INTERNATIONAL TELECOMMUNICATION UNION

UNITED NATIONS DEVELOPMENT PROGRAMME

Booklet no. 22

TELECOMMUNICATION AND DEVELOPMENT

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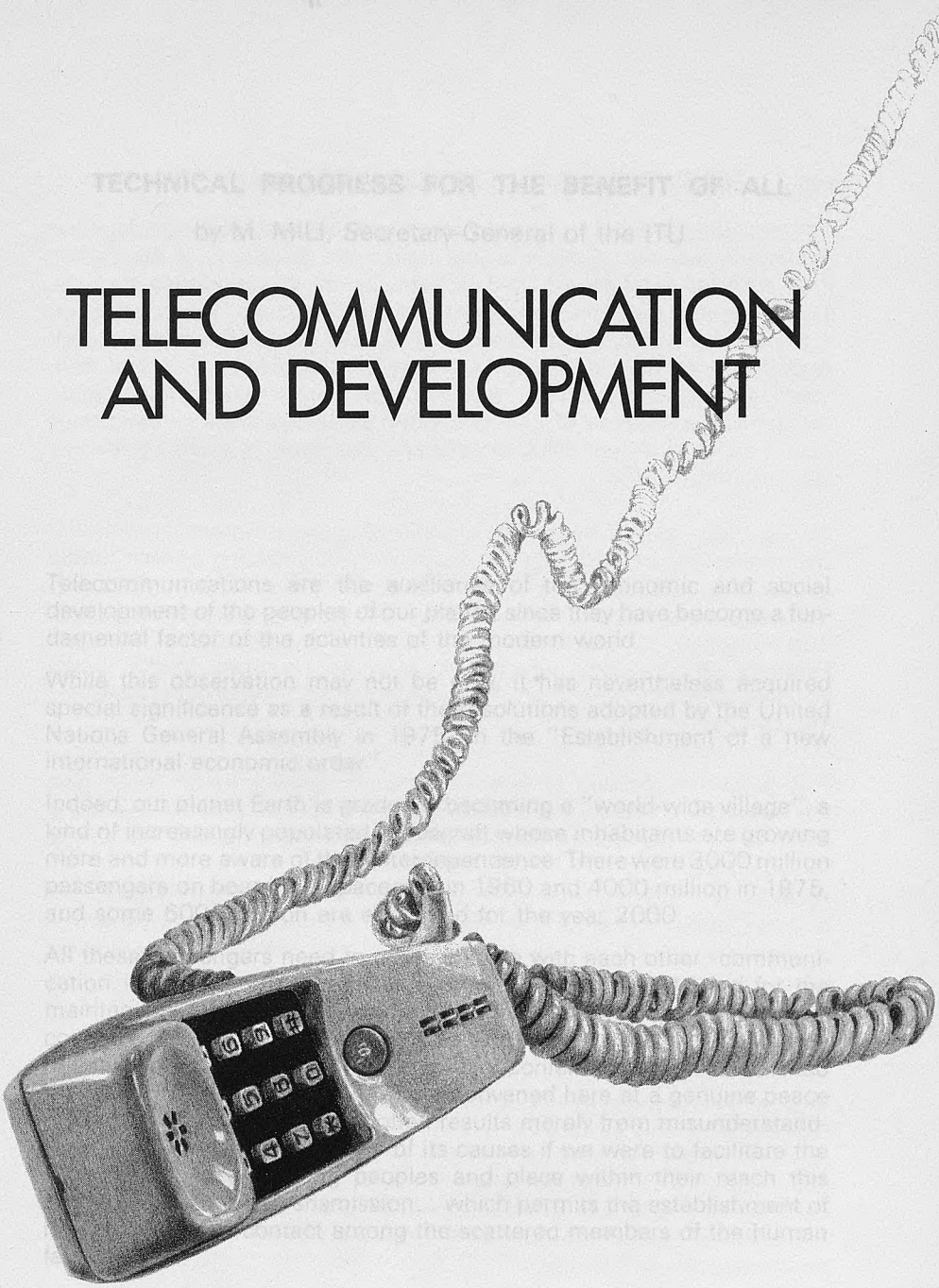
TELECOMMUNICATION AND DEVELOPMENT



INTERNATIONAL TELECOMMUNICATION UNION
UNITED NATIONS DEVELOPMENT PROGRAMME

TELECOMMUNICATION AND DEVELOPMENT

INTERNATIONAL TELECOMMUNICATION UNION
UNITED NATIONS DEVELOPMENT PROGRAMME

TECHNICAL PROGRESS FOR THE BENEFIT OF ALL

by M. MILI, Secretary-General of the ITU

Telecommunications are the auxiliaries of the economic and social development of the peoples of our planet, since they have become a fundamental factor of the activities of the modern world.

While this observation may not be new, it has nevertheless acquired special significance as a result of the resolutions adopted by the United Nations General Assembly in 1975 on the "Establishment of a new international economic order".

Indeed, our planet Earth is gradually becoming a "world-wide village", a kind of increasingly populated spacecraft whose inhabitants are growing more and more aware of their interdependence. There were 3000 million passengers on board this spacecraft in 1960 and 4000 million in 1975, and some 6000 million are estimated for the year 2000.

All these passengers need to communicate with each other: communication is indispensable both for economic and social life and for the maintenance of peace. Mankind thirsts for communication. This truth is confirmed by the fact that, as early as 1865, one of the representatives of the States attending the Plenipotentiary Conference which established the ITU spoke as follows: "... we are convened here at a genuine peace congress. If it is true that war often results merely from misunderstanding, would it not eradicate one of its causes if we were to facilitate the exchange of ideas among peoples and place within their reach this prodigious means of transmission... which permits the establishment of rapid, continuous contact among the scattered members of the human family?".

What enormous progress has been made since then...

To mention only the recent past, when the first transatlantic telephone cable was laid—in 1956, one year before the launching of the Earth's first artificial satellite—it had a capacity of 36 telephone circuits. Twenty years later, the transatlantic telephone cable, inaugurated on 1 September 1976, has a capacity of 4000 circuits (111 times more). And this is by no means the last word on the matter. The first geostationary satellite used for the common carrier telecommunication service had a capacity of 240 telephone circuits, while the latest ones have a capacity of over 6000 circuits and two colour television transmission channels.

During these last ten years, the number of sound programme and television receiving sets has tripled; satellites have provided us with media for keeping nearly all the nations of the world informed of events with minimum delay. Direct broadcasting via satellite became a reality, thanks largely to the conference convened by the ITU in January-February 1977, during which 106 Member countries of the Union adopted technical regulations for bringing direct broadcasting satellites into service...

This quick run-through of such spectacular developments might give the impression that in the electronic era all countries derive the same benefits from the use of modern telecommunication media. Yet this is far from true.

It is therefore of the utmost importance that the senior government officials responsible for the day-to-day problems of the development of telecommunication networks in the many countries where these networks are still inadequate should be informed of the means that are available to help them solve all or some of these problems.

That is the purpose of this pamphlet, prepared by the ITU with the collaboration and assistance of the United Nations Development Programme (UNDP). It does not claim to be exhaustive or to provide immediate solutions of problems, which in any event require detailed study in each specific case, but is intended rather as a guide to show decision-makers what can be done by calling upon the ITU and the procedures to be undertaken to this end.

THE FULL MEANING OF COMMUNICATION

by Bradford Morse, Administrator of the UNDP

The basic methods and guiding objectives of development and technical co-operation are richly embodied in the term "communication", whose many meanings include "sharing" and "equity".

At its roots in ancient Latin, Greek and Sanskrit, "**tele**communication" refers to interchanges, the nature of which is cyclical, as in dialogue; which require media for sending messages across space and time, and often across cultural separations as well; and which, as they are experienced, nurture the interlocutors and turn them towards one another.

Communication and telecommunication in these senses succinctly describe the qualitative goals of the United Nations development system's partnership with almost 150 developing countries and territories in the establishment of a new international economic order.

These deeper meanings are too easily blurred by the sheer convenience of the telephones, radios and televisions at our disposal, should we live in the developed world; or their dearth and the resulting difficulty of communication, should we live in the developing world. In a world of intricately interdependent nations, and within countries that have set themselves the priority task of national mobilization for basic development in industry, agriculture, health and education, there is an unquestionably strong link between telecommunications and development.

Certain facts speak volumes about this link. In Europe and North America, which represent a total population of 960 million, about 300 million telephones, 660 million radios and 280 million televisions are in use. By contrast, in all of Asia, Africa, Latin America and the Caribbean, and the Middle East, which represent a total population of 3 billion inhabitants, only about 78 million telephones, 205 million radios and 50 million televisions are in use. It is well documented in developing countries that, among the poor, as radio and telephone use increases, so does *per capita* income, and that the converse also holds true.

While complex, there is more to this relationship than is visible in statistics about physical elements in telecommunications and development. In the not distant past, telecommunication facilities were predominantly established on vertical lines, from the northern-world seats of economic and political power, to their colonial and commercial "outposts" in the southern world. With national political liberation almost universally achieved, the challenge now is to pursue new dimensions in telecommunication development within and among developing countries, on the horizontal axis. The use of electronic media as a means for sharing development information has hardly begun to be realized.

Within countries, telecommunication, if properly oriented and given adequate capacity, can support national goals in villages far from capital cities, in factories and mines and urban areas — as well as in government bureaux, corporate suites and university halls.

Among developing countries, closing of telecommunication gaps can help to overcome some of the crippling constraints on—for example—mutual trade, co-operative product development and natural resource utilization. It can also help to expand the exchange of knowledge about many types of development planning and practice that are rooted in similar needs and conditions.

Within and among countries, it is not merely the technology of communication that we must be concerned with. Rather, the crucial question in development terms is how will it be used to facilitate essential two-way exchanges. Planners need to have their notions cast into the light of village reality, even as villagers need to learn of helpful government services and of ways to participate in development decision-making. And national planners in different countries can benefit from communicating more quickly and widely, with accurate detail and interpretation, about their respective goals and common needs.

