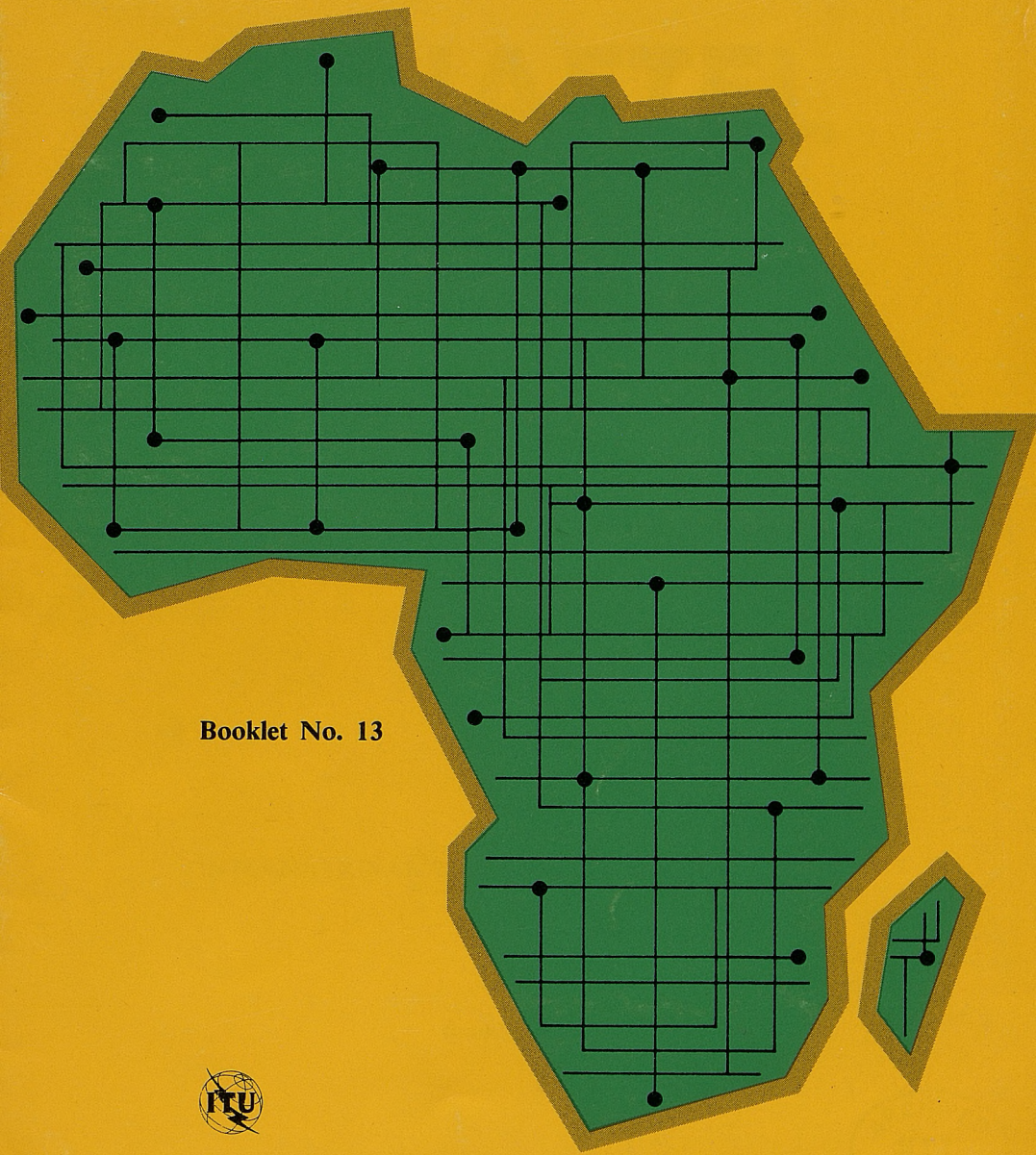
PANAFTEL

The Pan-African telecommunication network



Booklet No. 13

INTERNATIONAL TELECOMMUNICATION UNION

PANAFTEL

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Booklet N° 13

PREFACE

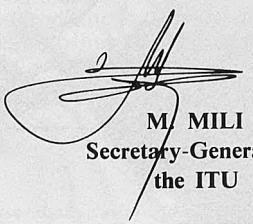
Now that the pre-investment survey for the pan-African telecommunication network (PANAFTEL) has been completed and the actual implementation study is beginning, it might be well to review this important work of international co-operation, the results of which are bound to have a decisive influence on the economic, social and cultural development of Africa. That is the purpose of this booklet.

From the beginning of the first development decade, the African governments were aware of the vital need for a telecommunication network which would enable them to pursue a harmonious policy of national and regional development.

Basing themselves on the work of the Plan Committee for Africa, a specialized Study Group of the ITU, the African governments requested the Union to undertake the technical, economic and financial studies required for the rapid establishment of a truly pan-African telecommunication network.

For five years a chain of co-operation existed among the national authorities of more than thirty African countries, the ITU, UNDP and the African organizations—the OAU and the ECA, on the one hand, and the international or national bodies of the developed countries, on the other—in order to carry out the pre-investment survey which has just been concluded.

