassador for the duration of the conference. This limited appointment by the President did not require Senate confirmation. This raised some concern about the general question of the selection process for the head of U.S. delegations to international telecommunication conferences. More specifically, there was concern expressed by several Senators over U.S. preparedness for the conference, especially focused on the question of the U.S. ability to counter effectively the expected demands of the less developed countries for a greater share of frequency allocations and for changes in ITU procedures. The submission of Professor Robinson's name for Senate confirmation as Ambassador to the conference may have provided an effective opportunity to explore those concerns.

Subsequent to Robinson's designation, an initial delegation of 20 representatives from Government agencies was formed and eventually the full delegation of 67 persons was named. In addition, some 30 individuals were named to a U.S. technical support group that worked first in Washington, D. C., and later in Geneva.

Traditionally, U.S. delegations to telecommunication conferences are made up largely

of spectrum managers and technical experts from Government agencies and industry. Theoretically, representation on the delegation should not be necessary to protect the particular interests of an agency, industry, company, or other organizations or groups because the delegation is committed to work for the U.S. proposals adopted during the preparatory process described above. Not only are the U.S. proposals adopted and submitted to ITU before a conference convenes (in this instance, by January 1979), but compromise positions are likewise agreed to within the United States before the conference.

However, during a conference—and WARC-79 was no exception—new compromises and new alternate proposals are often required when previously agreed U.S. proposals are not accepted by other administrations. At such times, the delegation, in consultation with higher echelons of Government in Washington, must develop and then agree on the new positions. In such circumstances, U.S. delegations almost without exception strive for compromises that will win general acceptance and that are as close as possible to the original U.S. proposals and thoroughly consistent with U.S. goals agreed to prior to the conference.

Proposals to modify the international table of allocations are based largely on the requirements or desires of individual countries to operate particular radio services in particular bands. Needs differ among countries. Decisions are driven in many cases by such nontechnical arguments as economic and national importance of one service vis-a-vis another. On the other hand, allocation decisions may be dictated by technical considerations, particularly those allocations involving the sharing of frequencies between two or more services. The arguments supporting these latter allocations are based on complex technical factors: acceptable interference levels and noise, power flux densities, antenna patterns, etc. For these allocations, the conclusions of the technical committee of a conference on the feasibility of and conditions for sharing often determine the successful adoption of the proposed allocation. In such discussions, obviously, the participation of the technical experts on the delegation is essential. Often such technical experts are not spectrum managers but work for Government or nongovernment organizations which operate communication facilities or other radio facilities. In the case of Government agencies this includes NTIA, NASA, the Federal Aviation Administration, DOD, FCC, and others. In the case of nongovernment organizations, it includes employees of companies that provide telecommunication systems and services, such as AT&T and COMSAT, and equipment manufacturers such as Hughes Aircraft Co. and the Harris Corp. The role of these nongovernmental experts is of great importance to the work of the delegation.

Since 1959, an average of 33 percent of the U.S. delegations to the eight ITU conferences held during that period were engineers and scientists from nongovernment organizations. For example, at the broadcasting satellite WARC held in 1977, 41 percent of the U.S. delegation was nongovernment. The U.S. delegation to the WARC-79 conference was predominately Government. Only 27 percent of the delegates were nongovernment including 18 percent from the telecommunication industry (see table 1).

Delegations from other developed countries include spectrum managers from the government ministries of telecommunication (often referred to as PTT's; postal, telegraph, and telephone authority) and engineers, scientists, and technical experts involved with the design, development, and operation of telecommunication systems and other radio equipment. Unlike the structure in the United States, most other countries place the operation of “commercial,” as well as government, communication facilities in the hands of the government, or with an entity owned or controlled by the government. Therefore, the composition of foreign delegations is predominately government with

Table 1 .–U.S. Delegates to **WARC-79 by Organization**

Organizational affiliation	Number of delegates	Percent of delegates
Federal Government:		
FCC	18	26.5%
NTIA (and other Commerce Department)	8	12
Department of Defense	6	9
Department of State	6	9
NASA*	4	6
International Communications Agency**	2	3
Department of Transportation	2	3
National Science Foundation	1	1.5
Office of Science and Technology Policy (White House)	1	1.5
Total	48	71.5%
Private Corporations:		
COMSAT	3	4.5%
AT&T	1	1.5
Hughes Aircraft	1	1.5
Motorola	1	1.5
Rockwell International	1	1.5
Satellite Business Systems	1	1.5
Western Union	1	1.5
Total	9	13.5%
Industry associations	3	4.5
All other	7	10.5
Total	67	100 %

*Includes Systematics General Corp. representatives.
**Includes Board of international Broadcasting.