As a result of the United Nations Conference on Technical Co-operation among Developing Countries to be held in Buenos Aires in March/April 1978, I would hope that the avenues for such communication and co-operation—from village to capital, and across frontiers to capital and village again—will be opened up more widely than at present.

Making communication choices with this sort of consciousness—reflecting the deepest meaning of communication—is vital to strengthening the individual and collective self-reliance of developing countries. It is an essential prerequisite to the achievement of justice and equity in our time.


Union internationale des télécommunications
UIT

1 FROM MINISTRIES TO SATELLITES... AND BACK TO PEOPLE

UNDP's Action

With all of its rapidly multiplying technologies, now enabling interplanetary contact over millions of miles, telecommunication is important for one basic and unchanging purpose: as a transmitter of ideas, innovations and information over distance. The ancient origins of today's "wandering minstrels" or story-tellers in India and the Yoruba "talking drums" show that human-kind's need to communicate with others far away has long been central to social existence. Telecommunication —among individuals, among nations, and among entire continents—is simply a modern extension of this underlying drive.

For the final quarter of the XX Century, it is already possible to foresee some of the quantum leaps to be made in telecommunication as a **technology.** Some of the world's foremost scientists and engineers, working in the most advanced electronics and computer laboratories, are already developing the next-generation offspring of the transistor and the satellite.

◀ *ITU Headquarters building in Geneva (photo: ITU)*

Scientific and engineering problems, progress and possibilities are amply chronicled in the specialized journals and commercial outlets available to the technologists. But what about the futurists, policy-makers and planners of telecommunication **as a service to people?** What prophecies can be drawn up and what visions pursued for the spread and redirection of telecommunication services to the most needy people and nations?

Just a glance at a map of world telecommunication at once tells that the need is greatest among the two-thirds of the world's people located in over 100 countries and territories on the southern part of the globe. On this map, Europe and North America are crossed and inter-connected with telecommunication links of all types, virtually blotting out the land mass on some parts of the map. Another but lesser stream of lines is strung out on the north-south axis, emanating from a relative handful of capitals in the affluent northern countries. By comparison, there are yawning expanses of continents and oceans within the southern world which are literally unreached by telecommunication and left virtually incommunicado.

Two-thirds of the world's people, with what miniscule proportion of the world's telecommunication services?

In seeking to rebalance the equation, developing countries face a wide range of options among technologies developed and produced in, and internationally financed and promoted from, the more industrialized countries. These technological and investment choices necessarily arise as part of a series of inter-related wider issues, issues on which the relevant experience of the technology-exporting countries is inevitably limited:

— One, a **domestic** concern, is how best to deploy new national telecommunication services so as to assist in national integration and in the reduction of poverty, particularly in rural areas. This is the issue of the **development strategy and content objectives** which should guide economic and technological decisions in telecommmunication.

— Another, an **international** concern, is how best to pool resources in telecommunication with other developing countries—in frequency regulation, in terrestrial network planning, in multi-country communication satellite use, in engineer and technician training, etc.

This is the issue of **technical co-operation among developing countries** (TCDC), which in telecommunication beyond national borders is not an option, but an obvious "must" almost by definition.

1. Development strategy and content objectives

For the developing countries, there is a double challenge for telecommunication expansion—to keep up with increasing demand for services from the modern sector in close **correlation** with the pace of development, while also planning and investing for national network extension into underserved and unserved sectors or geographic areas in order to **speed** the pace of development. The latter challenge, posing a long-term volume of expansion need far surpassing what the rich countries face, means that telecommunication issues have to be decided as an integral part of the whole development policy and dynamic of each country. It means linking telecommunication decisions with many other decisions—on rural development, on increased commodity production, on intra- and international trade expansion, and on a host of other objectives that depend on and contribute to telecommunication flows.

It is also important to give very special attention to the entire range of telecommunication infrastructure which can help to support development information and education and popular participation through schools, community centres, farmers' groups, and families and individuals. This is the infrastructure for electronic media, particularly radio but also increasingly television, along with appropriate technology for their educational uses, ranging from simple maintenance of community radio receivers to the programming and logistics of satellite transmissions.

The question of what is expressed through electronic media goes to the heart of a country's total development strategy.

China, for example, has used radio extensively and successfully to mobilize her 800 million citizens behind widespread social and economic reform and development. The Chinese people learn regularly via radio broadcasts about the nation's progress and industrial output, about how to make a smelter, how to apply new seeds and so on. Every quarter receives attention—factory workers, miners, peasants and urban proletariat. People throughout the country participate in discussion of each important idea and innovation, and thus facilitate dialogue between provincial and central leaders.

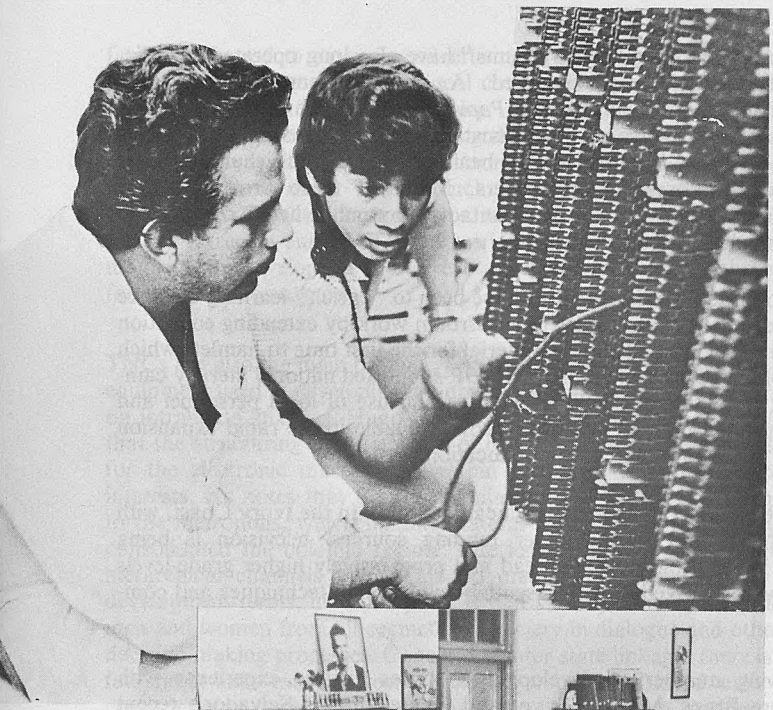
In Benin, two-way dialogue with farming communities is one of the fundamental objectives of the rural broadcasting service and a related network of 1000 radio clubs, which UNDP and the Food and Agricultural Organization of the United Nations (FAO) helped the government establish. The service includes not only the broadcast of feedback reports from listeners' clubs, but also live recordings from the villages. Enquiries in some villages have traced the stimulus these programmes are giving to such self-help initiatives as crop diversification and storage, better nutrition and hygiene, and building of local schools, dispensaries and roads—and the legitimization and re-enforcement the broadcasts lend to the activities of rural extension workers.

National School of Telecommunications in Kinshasa receives technical assistance from the International Telecommunication Union (ITU). Several ITU experts have in fact been helping train technicians of Zaire in radio telecommunications, telephone, telegraphy, etc. The school is equipped with several laboratories and trains the technicians needed for the national service (photo: UN)

An ITU expert training technician on the operation of multiplex telegraph equipment in Abidjan (photo: ITU)

A trainee at work in the crossbar training exchange of the Telecommunications Training, Test and Development Centre, Nondabuhri, Bangkok (photo: ITU)

Venezuela—Training Centre for Telecommunications: teacher and student check terminal lines (photo: UN/Guthrie)



Telecommunications are a vital production factor. The quick exchange of information to all places and over all distances is a prerequisite of modern productivity, and is essential to human and technical progress (photo: UN)

Wide-ranging networks of rural "radio forums" have also long operated in India, with some quarter-million people enrolled. An equally famous rural radio programme is in Colombia (*Acción Cultural Popular*—ACPO) which began in 1947 and today reaches a huge audience with a constant feedback mechanism. Radio is also being used successfully in efforts to raise health levels—in India, the Philippines and the Republic of Korea, among others. Many of these broadcasts are programmed in combination with personal contacts from public health officers and other feedback and demonstration methods.

In formal education, radio's principal uses have been to "enrich" learning or make up for classroom deficiencies; to follow up classroom work by extending education into homes; and to broadcast education material for the first time to hamlets which never had a school. A recent evaluation of UNDP-supported national literacy campaigns found that through extensive pre-planning and use of local personnel and locally produced printed matter, radio can prove valuable in the rapid expansion and improvement of literacy and formal education.

Television is also becoming an important educational tool. In the Ivory Coast, with support from UNDP and several other funding sources, television is being introduced into a wider geographical spread and progressively higher grade-levels of schools year by year, together with essential new learning techniques and companion materials.

Among the growing number of developing countries gaining experience with educational TV are Brazil, Mexico, Egypt and Guatemala. El Salvador's recent experience with classroom television, however, indicates that the introduction of the medium alone does little in itself to help pupils become more employable.

Few developing countries employ their electronic mass media for economic, social and political development. Instead, the overwhelming bulk of programming lies in the entertainment area. Television during "prime hours" in many developing countries is made up of filmed television shows from Western countries, often of the "soap opera" variety. One reason for this is cost. It is less expensive for poor countries to buy foreign-made films and other mass media material than to produce them themselves. Partly as a reflection of their programming-material source, developing countries typically include very little content on such development matters as agricultural innovations, even though their audiences are comprised largely of farmers.

Many studies, including those by the United Nations, have demonstrated that electronic mass media are not used principally for development in countries where content is strongly influenced by businesses whose first interest is stimulating a large consumer market for their products. Studies in Asia, for example, show that poor

families exposed to extensive advertising are buying imported baby foods at high price although they could buy local cow's milk at much lower cost with as much nutritional value. In Latin America, physicians working in rural areas report numerous instances of families selling the few eggs and chickens they have raised in order to buy well-advertised soft drinks, despite their children's need for more protein in their diets. Behind such advertising are often found transnational corporations (TNCs)—as producers, marketers and advertisers of the product concerned. A recent survey of 73 countries revealed that, in 44 countries of which a majority are developing, the advertising agencies which do the most business are foreign-majority owned.