We have now reached the crucial stage, that of implementation. The search for financial resources on the most favourable terms, which is co-ordinated by a committee comprising representatives of the ITU, OAU, ECA and ADB has produced such promising results that we are confident that Africa will have this much desired pan-African telecommunication network within a reasonable time.



M. MILI
Secretary-General of the ITU

Resolution adopted by the Heads of State and of Government of the Organization of African Unity concerning the Pan-African Telecommunications Network

The Council of Ministers of the Organization of African Unity meeting in its Twenty-First Ordinary Session in Addis Ababa, Ethiopia, from 17 to 24 May 1973,

Having considered the report of the Administrative Secretary-General on the Meeting on the Implementation of the Pan-African Telecommunications Network which took place in Addis Ababa from 30 October to 10 November 1972,

Recalling its resolution on Telecommunications CM/Res. 224 (XV) adopted at its Fifteenth Ordinary Session,

Noting with appreciation the studies completed under the auspices of the ITU and the UNDP,

Gratified at the Co-operation prevailing among the OAU, the ECA and the ITU in accelerating the progress for the implementation of the Pan-African Telecommunications Network,

Noting resolution No. 2 on the Establishment of an Investment Fund adopted by the Meeting on the Implementation of the Pan-African Telecommunications Network,

Conscious of the need for preserving the basic concept of an integrated Pan-African Telecommunications Network for promoting the economic and social co-operation among the African States,

1. DECIDES to endorse the establishment of an Investment Fund as contained in Resolution No. 2 of the Meeting on the Implementation of the Pan-African Telecommunications Network;

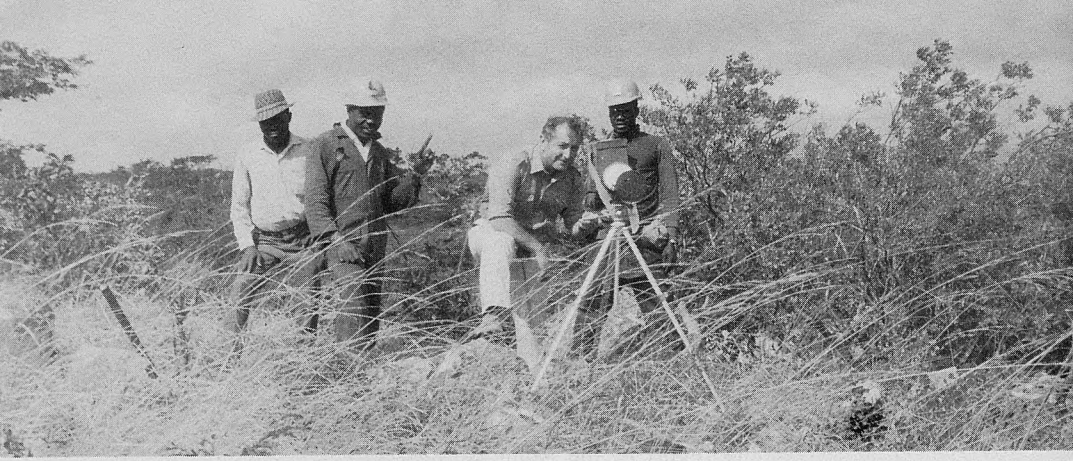
2. CALLS UPON the Administrative Secretary-General of the OAU, the Executive Secretary of the ECA, the Secretary-General of the ITU and the President of the ADB to continue to co-operate and to undertake the necessary measures and consultations to establish, organize and administer the Fund;

3. REQUESTS the Administrative Secretary-General of the OAU to draw the attention of the ITU to the importance which Member States of the OAU attach to the inter-connection of telecommunications networks, existing or in the process of being realized in African countries, to the Pan-African Telecommunications Network;

4. URGES all Member States of the OAU to give high priority for the realization of the Pan-African Telecommunications Network;

5. CALLS UPON the Administrative Secretary-General to maintain close and active co-operation with all the parties concerned and submit periodical reports to the Council of Ministers on the progress of the implementation of the Pan-African Telecommunications Network.

◀ *New telecommunication links encourage the development of economic, cultural and trade contacts between all countries. Abidjan, Ivory Coast, switchboard operator* (ITU)



(Preece, Cardew and Ride

Better telecommunications for Africa
The pan-African telecommunication network — PANAFTEL

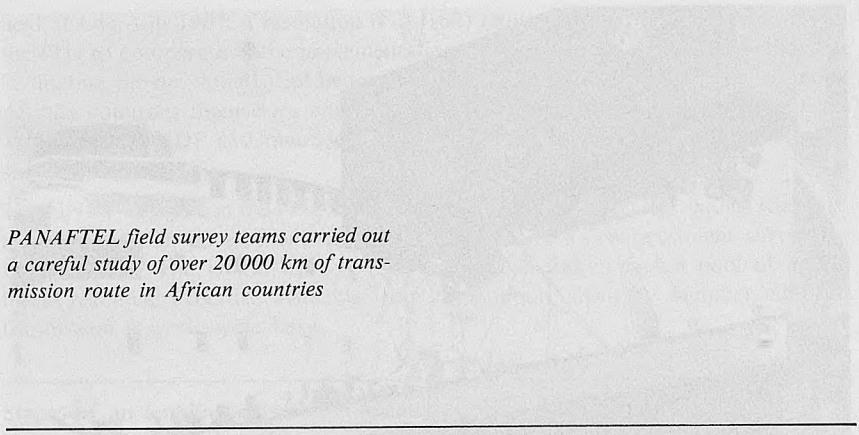
Telecommunications: an index of development

Peoples and governments, be they rich or poor, have become aware of the important role played by all categories of telecommunication services. They are the basis and prerequisites for social and economic progress in general and an essential part of the infrastructure of administrations. There is a clear correlation between the increase in the gross national product and the increase in the number of telephone sets.

