



**TOGETHER**  
*for a sustainable future*

## OCCASION

This publication has been made available to the public on the occasion of the 50<sup>th</sup> anniversary of the United Nations Industrial Development Organisation.



**TOGETHER**  
*for a sustainable future*

## DISCLAIMER

This document has been produced without formal United Nations editing. The designations employed and the presentation of the material in this document do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations Industrial Development Organization (UNIDO) concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries, or its economic system or degree of development. Designations such as “developed”, “industrialized” and “developing” are intended for statistical convenience and do not necessarily express a judgment about the stage reached by a particular country or area in the development process. Mention of firm names or commercial products does not constitute an endorsement by UNIDO.

## FAIR USE POLICY

Any part of this publication may be quoted and referenced for educational and research purposes without additional permission from UNIDO. However, those who make use of quoting and referencing this publication are requested to follow the Fair Use Policy of giving due credit to UNIDO.

## CONTACT

Please contact [publications@unido.org](mailto:publications@unido.org) for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at [www.unido.org](http://www.unido.org)

18664

Distr.  
LIMITED

IPCT.132(SPEC.)  
26 January 1991

UNITED NATIONS  
INDUSTRIAL DEVELOPMENT ORGANIZATION

ORIGINAL: ENGLISH

---

Workshop for African and Arab Country Representatives  
from the Telecommunications Industry  
New Delhi, India  
3-12 September 1990

REPORT\*

---

\* Mention of company names and commercial products does not imply the endorsement of the United Nations Industrial Development Organization (UNIDO). This document has not been edited.

V.91 21977

## CONTENTS

Chapter	Page
INTRODUCTION	1
I. ORGANIZATION OF THE WORKSHOP	1
Opening of the Workshop	2
Work Programme	2
II. SUMMARY OF STATEMENTS DELIVERED AT THE PLENARY SESSION	2
Minister of State for Telecommunications	2
Chairman, Trade Fair Authority of India	3
Chairman, Telecommunications Commission	3
UNIDO Director of Industrial Technology Development Division	4
III. AFRICA'S TELECOMMUNICATION EQUIPMENT AND CO-OPERATION NEEDS	4
UNIDO Preparatory Mission	4
Regional Presentations	8
Country and Company Papers	8
IV. INDIA'S SUPPLY CAPABILITIES	9
Identification of Indian Counterparts	9
TEMA as a Counterpart	9
V. 'ELECTRONICS INDIA '90 - EXHIBITION AND CONFERENCE'	10
VI. RESULTS OF BILATERAL DISCUSSIONS ON CO-OPERATION PROJECTS	11
VII. CONCLUSIONS AND RECOMMENDATIONS	12
ANNEX I - Programme of Workshop	15
ANNEX II - Telecommunications Technology and Services offered by India	17
ANNEX III - Telecommunication Industry Co-operation requested by African countries	23
ANNEX IV - Results of Bilateral Discussions	53
ANNEX V - List of Participants	61

## INTRODUCTION

The Workshop for African and Arab Country Representatives from the Telecommunications Industry (through Participation at 'Electronics India '90 - Exhibition and Conference') was held in New Delhi, India, from 3-12 September 1990. It was sponsored by UNIDO and hosted by the Department of Electronics and the Trade Fair Authority of India Ltd. (TFAI). For UNIDO the Workshop was a continuation of a number of activities supporting the development of the telecommunications industry in Africa and a specific follow-up to its Conference on National Strategies and International Co-operation for the Telecommunications Industry in Africa, held at Arusha, United Republic of Tanzania on 11-15 December 1989. As proposed by the recommendations and action programme of that Conference, the Workshop contributed to strengthening regional and international co-operation between countries from different geographical regions by assisting African participation in 'Electronics India '90 - Exhibition and Conference'. The Workshop was also a further step in the ongoing UNIDO programme offered to industrialists seeking to initiate or expand their long-term co-operation with counterparts in other developing countries.

The purpose of the Workshop was to develop closer co-operation between India and developing countries in the African and Arab region in the field of telecommunications equipment manufacture and use. Identification of areas of industrial co-operation both prior and during the Workshop enabled extensive bilateral discussions among the participants. The discussions took place in the context of the Indian telecommunications technology on display at 'Electronics India '90' as well as at the associated Conference.

### I. ORGANIZATION OF THE WORKSHOP

The Workshop was attended by 59 participants, 23 from 13 countries outside India. Recognizing that PTT administrations are the main purchasers of telecommunications equipment, PTT representatives together with a cross-section of both private and public sector equipment manufacturers were invited to participate. The list of participants is attached as Annex V.

### Opening of the Workshop

The event was opened by the Minister of State for Telecommunications, Mr. Janeshwar Mishra. Further welcoming remarks were addressed to the Workshop by the Chairman of the Trade Fair Authority of India (TFAI), Mr. Moosa Raza, the Chairman of the Telecommunications Commission, Mr. S. Pitroda, and the Director of UNIDO's Industrial Technology Development Division. A vote of thanks to the Minister, the African and Indian participants, TFAI and UNIDO was proposed by Mr. Y.L. Agarwal, Chairman, Telecommunications Consultants India Ltd. (TCIL).

### Work Programme

The work programme for the Workshop, attached as Annex I, was drawn up with the intent of giving African participants as much time as possible to tour the exhibition grounds and to better acquaint themselves with the Indian equipment and technology on display as well as to give them the opportunity to attend the technical sessions organized during the fair. This together with the time reserved for bilateral discussions was to be the main purpose of the Workshop.

## II. SUMMARY OF STATEMENTS DELIVERED AT THE PLENARY SESSION

Inaugurating the Workshop, the Minister of State for Telecommunications outlined the policy of the Government of India in the field of telecommunications. This emphasized strengthening of industrial and telecommunications capability in the area of manufacturing telecommunications equipment. Some US\$ 35 billion were expected to be invested in telecommunications in the next ten years and 80 per cent of it would be secured through generation of internal funds. For developing countries such as India, telephone accessibility was more relevant than telephone density. It had been India's experience that, given a measure of competition, quality products up to international standards could be produced in developing countries. The novel designs developed and manufactured in India such as the rural telephone systems were more suitable for the environment of most developing countries. The Minister recalled the co-operation between India

and several African countries in the engineering sector. and stated that similar co-operation was possible in the field of telecommunications manufacturing. He reiterated India's readiness to make available its experience and know-how to other developing countries.

The Chairman of TFAI, Mr. Moosa Raza, extended a warm welcome to both African and Indian participants to this event. His address emphasized the importance India attached to the development of their telecommunications and electronics industries. The level of development, he mentioned, was obvious by the many Indian exhibitors participating at 'Electronics India '90'. The main thrust of Mr. Moosa Raza's presentation was the importance of inter-regional trade of telecommunications equipment. There should be a realistic mix of local initiatives and use of equipment which could be provided in the region. A wider vision should be embraced and regional manufacturing should be seen as the only viable option open to developing countries. Trade policies should be adopted to encourage the flow of equipment and know-how between African countries thereby lessening the dependence on imports from outside the region.

The Chairman of the Telecommunications Commission, Mr. S. Pitroda, began his talk by giving a step by step description of India's development of telecommunications industry. The first major hurdle India faced in this process was convincing senior government decision-makers of the importance of developing this industrial sector. He strongly emphasized the point that only by having a functional communication network could India hope to improve its national economic standing. He further reiterated the Minister's point that developing countries like India should place more emphasis on accessibility to telephones rather than on telephone density. The need to clearly identify local and regional needs for telecommunications services and equipment in Africa should be given high priority. Related to this is the selection of appropriate equipment and technology that will meet these needs. Human and financial resources will play a key role in determining the pace of development of both services and manufacturing. Repair and maintenance facilities must also be planned well in advance in any long term development scheme. Recognizing the high costs attached to research and development in general, Mr. Pitroda offered to open the doors to all developing countries willing to take advantage of India's experience in establishing or reinforcing

a viable telecommunication industry. In summary he again reiterated the Minister's own offer to assist African countries in developing their telecommunications industry and improving services.

The Director of UNIDO's Industrial Technology Development Division made a brief presentation on UNIDO's own efforts in assisting African countries in developing their telecommunications industry. He further elaborated on UNIDO's future activities in continuing this assistance. One of these activities is a study on the assessment of the capacities and capabilities for the manufacture of telecommunications equipment in Africa which UNIDO will be undertaking in co-operation with ITU. This study when completed will set the framework for calling on donor countries to assist in developing African capabilities in the telecommunication sector, both with respect to services and manufacturing. He also stated that UNIDO would continue its efforts to assist developing countries individually or regionally to improve their economic situation.