TNCs are also the main producers and providers of virtually all telecommunication equipment used in developing countries and consult on the locations of facilities and on intra-state linkages. Hugo Radice, an expert on international business, believes that the structuring or organizing of telecommunication networks, including those for the electronic mass media within countries, is influenced by foreign-owned interests. He notes that former colonial powers linked points from the hinterland to the metropolis, which inhibited lateral communications between provinces and consolidated the colonial regime. The legacy, Radice says, is that such vertical, hierarchical channels remain all too predominant, even in new installations. In development terms, his main point is that such systems make it difficult to involve men and women from all segments of society in dialogue and other participation in decision-making processes. Concerning inter-state linkages there is one glaring fact: few direct links exist between developing countries. Indeed, calls between African countries, for example, are still mainly routed through London or Paris.

2. Technical co-operation among developing countries

The telecommunication map of Africa will never be the same again:

- 20 000 kilometres of new transmission routes,
- 18 new international switching centres, and
- 29 countries linked in a telecommunication network, many connected directly to their neighbours for the first time.

This new continental "topography" will come into being with the realization of the Pan-African Telecommunication Network, known as PANAFTEL. Since 1973 when UNDP, ITU and co-operating governments completed exhaustive pre-investment surveys, almost all of the estimated 120 million US dollars in investment

needed for this network has been raised. Some of the transmission routes and switching centres are now being installed. The Pan-African Telecommunication Union, an organization of African countries, will maintain, regulate and further plan the network in response to evolving needs. Historically, PANAFTEL is striking because the countries of the region have been so little inter-linked.

As an instance of telecommunication co-operation, PANAFTEL is actually a **world** example. Beyond the directly involved countries, governments in **all** regions are participants through financial resources made available for PANAFTEL by the World Bank, the African Development Bank (ADB), the Arab Fund for Economic and Social Development (AFESD), and nine bilateral sources.

Inter-country co-operation in telecommunication is one of those necessities of the modern world which the United Nations development system seems almost tailor-made to assist when governments jointly so request. UNDP is currently supporting 61 inter-country projects in telecommunication as well as in the techniques and content of development information and communication, with UNDP contributions amounting to 25 million dollars. Much of the inter-country work is devoted to regional telecommunication organizations. In addition to PANAFTEL in Africa, these include the Arab Telecommunications Union, the Asian Tele-Community, and the Inter-American Telecommunications Commission (CITEL).

The main purpose of these organizations is to centralize planning for the establishment of continental and subcontinental telecommunication networks. These networks are envisaged primarily as electro-media links between points within and among developing countries, primarily for the public telephone and telegraph services, including telex. They are also seen as part of an overall world-wide, point-to-point telecommunication scheme.

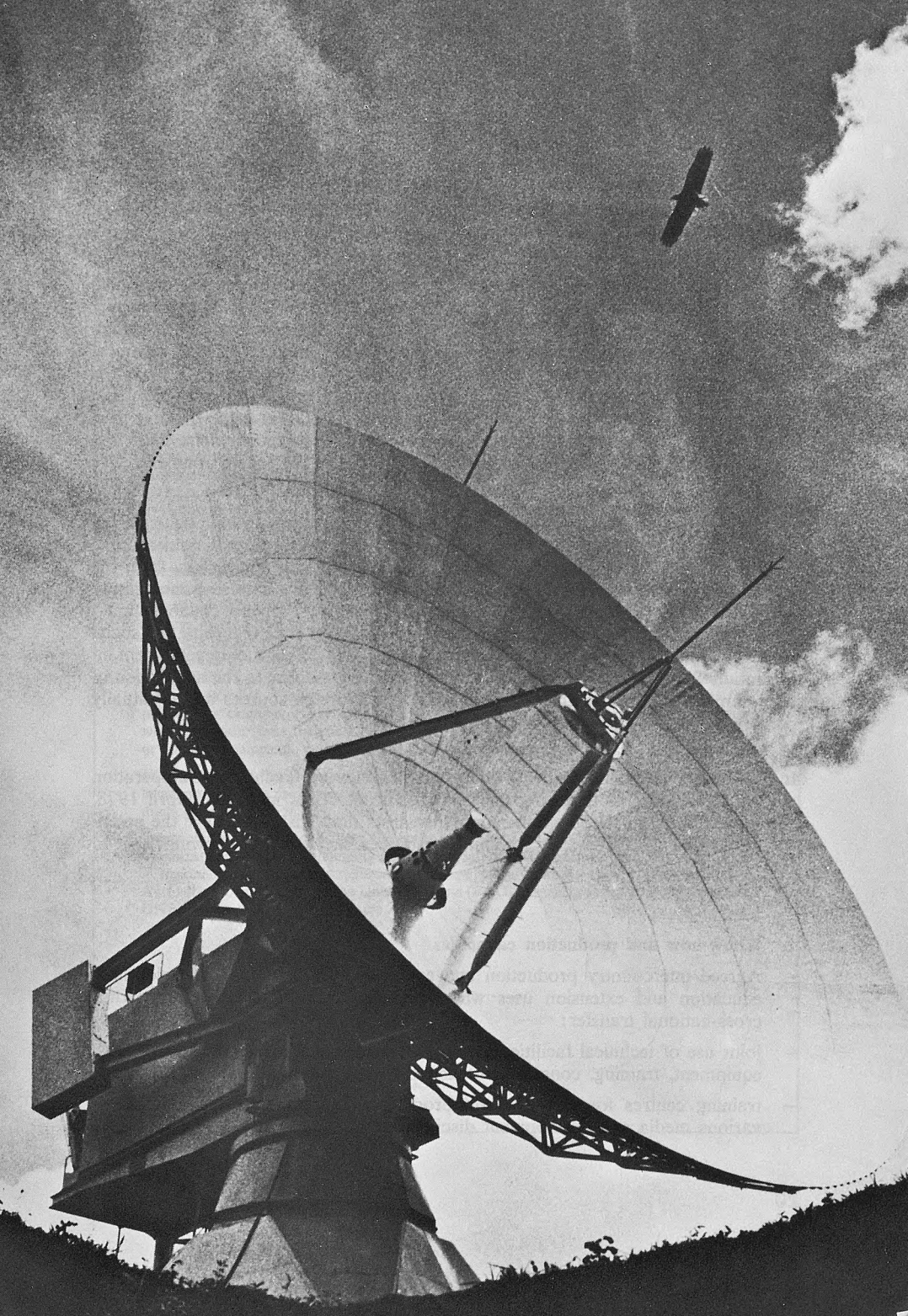
Where UNDP/ITU have helped in preparing a master plan for telecommunication development in a region, the plan's implementation of course depends on joint policy decisions by the governments concerned. In the Middle Eastern and Mediterranean region, such a plan was adopted at an inter-governmental meeting in Algiers in July 1975. Now, with continued UNDP/ITU assistance, detailed investment surveys are providing the necessary techno-economic data on switching and transmission facilities for the various national telecommunication systems in the region. Factors covered include scheduling of network development for maximum efficiency and economy; transmission standards, numbering schemes and other technical prerequisites conforming to internationally agreed recommendations; and compatibility between national and international networks.

◀ *Linking the Abidjan telecommunication centre with the transmitting station (photo: ITU)*

A corollary objective in some regional network-planning projects, as in Latin America, is training of national personnel so that telecommunication administrations have improved capability for preparing their own pre-investment studies for telecommunication projects. This enables them to gain better access to financing from international banks. It also reduces their dependence on suppliers' credits which at an earlier time were the primary source of financing for telecommunications in the region.

An example standing for many Latin American countries: in any given country one type of project to solve a specific problem may be succeeded by another of quite a different category, in step with a fresh stage in the development of the national telecommunication network. One good example is provided by Paraguay. To assist that country's national telecommunication administration in developing its urban telephone networks one expert was recruited by ITU in 1962. During his 2-year assignment he concentrated on planning the systems in the capital, Asunción, and other large cities. However, it was felt that the urban networks should be fully integrated into a national telecommunications plan. For this, further ITU assistance was sought. The request was agreed an unusual feature of the project being that it was carried out by a team from a single P&T administration, that of the Federal Republic of Germany (photo: UN)

India is now a highway for communications between other parts of the world. As a first step into the space communication age an important technical and scientific project centred on Ahmedabad, 800 km north of Bombay, was implemented, whereby the Indian Government has been assisted by the ITU in setting up an earth station for satellite communications (photo: ITU) ▶



Latin American countries also joined in a UNDP/UNESCO-supported feasibility study for shared educational uses of satellites—which could spur the establishment of "educational industries" under a regional division of labour, with respective national specializations in, for example, teaching aids, textbooks, etc.

Training of telecommunication engineers, technicians and other operating personnel often requires the elaboration of institutions, facilities, teaching staff and learning methods which it may not be viable for one country to undertake alone. A high degree of inter-country sharing is feasible in scientific engineering and technical training—by comparison with, say, social studies for rural development—since it is not nearly as affected by ecological and cultural differences among countries. Trainees have found programmes within their regions to be far more effective than those in developed countries, because greater emphasis is placed where there is a significant difference on practical problems of their homeland environment.

The advantages of co-operative communication development among countries can extend beyond regional system-planning and interconnection, and multi-country technical training programmes. These, of course, are almost mandatory from the technical and economic standpoints. Once the full dimensions of telecommunication and development are considered, however, there could be still wider collaboration—for example, in such areas as comparative national experience regarding the social role and impact of communication; generation and transmission of development information within and between countries; common approaches to the acquisition of telecommunication technology and hardware from foreign sources and eventually perhaps in its production by in-region industries.