Why a pan-African telecommunication network?

Africa has the lowest telephone density in the world. Whilst world average is 7.8 telephones per 100 population the independent African countries account for only 0.57 telephones per 100 population. Most of the existing telecommunication networks of African countries in general have been planned to meet national needs only, and communication links between States are often inadequate.

As a consequence of the former colonial structure of most African territories, inter-African telephone calls and telegrams must often be routed via Europe and, in certain cases, via several European transit countries.



◀ *PANAFTEL field survey teams carried out a careful study of over 20 000 km of transmission route in African countries*

Joint action: Africa-ITU-UNDP to link up the continent

Since 1960 African countries independently, and through participation in the Organization of African Unity (OAU), the Economic Commission for Africa (ECA), and in the International Telecommunication Union (ITU), have stressed the pressing need of developing an adequate pan-African telecommunication network (PANAFTEL).

In 1963, ECA and ITU concluded a memorandum of understanding whereby the two organizations agreed to co-ordinate their efforts to accelerate the development of telecommunications in Africa taking into consideration technical, economic and other factors. To this end a joint ITU/ECA expert mission was set up at ECA headquarters in Addis Ababa. The ITU experts together with ECA carried out studies and held working sessions on the ways and means of linking African countries using the most economical methods possible. Their work highlighted the many difficult problems, both technical and financial, that had to be overcome before a pan-African telecommunication network could become a reality. The expert team stressed the need for serious studies of actual and potential traffic between African countries before high capital investments could be considered. Initially the joint ITU/ECA mission recommended the establishment of high frequency radio circuits criss-crossing the African continent as this appeared to be the most suitable solution under the existing circumstances. The mission also recommended to the United Nations Development Programme (UNDP) to finance a trans-African telecommunication pilot link so as to assess the amount of suppressed intra-African traffic. Hence in 1968, thanks to the understanding of the UNDP Administrator and in collaboration with the Ivory Coast and the Ethiopian Govern-

(Automatic Telephone and Electric Company Ltd.)

Arrival of telephone equipment in an African harbour. Foreign exchange expenditure for equipment and installation of PANAFTEL amounts to 85% of the total capital expenditure

ments, ITU established an HF high quality pilot link between Addis Ababa in East Africa and Abidjan in West Africa providing telephone, telegraph and telex services. However, it was soon realized that the need for telecommunication circuits between African countries was so high that it could not possibly be met with the inherently low capacity HF radio system. The need for a detailed study on high capacity radio-relay and cable systems between African countries thus became evident.

Since its inception the African Development Bank (ADB) was kept in the picture of all this development and, as from 1965, actively participated in a number of meetings and discussions with the African Telecommunications Administrations and members of the joint ITU/ECA team, with a view to determining the best solutions for an early implementation of an adequate pan-African telecommunication network. All these developments led the ECA to adopt at its eighth session,

held at Lagos in 1967, a resolution (No. 162) requesting the ECA Secretariat and the ITU to co-operate in the implementation of such a project, ultimately aimed at facilitating the development of better economic, cultural and trade contacts among African countries themselves and between them and others outside the continent. To this end, UNDP assistance was again sought, and granted, for pre-investment studies.

The UNDP designated the ITU as its executing agency to fulfil the request for assistance by African governments in the carrying out of a pre-investment survey for PANAFTEL. The Union headquarters in Geneva has in fact a pool of operational technical expertise available from the support given by Member administrations on a world-wide basis.