### III. AFRICA'S TELECOMMUNICATION EQUIPMENT AND CO-OPERATION NEEDS

#### UNIDO Preparatory Mission

Introducing its own assessment of Africa's demand for telephone equipment, a representative of the UNIDO consultant, Telecommunications Consultants India Ltd (TCIL), said that the region currently had around 4.5 million telephones for a population of some 500 million. For a population growth of 2.5 per cent annually, Africa would need 25 million telephones by the year 2000 in order to attain a telephone density of 3 per hundred, calling for an investment of nearly US\$ 50 billion. Even to maintain the existing density an investment of about US\$ 10 billion would be needed.

There was hardly any major indigenous telecommunications industry in most of the countries in Africa. The PTTs are virtually totally dependent on world markets for telecommunications equipment. Modest indigenous industries now existed in some of the countries for cables and wires, telephone sets, switching and transmission equipment, components and spare parts for maintenance. Most of those industries are assembly operations.

In the studies of the African telecommunications industry conducted by UNIDO and ITU over the year, the consultant said, the major conclusions were:

- The driving force for regional telecommunications manufacture has come from a guarantee of PTT markets;
- The main obstacle to foreign and local investments are:
  - Actual and perceived risks of undertaking investments;
  - Foreign exchange restrictions;
  - High costs in a highly regulated environment; and
  - Uncertainty of demand;
- Electronic capabilities existed in some of the PTC factories and repair shops;
- Capabilities of local suppliers are mostly in mechanical and electrical engineering;
- Many local suppliers are operating at a low fraction of installed capacity.

Prior to the Workshop, specific needs and interests were identified, first at the Arusha Conference and secondly by means of a four-week study tour by a UNIDO consultant to seven African countries. This was supplemented by a questionnaire distributed to participants at the beginning of the Workshop and papers presented by them or distributed during the Workshop.

Project proposals and ideas identified by the African and Arab countries also represented at the Conference in Arusha included manufacture of cables (Cameroon, Egypt and Senegal (for UAPT member countries)), didactic systems for electrical engineering (Zimbabwe), electronic and microelectronic components (Egypt), plastic components (Zimbabwe), telephone instruments and



telecommunications accessories (Nigeria and Zambia), magnetoscopes and microcomputers (Cameroon), and telephone switches, rural radio equipment and spare parts for analogue equipment (Nigeria).

Proposals were also made for the establishment of a regional electronic repair centre (Egypt), for a subregional maintenance centre (Nigeria and Togo), a repair workshop for digital technologies/circuit cards (Zimbabwe), a maintenance and repair workshop (Kenya, Senegal and Zambia) and an application centre of videoscope technology for electronic consumer goods (Egypt). Egypt also proposed a training programme for board mounting of electronic components.

Based on these interests, the UNIDO consultant visited seven African and Arab countries and identified 18 joint venture possibilities for discussion during the Workshop:

Country	Area of co-operation
Cameroon	Underground cables
Kenya	RAX and/or EPABX
Madagascar	Switch board cords Switch board cables Jumper wire Drop wire Small PCB fabrication plant
Mauritius	Small capacity PCs Intelligent terminal telephone sets Underground cables
Nigeria	Telephone instruments
Tunisia	Telephone instruments Small capacity EPABX

Zimbabwe	Telephone sets
	EPABX
	PCM equipment
	Intelligent terminals and modems
	Personal computers and peripherals

Reporting to the Workshop on its study tour findings, the consultant noted that Mauritius had launched a massive expansion plan over a period of three years. At industry level there were plans to modernize and expand manufacture of electronic items, especially PCB fabrication. Indian participation was interesting both for manufacture and marketing the products in Mauritius and elsewhere. Some telecommunications equipment companies already had contacts with Indian manufacturers.

In Kenya interest was found particularly in expanding telecommunication services in rural areas. It was Government policy, however, that any manufacturing units supplying the Kenya PTC would have to come under PTC management.

It was found that the Nigerian telecommunication equipment industry was relatively well developed. PTC itself assembled rack frames, relay sets and cable forms for step-by-step switching systems and was diversifying into electronic STD equipment. A joint venture manufacturer assembled electronic party line equipment. Interfaces for STD trunk lines were assembled under a digitalization programme using indigenous PCBs.

NITEL, Nigeria's national telecommunications authority will add 600,000 lines during 1990-1994. Some 20,000 lines annually would be for rural digital exchanges. One joint venture possibility was to supply telecommunication equipment to NITEL; NITEL, a Nigerian industrialist and an Indian firm would share the equity.

Discussions in Cameroon focussed on an opportunity for Indian participation in a telecommunications cable factory, for which land had been allotted and a feasibility study prepared.

Indian assistance would be interesting for a project to set up a joint venture manufacturing unit in Tunisia. Potential partners were Tunisian firms already assembling key telephones and power units for PABXs.

Upon registering for the Workshop, all participants, Indians as well as Africans, were requested to complete a UNIDO prepared questionnaire in an effort to better identify what services Indian companies could offer and also what African countries were seeking. The responses received are summarized in Annex III.

### Regional Presentations

In an effort to make optimum use of the short time scheduled for the plenary session of the Workshop, it was felt that a summary overview of the African situation on a regional basis would afford all participants more time to interact with each other. To this end, representatives from Egypt, Kenya and Nigeria made statements. After consulting with other country representatives from their region they highlighted the telecommunications situation in their respective regions. They made it very clear in their presentations that unless African countries could agree on regionalized manufacturing of telecommunications equipment this industry would face tremendous difficulties in establishing any concrete footing on the continent. They reiterated the fears of the Chairman of TFAI that they would remain dependent on foreign markets for meeting their demands.

### Country and Company Papers

A formal condition of paid-participation for the PTT representatives was the preparation of a national paper on their country's strategies and policies. In the case of industrialists, a paper was requested giving their company's complete background, production range, goals, etc. All participants complied with this condition and copies of these papers were distributed to them. These papers, together with the papers submitted for the Arusha Conference, are expected to be published as a UNIDO document.

#### IV. INDIA'S SUPPLY CAPABILITIES

##### Identification of Indian Counterparts

Pre-workshop identification of Indian equipment manufacturers interested in co-operating with counterparts in African and Arab countries took place in a meeting to present the country-specific projects identified by the UNIDO consultant, TCIL.

For this purpose TCIL had prepared profiles of Indian companies they had solicited and screened in order to have this information available for invited African delegates. An overview of these profiles, attached as Annex II, was presented to the participants by the TCIL consultant. TCIL had also drawn up a preliminary time schedule for the first day of bilateral talks. All participants, both African and Indian, were encouraged to talk to any participant they wished in addition to time schedules for further bilateral talks.

In order to monitor and record the progress of these discussions, participants were requested to inform the organizers of this event of any subsequent or unscheduled talks so that follow-up activities could be better planned and UNIDO assistance given where required.

##### TEMA as a Counterpart

In his introductory remarks, the President of the Telecom Equipment Manufacturers' Association of India (TEMA), Mr. P K. Sandell, explained that prior to 1988, the telecommunications industry in India was characterized by a few well-known manufacturing units which were almost wholly in the public sector. However, by 1990 the scenario had radically changed. He stated that there are about 120 manufacturing units, in both public and private sectors, which are engaged in production of telecom and related products and accessories. Out of these, 80 per cent have joined forces to form the Association. Furthermore, TEMA publishes a directory of Indian telecommunications equipment manufacturers as well as other publications of interest to telecom entrepreneurs.

The Association strives to help Indian authorities in arriving at optimal standards for telecommunications equipment for the country, harmonizing the interest of the public, the network and the manufacturers. They are very active in promoting exports by organizing exchange of trade delegations, intra-regional surveys and displays and third party joint ventures in developing countries.

TEMA, through its President, pointed out that the Association would be in a position to offer the following services:

- Assistance in identification of leading Indian manufacturers who could act as trading partners;
- Arrange the allocation of foreign trainees to the appropriate establishment;
- Assistance in identifying and providing lists of its members willing to engage in technology transfer and joint venture collaboration;
- Render technical assistance in the field of techno-economic surveys and studies;
- Help in organising and setting up local consultancy in planning and design of telephone networks, ISDN systems, plant design and installation, and inspection programmes.

#### V. 'ELECTRONICS INDIA '90' - EXHIBITION AND CONFERENCE'

The Workshop which took place was organized around the 'Electronics India '90 - Exhibition and Conference on Electronics Industry in India'. African participants were given time to visit the numerous exhibition stands and gain firsthand information on what India could offer in terms of equipment and know-how. Also included in the schedule of activities were visits to C-DOT and the Advanced Level Telecommunication Training Centre.

At the request of African participants, a discussion session with Mr. Pitroda, Chairman of the Telecommunications Commission, was also arranged. During this session, numerous questions were asked regarding India's penetration in the telecommunications market and advice sought with respect to Africa's prospects for developing their own telecommunications industry.

All participants were invited to attend half-day seminars organized jointly by TFAI and UNIDO. The topics covered were as follows:

- New technologies for rural communications;
- Joint ventures: India as partner;
- Computer software and hardware;
- Co-operation in telecommunications.