In looking towards the United Nations Conference on Technical Co-operation among Developing Countries to be held in Buenos Aires in March/April 1978, communication and telecommunication specialists may wish to explore the potential for shared endeavours or combined resources such as the following:

1. Know-how and production capacities

- Agreed intercountry production and exchange of materials for development education and extension uses where technical and cultural factors permit cross-national transfer;
- joint use of technical facilities for media-material production such as studios, equipment, training, consultancies and the like;
- training centres for planners and producers of communication material in various media and development disciplines;

HOW UNDP RESOURCES ARE PROGRAMMED

The total amount of assistance from the United Nations Development Programme planned for the period 1977-1981 is 2455 million US dollars, assuming that voluntary contributions to the programme grow at an average annual rate of 14%. Of this total, some 84% is intended for support of individual country programmes and the balance for regional, inter-regional and global programmes. These anticipated funds are allocated among individual countries and regions for five-year periods by means of an "indicative planning figure" (IPF), as determined by UNDP's 48-member Governing Council.

The UNDP is premised on the conviction that development needs can best be determined at the country level: the establishing of priorities and the allocating of resources are the responsibility of the recipient government; and the exercise of that responsibility is essential to the building of self-reliance. In line with this principle, country programmes are prepared by governments in collaboration with the UNDP Resident Representatives to indicate how UNDP resources will be used to further selected national development objectives during the period covered by the national development plan. Other United Nations agencies join with the government and UNDP in the formulation and implementation of projects carried out within the framework of the country programme.

For example, a need for external co-operation in telecommunication planning, training or administration would be assessed by the government authority responsible for setting overall development priorities and for co-ordinating technical assistance from international sources. If UNDP resources available within the five-year indicative planning figure are suggested for use in meeting this need, a specific project could be formulated as part of the government/UNDP country programme which is approved by the UNDP Governing Council. For a project in this field, the International Telecommunication Union would normally be asked to co-operate with government specialists in planning and carrying out the project—for example, by recruiting international technical advisers or trainers, contracting with consultant firms for special technical or economic studies, procuring demonstration or training equipment, and/or placing fellows for advanced training in other countries.

UNDP is currently providing about 61 million dollars in assistance for ITU-executed telecommunication projects at the country level, and 17 million for inter-country telecommunication projects in all regions.

Depending on the type of project, the government and UNDP may ask other international organizations to assist in planning and implementation—for example, the World Bank or a regional bank in certain telecommunication pre-investment studies, the Food and Agriculture Organization of the United Nations (FAO) in rural broadcasting programmes, UNESCO in training broadcasters, etc.

- technology and knowledge of "feedback" systems employing mass media, such as agriculture-information for a using radio broadcasts;

- regional and inter-regional agencies, for dissemination of development news, features and opinions;

- in-region manufacturing facilities of telecommunication hardware;

- training programmes and facilities for those responsible for negotiating with foreign corporations selling telecommunication hardware and software.

2. Applied Research

- Quantity and quality of information flows occurring into developing countries (including import costs and social impact), and between developing countries;

- use of telecommunications to speed and support development within countries and to narrow undesirable gaps between segments of the population and between urban and rural areas;

- techniques for producing locally-oriented development information and learning materials and evaluation of their developmental impact;

- social, economic and political implications of commercial sponsorship of media programmes;

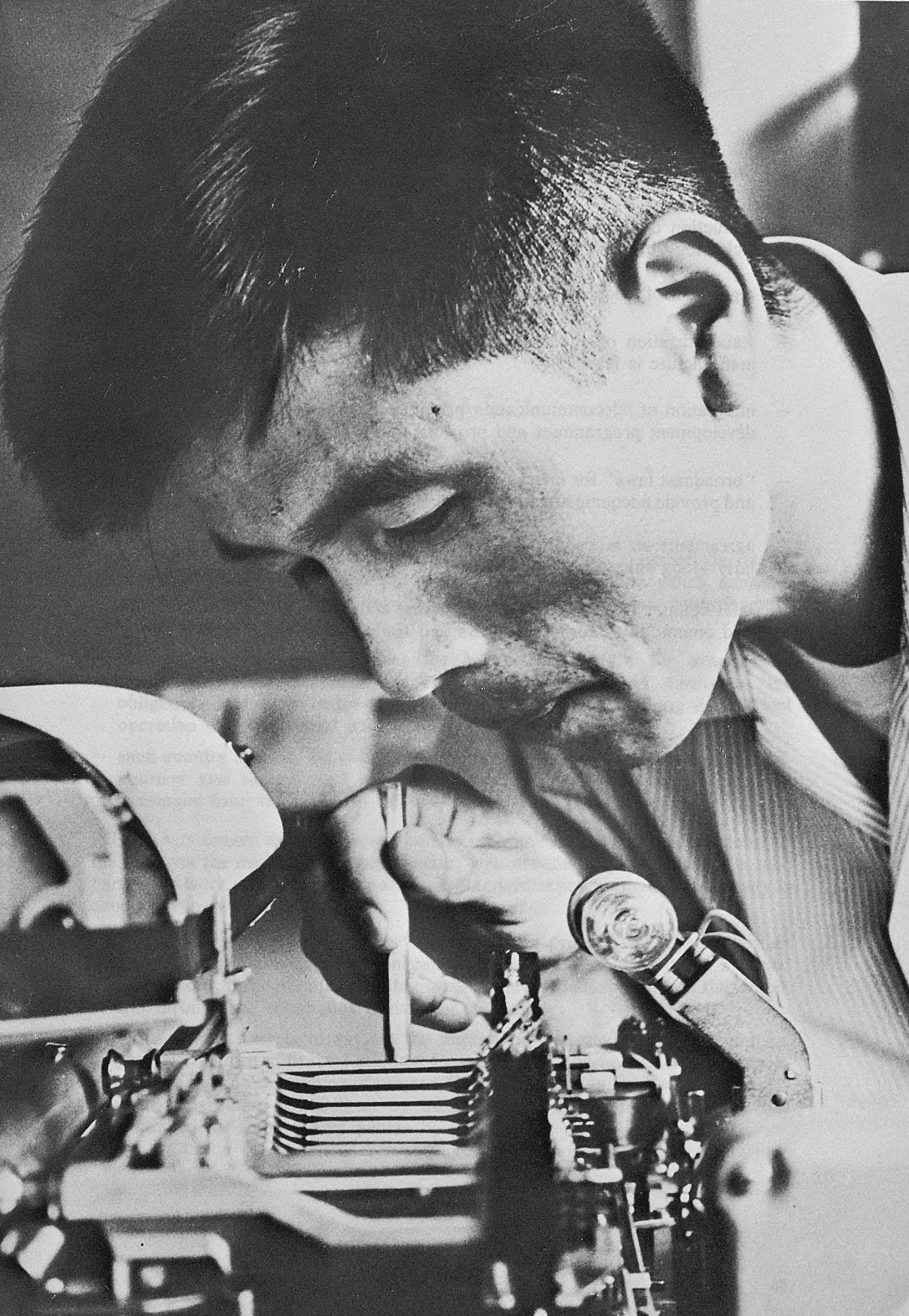
- alternative models for structuring telecommunication networks within and among developing countries, **e.g.,** according to development needs and common interests geographically rather than only hierarchically (capital to village and back);

- approaches to giving local people the tools for creating their own programmes along with access to airwaves for their material;

- impact of rural telephone co-operatives, and

- appropriateness to national development of new technology, such as space satellites and microwave systems.

A student inspects the mechanism of a teleprinter at the Telecommunications Training Centre in Seoul (photo: UN) ▶



3. Statutes and Agreements

- Reduction of tariff and non-tariff barriers to the flow of telecommunication technology between developing countries;
- regulation of frequencies;
- standardization of equipment (so that sharing of equipment and equipment manufacture is feasible);
- integration of telecommunication priorities into regional social and economic development programmes and projects;
- "broadcast laws" for international broadcasts to help preserve cultural values and provide adequate attention and channels for that development information;
- agreements on procedures to meet the exigencies of sudden disaster, particularly along shared borders;
- inter-country telecommunication structure and pricing to facilitate commercial and commodity information flows and trade promotion.

THE ITU AND INTERNATIONAL CO-OPERATION

The activity of the International Telecommunication Union is essentially one of international co-operation, and it is this ideal of co-operation which animates the spirit and the principles of the Union, each of whose Member countries both **gives** and **receives:**

- **each Member country provides the information needed for drawing up regulations, plans, technical standards and statistics and discharges the obligations laid down in the Convention with a view to ensuring the efficient operation of international telecommunications;**
- **each country receives the voluminous technical data centralized at Union headquarters and redistributed to the 154 Member countries and also receives assistance from the technical and administrative organs at headquarters.**

ITU activity covers the whole world of telecommunications, from the legislator to the user, via the designer and the operator, who are the people who actually take part in the work of the Union, especially in standardization matters. This activity is conducted in two ways:

- **"continuously"** or "traditionally", first of all—a process which is more than 112 years old—through the application of the Convention and the annexed Regulations, through the day-to-day work of the permanent organs of the Union, and through the continuous transfer of technology;
- **"à la carte"**, that is to say, at the request of interested Member countries, generally addressed to the Technical Co-operation Department which is responsible for the implementation of projects financed by the United Nations Development Programme (UNDP) or by other sources, an arrangement which has continued for some twenty years.

1. MORE THAN 112 YEARS OF TRANSFER OF TECHNOLOGY

As mentioned above, the ITU has been conducting continuous international co-operation activities among its Members for over 112 years. This co-operation has three distinct aspects:

- detailed preparation of legislation on international telecommunications;
- day-to-day work at Union Headquarters to enable Member countries to ensure the operation of world telecommunications;
- continuous transfer of technology.

It is this last-named aspect that we should like to dwell on, because it is one of the least known and because it represents one of the most valuable sources of assistance for the developing countries.

The transfer of technology is not a new idea for the ITU. As far back as 1865, the 20 signatories of the first International Telegraph Convention, meeting in Paris, undertook to transmit on a reciprocal basis all documents relating to their internal administration and to inform each other of any improvements they might introduce (Article 56). Four years later, in 1869, the Members of the International Telegraph Union—as the ITU was then called—decided to publish a monthly review, the "Journal télégraphique", to provide information on new telegraph techniques and operational matters. The Bureau of the Union was made responsible for this publication.