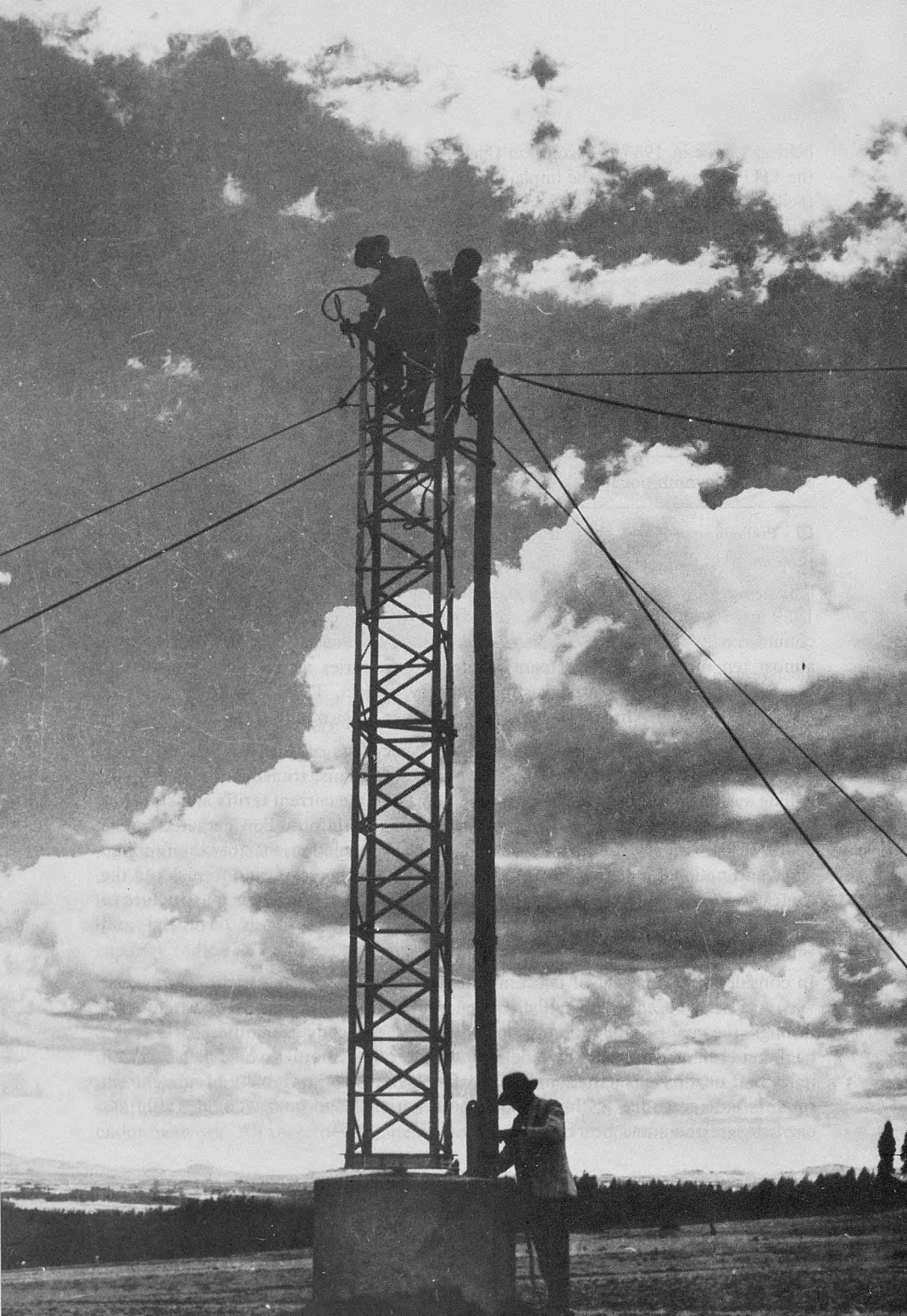
Stages of an ambitious telecommunication project

☐ Preliminary study: 83% of the total area of Africa surveyed

In 1968 a team of ITU-recruited experts, based in Addis Ababa, conducted a preliminary pre-investment survey in the countries of Northern and Eastern Africa. In 1969 a second team of experts, based in Abidjan, began similar work in the countries of Western and Central Africa. During these field operations, which lasted almost ten months, the two teams visited 38 countries which had officially expressed support for the pre-investment survey project. These countries represent about 87% of the African population and cover 83% of the total area.

The study team, in close co-operation with specialists of African Telecommunications Administrations, took stock of numbering plans, transmission plans, signalling systems used or projected, routing plans and the current tariffs and statistics of the previous six years. These data, as well as the information gathered in the course of preliminary studies on the distribution of population, the growth of foreign trade and national income, were used to make traffic forecasts, and to pick out the routes which would constitute the framework and the most economical structure of the pan-African telecommunication network, comprising both terrestrial and satellite links.

In considering the layout of telecommunication links between African countries it was necessary to ensure that the chosen routes would be those that would pass through the main population centres within the respective countries so that the backbone bearers routes that would ultimately cross the border would also carry an important portion of the national traffic. By this means the viability of any chosen route is enhanced due to the fact that both national and international traffic are carried over the same bearer.



☐ Detailed pre-investment surveys

After the preliminary study, which conclusively proved the urgent need for a major intra-African telecommunication network, the UNDP provided, at the request of the interested governments of Africa, the funds required for the preparation of a detailed project for an integrated high quality and economically viable regional transmission network taking into account trunk, intra-African and intercontinental telecommunication traffic of all kinds and taking due note of existing or planned earth stations in Africa.

The ITU appointed highly experienced telecommunication consulting firms to carry out, under the direct supervision of the Union, the detailed field studies of the routes identified under the preliminary survey. The ITU consulting firms carried out a very careful study of over 20 000 km of transmission routes and 18 international switching centres.