The seminars scheduled for most of the afternoons were intended to inform participants on India's progress in applying old and new technologies in the telecommunications sector. They also served to explain some of the modalities for establishing joint-ventures with Indian companies.

#### VI. RESULTS OF BILATERAL DISCUSSIONS ON CO-OPERATION PROJECTS

The bilateral discussions, aimed at identifying specific co-operation opportunities, were held in four half-day sessions from 6 to 10 September. A total of 48 working agreements between African and Arab country representatives and Indian counterparts, including 20 signed Memoranda of Understanding, resulted from these discussions. They envisaged exchange of information, preparation of detailed project proposals for technology transfer and feasibility studies, and supply of components and equipment. Although the main focus was on telephone instruments, rural communication systems, EPABX and cable manufacture, more sophisticated items also attracted attention, such as intelligent terminals and PCM equipment.

UNIDO together with TCIL would undertake follow-up activities to promote practical realization of the working agreements, in particular by means of self-financed study tours and the use of national funds for TCDC.

A summary of the results of the bilateral talks is attached as Annex IV.

## VII. CONCLUSIONS AND RECOMMENDATIONS

Based on the results of the Arusha Conference and the discussions during the Workshop, it was generally agreed that most African countries need to take positive steps to industrialize in the field of telecommunications equipment. To the extent market constraints allowed, this meant acquiring without further loss of time the technologies, the human resource and other capabilities to manufacture selected items of telecommunications equipment.

African participants recognized the relevance of India's experience in this respect and expressed their desire for co-operation with Indian manufacturers and technical institutions. It was felt that technical and economic co-operation with developing countries such as India would help both sides to learn from each other's experience and to provide equipment and technology suited to the African countries.

Recalling the recommendations of the Arusha Conference, the Workshop called on the African countries, UNIDO and ITU to accelerate the implementation of those recommendations in a time-bound framework. This included especially the assignment by African Governments of higher priority (a) to developing indigenous telecommunications manufacturing industries; and (b) to its inclusion in the Second Industrial Development Decade for Africa (IDDA II). UNIDO was urged, subject to available resources, to follow up the Arusha recommendations concerning information activities supporting development of the telecommunications manufacturing sector.

Noting that around 48 proposals requiring further consideration or specific follow-up action, including 20 memoranda of understanding, had emerged from the discussions, the Workshop urged that concrete follow-up measures be adopted by the parties directly concerned. It called on UNIDO to promote such follow-up in order to establish telecommunication equipment manufacturing capacities in Africa. It also requested the Indian Government to provide financial and technical assistance in this respect.

The Workshop urged that alongside the implementation of viable manufacturing projects, an overall feasibility study for manufacturing telecommunications equipment in Africa be undertaken by UNIDO and ITU. This would provide an overall structural and long-term framework for African Governments and enterprises. The Workshop requested that UNDP finance such a feasibility study on a priority basis and called on ITU and UNIDO to take the necessary action in this respect. The meeting also called on the African Development Bank to provide resources for establishing and strengthening telecommunication manufacturing capacities in Africa.

Recognizing the limited size of the telecommunication's equipment market in many African countries, the Workshop recommended that UNIDO and ITU bring to the attention of the subregional and regional African organizations the need to take measures to evaluate subregional and regional markets. This would include the promotion of standardization, tariff incentives and other measures.

The Workshop urged the importance of co-operation and contacts at the enterprise level and welcomed the possibility of industrial associations like India's TEMA forming sister-relationships with appropriate industrial associations in Africa. These associations could also serve as focal points in the countries or the region where information could be collected and disbursed to interested parties. Furthermore, such associations could generate a pool of funds through contributions from their members, which could be used for further contacts, providing information, compiling directories, facilitating training and other activities.

The Workshop called on UNIDO and ITU to continue their promotional work for manufacturing of telecommunications equipment in Africa. This could include preparation of information packages and technical profiles, and monitoring of technologies. All information collected by UNIDO so far, including the country and industry papers from the Arusha Conference and the New Delhi Workshop, should be pooled together and made available to interested African manufacturers.



It was also recommended that the Workshop promote a roving exhibition of Indian telecommunications and electronic equipment and applications which could be organized sequentially in several African countries. The exhibition would remain in each country sufficiently long to demonstrate the reliability and usefulness of the Indian equipment as a functioning component of its telecommunication networks, as well as the possibility of local manufacture.

Representatives of Indian manufacturers expressed their willingness to co-operate with manufacturers from African countries in the field of telecommunications equipment. They called on UNIDO to promote similar co-operation with interested Asian countries.

ANNEX I

WORKSHOP FOR AFRICAN AND ARAB COUNTRY REPRESENTATIVES FROM  
THE TELECOMMUNICATIONS INDUSTRY  
(THROUGH PARTICIPATION AT 'ELECTRONICS INDIA '90 -  
EXHIBITION AND CONFERENCE')

New Delhi, India, 3-12 September 1990

**PROGRAMME**

**Monday, 3 September 1990**

Morning Arrival in New Delhi  
Afternoon Registration of participants

**Tuesday, 4 September 1990**

10.00 - 12.30 Opening of the UNIDO Workshop.  
Presentation of the African national projects  
14.00 - 17.00 Plenary session of UNIDO delegates and Indian  
entrepreneurs on joint ventures

**Wednesday, 5 September 1990**

10.00 - 12.30 Opening of 'Electronics India '90'  
Guided tour of 'Electronics India '90'  
14.00-17.00 Unescorted visit to 'Electronics India '90'

**Thursday, 6 September 1990**

10.00 - 12.30 Bilateral discussions between Indian and African  
participants on joint ventures  
14.00 - 17.00 Seminar on new technologies for rural  
communications, advances in switching technology,  
terminal equipment, etc.

**Friday, 7 September 1990**

10.00 - 12.30 Bilateral discussions between Indian and  
African participants on joint ventures  
14.00 - 17.00 Seminar on joint ventures - 'India as a Partner'

**Saturday, 8 September 1990**

10.00 - 12.30 Bilateral discussions  
14.00 - 17.00 Seminar on computer hardware and software

**Sunday, 9 September 1990** Free

**Monday, 10 September 1990**

10.00 - 12.30

Visit to ALTTC and C-DOT

14.00 - 17.00

Seminar on rural networks, digitization, network planning, O and M training, etc.

**Tuesday, 11 September 1990**

10.00 - 12.30

Bilateral discussions

14.00 - 17.00

Bilateral discussions

**Wednesday, 12 September 1990**

10.00 - 12.30

Concluding session

TELECOMMUNICATIONS TECHNOLOGY AND SERVICES  
OFFERED BY INDIA

**INTRODUCING**

**INDIAN**

**TELECOMMUNICATION**

**INDUSTRIES**

# PRODUCTS OF TELECOM

## EQUIPMENT

### MANUFACTURES

#### TERMINAL EQUIPMENT

- TELEPHONE SETS, PC'S, INTELLIGENT  
TERMINALS

#### SWITCHING SYSTEMS

- EPAD'S, RAX'S

#### DIGITAL CABLES

- JELLY FILLED CABLES
- SWITCHBOARD CABLES
- SWITCHBOARD CORDS
- JUMPER WIRES
- DROP WIRE

# INDIAN TELEPHONE

## INDUSTRIES

FACTORIES BANGALORE, NAINI, RAE  
LOCATED AT BARELI, MANKAPUR, PALGHAT

COMPLETE RANGE OF TELECOM PRODUCTS:

DIGITAL AND ANALOG SWITCHING SYSTEMS  
DIGITAL AND ANALOG TRANSMISSION SYSTEMS

- CARRIER SYSTEMS (OPEN WIRE)
- COAXIAL CABLE SYSTEMS
- NARROW AND WIDEBAND RADIO  
(VHF, UHF, MW)
- OPTICAL FIBRE LINE EQUIPMENT
- SATELITE SYSTEMS
- PCM SYSTEMS

SUBSCRIBER TERMINAL EQUIPMENT

EXPORTS MANY ITEMS IN WORLD MARKETS

GUJRAT COMMUNICATIONS &  
ELECTRONICS LIMITED

FACTORY LOCATED AT VADODRA (GUJRAT)

SUPPLERS OF ADVANCED TELECOM EQUIPMENT TO :

-DOT, RAILWAYS, DEFENCE, BROADCASTING,  
CIVIL AVIATION

PRODUCTS:

- TELEPHONE SETS
- PCM MUX (30 CHANNEL)
- MUTI-ACCESS RADIO TELEPHONE
- LOW POWER TV TRANSMITTER (100 W)
- NAVIGATIONAL AIDS

PUNJAB COMMUNICATIONS

LIMITED

FACTORY AT SAS NAGAR (PUNJAB)

PRODUCTS EPABX  
RAX  
PCM (30 CHANNEL)