As communication techniques advanced, ITU Member countries exchanged new technical information through the Union's administrative conferences and through its Bureau.

Systematic consolidation of knowledge

Specialized international consultative committees were set up as from 1924. There are now two such committees, one for radio and the other for telegraphy and telephony. They are designated by the acronyms CCIR and CCITT, respectively. The purpose of the CCIs is to study technical and operational questions and to issue recommendations on them.

Operational staff at the gentex centre of the Bureau of Telecommunications in Manila (photo: UN)

A joint effort

All Members of the ITU can participate in the work of these Committees, as can recognized private operating agencies and industrial organizations. Every country contributes to the work of the CCIs according to its ability and knowledge of new technology, and in turn receives information of the same kind in all the other Member countries. In other words, the knowledge shared in the CCIs is the knowledge acquired in laboratories and administrative services engaged in new scientific and engineering enterprises.

Nearly 8000 pages published!

The CCIR and the CCITT books (issued every 4 years) represent a compendium —nearly 8000 pages long—of the most recent technical standards for telecommunication, radio and common carrier services. Although all countries benefit by the work of the CCIs, it is not surprising that active participation in the CCI Study Groups is still too often confined to the industrialized countries. Shortage of technical staff in the developing countries and the limited scope of their research and development continue to hamper their full participation in the work of the Consultative Committees.

Dissemination of knowledge

But technical recommendations and standards are not enough. It is also essential to know how to apply them in given circumstances and environments. This has led to a demand for co-operation in the interpretation, application, choice and planning of standard techniques and systems.

This demand has been met by the compilation of handbooks providing digests of information on telecommunications and the principal techniques employed.

These CCITT and CCIR handbooks have generally been produced by setting up a Working Party of acknowledged experts especially for the purpose; others have been prepared by the regular Study Group concerned with the subject.

The ITU has already published handbooks on such different subjects as the following:

- economic studies at the national level in the field of telecommunications;
- national automatic telephone networks;
- transmission planning of switched telephone networks;
- local telephone networks;
- economic and technical aspects of the choice of transmission systems;
- primary sources of energy;
- protection of telecommunication lines and equipment against lightning discharges;
- earthing of telecommunication installations;
- the protection of telecommunication cables by pressurization;
- the preservation of wooden poles carrying overhead telecommunication lines;
- high-frequency directional antennae;
- monitoring stations;
- broadcasting in band 7 (HF) in the tropical zone.

The Handbook on "Economic studies" (1976) contains chapters specifically concerned with the transfer of technology in the manufacture of telecommunication equipment.

Summing up, we may say that the work of the ITU's International Consultative Committees is an important channel for the transfer of technology, both vertically, from developed to developing countries, and horizontally, between countries of more or less equal degrees of development. This machinery has come to be known as the "continuous" technology transfer of the ITU.

◀ *Linemen of the Philippines Bureau of Telecommunications stretching a messenger wire prior to the installation of aerial cable in Paco District, Manila (photo: UN)*

2. TECHNICAL CO-OPERATION "À LA CARTE"

Supplementing the traditional technical co-operation activities effected by the three permanent technical organs of the ITU,* specific technical assistance projects meeting particular needs of a country or of a region are designed, organized and implemented by the ITU's Technical Co-operation Department (TCD) upon request of the recipient government or governments. This department is organized within the General Secretariat, the other permanent organ of the ITU.

The majority of these projects are carried out within the framework of the United Nations Development Programme (UNDP) under which the ITU is the Executing Agency for all UNDP-financed projects in the telecommunication sector including broadcasting transmission (UNESCO is the UNDP executing agency for projects concerning broadcasting programmes). A smaller number of projects are financed directly by the recipient countries themselves or by certain donor countries and institutions.

As the ITU regular budget contains practically no funds for carrying out specific "à la carte" technical assistance projects, the costs of these projects, as well as the related expenses incurred within the TCD are borne by the financing source.

What kinds of projects are executed by TCD?

Although not exhaustive, the following list indicates in general the particular fields in which assistance may be requested from the ITU:

- the planning, development, organization, operation and maintenance of telecommunication networks;
- installation of telecommunication equipment;
- establishing training institutions;
- establishing test and development centres;
- traffic and tariffs;
- operating procedures;
- economic and technical studies to ascertain future requirements in the field of telecommunications;
- radiocommunication techniques;
- management of radio frequency usage;
- frequency monitoring;

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* The ITU comprises four permanent organs: the General Secretariat, the International Frequency Registration Board (IFRB), the International Radio Consultative Committee (CCIR) and the International Telegraph and Telephone Consultative Committee (CCITT).

– radio broadcasting and television (transmission aspects);

– space communications;

– training of personnel in all branches of telecommunications.

Which countries may expect to benefit from UNDP financial telecommunication projects?

An estimate of the financial resources which UNDP expects to have available over a five-year period (the current planning cycle is from 1977 through 1981) is divided up among the countries to be assisted. (These allocations are largely based upon a formula involving each country's population and *per capita* gross national product.) A table showing countries receiving an allocation under the 1977-1981 UNDP planning cycle may be found in Annex I.

The students' hostel at the Telecommunications Training Centre, Kuala Lumpur, Malaysia: twin towers with double and single rooms house a total of 150 trainees (photo: ITU)

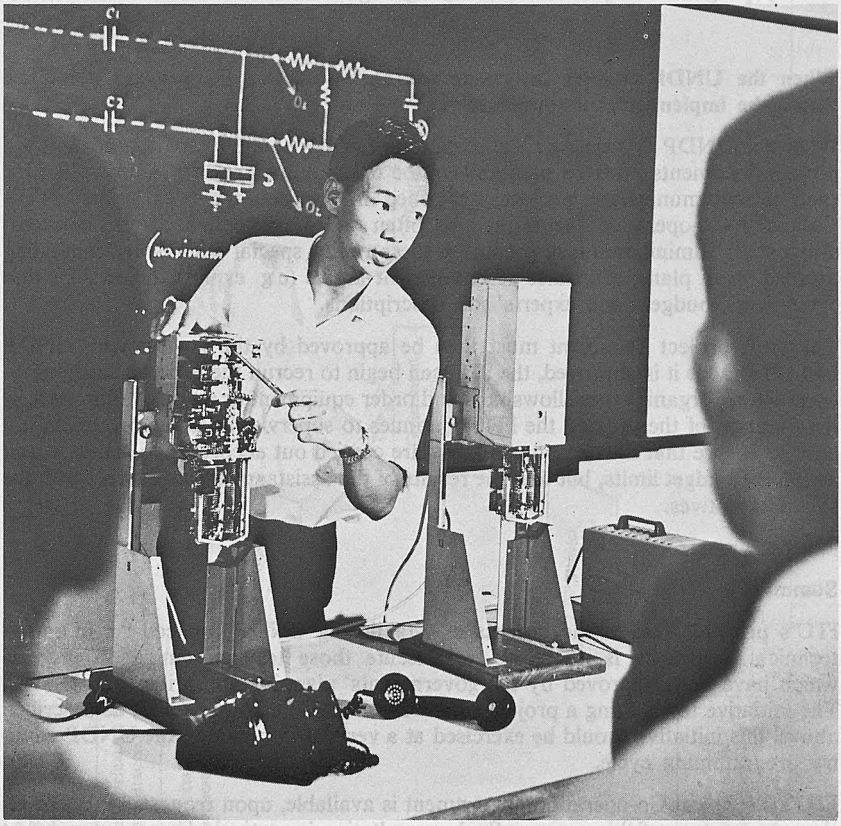
A promotion ceremony at the National Telecommunications Training Centre, Kuwait (photo: Administration of Kuwait)

How is an ITU/UNDP telecommunication project initiated?

With few exceptions, projects to be executed by the ITU under the UNDP programme must be included in the UNDP five-year programme for assistance for each country receiving UNDP support. These programmes are established as a result of a process of consultation and review between the government's planning authorities and the UNDP. As the ITU is normally not directly included in these negotiations, it is the responsibility of the telecommunication administration in each country to make its needs clearly known to its country's planning authorities, preferably in the form of concrete proposals. Such proposals should indicate the justification for the project, the long-term objectives as they relate to the social and economic development of the country, and the short-term objectives. The type of assistance required and the estimated cost for this assistance should also be included.

As many administrations are not experienced in designing technical assistance projects, ITU's Technical Co-operation Department is frequently called upon to assist the administration in identifying its needs for outside technical assistance and in preparing its project proposals for submission to the country's planning authorities.

The UNDP Resident Representative and the government planning authorities will then review these proposals along with all the other proposals for UNDP assistance coming from the other sectors of the country's economic and social structure, and they will prepare a draft country programme in which UNDP-financed technical assistance projects for all sectors will be defined. This draft country programme must then be submitted for approval to one of the two bi-annual meetings of the UNDP Governing Council.



A demonstration room at the Telecommunications Training Centre, Kuala Lumpur, Malaysia, where a small group (12 trainees) enables close attention to detail (photo: ITU)

When should specific proposals be submitted by the telecommunication administration to its country's planning authorities?

As the UNDP attempts to co-ordinate the preparation of the UNDP five-year country programme with the country's five year development plans, not all UNDP country programmes are prepared at the same time. Schedules of the dates upon which draft country programmes will be submitted to the UNDP Governing Council are shown in Annex II. In order for a technical assistance project to receive careful consideration it should normally be submitted by the administration to the country's planning authorities one year before the scheduled date of review of the country programme by the UNDP Governing Council.

When the UNDP country programme is approved, can the projects contained therein be implemented automatically?