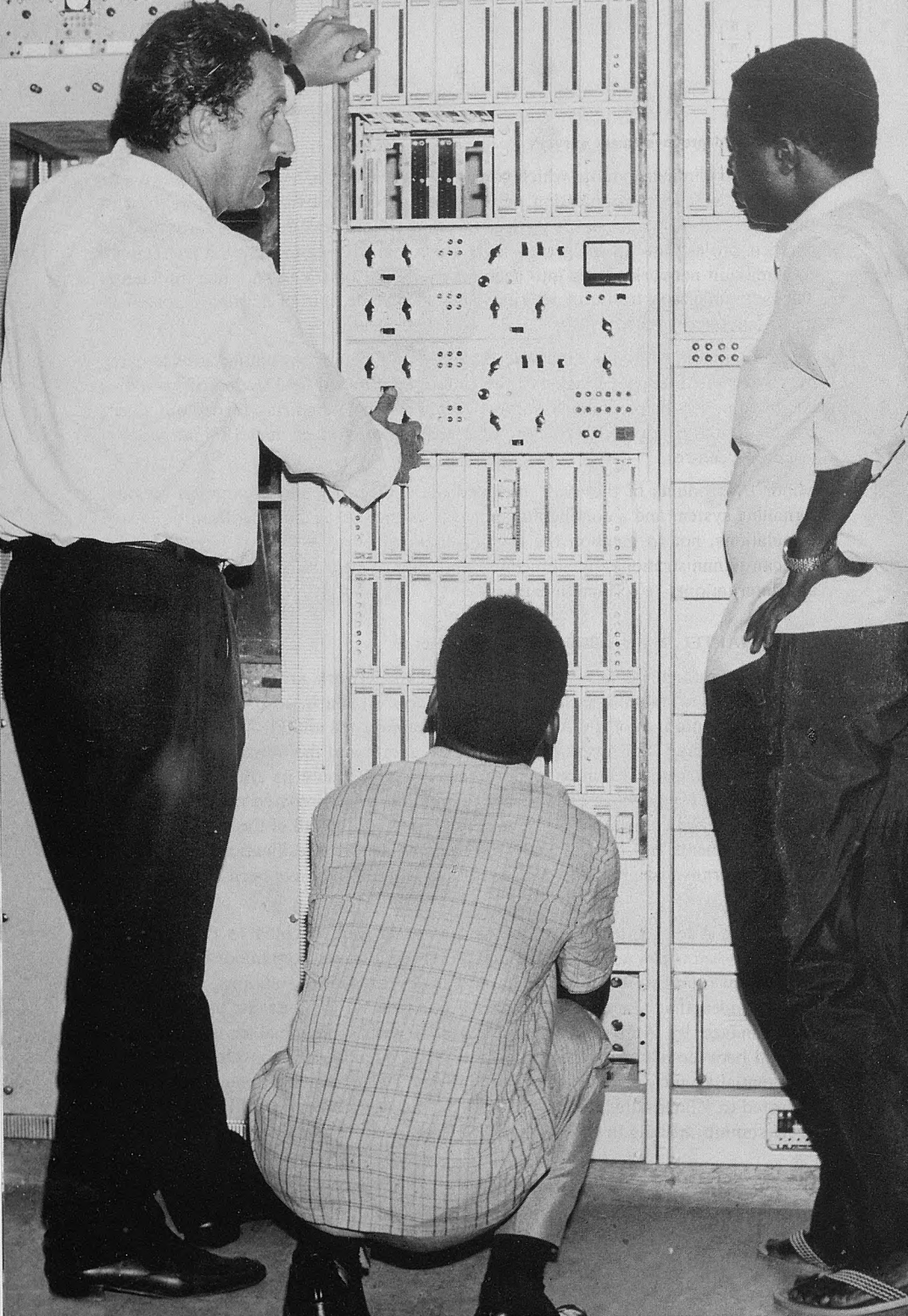
Major by-products of the study included the choice of a single common regional signalling system and a continental approach to the setting up of tariffs and revenue calculations, not to mention the establishment of close working relations among African administrations for all medium and long-term plans in the field of national and international telecommunications.

☐ PANAFTEL, a 115 million US dollar project

The pre-investment surveys for the pan-African network are now virtually completed. At co-ordination meetings, held in Addis Ababa in 1972 and in Lomé in 1973, representatives of the African countries concerned and ITU planning experts jointly considered the consultants' draft final reports and the means required to set up the pan-African telecommunication network and ensure its efficient operation. The detailed surveys have enabled documentation to be prepared on both the economic and technical aspects of the proposed links. In fact all of the interested African governments will be provided with complete tender specifications by the ITU for all the transmission routes and switching centres that have been the subject of this survey.

During the Addis Ababa meeting, some sessions were devoted to the financing aspects of the project and were attended by representatives from major bilateral and multilateral financing institutions. In its deliberations and resolutions, the meeting recommended that a special fund for the financing of the network be established and managed by ADB and that technical as well as financial co-ordination be ensured between all the parties concerned. Subsequently, at a consultative meeting of potential financiers, held in Geneva in May 1973, the co-ordination work was entrusted to a committee composed of OAU, ECA, ADB and the ITU. During the OAU summit meeting in May 1973, the Heads of State and Government passed a

◀ *A new link is being added in the long chain which will unite all African States* (ITU)



resolution confirming the task assigned to the Co-ordinating Committee and more specifically requested the Committee to take the appropriate measures for the mobilization of the necessary resources and for the speedy implementation of the network.

