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# REPORT ON PROSPECTS OF TECHNOLOGICAL COOPERATION BETWEEN TELECOMMUNICATION INDUSTRIES OF BANGLADESH, NEPAL AND INDIA*

US/RAS/92/076

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* Mention of company names and commercial products does not imply the endorsement of the United Nations Industrial Development Organization (UNIDO). The views expressed in this document are those of the author and do not necessarily reflect the views of the Secretariat of UNIDO. This document has not been edited.

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## EXPLANATORY NOTES

VALUE OF LOCAL CURRENCIES

1 US $ = 31.5 INDIAN RUPEES

1 US $ = 41.0 TAKA (BANGLADESH CURRENCY)

1 US $ = 49.0 NEPALESE RUPEES

LIST OF ABBREVIATIONS

ADP - Annual Development Plans (Bangladesh)

BCS - Bangladesh Cable Shilpa Ltd., Khulna, Bangladesh

BEL - Bharat Electronics Ltd., India

BMRE - Balancing, Modernisation, Replacement, and Expansion Plan (Terminology used in Bangladesh)

BOI - Board of Investments, Bangladesh

BRTA - Bangladesh Rural Telecom Authority,Dhaka, Bangladesh

BTTB - Bangladesh Telephone & Telegraph Board

BUET - Bangladesh University of Engineering and Technology

CACT - Component Approval Centre for Telecommunications, Bangalore, India

CDOT - Centre for Development of Telematics, New Delhi, India

DCC - Development Coordination Committee (Deptt. of Telecom), India

DOE - Department of Electronics, India

DOT - Department of Telecommunications, India

DRDO - Defence Research & Development Orgn., Government of India

ERTL - Electronic Regional Testing Laboratories, India

FDCCI- Federation of Bangladesh Chambers of Commerce and Industries, Bangladesh

FNCCI- Federation of Nepalese Chambers of Commerce, and Industries.

FINNIDA- Finish International Development Agency

FIPB - Foreign Investment Promotion Board, India

IIT - Indian Institute of Technology, India

ILT - Integrated Local and Transit Exchange (Developed by ITI, India)

ITI - Indian Telephone Industries Ltd. Bangalore, India

NTC - Nepal Telecom Corporation, Nepal

PCM - Pulse Code Modulation

QA - Quality Assurance, DOT, India

RAX - Rural Automatic Exchange

STQC - Directorate of Standards, Testing and Quality Control, Department of Electronics, India

TCIL - Telecommunications Consultants India Limited, New Delhi, India.

TEC - Telecom Engineering Centre, DOT, New Delhi, India

TIFR - Tata Institute of Fundamental Research, Bombay

TQA - Telecom Quality Assurance (India)

TSS - Telephone Shilpa Sangstha Ltd, Dhaka, Bangladesh

**ABSTRACT**

REPORT ON AVENUES OF JOINT VENTURES BETWEEN TELECOMMUNICATION INDUSTRIES OF BANGLADESH, NEPAL AND INDIA

The present project No. US/RAS/92/076 was taken up as a follow up action for pursuing preliminary discussions held during the workshop for Asia and Pacific Region representatives from the Telecom Industry held at New Delhi in September, 1992.

Under this project visits were made to firms in India, Nepal and Bangladesh and the representatives of the firms in India and representatives of industry and Federation of Chamber of Commerce, Telecom operating authorities, Ministries of Industries and Telecom in Nepal and Bangladesh were met.

The status of the Telecom network, their expansion programmes, the concessions and facilities extended to industries by the Governments and privatisation steps and the status of the industries in the three countries have been examined. The need for diversifying and modernising the two telecom factories of Bangladesh has been analysed. In order to ensure orderly development of Telecom industry in Bangladesh steps are to be taken to organise quality management and type approval procedures. Both in Nepal and Bangladesh dissemination of information regarding telecom products, technologies available, viability of projects etc. is required.

Seven recommendations have been made regarding studies to be undertaken, seminars to be organised and organisational support at UNIDO offices of Dhaka, Kathmandu and Delhi for pursuing and continuous monitoring of the cooperation and joint ventures between the industries of these countries.