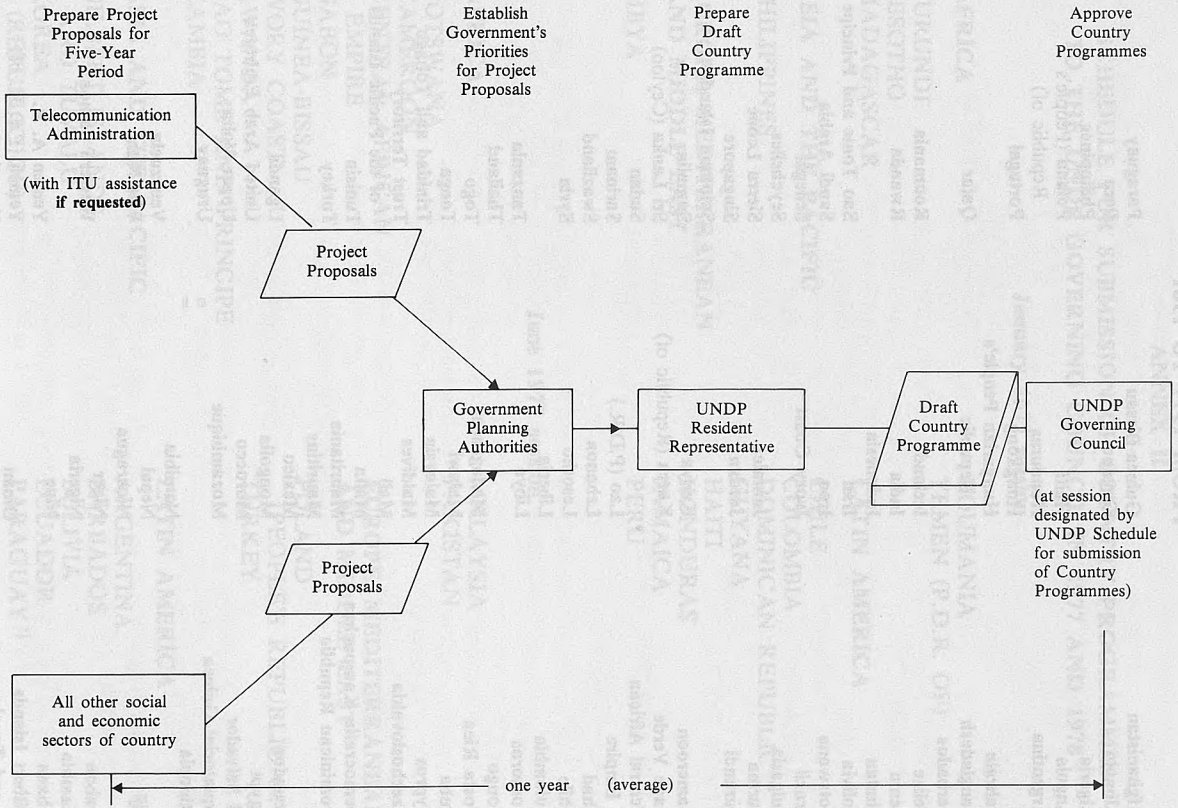
When the UNDP Governing Council has approved a country programme, detailed project documents must be prepared by the telecommunication administration for each telecommunication project mentioned in the country programme. ITU's Technical Co-operation Department is often called upon to assist the telecommunication administration in preparing these rather special documents containing detailed work plans, schedules of component inputs (e.g. experts, fellowships and equipment), budgets and experts' job descriptions.

The draft project document must then be approved by the government, UNDP and ITU. Once it is approved, the ITU can begin to recruit the experts, engage subcontractors, organize the fellowships, and order equipment as required. Throughout the duration of the project, the ITU continues to supervise its implementation, not only to ensure that the component parts are carried out according to schedule and within the budget limits, but that the results of the assistance are consistent with the stated objectives.

Summary

ITU's principle role in the process of establishing UNDP-financed "à la carte" technical assistance is, therefore, to execute those telecommunication projects which have been approved by the governments' planning authorities and UNDP. The initiative for starting a project rests with the administrations and, as described above, this initiative should be exercised at a very early period of the UNDP country programming cycle.

ITU's Technical Co-operation Department is available, upon request, for consultation at any stage of this process. Such consultation is particularly recommended at the initial planning stage of proposals and during preparation of the working documents for the approved projects.


Prepare Project Proposals for Five-Year Period
Establish Government's Priorities for Project Proposals
Prepare Draft Country Programme
Approve Country Programmes
Telecommunication Administration
(with ITU assistance if requested)
Project Proposals
Government Planning Authorities
UNDP Resident Representative
Draft Country Programme
UNDP Governing Council
(at session designated by UNDP Schedule for submission of Country Programmes)
Project Proposals
All other social and economic sectors of country
one year (average)

ANNEX I

COUNTRIES SCHEDULED TO RECEIVE UNDP ASSISTANCE FROM 1977 TO 1981

Afghanistan
Albania
Algeria
Angola
Argentina

Bahrain
Bangladesh
Barbados
Belize
Benin
Bhutan
Bolivia
Botswana
Brazil
Bulgaria
Burma
Burundi

Cameroon
Cape Verde
Central African Empire
Chad
Chile
Colombia
Comoros
Congo
Costa Rica
Cuba
Cyprus
Czechoslovakia

Democratic Kampuchea
Dominican Republic

Ecuador
Egypt
El Salvador
Equatorial Guinea
Ethiopia

Fiji

Gabon
Gambia
Ghana
Gilbert Islands and Tuvalu
Greece
Guatemala
Guinea

Guinea-Bissau
Guyana

Haiti
Honduras
Hongkong
Hungarian People's Republic

Iceland
India
Indonesia
Iran
Iraq
Ivory Coast

Jamaica
Jordan

Kenya
Korea (Republic of)

Lao (P.D.R.)
Lebanon
Lesotho
Liberia
Libya

Madagascar
Malawi
Malaysia
Maldives
Mali
Malta
Mauritania
Mauritius
Mexico
Mongolia
Morocco
Mozambique

Namibia
Nepal
Nicaragua
Niger
Nigeria
Niue

Oman

Pakistan
Panama
Papua New Guinea

Paraguay
Peru
Philippines
Poland (People's Republic of)
Portugal

Qatar

Roumania
Rwanda

Sao Tome and Principe
Saudi Arabia
Senegal
Seychelles
Sierra Leone
Singapore
Solomon Islands
Somalia
Sri Lanka (Ceylon)
Sudan
Surinam
Swaziland
Syria

Tanzania
Thailand
Togo
Tonga
Trinidad and Tobago
Trust Territory of the Pacific Islands
Tunisia
Turkey

Uganda
United Arab Emirates
Upper Volta
Uruguay

Venezuela
Viet Nam

Western Samoa

Yemen A. R.
Yemen (P.D.R. of)
Yugoslavia

Zaire
Zambia

ANNEX II

SCHEDULE FOR SUBMISSION OF COUNTRY PROGRAMMES TO THE UNDP GOVERNING COUNCIL IN 1977 AND 1978[1)]

January 1977 session

AFRICA

BURUNDI
LESOTHO
MADAGASCAR

ASIA AND THE PACIFIC

PHILIPPINES

EUROPE, MEDITERRANEAN AND MIDDLE EAST

LIBYA
ROUMANIA
YEMEN (P.D.R. OF)

LATIN AMERICA

CHILE
COLOMBIA
DOMINICAN REPUBLIC
GUYANA
HAITI
HONDURAS
JAMAICA
PERU

June 1977 session

AFRICA

BOTSWANA
CAMEROON
CENTRAL AFRICAN EMPIRE
GABON
GUINEA-BISSAU
IVORY COAST
RWANDA
SAO TOME AND PRINCIPE
ZAMBIA

ASIA AND THE PACIFIC

GILBERT ISLANDS AND TUVALU
KOREA (REPUBLIC OF)
MALAYSIA
PAKISTAN

EUROPE, MEDITERRANEAN AND MIDDLE EAST

POLAND (PEOPLE'S REPUBLIC OF)
TURKEY

LATIN AMERICA

ARGENTINA
BARBADOS
BOLIVIA
ECUADOR
PARAGUAY[2)]

January 1978 session

AFRICA

CAPE VERDE
CHAD
GAMBIA
GHANA
KENYA
MALI
MAURITANIA
MOZAMBIQUE
NIGER
SENEGAL
SIERRA LEONE
SWAZILAND
TANZANIA
TOGO
UPPER VOLTA

ASIA AND THE PACIFIC

BANGLADESH [2]
BHUTAN [2]
INDIA [2]
MALDIVES [2]
MONGOLIA [2]
PAPUA NEW GUINEA [2]
SRI LANKA (CEYLON) [2]
TRUST TERRITORY OF THE PACIFIC ISLANDS*

EUROPE, MEDITERRANEAN AND MIDDLE EAST

ALBANIA [2]
ALGERIA
BAHRAIN
CZECHOSLOVAKIA
EGYPT
GREECE
IRAQ
LEBANON [2]
MALTA
PORTUGAL [2]
QATAR [2]
SAUDI ARABIA [2]
SYRIA
TUNISIA
UNITED ARAB EMIRATES [2]
YEMEN A. R.
YUGOSLAVIA

LATIN AMERICA

CARIBBEAN
EL SALVADOR
MEXICO
URUGUAY [2]

June 1978 session

AFRICA

BENIN

ASIA AND THE PACIFIC

AFGHANISTAN [2]
INDONESIA
IRAN [2]
THAILAND
WESTERN SAMOA [2]

UNDISTRIBUTED IPF COUNTRIES

EUROPE, MEDITERRANEAN AND MIDDLE EAST

MOROCCO [2]
OMAN
SUDAN

[1] Unless indicated otherwise, the country programmes are second programmes.
[2] Tentative.
* First programme.

Schedule dated 26 November 1976

THE FIGURES SPEAK FOR THEMSELVES

A year's activity

During 1976, the activities of the ITU's Technical Co-operation Department were directed towards the implementation of projects which may be grouped under 3 main headings:

1) the promotion of development of telecommunication networks in Africa (PANAFTEL), the Americas, Asia and the Pacific, and Europe and the Middle East;
2) the strengthening of national telecommunication technical and administrative services in developing countries; and
3) the development of human resources for telecommunications.