The African countries, with the assistance of OAU, ECA and the ITU, are ready to embark on the project's final phase. The African countries have requested the ITU to assist them in preparing documents for the invitation to tender, evaluating tenders, supervising the installation of equipment, carrying out technical acceptance procedures and setting up manning tables of staff required for the future operation and maintenance of the installations.

In addition, in accordance with the time schedule for the installation of PANAFTEL, tenders for many international switching centres and transmission routes are to be issued already in 1974 so as to have the actual implementation completed during the period of 1974-1978.

At the end of 1973 the experts' estimate of PANAFTEL's likely total cost was approximately 115 million US dollars. The foreign exchange expenditure for equipment and foreign labour expenses for installation amounts to 85% of the total capital expenditure. Furthermore, the overall internal rate of return of the project taken as a whole is well over 10%, which is quite a satisfactory figure by all standards.

Towards the realization of PANAFTEL

The African Heads of State meeting at Addis Ababa in May 1973 reiterated their respective governments' determination to continue to give highest priority to the realization of PANAFTEL. They also requested the OAU, ECA, ADB and the ITU to continue their efforts for the speedy realization of PANAFTEL.

Throughout the consultative meetings and discussions, it has been stressed that the project ought to be treated as a whole from the viewpoint of both financing and timing in the establishment of the proposed links.

Regardless of the sources of financing it is imperative that maximum co-ordination should be established for the procurement, technical standards and implementation programme in order to achieve high quality operation and to avoid waste of resources. It is foreseen that such co-ordination body will be set up by African countries in close co-operation with the above-mentioned international bodies.

PANAFTEL is a most spectacular example of intra-African-ITU co-operation. This new chain of telecommunication links will unite all African countries and all States in the world engaged in the same effort to ensure greater understanding, friendship and fraternity between peoples and the happiness of all in freedom and peace.

◀ *Two Ivory Coast technicians and one of the ITU experts responsible for setting up the Abidjan terminal of a pilot circuit between the Ivory Coast and Ethiopia discussing a multiplex telegraphy installation* (ITU)

Pan-African telecommunication network – Transmission routes + CT3

No.	country	route	distance (km)	system	circuits			
					75	80	85	90
1	Sudan	Khartoum-Atbara	288	HC MW	14	40	133	264
		Atbara-Halfa	560	– –	9	31	105	210
		Atbara-Port Sudan	453	– –	5	9	28	54
		Sennar-Tessenai	426	– –	6	15	51	107
		Khartoum	–	CT3	16	39	103	191
2	Ethiopia	Tessenai-Asmara	298	HC MW	6	15	51	107
		Harrar-Hargeisa	223	HC/MC MW	3	4	8	15
		Sheshemane-Moyale	453	HC MW	9	27	91	183
3	Somalia	Hargeisa-Harrar	223	HC/MC MW	3	4	8	15
		Chisimaio-Lamu	426	LC/MC tropo. MW	7	19	46	92
		Mogadiscio		CT3	7	15	39	67
4	Kenya	Nairobi-Moyale	736	HC MW	9	27	91	183
		Mombasa-Lamu	122	HC MW	7	19	46	92
5	Kenya/ Tanzania	Nairobi-Dodoma + Arusha-Moshi	617 67	HC MW	112	247	498	1040
		Dar-es-Salaam-Dodoma Zambia border	980	HC MW	23	102	189	471
		Dodoma-Mwanza	779	HC MW	128	225	45	900
6	Zambia	Lusaka-Tanzania border	1000	HC MW	13	58	133	339
		Livingstone-Botswana border	74		11	52	126	315
7	Botswana	Gaborone-Francistown	434		24	92	182	364
		Francistown-Zambia border	450		13	54	130	320
	Technical survey after Addis Ababa meeting							
	Lesotho	Maseru-Nairobi	4000	LC HF				

No.	country	route	distance (km)	system	circuits			
					75	80	85	90
8	Chad	Ndjamena-Moundou-Sarh	700	HC MW		90	132	186
				HC coax.		90	132	186
		Ndjamena-Moundou-Sarh + junction RCA Ndjamena	760	HC MW		102	144	204
				HC coax. MW		102	144	204
				CT3		38	65	110
9	RCA	Bossembele-Paoua	300	HC MW		30	42	60
		Bouar-Paoua	200	HC MW		30	42	60
		Bossembele-Paoua + junction Chad and Congo/Bangui	440	HC MW tropo.		54	72	102
		Bouar-Paoua + junction Chad and Congo/ Berberati		HC MW tropo.		54	72	102
		Berberati-Nola		LC UHF		12	18	24
		Bangui		CT3		36	54	86
10	Congo	Brazzaville-Ouesso-Impfondo	980	HC MW tropo.		60	84	108
		Brazzaville-Ouesso-Impfondo + junction RCA	1180	HC MW tropo. tropo.		72	102	132
		Brazzaville		CT3		64	100	172
11	Cameroon	Yaounde-Ebolowa Yaounde-Sangmélima	350	HC MW		72	102	138
		Yaounde-Ebolowa-Bitam (Gabon) + Yaounde-Sangmélima	550	HC MW		78	114	156
12	Equatorial Guinea	Santa Isabel		CT3		22	28	38
13	Rwanda/ Zaire	Kigali-Bukavu	207	HC MW		42	54	84
		Kigali		CT3		40	54	77
14	Nigeria	Kano-Maradi	241	HC MW	12	23	40	71
		Lagos-Cotonou	124	HC MW	60	105	213	257
15	Niger	Maradi-Kano	241		12	23	40	71
		Niamey-Dosso-Dahomey border	310	HC MW	97	155	226	340
		Niamey-Ouagadougou	120	HC MW	15	22	31	50
		Niamey	–	CT3	30	51	80	147