SOURCE: Office of Technology Assessment.

some representation from manufacturers of communication equipment.

When it comes to a discussion of technical issues, such as system design capabilities and sound operating practices, the experts on other delegations expect their proposals to be discussed by similarly knowledgeable experts from the United States. Over the years, U.S. delegations to international telecommunication conferences have included industry and private sector experts involved in the day-to-day operations of communication systems. This is a natural result of the U.S. structure whereby the ownership, operations, and management of commercial and private communication systems are functions performed by private enterprise subject to Government regulation. U.S. telecommunication companies, and not the U.S. Government, are responsible for negotiations with foreign entities for the construction and operations of international telecommunication facilities. These companies undertake the financial obligations and own the U.S. share of the commonly operated international facilities with foreign entities. For example, AT&T and the several U.S. international record carriers own and operate submarine cables between the United States and Europe under contractual agreements with European telecommunication authorities. COMSAT owns and operates the U.S. share of the satellites operating in the global International Telecommunications Satellite Organization (INTELSAT) system together with 106 other countries.

The U.S. Government conducts negotiations on telecommunication matters of a foreign policy nature including U.S. participation in ITU conferences. In forming U.S. delegations to ITU conferences, the Government has looked to the U.S. operating companies and equipment manufacturers to provide expertise not generally available within the Government. A delegation of Government and industry representatives reflects the split responsibility for telecommunication activities in the United States. The inclusion of industry experts on U.S. delegations was brought into question in 1978 as a result of an apparent conflict of interest in an international conference dealing with an entirely different subject (the renegotiation of the international coffee agreement during which representatives from coffee companies participated as members of the U.S. delegation). Following that incident, the Department of State, acting on the advice of the Department of Justice, adopted new guidelines based on the conflict of interest provisions of the U.S. Code (sees. 203, 205, 207, and 208 of title 18) that effectively limited participation of nongovernment delegates to international conferences. Although the guidelines permitted nongovernment delegates to address technical points, they prevented such delegates from addressing policy issues or serving as spokesperson for U.S. proposals.

These restrictions were first imposed during the highly technical 1978 SPM of CCIR in preparation for the WARC-79 conference.

An amendment to a State Department appropriation bill (Public Law 96-60) introduced by Sen. Harrison Schmitt, and passed by the 96th Congress, exempted WARC-79 from these guidelines. However, the exemption came only shortly before the conference, leaving the role of nongovernment delegates uncertain until late in the preparatory effort. This may account, in part, for the low percentage of industry delegates to WARC-79.

Legislation to exempt all international telecommunication conferences from the restrictions of the State Department guidelines was enacted in the 96th Congress. However, the legislation to which it was added was vetoed by the President (the reason for the veto was unrelated to the exemption). The Senate again passed the exemption provision, but the House did not consider the measure before adjournment.

Another issue concerning the makeup of U.S. delegations was highlighted in preparing for WARC-79. In formulating proposals for nongovernment use of the spectrum, FCC must evaluate needs and sort arguments among competing commercial and private interests vying for spectrum allocations. This process follows FCC guidelines for rulemaking under the Administrative Procedures Act. Basic issues about the fairness of this process were raised by the timing of establishing the U.S. delegation.

The benefits derived from early creation of a U.S. delegation to prepare for the conference were recognized for WARC-79. However, conflict of interest and violation of due process were also recognized as possible consequences of naming industry representatives to the delegation before the FCC process of adopting U.S. proposals was complete. The concern was that individuals named to the delegation would be in a position to advocate the proposals of their companies in FCC's decisionmaking process better than those *companies* without representatives on the delegation. Moreover, delegates were likely to have access to information not generally available to nondelegates, giving credence to the argument that those companies with representatives on the delegation would have an advantage in supporting positions before FCC over those companies not represented and who might be taking contrary or conflicting positions in the FCC process.

This problem was avoided by naming only Government representatives to the WARC-79 delegation during the time of the FCC deliberations. Following adoption of proposals and the conclusion of the FCC process, industry and other nongovernment representatives were named to the delegation. This may also account, in part, for the relatively small number of industry representatives on the delegation. Also, some industry and Government officials have argued that the addition of industry experts to the delegation at such a late stage (spring of 1979) reduced their role and effectiveness.