INDCHEM ELECTRONICS LIMITED

FACTORY AT        MADRAS

PRODUCTS        EPABX  
                  RAX  
                  PC-TELEX UNIT  
                  MINICOMPUTERS  
                  GRAPHIC WORKSTATION  
                  KEYBOARDS  
                  MONITORS  
                  DIGITAL        MICROWAVE  
                  SYSTEMS (PLANNED)

CROMPION GREAVES

(ELECTRONICS)

FACTORIES AT BOMBAY, NASHIK, AHMEDNAGR.  
AURANGABAD

PRODUCTS TELEPHONE SETS  
EPABX  
PC  
DATA MODEM  
COMMUNICATION  
TERMINALS  
INDUSTRIAL ELECTRONICS  
TV SETS (COLOUR AND B&W)

BHARATI TELECOM LIMITED

FACTORY AT LUDHIANA (PUNJAB)

PRODUCTS ELECTRONIC PUSH BUTTON  
TELEPHONES  
TELEPHONE ANSWERING AND  
RECORDING MACHINES  
SWITCHING TELEPHONES  
CORDLESS TELEPHONES (PLANNED)

NEW ACTIVITIES PLANNED : FAX, RADIO PAGING

TATA KELTRON

FACTORY AT PALGHAT (KERALA)

PRODUCTIONS ELECTRONIC PUSH BUTTON  
TELEPHONES  
SWITCHING TELEPHONES  
COMPONENTS FOR TELEPHONES

BPL SYSTEMS AND PRODUCTS  
LIMITED

FACTORY AT PALGHAT, BANGLORE

PRODCUTS PLC AND ALLIED PRODUCTS,  
EPABX AND FAX'S  
TELEPHONE SETS  
RAX'S

SHYAMA COMMUNICATION

SYSTEMS

FACTORY AT        DELHI

PRODUCTS        EPABX  
TELEPHONE SETS  
COMPUTERS  
VHF/UHF TELEPHONE LINE  
EXTENDERS  
MULTI ACCESS RURAL  
RADIO  
DIGITAL UHF RADIO (10 &  
30 CHANNELS)  
TVRO (SATELLITE)  
MASTER ANTENNA TV SYSTEM  
COMMUNITY ANTENNA TV  
SYSTEM

APLAB

FACTORY AT THANE

PRODUCTS

TEST INSTRUMENTS  
POWER SUPPLY UNITS  
CABLE FAULT LOCATOR  
CARD FAULT LOCATOR  
CARD-OPERATED PAYPHONES

**FINOLEX CABLES LIMITED**

**FACTORY AT PUNE**

**PRODUCTS**  
**JELLY FILLED TELECOM CABLES**  
**AUTOMOTIVE CABLES**  
**POWER CABLES**  
**CONTROL CABLES**  
**PVC INSULTATED WINDING WIRES**

**SUPPLIERS TO DOT, DEFENCE, INDUSTRY**



DELTON CABLES LIMITED

FACTORIES AT DELHI, FARIDABAD AND  
DHARUHERA

PRODUCTS JELLY FILLED CABLES  
CONTROL CABLES  
INSTRUMENTATION & DATA CABLES  
SWITCHBOARD CABLES  
RF CABLES  
TELEPHONE CORDS  
SPECIAL CABLES

SUPPLIERS TO DOT, DEFENCE, RAILWAYS, INDUSTRY

KARNATAKA TELECABLES

LIMITED

FACTORY AT      MYSORE

PRODUCTS      JELLY FILLED TELECOM CABLES  
10-2400 PAIRS

SUPPLIERS TO    DOT

TELECOMMUNICATION INDUSTRY CO-OPERATION  
REQUESTED BY AFRICAN COUNTRIES

**REPORT ON**  
**PREPARATORY WORK CONDUCTED BY**  
**TCIL**  
**AS CONSULTANTS TO UNIDO**  
**FOR THE UNIDO WORKSHOP**  
**3-12 SEPTEMBER 1990**

## SCOPE OF STUDY

- OVERALL ASSESSMENT OF THE NEEDS OF AFRICA FOR TELECOM EQUIPMENT
- AFRICAN SCENE IN TELECOM EQUIPMENT MANUFACTURING
- EFFORTS UNDERWAY TO SET UP TELECOM INDUSTRIES
- PROSPECTS FOR TELECOM INDUSTRIES
- STUDY CONDUCTED TO IDENTIFY COUNTRY-SPECIFIC PROJECTS
- IDENTIFICATION OF INDIAN PARTIES FOR JOINT VENTURES

**ASSESSMENT OF THE NEEDS**

**OF AFRICA**

**FOR TELECOM EQUIPMENT**

**OVER THE NEXT TEN YEARS**

## DIGITAL SWITCHING SYSTEMS

PRESENT INSTALLED CAPACITY	4.5 MILLION LINES (MOSTLY ANALOG)
ASSESSED RATE OF GROWTH	10% ANNUALLY
ASSESSED CAPACITY AFTER 10 YEARS	11.65 MILLION LINES
INCREASE IN CAPACITY	7.17 MILLION LINES

## EXPECTED REQUIREMENT OF SWITCHING EQUIPMENT

LESS THAN 500 LINES CAPACITY (15% OF TOTAL)	1.75 MILLION LINES
BETWEEN 500-5,000 LINES (25% OF TOTAL)	2.91 MILLION LINES
ABOVE 5,000 LINES (60% OF TOTAL)	5.99 MILLION LINES -----
TOTAL	7.15 MILLION LINES -----

## TRANSMISSION SYSTEMS

### I) TERRESTRIAL SYSTEMS

#### RURAL

MARR 1,000 SYSTEMS WITH AVERAGE OF 6  
SUBSCRIBERS/ SYSTEM

VHFRADIO 8,000 HOPS

UHF RADIO 2,000 HOPS

#### URBAN

34 MBPH SYSTEMS 2,000 HOPS  
140 MBPH SYSTEMS 500 HOPS

### II) SATELLITE SYSTEMS

SMALL CAPACITY RURAL EARTH STATIONS 1,600

MEDIUM/LARGE URBAN EARTH STATIONS 200

### JII) PCM SYSTEM

#### LONG DISTANCE TRANSMISSION

FIRST ORDER MUX (30 CHANNEL) 18,000 SYSTEMS  
SECOND AND HIGHER ORDER 14,000 SYSTEMS

#### JUNCTION FOR LOCAL TELEPHONE SYSTEMS

PCM MUX 4,000 SYSTEMS

### IV) SUBSCRIBER APPARATUS

NEW CONNECTIONS 7 MILLION  
REPLACEMENTS 3 MILLION

TOTAL

---

10 MILLION

---

## EXTERNAL PLANT

UNDERGROUND CABLE  
@ 12 CKM/LINE  
CKM

85.5 MILLION

POST MATERIALS  
@ 3 POSTS/LINE  
POSTS

21.45 MILLION

DROP WIRE  
@ 0.2 KM/LINE

1.43 MILLION KM



## GENERAL REQUIREMENTS

### I) POWER PLANTS FOR TELEPHONE EXCHANGES

SMALL CAPACITY	3,500 UNITS
MEDIUM CAPACITY	582 UNITS
LARGE CAPACITY	1,000 UNITS

### II) POWER PLANTS FOR TRANSMISSION SYSTEMS

SMALL CAPACITY	30,000 UNITS
MEDIUM CAPACITY	4,500 UNITS
LARGE CAPACITY	1,000 UNITS

### iii) BROADCAST TV AND SOUND

TV RECEIVE ONLY TERMINALS	1,000 UNITS
DIRECT RECEIVING SETS	10,000 UNITS
RADIO NETWORKING RECEIVE ONLY EQUIPMENT	2,000 UNITS

### iv) METEROLOGY

DATA COLLECTION PLATFORMS	1,000
DISASTER WARNING SYSTEMS	1,000

## AFRICAN SCENE IN TELECOM EQUIPMENT MANUFACTURING

- NO MAJOR INDIGENOUS TELECOM INDUSTRY
- TOTAL DEPENDENCE ON WORLD MARKETS FOR TELECOM EQUIPT.
- MODEST INDIGENOUS INDUSTRIES NOW EXIST IN SOME COUNTRIES FOR : CABLES & WIRES, TELEPHONE SETS, SWITCHING & TRANSMISSIONS EQUIPMENT, COMPONENTS AND SPARE PARTS FOR MAINTENANCE
- INVESTMENT NEEDED FOR TELEPHONE EXPANSION

TELEPHONE DENSITY	TOTAL TELEPHONE EXISTING 4.5 M	INVESTMENT US \$
1/100 POPULATION	9 MILLION	10 BILLION
2/100 POPULATION	18 MILLION	32.5 BILLION
3/100 POPULATION	25 MILLION	50 BILLION