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## INTRODUCTION

UNIDO organised a workshop on Telecom Industry at New Delhi in September, 1992, which was attended by representatives of Asia & Pacific Region telecom industries. During the workshop a number of discussions were held among the participants with the objective of developing closer cooperation between India and countries of the region in the transfer of technology for the telecom industry. As a follow up action, Mr. N. Subramanian, Group General Manager, Telecom Consultants India Ltd., Nehru Place, New Delhi, India was appointed as Consultant and a duration of 4 weeks was allotted with a visit of one week each to Nepal, Bangladesh and the rest in India with specific instructions to pursue the preliminary discussions held among the representatives of Nepal, Bangladesh, and India. Copy of the job description is given in Annex - 0.1.

The mission commenced on 14th August, 1993 and lasted upto 13th September, 1993. The consultant has visited all the firms in India, Nepal and Bangladesh mentioned in the terms of reference and held further discussions with them on the possible areas of cooperation with a view to forming the joint ventures. The consultant also visited organisations like Centre for Component Approval for Telecom (CACT), Bangalore, Electronic Regional Testing Laboratory, Delhi, Directorate of STQC, Delhi, the Chambers of Commerce in Bangladesh and Nepal and Board of Investment, Bangladesh. The status of the Telecom network, the telecom industries, the avenues for cooperation and joint ventures were examined in detail. In addition the suggestion of Chief Planning and Joint Secretary of Ministry of Posts and Telecommunications, Bangladesh, routed through UNIDO, Dhaka for additional avenues of cooperation was also examined. This lists of officers met in India, Bangladesh and Nepal are at Annexes 2.2, 5.4 and 7.1 respectively.

This report has been written based on the discussions held with the various authorities and representatives of the firms mentioned and visits made to the factories. The report identifies the strengths and weaknesses of industries, the areas which need attention for promotion of cooperation, and makes specific recommendations indicating further steps to be taken. A brief description of company visits is given in Annexe 2.1 and the documents referred are mentioned in the Bibliography at Annexe 0.2.

On the whole the mission is a success in as much as the areas of cooperation have been identified and the visit of the consultant has created an awareness about the possibilities of joint ventures among the representatives of industry met by him. The recommendations given in the report will go a long way in promoting cooperation of the industries of the countries under consideration.

## CHAPTER - I

## TELECOM SCENARIO IN INDIA

1. The Telecom services in India is run by Government and the Department of Telecommunications under the Ministry of Communications is responsible for planning, engineering, installation, and maintenance arrangement and operation of voice and non voice telecom services all over the country. In addition the Department is also responsible for frequency management in the field of radio communications in close coordination with other national bodies. It also enforces wireless regulatory measures by monitoring wireless transmission of all users in the country.

2. Beginning with a meagre 86000 lines at the time of independence in 1947, the number of telephones has grown to 6.79 million lines by April, 1993. However the waiting list (of persons registered for provision of telephones) is about 2.8 million lines which is substantial. There are a total of 17368 telephone exchanges out of which about 59% are electronic, the balance being electro-mechanical switches like Strowger and Crossbar systems. A few manual exchanges also still remain in the network. The network spreads over 93000 route KM out of which 29000 is radio systems, 28000 RKM is coaxial and the rest is optical fibre. The digital connectivity to all 13 state capitals has been achieved. The 80% of the population is spread over the rural areas. The telephone density being as low as 0.68 telephones per 100 inhabitants, the Government of India has laid emphasis on accessibility of telephones to the common man and decided to provide telephone facility to all Gram Panchayats totalling around 2.3 million by 1995. 98000 villages have been covered by April, 1993. About 4000

stations including all District Headquarters and 70% of Tehsil Headquarters (Sub-District HQ) have been connected to National Subscriber Dialling (NSD). The telecom network provides access to 233 countries for International Subscriber Dialling (ISD). The facts and figures regarding Indian Telecom network are given in Annex 1.1.