Global appraisal of achievements in 1976

A significant aspect of the Union's activities in the field of technical co-operation in 1976 was the aid rendered to developing countries, as shown by the following figures:

a) 493 expert missions were carried out, against 526 in 1975 (these figures include associate expert assignments and 19 missions carried out under Resolution 17 of the Plenipotentiary Conference (Malaga-Torremolinos, 1973));
b) 497 fellows (including 117 participants in short-term group training) underwent training abroad, against 666 in 1975;

c) 238 projects were assigned to the Union, against 245 in 1975;

d) 4 812 150 US dollars' worth of equipment was delivered to various field projects, against 3 959 865 in 1975;

e) thirteen projects were being implemented partially or entirely under sub-contracts, against 15 in 1975.

The total expenditure for project implementation amounted to 20 241 527 dollars against 18 837 775 in 1975 (7.5% increase) and was the highest attained so far in any one year.

The percentage of the total expenditure for all types of projects, by region, was: Africa 35.6%, the Americas 18.7%, Asia and the Pacific 20.0%, Europe and the Middle East 23.7% and two interregional projects 2.0%. The percentage breakdown of the 1976 field expenditure by project component was as follows: project personnel 62.9%, sub-contracts 5.4%, training 6.2%, equipment 23.8% and miscellaneous 1.7%.

Financial resources

In 1976, 84.8% of the total value of assistance rendered to developing countries was financed by the United Nations Development Programme, while the remainder came from other sources (Funds-in-Trust, Associate Expert arrangements, etc.).

In 1976, the UNDP assigned to the Union 192 projects, comprising 139 country projects (54 in Africa, 38 in the Americas, 37 in Asia and the Pacific and 30 in Europe and the Middle East) and 33 other projects including 31 regional or multinational projects (15 in Africa, 5 in the Americas, 7 in Asia and the Pacific, 4 in Europe and the Middle East) and 2 interregional projects.

Out of 192 UNDP/ITU projects, 27 required substantial contributions by the governments concerned and UNDP.

Furthermore, UNDP financed the services of 8 ITU regional experts (3 in Africa for a total of 32 man-months, 2 in the Americas for a total of 2 man-months and 3 in Asia and the Pacific for a total of 9 man-months).

In 1976 the Union continued its collaboration with the following UNDP executing agencies in the implementation of UNDP-assisted projects: UPU (Universal Postal Union) and UNSSO (United Nations Special Sahelian Office).

The Union provided assistance to the Dutch West Indies, Saudi Arabia, Brazil, El Salvador, Iraq, Kuwait, Libya, Nigeria, Surinam and Yemen Arab Republic under Funds-in-Trust arrangements in the form of 52 expert missions and 80 fellowships. Five experts were provided under UNDP/SIDA/FT projects to two countries (Lesotho and Swaziland).

In addition, donations from the following governments enabled a total of 16 expert missions to be continued: Germany (Federal Republic of)—1 mission to Sri Lanka; India—1 regional mission in Asia and the Pacific; Norway—1 mission to Africa (PANAFTEL project) and two extensions of missions in the least developed countries of Africa; Netherlands—1 mission to Peru; Switzerland—5 missions to Bolivia.

Moreover, under a contract signed by the government of the Somalia and the European Economic Community, funds allocated by the EEC made possible the continuation of five expert missions in that country.

The total value of Funds-in-Trust assistance (73 expert missions and 80 fellowships in all) amounted to 2 159 889 US dollars.

The cost, in dollars, of 42 associate expert missions was borne by the donor countries, i.e. Federal Republic of Germany: 150 243; Denmark: 83 780; Finland: 24 778; France: 5511; Japan: 9783; Norway: 18 659; Netherlands: 232 957; and Sweden: 232 603; giving a total of: 758 314 dollars.

The Union also benefited from the services of 8 volunteers under the United Nations Volunteer Programme.

Fellowships, seminars and consultant engineer missions

In 1976, 497 fellowships were being used against 666 in 1975. This figure includes 117 awards for group training. Despite the fact that the vocational training facilities in the host countries are already saturated, it was possible, through the goodwill of the administrations of those countries, to implement 380 study programmes.

In 1976, the Union organized two seminars, one of them jointly with the Asian Broadcasting Union (ABU), on satellite broadcasting in the 12 GHz band, in Kyoto, Japan. The Japanese Administration made the practical arrangements for the seminar and also granted fellowships to participants from the developing countries of the region. A similar seminar was organized in Khartoum, Sudan, thanks to credits provided by the Arab Bank for Economic Development in Africa (ABEDA) and the Arab Fund for Economic and Social Development (AFESD), amounting to 95 940 dollars. Fifty participants from 18 countries in the region attended the Kyoto seminar and 98 participants from 44 countries in Africa and the Middle East attended the Khartoum Seminar.

During the year, 5 200 000 dollars' worth of equipment was ordered from 32 different countries, while the value of equipment delivered was 4 812 154. The Union dealt with the procurement of equipment for 72 projects.

In 1976, three telecommunication specialists filled posts in the ITU Group of Consultant Engineers. Their fields of specialization were radiocommunications, transmission and switching. Members of the Group assisted and/or advised 22 developing countries on request; they carried out six special missions in various countries and regions. On various occasions advice was given to requesting countries by correspondence.

Under the ITU Special Fund for Technical Co-operation, the following assistance and donations were given in 1976: five fellowships in the development of telecommunication services (each lasting 4 months) by Belgium; 4800 dollars by Netherlands as assistance to the least developed countries; HF radiocommunication equipment by the Federal Republic of Germany to the Lesotho for their monitoring services. The following sums were spent: 1414 dollars to enable a Guinea-Bissau official to participate in the IFRB Seminar; 2665 dollars for the purchase of emergency repair equipment and training aids for Guinea-Bissau (for an amount of 1111 dollars) and Cape Verde (for an amount of 1554 dollars); 633 dollars to cover the cost of transporting the equipment offered by the Federal Republic of Germany to Lesotho; 511 dollars for the purchase of technical publications for the benefit of African engineers studying in Europe. The funds remaining available at the end of 1976 amounted to 22 090 US dollars.

Finally, the ITU continued its studies on the standardization of training programmes and particularly in:

- course development in the field of telecommunications (CODEVTEL): seven vocational training centres sponsored by the ITU are at present devising eight courses under the supervision of three education specialists recruited for the purposes of the project. At the beginning of the year, training workshops were organized to provide training in all course development disciplines for teams in the three French-speaking and the two Spanish-speaking vocational training centres. The co-ordination group at Union Headquarters organized and supervised, with the assistance of Headquarters staff, two training workshops for course developers in the French Telecommunication Administration;

- training standards;

- a table of contents for the reference manual scheduled on the organization and management of training centres was prepared and disseminated;

- a substantial amount of training material was assembled;

- the coding of vocational training aids and the distribution of a complete catalogue to all Member countries were continued.

RESPONSIBILITIES OF THE ITU

The International Telecommunication Union (ITU) was established on 17 May 1865* in Paris by the signature of the first International Telegraph Convention.

In 1947 the ITU became a specialized agency of the United Nations, as the result of an agreement concluded with the United Nations.

Article I of this Agreement provides: "The United Nations recognizes the International Telecommunication Union... as the specialized agency responsible for taking such action as may be appropriate under its basic instrument for the accomplishment of the purposes set forth therein".

The basic instrument of the ITU is the International Telecommunication Convention. The purposes of the Union are described as follows in Article 4 of the Convention.

"1. The purposes of the Union are:

a) to maintain and extend international cooperation for the improvement and rational use of telecommunications of all kinds;

b) 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;

c) to harmonize the actions of nations in the attainment of those ends.

2. To this end, the Union shall in particular:

a) effect allocation of the radio frequency spectrum and registration of radio frequency assignments in order to avoid harmful interference between radio stations of different countries;

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* Since 1969, 17 May has been declared "World Telecommunication Day". This Day is regularly celebrated by ITU Member countries.

b) coordinate efforts to eliminate harmful interference between radio stations of different countries and to improve the use made of the radio frequency spectrum;

c) coordinate efforts with a view to harmonizing the development of telecommunications facilities, notably those using space techniques, with a view to full advantage being taken of their possibilities;

d) foster collaboration among its Members with a view to the establishment of rates at levels as low as possible consistent with an efficient service and taking into account the necessity for maintaining independent financial administration of telecommunication on a sound basis;

e) foster the creation, development and improvement of telecommunication equipment and networks in developing countries by every means at its disposal, especially its participation in the appropriate programmes of the United Nations;

f) promote the adoption of measures for ensuring the safety of life through the cooperation of telecommunication services;

g) undertake studies, make regulations, adopt resolutions, formulate recommendations and opinions, and collect and publish information concerning telecommunication matters."

In short, the ITU is responsible, on behalf of its 154 Member countries,* for the regulation, planning, standardization and co-ordination of telecommunications of all kinds.** It is in this capacity that it undertakes the implementation of technical co-operation projects relating to telecommunications, especially in the context of the activities of the United Nations Development Programme (UNDP).

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* On 31 December 1977.

** Telecommunications are defined in the Convention as follows: "Any transmission, emission or reception of signs, signals, writing, images and sounds or intelligence of any nature by wire, radio, optical or other electromagnetic systems."

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Vol. VI Ionospheric propagation (Study Group 6)

Vol. VII Standard frequencies and time signals (Study Group 7)

Vol. VIII Mobile services including satellite applications (Study Group 8)

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Vol. II.2 Telephone operation and tariffs: Series E Recommendations (Study Group II) and Questions

Vol. II.3 Telegraph operation and tariffs: Series F Recommendations (Study Group I) and Questions

Vol. III Line transmission: Series G, H, J Recommendations (Study Groups XV, XVI, Special C and Special D) and Questions

Vol. IV.1 Line measurement and maintenance: Series M and N Recommendations (Study Group IV) and Questions

Vol. IV.2 Specification of measuring equipment: Series O Recommendations (Study Group IV) and Questions

Vol. V Telephone transmission quality and telephone sets: Series P Recommendations (Study Group XII) and Questions

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Vol. VI.2 Signalling System No. 6: Recommendation (Study Group XI) and Questions

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Vol. IX Protection: Series K Recommendations (Study Group V) and Series L Recommendations (Study Group VI) and Questions

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ITU'S WORLD-WIDE TECHNICAL CO-OPERATION

This map shows the countries which benefited by the technical co-operation activities of the International Telecommunication Union (ITU) in 1976. These activities are conducted under the United Nations Development Programme (UNDP) but some other sources of Financing are also involved.