## **EFFORTS UNDERWAY TO SETUP TELECOM INDUSTRIES**

**UNIDO AND ITU HAVE CONDUCTED MANY STUDIES TO PROMOTE TELECOM INDUSTRIES IN AFRICA.**

**SOME OF THESE ARE :**

- **UNIDO SEMINAR IN HARARE IN JANUARY 1986**
  
- **ZIMBABWE PTC'S TELECOM DEVELOPMENT PLAN 1986-2006 PREPARED BY ITU**
  
- **ITU/UNIDO/UNDP PREFEASIBILITY STUDY IN DECEMBER 1988 FOR MANUFACTURE OF TELECOM ITEMS IN AFRICA**
  
- **TECHNICAL PREPARATORY MEETING OF UNIDO HELD IN SAO PAULO, BRAZIL IN MAY 1989**
  
- **UNIDO CONFERENCE ON NATIONAL STRATEGIES AND INTERNATIONAL COOPRATION ON TELECOM INDUSTRIES IN AFRICA HELD IN ARUSHA, TANZANIA IN DECEMBER 1989**

**PROSPECTS FOR TELECOM INDUSTRIES  
IN AFRICA**

## **FINDINGS OUT OF THE STUDIES CONDUCTED**

**THE DRIVING FORCE FOR REGIONAL TELECOMS  
MANUFACTURE HAS TO COME FROM A GUARANTEE OF  
PTC MARKETS**

**SOME OF THE OBSTACLES TO FOREIGN AND LOCAL  
INVESTMENTS ARE**

- \* ACTUAL AND PERCEIVED RISKS OF UNDERTAKING  
INVESTMENTS**
- \* FOREIGN EXCHANGE RESTRICTIONS**
- \* HIGH COST IN A HIGHLY REGULATED  
ENVIRONMENT**
- \* UNCERTAINTY OF DEMANDS**

**THERE ARE ELECTRONICS CAPABILITIES IN SOME OF  
THE PTC FACTORIES AND REPAIR SHOPS**

- CAPABILITIES OF LOCAL SUPPLIERS ARE MOSTLY  
MECHANICAL AND ELECTRICAL**
- MANY LOCAL SUPPLIERS ARE OPERATING AT A  
SMALL PERCENTAGE OF INSTALLED CAPACITY**

**TCIL'S STUDY TO IDENTIFY  
COUNTRY - SPECIFIC PROJECTS**

**COUNTRY VISITED : MAURITIOUS, MADAGASCAR  
KENYA, ZIMBABWE,  
NIGERIA, CAMEROON AND  
TUNISIA**

## MAURITIUS

- MAURITIUS TELECOMMUNICATIONS SERVICES HAS A MASSIVE EXPANSION PLAN TO BE COMPLETED IN 3 YEARS WHEN TELECOM SERVICES WOULD GET NEAR SATURATION
- LOCAL PRODUCTION FOR MTS AFTER EXPANSION MAY NOT BE VIABLE
- ANY FACTORY TO BE SET UP WILL HAVE TO BE FOR SUPPLIES OUTSIDE MTS AND FOR EXPORTS
- IDENTIFIED PRODUCTS WITH INDIAN ASSISTANCE ARE:

ITEM	ANNUAL PRODUCTION	INVESTMENT US \$ MILLION
PABX	50,000 LINES	2
TELEPHONE SETS	50,000	1.5
PC'S		
INTELLIGENT TERMINALS	5,000	1
TELEPHONE CABLE	250,000 CKM	10

## MADAGASCAR

- VERY FEW INDUSTRIAL UNDERTAKINGS IN MADAGASCAR
- TELEPHONE SYSTEM HAS MANY MANUAL EXCHANGES IN RURAL AREAS AND SPARES ARE DIFFICULT TO OBTAIN
- DEVELOPMENT WORK UNDERTAKEN IN LABORATORIES OF PTT FOR MODERN TYPES OF EQUIPMENT AND THERE IS NEED FOR FABRICATION FACILITIES FOR ELECTRONIC ITEMS

### RECOMMENDATION

#### FACTORY FOR PRODUCTION OF

ITEM	ANNUAL PRODUCTION	INVESTMENT US \$ MILLION
SWITCH BOARD CORD		
SWITCH BOARD	100,000 M	
CABLES		1.5
JUMPER WIRE	500,000 M	
DROP WIRE	200,000 M	
PCB PLANT	-	0.5
FOR LABORATORY		
REPAIR SHOP	-	0.5



## KENYA

- MANUFACTURING FOR KENYA PTC IS UNDERTAKEN IN KENYA PTC FACTORY
- KENYA HAS EXTENSIVE PLANS FOR EXPANSION OF TELECOM SERVICES, ESPECIALLY IN THE RURAL AREAS OF NORTHERN AND EASTERN AREAS
- POSSIBLE PRODUCTS IDENTIFIED FOR DISCUSSIONS IN THE NEW DELHI WORKSHOP ARE RAX'S AND EPABX'S.

ANNUAL PRODUCTION

50,000 LINES

INVESTMENT

3 MILLION US \$

## ZIMBABWE

- ZIMBABWE IS HAVING BASIC INDUSTRIES FOR PRODUCTION OF ELECTRONIC ITEMS
- PTC FACTORY IS UNDERTAKING ASSEMBLY OF TELECOM ITEMS BY OBTAINING SUBSYSTEMS FROM LOCAL MANUFACTURERS
- PTC IS HAVING A JOINT VENTURE FOR PRODUCTION OF SOME ELECTRONIC ITEMS
- PRODUCTS IDENTIFIED FOR PRODUCTION WITH INDIAN ASSISTANCE :

ITEM	ANNUAL POPULATION	INVESTMENT US \$ MILLION
TELEPHONE SETS	50,000	1.5
PCM EQUIPMENT	1,000	2
INTELLIGENT TERMINALS	5,000	1
MODEMS	TO BE ASSERTED	-

## NIGERIA

- NITEL HAS PLANS TO ADD ADDITIONAL 600,000 LINES DURING 1990-94
- ANNUAL REQUIREMENT ABOUT 150,000 LINES OUT OF WHICH 20,000 LINES ARE FOR RURAL EXCHANGES
- PRODUCT IDENTIFIED FOR MANUFACTURE IN A JOINT VENTURE WITH INDIAN PARTY IS FOR TELEPHONE SETS

ANNUAL PRODUCTION	250,000 NO'S
INVESTMENT	2.5 MILLION US \$

## CAMEROON

- WITH THE FREE-TRADE FACILITIES IN THE NEIGHBOURING FRENCH SPEAKING COUNTRIES AND COMMON CURRENCY IN THE REGION, POSSIBILITIES EXIST FOR GOOD MARKET
- THE INDUSTRY REPRESENTATIVE IN THE DELEGATION HAS ALREADY GOT A FEASIBILITY STUDY CONDUCTED FOR SETTING UP A TELECOM CABLE MANUFACTURING PLANT. THIS COULD BE DISCUSSED WITH INDIAN MANUFACTURER IN THE NEW DELHI WORKSHOP

ANNUAL PRODUCTION

250,000 CKM

INVESTMENT

10 MILLION US \$

## TUNISIA

- QUITE A FEW ELECTRONIC MANUFACTURING FACTORIES  
EXIST IN TUNISIA

- PRODUCTS IDENTIFIED FOR MANUFACTURE WITH  
INDIAN ASSISTANCE ARE :

ITEM	ANNUAL PRODUCTION	INVESTMENT US \$ MILLION
TELEPHONE SETS	50,000	1.5
PABX'S	50,000 LINES	2

## IDENTIFICATION OF INDIAN PARTIES FOR JOINT VENTURES

- TCIL ADDRESSED ALL TELECOM EQUIPMENT & CABLE MANUFACTURERS IN INDIA ASCERTAINING THEIR WILLINGNESS TO SET UP JOINT VENTURES IN AFRICA WITH EQUITY PARTICIPATION
  
- BASED ON THE RESPONSE RECEIVED FROM THE INDIAN PARTIES, HELD A MEETING TO IDENTIFY THE PRODUCTS AND PARTIES FOR BILATERAL DISCUSSIONS WITH AFRICAN INDUSTRIALISTS
  
- OTHER ORGANISATIONS LIKE MANUFACTURERS' ASSOCIATION ALSO CONSULTED
  
- THE PRODUCTS IDENTIFIED FOR INDUSTRIES IN AFRICA WITH INDIAN PARTICIPATION ARE: TELEPHONE SETS, EPABX'S, RAX'S PCM EQUIPMENT, PC'S INTELLIGENT TERMINALS, MODEM, AND TELECOM CABLES
  