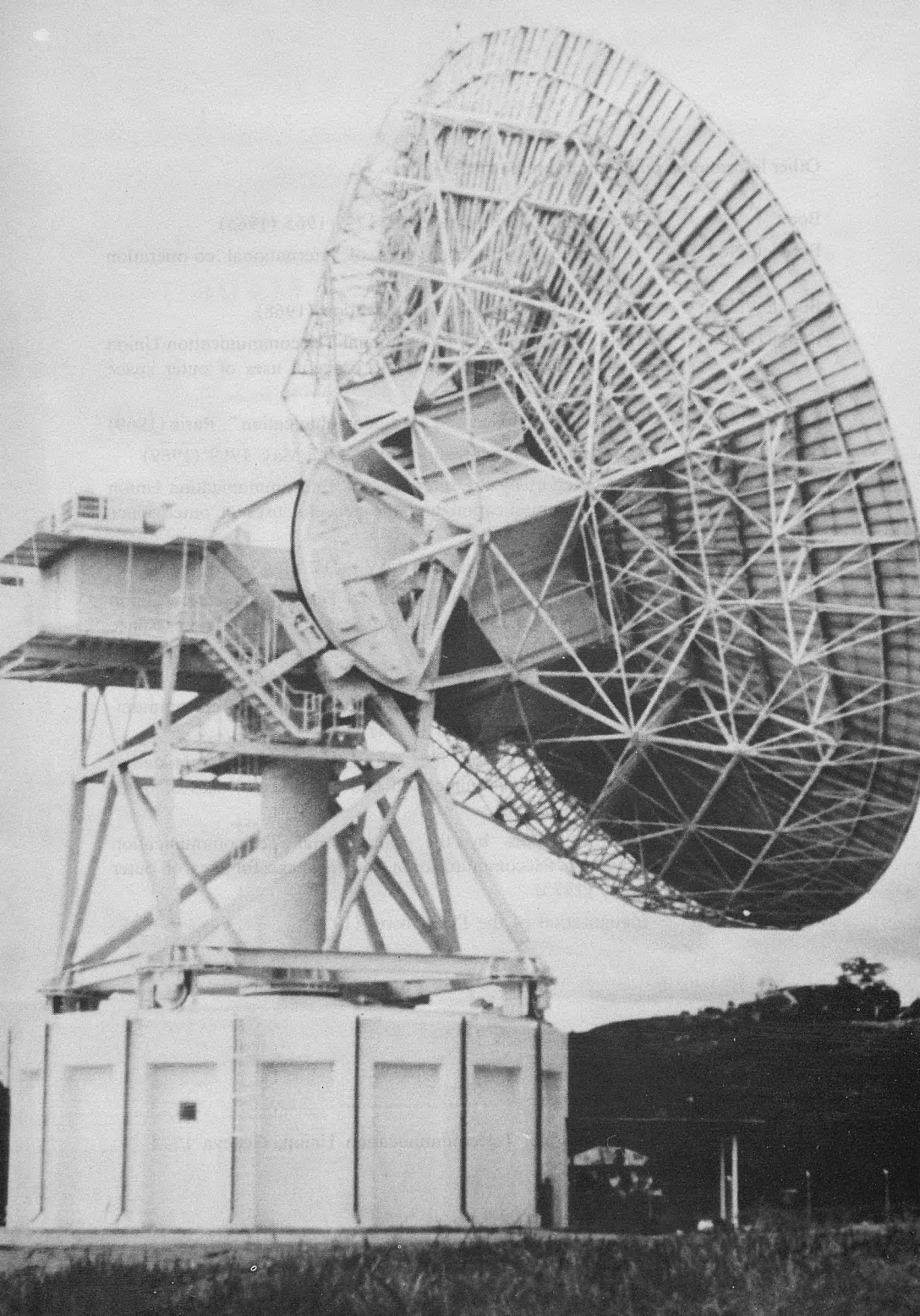
No.	country	route	distance (km)	system	circuits			
					75	80	85	90
16	Dahomey	Cotonou-Lagos	124		60	105	213	257
		Cotonou-Lomé	80	HC MW	62	126	209	348
		Cotonou-Parakou-Niger border	560	HC MW	58	94	148	227
		Cotonou		CT3	52	101	189	315
17	Togo	Lomé-Accra	10	HC MW	27	42	77	177
		Lomé-Cotonou	60	HC MW	62	126	209	348
		Lama Kara-Ouagadougou (Togo section)			6	10	15	25
		Lomé		CT3	45	94	172	275
18	Ghana	Accra-Lomé (via the coast)	170	HC MW	39	61	107	223
		Takoradi-Abidjan	310	HC MW	122	187	274	389
		Accra		CT3	36	68	104	199
19	Upper Volta	Ouagadougou-Koupela-Niger border		HC MW	53	77	121	197
		Koupela-Sango-Togo border	145	HC MW	6	10	15	25
		Bobo-Sikasso	145	HC MW	16	25	36	58
		Ouagadougou	—	CT3	30	49	82	140
20	Ivory Coast	Abidjan-Ghana border	150	HC MW	25	49	85	149
		Korhogo-Mali border	—		—	—	—	—
		Man-Mt. Nimba (Liberia)	90	HC MW	11	18	28	48
21	Guinea	Conakry-Boke	210	HC MW	26	42	65	89
		Conakry-Kankan	600	HC MW	72	136	234	343
		Kankan-Siguiri	175	LC MW	3	4	6	8
		Mamou-Labé	200	HC MW	15	28	47	67
		Dabola-Dinguiraye	110	LC MW	6	8	12	16
		Faranah-N'Zérékoré	345	HC MW	24	38	56	78
		Conakry-Sierra Leone border	102	HC MW	21	36	61	110
		Kindia-Koundara-Senegal border	200	HC MW	32	58	102	180
		Conakry	—	CT3	29	51	92	168