3. **EIGHTH FIVE YEAR PLAN**

During the Eighth Five Year Plan (1992-97) it is programmed to achieve 7.5 million lines with a switching capacity of 9.3 million lines (90% will be electronic). It has been planned to fully automatise the network by 31.3.1994 with digital connectivity to all District Headquarters. It is proposed to provide telephones on demand in Rural and Tribal areas while the waiting list period will be reduced to 2 years in other areas. All panchayat headquarters and 150000 villages totalling around 377000 villages will have phones at the end of the plan period. The availability of Public telephones will be enhanced to one telephone per 100 inhabitants in the rural areas. The transmission systems route KM will be doubled and Information Highway (Data Services) to 90 cities will be provided.

The Government of India has drawn up perspective plans for the year 2000, the chief objectives being provision of telephones in all villages, a target of 20 million telephones thereby tripling the existing capacity and one pay phone for every 400 urban population and full coverage of ISDN to meet commercial requirement. The staff strength of 443000 has been frozen and it is expected that the productivity will be improved to 25 persons per 1000 telephones.

## 4. EXPERTISE IN PLANNING, ASSIMILATION OF NEW TECHNOLOGIES AND UTILISATION OF SOFTWARE FOR TELECOM MANAGEMENT

The planning effort required for various services in a vast country has always been a challenging task especially when the funds are meagre and not commensurate with demand. The process becomes complicated due to the wide variety of demands by different regions and different sectors. In addition, varied technologies were also used at different times. Upto 1970 the technology used was only Strowger. The seventies saw the induction of Crossbar systems of different technologies like Penta Conta, ARF, C-400, and Indian Crossbar (ICP). After this in eightees the analogue electronic switches like ND10, Fetex, Phillips Containerised Exchanges, NEAX Analogue, Meta conta Rural exchanges etc., subsequently the digital switches like E10B, NEAX 61, were introduced. In addition, digital switches of C-DOT and ILT switches (ITI designed) were also commissioned in the network. Latest in the series is the impending introduction of six new technologies with ISDN capability viz. OCB 283 of CIT Alcatel, Fetex 150 L of Fujitsu, AXE 10 of Ericsson, 5ESS of AT&T, System 12 of GPT and EWSD of Siemens. One exchange of each system has already been installed, tested, validated and commissioned in the network. Valuable planning expertise has been developed especially in managing transition from electro-mechanical to electronic and from analogue to digital. Similarly enormous expertise has been gathered in evolving strategies for providing rural services integrating small digital exchanges with digital multi-access radio systems. Another aspect is the unique principle followed by the Department of Telecommunciations that regardless of the technology, the system will be installed, tested, and commissioned

by its engineers. This has resulted in a vast reservoir of trained technical talent experienced in installation, maintenance, and operation of various technologies. The absorption of new technologies was possible mainly due to the importance accorded to training by the Indian Telecom Administration. Systematic training is given at the time of initial induction of the staff followed by periodical refresher training in various new technologies as and when these are introduced. At the apex is the Advanced Level Training Centre (ALTTC) Ghaziabad near Delhi supported by Telecom Training Centre (TTC) Jabalpur and 36 Regional Telecom Training Centres. The total number of personnel trained in these centres in 1992-93 is a staggering figure of 45300 including 51 foreign engineers.

4.1 Another important factor to be considered is the extensive utilisation of software developed indigenously in the administration of the Telecom Network. Some important software developed elsewhere has also been successfully adapted to Indian conditions. The complete software for network planning got in 1983 from SOFRECOM, France covering various aspects of local network planning, traffic planning and transmission planning was successfully adapted to the Indian conditions and also transported to PCs. These programmes are used today extensively by various planning units of Indian Telecom network. A number of software for different aspects of telecom administration like Directory Enquiry, Fault Repair Service, Resource Allocation for provision of new connections and shifts of telephones, management of cable network including graphics, telephone revenue accounting, works accounting, materials management, MIS etc. have been indigenously developed. Some new products like Automatic Call Distribution (ACD),

Automatic Numbering Identification, Wake up alarms have also been developed indigenously with the encouragement of the Department of Telecom.