- PROFILE OF THE INDIAN PARTIES WILL BE PRESENTED DURING THE WORKSHOP

ANNEX IV

RESULTS OF BILATERAL DISCUSSIONS

<b>Proposer or Main Beneficiary</b>	<b>Indian Counterpart Organization</b>	<b>Type of Co-operation</b>
<b>1. ANGOLA</b>	<b>TCIL</b>	<b>Provision of services</b>
<p>Project: Supply of maintenance services for the national telecommunications system; consultancy services for planning, project supervision, material procurement, equipment purchases for telecommunications management and subscriber services.</p> <p>Memorandum of Understanding signed</p>		
<b>2. ANGOLA</b>	<b>Bharat Electronics</b>	<b>Technology transfer and equipment supply for rehabilitation</b>
<p>Project: Supply and installation of microwave band tropscatter transmission systems; technical study of Indian equipment and Angolan requirements with a view to adapting Bharat Electronics rural telecommunication technology to Angolan conditions; supply of spare parts for existing network equipment from other Indian sources.</p>		
<b>3. ANGOLA</b>	<b>Himachel Futuristic Communications</b>	<b>Technology transfer and equipment supply</b>
<p>Project: Technical trials of the HF-8 1 + 7 analogue subscriber carrier system enabling improved utilization of cable-pair resources in Angola; also 1 + 1 version.</p>		
<b>4. CAMEROON</b>	<b>Priyarag Electronics</b>	<b>Technology transfer</b>
<p>Project: Assembly of telephone instruments from SKD kits.</p>		
<b>5. CAMEROON</b>	<b>Shyam Computer Systems</b>	<b>Technology transfer</b>
<p>Project: Direct purchase and setting up of assembly plant for telephone instruments and PCs using SKD kits.</p>		
<b>6. CAMEROON</b>	<b>Finolex cables</b>	<b>Technology transfer</b>
<p>Project: Setting up a plant to manufacture telecommunications and electrical cables with a maximum investment of \$1.5 million.</p>		

Proposer or Main Beneficiary	Indian Counterpart Organization	Type of Co-operation
7. CAMEROON	ESPL	Technology transfer, training and equipment supply
Project: Local representation, engineering and after-sales service, plus transfer of technology engineering support, maintenance and local manufacture of PC computers and modems.		
Memorandum of Understanding signed.		
8. KENYA	Bharat Electronics	Technology transfer
Project: Technology transfer for manufacture of domestic satellite communication equipment.		
9. KENYA	Himachal Futuristic Communications	Technology transfer
Project: Technology transfer for manufacture of subscriber carrier systems.		
Memorandum of Understanding signed.		
10. KENYA	ITI	Technology transfer
Project: Technology transfer for manufacture of rural communications systems and domestic satellite communication equipment.		
11. KENYA	TCIL	Technology transfer
Project: To identify the parameters necessary for improving the existing manufacturing establishment and planning expansion of both manufacturing and research facilities, together with a related training programme.		
Memorandum of Understanding signed.		
12. MAURITIUS	Finolex Cable	Technology transfer
Project: Manufacture of large-scale cable - for 300 prs. and above.		
Memorandum of Understanding signed.		
13. NIGERIA	C-DOT	Technology transfer
Project: Transfer of RAX/MAX technology, establishment of an R and D centre for electronic switching; establishment of a software centre (for NITEL); transfer of technology for digital radio MUX.		



<b>Proposer or Main Beneficiary</b>	<b>Indian Counterpart Organization</b>	<b>Type of Co-operation</b>
<b>14. NIGERIA</b>	<b>Bharti Telecom</b>	<b>Technology transfer</b>
Project: Joint venture and transfer of technology to manufacture 100,000 telephone instruments per annum.		
Memorandum of Understanding signed.		
<b>15. NIGERIA</b>	<b>ITI</b>	<b>Technology transfer or joint venture</b>
Project: Transfer of technology and/or investment to manufacture telephone sets, RAX, EPABX, PCM.		
<b>16. NIGERIA</b>	<b>Crompton Greaves</b>	<b>Technology transfer or joint venture</b>
Project: Transfer of technology and/or investment to manufacture telephone instruments, RAX, EPABX and other products.		
Memorandum of Understanding signed.		
<b>17. NIGERIA</b>	<b>PCL</b>	<b>Technology transfer or joint venture and equipment supply</b>
Project: Transfer of technology and/or investment to manufacture RAX, EPABX.		
<b>18. NIGERIA</b>	<b>APLAB</b>	<b>Technology transfer</b>
Project: Transfer of technology to manufacture 5,000 units/year of card-operated pay phones.		
Memorandum of Understanding signed.		
<b>19. SENEGAL</b>	<b>TCIL</b>	<b>Equipment supply and manufacturing</b>
Project: Manufacture of cables and rural systems in co-operation with other African countries such as Congo and Zaire.		
<b>20. TOGO</b>	<b>Shyam Antenna</b>	
Project: (To come - Re interest in satellite communication, computers, EPABX and telephones.)		

<b>Proposer or Main Beneficiary</b>	<b>Indian Counterpart Organization</b>	<b>Type of Co-operation</b>
<b>21. TOGO</b>	<b>TCIL</b>	<b>Provision of services</b>
Project: Provision of Indian expertise to Togo on reorganization and management aspects of the national telecommunications network, including computerization of telephone accounting and on-the-job training in maintenance.		
<b>22. TOGO</b>	<b>Himachal Futuristic Communications</b>	<b>Supply of equipment</b>
Project: Supply of an analogue subscriber carrier system.		
Memorandum of Understanding signed.		
<b>23. TUNISIA</b>	<b>Swede India</b>	<b>Technology transfer or joint venture</b>
Project: Supply of equipment, investment and/or technology transfer for manufacture by local assembly or full indigenous production of push-button telephone sets.		
<b>24. TUNISIA</b>	<b>ESPL</b>	<b>Technology transfer</b>
Project: Technology transfer for manufacture by local assembly or full indigenous production of computerized fax machines.		
<b>25. UGANDA</b>	<b>ITI</b>	<b>Technology transfer or joint venture</b>
Project: Investment and/or technology transfer for local assembly (SKD or CKD) of push-button telephone instruments and small exchanges.		
Memorandum of Understanding signed.		
<b>26. UGANDA</b>	<b>BPL</b>	<b>Technology transfer or joint venture</b>
Project: Investment and/or technology transfer for local assembly (SKD or CKD) of push-button telephone instruments and small exchanges.		
<b>27. UGANDA</b>	<b>Bharat Electronics</b>	<b>Technology transfer or joint venture</b>
Project: Investment and/or technology transfer for local assembly (SKD or CKD) of push-button telephone instruments and small exchanges.		

<b>Proposer or Main Beneficiary</b>	<b>Indian Counterpart Organization</b>	<b>Type of Co-operation</b>
<b>28. UGANDA</b>	<b>Bharati Telecom Ltd.</b>	<b>Technology transfer and joint venture</b>
<p>Project: Investment and/or technology transfer for setting up a joint venture for manufacture of telecommunication items in Uganda.</p> <p>Memorandum of Understanding signed.</p>		
<b>29. TANZANIA</b>	<b>TCIL</b>	<b>Consulting</b>
<p>Project: Assistance in computerization of PTC activities, especially in the area of financing (billing, use of money orders, inventory control, telex billing and maintenance control) and planning (short- and long-term and development planning).</p> <p>Memorandum of Understanding signed.</p>		
<b>30. TANZANIA</b>	<b>Crompton Greaves</b>	<b>Technology and know-how transfer</b>
<p>Project: Manufacture of telephone instruments, EPABX and other electrical items.</p> <p>Memorandum of Understanding signed.</p>		
<b>31. TANZANIA</b>	<b>Himachal Futuristic Communications</b>	<b>Technology and know-how transfer</b>
<p>Project: Technology transfer for local manufacture of the 1 + 7 analogue subscriber carrier systems.</p> <p>Memorandum of Understanding signed.</p>		
<b>32. TANZANIA</b>	<b>Punjab Communication Ltd.</b>	<b>Technology and know-how transfer</b>
<p>Project: Technology transfer for local manufacture of RAX systems, small exchanges, small capacity, radio systems.</p>		
<b>33. TANZANIA</b>	<b>CMC</b>	<b>Technology and know-how transfer</b>
<p>Project: Assistance in the establishment of a national information technology development centre.</p>		

<b>Proposer or Main Beneficiary</b>	<b>Indian Counterpart Organization</b>	<b>Type of Co-operation</b>
<b>34. TANZANIA</b>	<b>TCIL</b>	<b>Technology and know-how transfer</b>
<p>Project: Assistance in preparation of a comprehensive feasibility study to cover the long-term development of the telecommunication and electronics industry in Tanzania.</p> <p>Memorandum of Understanding signed.</p>		
<b>35. ZAMBIA</b>	<b>ESPL</b>	<b>Technology transfer or joint venture</b>
<p>Project: Local representation, engineering and after-sales service, plus transfer of technology engineering support, maintenance and local manufacture of PC computers and modems.</p>		
<b>36. ZAMBIA</b>	<b>APLABA</b>	<b>Technology transfer or joint venture</b>
<p>Project: Local representation, engineering and after-sales service, plus transfer of technology engineering support, maintenance and local manufacture of smartcard pay telephones.</p>		
<b>37. ZAMBIA</b>	<b>Priyaraj Electronics</b>	<b>Technology transfer or joint venture</b>
<p>Project: Supply of kits and transfer of technology for local assembly and indigenous manufacture of push-button telephones.</p>		
<b>38. ZIMBABWE</b>	<b>Crompton Greaves</b>	<b>Technology transfer</b>
<p>Project: Transfer of technology for the setting up of a unit for assembly and testing of electronic EPABX.</p> <p>Memorandum of Understanding signed.</p>		
<b>39. ZIMBABWE</b>	<b>Crompton Greaves (with other Zimbabwean industrialist)</b>	<b>Technology transfer</b>
<p>Project: Transfer of technology for the setting up of a unit for assembly and testing of electronic EPABX.</p> <p>Memorandum of Understanding signed.</p>		