LATIN AMERICA

Antigua 9
Telephone system management

Argentina 22
Telecommunications laboratory

Belize 3
Assistance to the Belize Telecommunications Authority

Bolivia 19
Telecommunications Training Institute

Brazil 18
Telecommunications research and development
Human resources — Telecommunications training

Chile 21
Telecommunications Training Centre — Phase II

Colombia 11
Training of teaching personnel and promotion of research in telecommunications

Cuba 7
Development of telecommunications services

Ecuador 16
National Telecommunications Training Centre

El Salvador 4
Telecommunications planning and operation

Guatemala 2
Telecommunications—Operation and outside plant

Guyana 14
Telecommunications Training Centre

Jamaica 8
Telecommunications Training Centre

Mexico 1
National Telecommunications School

Netherlands Antilles 10
Telecommunications Training Centre

Nicaragua 5
Organization of telecommunications

Panama 6
Planning of telex network

Paraguay 20
National Institute of Telecommunications

Peru 17
Telecommunications development and Training Institute

Surinam 15
Telecommunications operation and maintenance

Trinidad and Tobago 13
Telecommunications administration and management
Telecommunications Training Centre

Uruguay 23
Telecommunications Training Centre

Venezuela 12
Reorganization of postal and telegraphic services

Regional Projects
Central America Telecommunications Institute (INCATEL)
Regional integration of telecommunications
Integration of telecommunications in Central America
Frequency management infrastructure and follow-up

Caribbean region
Telecommunications administration and management

EUROPE

Albania 29
Sound broadcasting and television fellowships
Telecommunications School (fellowships)

Bulgaria 28
Fellowships in various telecommunications fields

Czechoslovakia 25
Modern techniques in telecommunications (fellowships)

Greece 30
Fellowships in various telecommunications fields

Hungarian People's Republic 26
Mathematical models of non-linear circuits (fellowships)

People's Republic of Poland 24
Fellowships in various telecommunications fields

Roumania 27
Fellowships in various telecommunications fields

Turkey 31
Fellowships in various telecommunications fields

AFRICA

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Telecommunications Institute (Oran)

Benin 45
Fellowship programme

Botswana 57
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National Training Centre for Telecommunications

Cameroon 51
Postal and Telecommunications High School

Cape Verde 37
Assistance to telecommunications and broadcasting services
Development plan for sound and television broadcasting

Central African Empire 50
Fellowship programme
Advisory services

Chad 48
Telecommunications planning
National Telecommunications School

Egypt 36
Telecommunications Training and Research Institute
Upgrading Cairo telephone cable networks

Equatorial Guinea 52
Preliminary survey on development of telecommunications

Ghana 44
High-level fellowship programme

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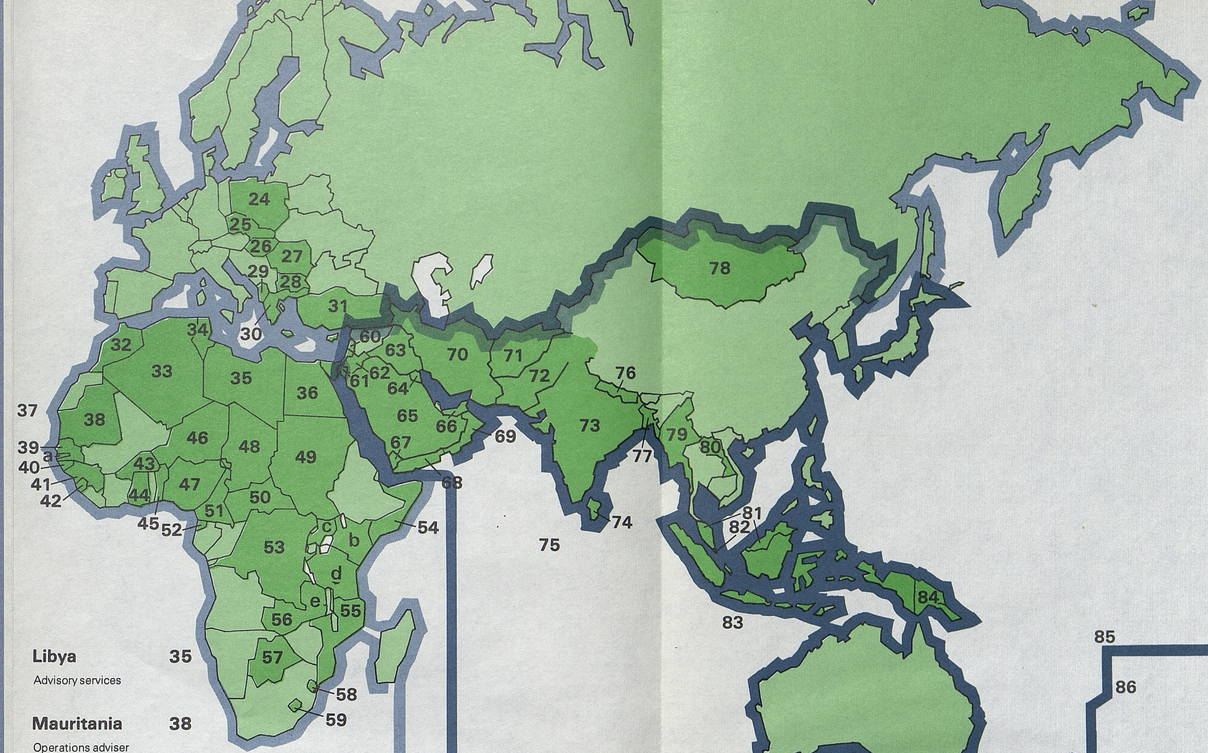
National Training Institute
Telecommunications adviser

Guinea-Bissau 40
Restoration and reorganization of Telecommunications Development Plan 1977-1996
Special assistance to broadcasting service

Lesotho 59
National Training Centre
Financial Controller
Assistance to the Ministry of Works
Maseru — Nairobi link



Libya 35
Advisory services

Mauritania 38
Operations adviser
National Telecommunications School (Nouakchott)

Morocco 32
Posts and Telecommunications Institute (Rabat)

Mozambique 55
Exploratory mission

Niger 46
National Posts and Telecommunications Training Centre

Nigeria 47
Posts and Telecommunications Training Centre (Oshodi)
National telecommunications development planning
Monitoring and frequency management

Senegal 39
Telecommunications planning (Master plan 1975-2000) and training of personnel

Sierra Leone 42
Telecommunications advisory services

Somalia 54
National Institute for Telecommunication Training
Assistance in telecommunication maintenance

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Satellite communications adviser
Microwave systems adviser
Development in Southern Sudan

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Telecommunications Training Centre
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Chief engineer, Telecommunications

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Upper Volta 43
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Zambia 56
Posts and Telecommunications Training College
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Reorganization of accounting and financial services

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Regional Telecommunications Adviser (East Africa)
Regional Telecommunications Adviser (West Africa)
Regional Telecommunications Adviser (Central Africa)
Telecommunication Pre-investment survey
Multinational Posts and Telecommunications Training School **—Kenya (b), Uganda (c), Tanzania (d)**
Multinational Telecommunications Training Centre **— Malawi (e)**
Multinational Telecommunications Training School **— Senegal (39)**
Monitoring and frequency management
Telecommunication link **Gambia (a)—Senegal (39)**
Survey of maritime radiocommunications
Pre-investment survey of national and inter-country links
Exploratory mission for the establishment of special telecommunication services in lesser-developed countries
Sahel emergency survey
Implementation of PANAFTEL
Seminar on direct satellite broadcasting

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Bangladesh 77
Telecommunications Training Centre

Burma 79
Assistance in the development of telephone and telegraph systems

India 73
Expansion of the satellite communication earth station
Advanced level Telecommunications Training Centre
Expansion and modernization of the telecommunication services (fellowships)
Preparatory assistance for India — Afghanistan tropo-scatter link

Indonesia 83
Telecommunications Training Centre
Telecommunications installation and maintenance

Iran 70
Telecommunications Training Institute

Iraq 63
Telecommunications Training Centre

Israel 61
Establishment of an Institute of Telecommunications

Jordan 62
Telecommunications Training Centre

Kuwait 64
Telecommunications training Institute
Experts in different specialities

Lao P.D.R. 80
National Telecommunications Training Centre

Lebanon 60
Telecommunications network planning

Malaysia 81
Crossbar switching maintenance

Maldives 75
Establishment of an HF radiocommunications station

Mongolia 78
Establishment of a Faculty of Telecommunications at the State Polytechnic Institute and of a Telecommunications Training Centre

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Oman 69
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Papua New Guinea 84
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Saudi Arabia 65
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Singapore 82
Telecommunications Training Centre
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Telecommunications Training Centre
Supervision of installation and training in maintenance of telex exchange

Tonga 86
Telecommunications development

United Arab Emirates 66
Telecommunication adviser

Western Samoa 85
Telecommunications development
Telecommunication training fellowships

Yemen (A.R.) 67
Organization and administration of telecommunications
National telecommunications feasibility study
Training in telecommunication systems (fellowships)
Television coverage survey

Yemen (P.D.R. of) 68
Telephony adviser

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Telecommunications advisory services
Feasibility studies for the Asian telecommunication network (fellowships)
Co-ordination of maritime telecommunication services and facilities
Regional telecommunication training in the South Pacific
Feasibility study for regional telecommunication network in the South Pacific

Regional Projects (Middle East)
Sana'a (67)—Aden (68) pilot link
Feasibility study/pre-investment survey of the Middle East telecommunication network

Interregional Project
Curriculum Development in Telecommunications Training (CODEVTEL)

The boundaries on this map are not necessarily officially recognized

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