No.	country	route	distance (km)	system	circuits			
					75	80	85	90
22	Liberia	Monrovia-Mt. Nimba (Ivory Coast)	300	HC MW	29	39	53	75
		Monrovia-Mano-Sierra Leone border	130	HC MW	12	18	34	67
		Monrovia-Harper-Ivory Coast border	440	HC MW tropo.	25	32	46	62
		Monrovia	—	CT3	28	49	96	185
23	Sierra Leone	Freetown-Bo-Liberia border	270	HC MW	46	68	100	159
		Freetown-Kambia-Guinea border	120	HC MW	22	33	61	107
		Freetown	—	CT3	15	28	50	88
24	Mauritania	Akjoujt-Atar	200	MC MW	34	35	75	110
		Atar-Choum	87	coaxial	31	49	69	101
		Nouadhibou-Choum	500	coaxial	30	49	69	103
		Choum-F'Derik	163	MC MW	22	34	47	68
		Rosso-Senegal border	12	—	—	—	—	—
		Nouakchott	—	CT3	16	32	56	118
25	Senegal	Kaolack-Kidira	490	HC MW	47	88	143	254
		Tambacounda-Koundara	130	HC MW	32	58	102	180
26	Mali	Bamako-Kayes	500	HC MW	33	60	104	165
		Bamako-Sikasso	370	HC MW	30	46	70	105
		Sikasso-Korhogo	—	—	—	—	—	—
		Bamako-Mopti	560	HC MW	15	22	44	121
		Bamako-Siguiri	—	—	—	—	—	—
		Bamako	—	CT3				
27	Gambia	Banjul-Kaolack	92	HC MW	9	16	25	45
		Banjul	—	CT3	8	15	24	42

HC = high capacity
MC = medium capacity
LC = low capacity
CT3 = third category transit centre
MW = microwave

View of satellite communications earth station constructed in Nigeria by GTE International Incorporated ▶

(GTE International)



Other information publications on the ITU:

Book — From semaphore to satellite, 1793-1965 (1965)

Booklet No. 1 — 1865-1965, a hundred years of international co-operation (1967)

Booklet No. 2 — ITU and space radiocommunication (1968)

Booklet No. 3 — Eighth Report by the International Telecommunication Union on telecommunication and the peaceful uses of outer space (1969)

Booklet No. 4 — Symposium "Space and Radiocommunication", Paris (1969)

Booklet No. 5 — World Telecommunication Day — 17 May 1969 (1969)

Booklet No. 6 — Ninth Report by the International Telecommunication Union on telecommunication and the peaceful uses of outer space (1970)

Booklet No. 7 — World Telecommunication Day — 17 May 1970 (1971)

Booklet No. 8 — Tenth Report by the International Telecommunication Union on telecommunication and the peaceful uses of outer space (1971)

Booklet No. 9 — Speeches made at the inaugural meeting of the second World Administrative Radio Conference for Space Telecommunications on 7 June 1971 (1971)

Booklet No. 10 — Eleventh Report by the International Telecommunication Union on telecommunication and the peaceful uses of outer space (1972)

Booklet No. 11 — Twelfth Report by the International Telecommunication Union on telecommunication and the peaceful uses of outer space (1973)

Booklet N°. 12 — Inauguration of the ITU Tower (1973)

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RESEAU PANAFRICAIN DE TELECOMMUNICATION
PAN-AFRICAN TELECOMMUNICATION NETWORK

UNDP/ITU PRE-INVESTMENT SURVEY
ETUDE DE PRÉINVESTISSEMENT PNUD/UIT

Legend
Légende

operating or planned en service ou prévue	ITU study étude UIT	
		earth station station terrienne
●	●	international switching centre centre international de commutation
	○	other towns autres villes
		terrestrial transmission link liaison de transmission terrestre:
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— · — · —	-----	national nationale
≈——≈		submarine cable câble sous-marin
		border (*) frontière(*)

(*) The boundaries on this map are not necessarily officially recognized.
(*) Les frontières portées sur cette carte ne sont pas nécessairement officiellement reconnues.

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