<b>Proposer or Main Beneficiary</b>	<b>Indian Counterpart Organization</b>	<b>Type of Co-operation</b>
<b>40. ZIMBABWE</b>	<b>APLAB</b>	<b>Technology transfer</b>
Project: Investment, technology transfer and training for manufacture of smart card-operated payphone.		
<b>41. ZIMBABWE</b>	<b>PGL</b>	<b>Technology transfer</b>
Project: Manufacture of 30-channel pulse code modulation multiplexing equipment with a 2 Mb/s bit rate.		
<b>42. ZIMBABWE</b>	<b>Tata Keltron</b>	<b>Technology transfer</b>
Project: Manufacture of EPABX systems, upgraded and adapted to Zimbabwe specifications, including a VDU operations consul and access diagnostics also on the smallest exchanges.		
<b>43. ZIMBABWE</b>	<b>Shyam Amt</b>	<b>Technology transfer</b>
Project: Technology and training for manufacture and installation of a data network of intelligent terminals.		
<b>44. ZIMBABWE</b>	<b>Mahendra Group</b>	<b>Technology transfer</b>
Project: Manufacture fax adapter for a PC together with scanner and digitizer.		
<b>45. ZIMBABWE</b>	<b>Bergen Associates</b>	<b>Technology transfer</b>
Project: Purchase of equipment for manufacturing electronics systems.		
<b>46. ZIMBABWE</b>	<b>ESPL</b>	<b>Technology transfer and equipment supply</b>
Project: Technology transfer and equipment supply for local manufacturing of PC range systems and process control systems. Outright purchase of pre-assembled 80286/80386 chip based PC's.		
Memorandum of Understanding signed.		
<b>47. ZIMBABWE</b>	<b>ESPL</b>	<b>Technology transfer and equipment supply</b>
Project: Technology transfer and equipment supply for local manufacturing of PC based intelligent terminals for networking purposes.		
Memorandum of Understanding signed.		

Proposer or Main Beneficiary	Indian Counterpart Organization	Type of Co-operation
------------------------------	---------------------------------	----------------------

---

48. ZIMBABWE

Gujarat Communication and Electronics (GCEL) Technology transfer or joint venture

Project: Possible co-operation for the manufacture of PCM equipment.

Memorandum of Understanding signed.

20 September 1990

LIST OF PARTICIPANTS

WORKSHOP FOR AFRICAN AND ARAB COUNTRY REPRESENTATIVES  
FROM THE TELECOMMUNICATIONS INDUSTRY  
(THROUGH PARTICIPATION AT 'ELECTRONICS INDIA '90 - EXHIBITION AND CONFERENCE  
ON ELECTRONICS INDUSTRY IN INDIA')

New Delhi, India  
3 - 12 September 1990

PARTICIPANTS

Mr. Joe Gualberto DE MATOS  
General Director  
ENATEL  
Caixa Postal 1321  
Luanda  
Angola

Telephone: 331032  
Telex: 3030 enatel an  
Fax: 391032

Mr. Calvin Evina ABOSSOLO  
President  
Industrial Electronics Cameroon S.A.  
Boite postale 4512  
Douala  
Cameroon

Telephone: (237) 42 95 97  
Telex: 5941 ctaei  
Fax: (237) 42 07 54  
(pabx extension 209)

Mr. Benoit Roger MOUTASSI  
Ministère des postes et télécommunications  
Province Delegate of  
Telecommunications  
Adamaoua Province  
Ngaoundere  
Cameroon

Telephone: 237-25 10 03  
Telex: 4772 kn  
Fax: 237-25 20 25

Mr. Abdel Wahab el DOKKY  
Chief  
Sector for Planning and Follow-up  
ARENTO  
P.O. Box 2271  
Cairo  
Egypt

Telex: 20393 radmsr unu

Mr. Yahia Aly KHATTAB  
Chief  
Sector for Technical Affairs  
Egyptian Telephone Company  
c/o P.O. Box 2271  
Cairo 11511  
Egypt

Telephone: 3504985 or 3500477  
Telex: 92236 cairo  
Fax: c/o 771306 cairo

Mr. KIMARI  
K.P. and T. Corporation  
Gilgil Complex  
P.O. Box 250  
Gilgil  
Kenya

Telephone: (03671) 2014/2223  
Telex: 39053 KTI KE

Mr. Alexander J. MAINA  
Assistant Production Manager/Electronics  
K.P. and T. Corporation  
Gilgil Complex  
P.O. Box 250  
Gilgil  
Kenya

Telephone: (03671) 2014/2223  
Telex: 39053 KTI KE



Mr. F. WASILWA  
General Manager  
Gilgil Multipurpose Manufacturing Complex  
P.O. Box 250  
Gilgil  
Kenya

Telephone: Nairobi 27401 Ext. 3020  
Telex: 39053 ktike

Mr. Sonny MOOLLAN  
Director  
Plasmo Ltd.  
P.O. Box 314  
Port Louis  
Mauritius

Telephone: (230) 212 1114  
Telex: 4602 asmo iw  
Fax: (230) 212 2379

Mr. Folagbade E. ALAMUDUN  
General Manager  
Nigerian Telecommunications Ltd.  
(NITEL)  
Post Mail Box 5716  
Ibadan  
Nigeria

Telex: 36399 gmsw

Mr. Ishaq Tunde OKUNOLA  
Marketing and Policy Manager  
Murhi International (Nig.) Ltd.  
P.O. Box 4260  
Ikeja, Lagos  
Nigeria

Telex: 20202 tds ikj ng. (attn. box 711)  
Telephone: 964789, 901870

Mr. Adeniji RAJI  
BTN (Nig.) Limited  
P.O. Box 54962  
Ikoyi  
Lagos  
Nigeria

Mr. Leon Charles CISS  
Director of Studies and  
Development  
Société nationale des télécommunications  
du Senegal (SONATEL)  
Boite postale 69  
Dakar  
Senegal

Telephone: (221) 21 96 36  
Telex: 1296 sntdg b sg  
Fax: (221) 22 14 92

Mr. Ayikoe KOSSIVI  
Director of Telecommunications  
Ministry of Posts and Telecommunications  
(OPTT)  
Lome  
Togo

Telex: 5245 postel tg

Mr. Sadok GHANOUCI  
Director-General for Planning  
and Training  
Ministry of Communications  
3 bis rue d'Angleterre  
1030 Tunis  
Tunisia

Telephone: 34 53 50  
Telex: 13 900 tun  
Fax: 343 777

Mr. Christopher Columbus SEMBUYA  
Chairman  
Sembule Steel Mills  
P.O. Box 15182  
Kampala  
Uganda

Telephone: (256) 41 257498 or  
(256) 41 270146  
Telex: 61371

Mr. K.M. VENKATESH  
Chief Electrical Engineer  
Sembule Steel Mills  
P.O. Box 15182  
Kampala  
Uganda

Telephone: (256) 41 257498 or  
(256) 41 270146  
Telex: 61371

Mr. Bachubila I. MBAKILEKI  
Chief Executive Engineer  
Corporate Planning  
Tanzania Posts and Telecommunications  
Corporation  
P.O. Box 9394  
Dar-es-Salaam  
United Republic of Tanzania

Telephone: 3115 or 38822  
Telex: 41054

Mr. Isack L. MASALA  
Director of Operations  
National Development Corporation  
P.O. Box 2669  
Dar-es-Salaam  
United Republic of Tanzania

Telephone: 25161 (Direct)  
Telex: 41068 natdev  
Fax: 26271

Mr. Churchill F. MUTALE  
General Manager  
Horizon Communications Systems Ltd.  
P.O. Box 35110  
Lusaka  
Zambia

Telephone: (260) 122 9149  
Telex: 42910 eritel za  
Fax: 2601 22 91 50

Mr. Samuel David Chiterera DUMA  
Executive Factory Manager  
Posts and Telecommunications Corp. Factory  
P.O. Box AY 130  
Amby  
Harare  
Zimbabwe