An additional issue concerning the formulation of the delegation resulted from the real or perceived need to include individuals with differing viewpoints, to add representatives from public and consumer interest groups, and provide adequate participation by minorities and by women.

This, together with the pressures from Federal agencies, various elements of industry, public, and special interest groups to be represented on the delegation made the selection and functioning of the U.S. delegation a perplexing exercise open to criticism. On the one hand, these problems can be dismissed as a reflection of the times and the increased importance of telecommunication in all sectors of society. The stakes are high and the need to be represented is perceived to be important. On the other hand, the problems may reflect the absence of a clear Government policy regarding the selection and approval of individuals to serve on delegations to telecommunication conferences.

Adding representatives to the delegation with no apparent role other than to fulfill some nonspecific requirement to include special interest, racial, or sexual representation

proved to be frustrating for all concerned with no apparent benefits. There were four delegates funded by the Department of State under the "Biden amendment."* At least two of those delegates have stated publicly that their role was never defined nor did they provide any substantive contribution to the deliberations of the delegation. Other members of the delegation were also apparently unsure of the role of the Biden amendment delegates. One of the Biden amendment delegates reported that other delegation members seemed to treat the Biden delegates as though they had not earned the right to be on the delegation.

As stated above, the function of the U.S. delegation at international telecommunication conferences is to seek agreement on U.S. proposals submitted to the conference. These proposals are developed under U.S. domestic procedures and laws. Any shortcomings in these procedures regarding participation of concerned and interested parties are unlikely to be corrected by last minute measures to add to or adjust the membership of U.S. delegations. The process of preparing for international conferences should include the natural selection of the most qualified individuals to serve on U.S. delegations with the range of skills and disciplines required to negotiate the U.S. proposals. Representation on U.S. delegations cannot overcome any perceived deficiency in U.S. domestic processes.

Clear guidelines for the type of representation to be included are necessary and measures to ensure that the right combination of skills are represented by the individuals selected to serve on U.S. delegations are essential. That individuals with these skills will be available when needed should not be left to chance. Specific action to develop and train individuals and assure that U.S. delegations are equipped with these skills would help alleviate the problems encountered in preparing for WARC-79.

The OTA-sponsored survey on WARC-79 preparations and impacts asked respondents to list the four or five most important qualifications an "ideal" member of a U.S. delegation to a WARC-type conference should have. While no human being could meet all of the qualities listed by all of the respondents, a U.S. delegate who conformed to the most frequently repeated qualifications would require the following attributes:

Personality
- good communicator, adept at self-expression;
- mature, "diplomatic" personality;
- international reputation in some field;
- willing to accept advice from technical experts;
- able to exert independence from parochial interests;
- willing to compromise; and
- willingness and ability to work hard.

Experience:
- negotiating experience, particularly at ITU meetings;
- spectrum management experience; and
- operational experience in at least one radio service.

Knowledge:
- broad understanding of telecommunications, including technical competence and an understanding of the societal impacts of telecommunication technology;
- ability and understanding necessary to support and explain U.S. positions at the conference;
- knowledge of present and planned spectrum management requirements of U.S. users;
- knowledge of ITU history and procedures;
- a "feel" for international politics, or at least a personal world view; and
- fluency in at least one foreign language, usually cited as French or Spanish.

Sensitivity:
- sensitivity to Third World positions and cultural differences;

*According t.o a amendment sponsored by Senator Joseph Biden, which became sec. 113 of Public Law 95-105, the State Department is authorized to reimburse individuals or organizations for their costs of participation in State Department activities if such persons represent an unrepresented or underrepresented interest in the proceedings and otherwise could not afford to participate.

- sensitivity to U.S. national security concerns; and
- sensitivity to users' and consumers' needs, and the ability to relate these needs to spectrum allocations.

The results of the OTA-sponsored survey also show that a majority of the respondents chose "selection of the most effective delegation possible" as the number 1 goal of the preparatory process from a list of 12 goals. However, less than half (48 percent) of the respondents felt that the process was moderately effective in achieving that goal. Another 25 percent felt that the effectiveness of the process was low and another 12 percent said it was totally ineffective in achieving that goal. Only 14 percent of the respondents rated the degree of effectiveness of the process high in achieving the goal of selecting the most effective delegation possible.

Possible actions to address the problems of industry participation and broader representation of interests and skills are discussed in chapter 5 of this report.