Telex: 24 445  
Fax: 263-4 73 19 80

Mr. Beau FRIEND  
General Manager  
Communications Systems of Zimbabwe  
P.O. Box 1082  
Harare  
Zimbabwe

Telephone: 791964/5  
Telex: 26486 zw  
Fax: 793799

Mr. A.E. RODLEY  
Telkom Systems  
P.O. Box: 5135  
Harare  
Zimbabwe

Telex: 25138 wrs zw

LIST OF INDIAN DELEGATES

Mr. Y.L. AGARWAL  
Chairman and Managing Director  
Telecommunications Consultants India Ltd.  
Chiranjiv Tower, 3rd Floor  
43, Nehru Place  
New Delhi-110 019  
India

Telephone: 6438514  
Telex: 031-62935 or 62135  
Fax: 6435398

Mr. Ravi AILAWADHI  
Regional Manager  
Indchem Electronics  
124-A Lattice Bridge Rd.  
Adyar  
Madras-600 020  
India

Telephone: 418978 or 418387  
Telex: 041-21029 ndil-in  
Fax: 91-44-413072

Mr. Neeraj ARORA  
Sales Engineer  
Tata Telecom Ltd.  
2nd Floor, Devika Tower  
6, Nehru Place  
New Delhi-110 019  
India

Telephone: 6463302 or 6464145  
Telex: 71407

Mr. R.D. ARYA  
General Manager  
Gujarat Communications and Electronics Ltd.  
Anurag Commercial Centre, Race Course  
Baroad-390 005  
India

Telephone: 324514 or 324495  
Telex: 0175596  
Fax: 0265-42279

Mr. C.L. BEDI  
General Manager  
Shyam Antenna Electronics (P) Ltd.  
A-60, Naraina Industrial Area  
Phase-I  
New Delhi-110 028  
India

Telephone: 5439606  
Telex: 031-62973

Mr. Y.S. CHOUDHARY  
Vice President (Mktg)  
Himachal Futuristic Comm. Ltd.  
1202, Chiranjiv Tower, 12th Floor  
Nehru Place  
New Delhi-110 019  
India

Telephone: 6468409  
Fax: 6427355

Mr. Viresh DAYAL  
General Manager  
Bharti Telecom Ltd.  
15th Floor, Devika Tower  
6, Nehru Place  
New Delhi-110 019  
India

Telephone: 6415769 or 6443871  
Telex: 31-62043 botc in

Mr. R.C. DHINGRA  
Resident General Manager  
BPL Systems and Projects Ltd.  
304, Ashok Bhawan  
93, Nehru Place  
New Delhi-110 019  
India

Telephone: 6433865  
Telex: 031-71009

Mr. V.M. JOHARI  
Manager (Export)  
Bharat Electronics Ltd.  
116/2, Race Course Road  
Bangalore-560 001  
India

Telephone: 267322  
Telex: 0845-2477 BE IN  
Fax: 812-258410

Mr. S.R. JOSHI  
Telecom Department  
Crompton Greaves Ltd.  
27, Rani Jhansi Road  
New Delhi  
India

Telephone: 737671 or 514910  
Telex: 031-63230 cgle in  
Fax: 011-514055

Mr. R. KAPUR  
Punjab Communication Limited  
C-134-135, Phase VIII  
Industrial Area  
Sas Nagar  
Punjab-160 059  
India

Telephone: (91)-172-8-7516  
Telex: (81)-0395-366 pclx in

Mr. Vivek KAPUR  
Punjab Communications Limited  
C-134-135, Phase VIII  
Industrial Area  
Sas Nagar  
Punjab-160 059  
India

Telephone: (91)-172-8-7516  
Telex: (81)-0395-366 pclx in

Mr. A. KHANNA  
Shyam Antenna Electronic (P) Ltd.  
A-60, Naraina Industrial Area  
Phase-I  
New Delhi  
India

Telephone: 5439606  
Telex: 031-62973

Mr. V.K. KOSHY  
General Manager (Export)  
Baharat Electronics Ltd.  
116/2, Race Course Road  
Bangalore-560 001  
India

Telephone: 267322  
Telex: 0845-2477 BE IN  
Fax: 812-258410

Mr. V. KRISHNAN  
Addl. General Manager  
ITI, Bangalore  
Corporate Office  
45/1, Magrath Road  
Bangalore-560 C25  
India

Telephone: 566116  
Telex: 0845-8222



Mr. Ashok KUMAR  
Executive Secretary  
T.E.M.A.  
355, Asiad Village  
New Delhi  
India

Telephone: 6442422

Mr. Naresh KUMAR  
Sr. Marketing Manager  
Finolex Cables Ltd.  
205, B.M.C. House  
N-1, Connaught Circus  
New Delhi-110 001  
India

Telephone: 3324748  
Telex: 62078

Mr. LAKSHMINARAYANA  
ITI Ltd.  
Corporate Office  
45/1, Magrath Road  
Bangalore-560 025  
India

Telephone: 566116  
Telex: 0845-8222

Mr. S. Badari NARAYANA  
ITI Ltd.  
Corporate Office  
45/1, Magrath Road  
Bangalore-560 025  
India

Telephone: 566116  
Telex: 0845-8222

Mr. Satyan NAYAR  
Sales Manager  
Swede India Teltronics  
42, M.G. Road  
Bangalore-560 001  
India

Telex: 0845-8270 sitl

Mr. R.M. ONKAR  
Punjab Communication Limited  
C-134-135, Phase VIII  
Industrial Area  
Sas Nagar  
Punjab-160 059  
India

Telephone: (91)-172-8-7516  
Telex: (81)-0395-366 pclx in

Mr. Ashish PAUL  
Regional Manager  
Tata Keltron Ltd.  
C-25 Nizamudin East  
New Delhi  
India

Telephone: 694837

Mr. P. Rajamohan RAO  
Managing Director  
Priyaraj Electronics (P) Ltd.  
No. 777G - 100, Feat Road  
Indiranagar  
Bangalore  
India

Telephone: 561057 or 562711  
Telex: 845-2442 Purein  
Fax: 91-812-562075 purein

Mr. P. ROY  
Telecom Department  
Crompton Greaves Ltd.  
27, Rani Jhansi Road  
New Delhi  
India

Telephone: 737671 or 514910  
Telex: 031-63230 cgle in  
Fax: 011-514055

Mr. Ashok SAPRA  
General Manager (Telecom)  
Karnataka Telecables Ltd.  
Hebbal Kaibo Indl. Area  
Mysore (Karnataka)  
India

Telex: 0846-208 ktl in

Mr. S. SEN  
Telecom Dept.  
Crompton Greaves Ltd.  
27, Rani Jhansi Road  
New Delhi  
India

Telephone: 737671 or 514910  
Telex: 031-63230 cgle in  
Fax: 011-514055

Ms. Madhumanti SENGUPTA  
Crompton Greaves Ltd.  
27, Rani Jhansi Road  
New Delhi  
India

Telephone: 737671 or 514910  
Telex: 031-63230 cgle in  
Fax: 011-514055

Mr. Kuljeet SINGH  
Manager - Sales  
Karnataka Telecables Ltd.  
Hebbal Kaibo Indl. Area  
Mysore (Karnataka)  
India

Telex: 0846-208 ktl in

Mr. V. SUBRAMANIYAN  
General Manager  
Indchem Electronics  
124-A Lattice Bridge Rd.  
Adyar  
Madras-600 020  
India

Telephone: 418978 or 418387  
Telex: 041-21029 ndil-in  
Fax: 91-44-413072

Mr. R.K. TASKAR  
Vice President  
Crompton Greaves Ltd.  
1, Dr. V.B. Gandhi Marg.  
Bombay-400 023  
India

Telephone: 270695  
Telex: 011-2207

Mr. K. VENKATARAMAN  
Senior Engineer  
Corporate Quality Network  
I.T.i.  
Corporate Office  
45/1, Magrath Road  
Bangalore-560 025  
India

Telephone: 566116  
Telex: 0845-8222

UNIDO STAFF MEMBERS

Mr. Krishnaswamy VENKATARAMAN  
Director  
Industrial Technology Development Division  
Department for Industrial Promotion, Consultations and  
Technology  
United Nations Industrial Development Organization (UNIDO)  
P.O. Box 300  
A-1400 Vienna  
Austria

Telephone: 21131 Ext. 3728  
Telex: 135612  
Fax: 232156

Mr. Anthony SPINA  
Industrial Development Officer  
Informatics Unit  
Industrial Technology Development Division  
Department for Industrial Promotion, Consultations and  
Technology  
UNIDO

Telephone: 21131 Ext. 3359  
Telex: 135612  
Fax: 232156

Mr. Peter ELLWOOD  
Industrial Development Officer  
Section for Economic Co-operation among Developing Countries  
Area Programmes Division  
Department for Programme and Project Development  
UNIDO

Telephone: 21131 Ext. 5538  
Telex: 135612  
Fax: 232156