## 5. R&D IN TELECOM AND CDOT

India has always been striving to develop telecom products indigenously and since its independence DOT has been carrying out research on telecom through its erstwhile organisations of Telecom Research Centre, New Delhi. TRC was performing the functions of research, development, and issue of specifications. In eightees this was split into two organisations one for R&D and the other as Standards Organisation under the name TEC. Meanwhile in 1984, a new organisation by name Centre for Development of Telematics was formed with the objective of self reliance in development of all telematic equipments in India. The immediate objective was to design a state-of-art digital switching system suited to Indian requirments. This centre had a meagre budget of Rs. 36 crores (US$ 10 million) and a tight target of three years. It goes to the credit of Indian scientists and engineers who were entrusted with this tough task, that they produced a digital switch which became a building block for the bigger switch. Today the CDOT family of digital switches ranging from 128 lines to 40000 lines is available. The TRC also has been merged with CDOT which possesses as on date a formidable team of 800 talented engineers and technicians.

### 5.1 CDOT RAX

The digital rural automatic exchanges of 128 lines and 256 lines designed by CDOT and manufactured by nearly 33 licensees under its transfer of technology scheme has completely changed the telecom scenario in rural areas. This switch was designed to meet the rural conditions like absence of Airconditioning and lack of

trained manpower and varied climatic conditions of the country. The final product using CMOS components, eliminating disk drives resulted in low power consumption and proved to be a boon. Along with these small capacity exchanges, medium sized exchanges of 512 lines upto 1400 lines and large exchanges upto 10000 lines were also designed and manufactured within the country. There are about 33 licencees producing these switches with transfer of technology. About 1.7 million lines of various sizes have been introduced in the network as on date. Enhancement of the product like introduction of CCITT No. 7 signalling, synchronisation and ISDN services are under way. Besides designing digital switch, CDOT has also developed and is developing a number of transmission products like 2/15 multi access radio relay systems, digital multiplex equipments of 2/8 Mbts and 8/34 Mbts, 10 channel digital UHF system (800 MHz and 400 MHz), single channel VHF system, 2/8 Mbts optical line termination equipment, 16 KBPS TDM point to point, point to multipoint, rural radio system, satellite based rural telegraph network, SDA systems and digital MW systems.

## 5.2 TRANSFER OF TECHNOLOGIES

CDOT is keen to carry out Transfer of Technology (TOT) especially to developing countries and has developed extensive and systematic expertise as it has successfully carried out TOT to more than 33 licensees. The TOT process consists of packages specially designed towards design documents, engineering details, manufacturing process, computerised manufacturing system and quality assurance. Right from the start to finish the manufacturer is helped, trained and informed about various actions to be taken at different stages. Recently the CDOT switch manufacture was taken up in

Vietnam under TOT agreement between the two Governments.

5.3 **OTHER R&D ORGANISATIONS**

Almost all large manufacturing plants have their own R&D units. For example manufacturers like Indian Telephone Industries, Hindustan Teleprinters, Bharat Electronics, ECIL, etc. have set up their own R&D units. Even smaller enterprises have realised the need for R&D and set up their own R&D activities even though of limited extent. Apart from these, other Government funded agencies like TIFR, IIT's, DRDO also carry out R&D efforts in Telecommunications. One of the notable achievements in R&D by other units is the development of a family of digital switches by Indian Telephone Industries. This family was named Integrated Local and Transit (ILT) Switches designed mainly as rural switches starting with 64 lines mini ILT to 2048 ILT switches. Recently ITI has also developed its own version of large switch of capacity upto 16000 lines. Other achievements of ITI's R&D include development of computerised trunk manual exchange of 32 positions using 512 ILT and PCs to put through booked trunk calls manually by trunk operators at trunk centres. ITI has also developed its own telephone sets, transmission systems etc. Bharat Electronics Ltd. (BEL) had carried out extensive R&D efforts and has developed in-house a number transmission, radio wireless, radar, and TV products.

5.4 To sum up, the Indian Telecom Network is poised for a giant leap forward and is well supported by the various R&D units, the leader amongst them being Centre for Development of Telematics (CDOT) spreading new technologies, products, and updates. These organisacions are keen to share their expertise and experience to other developing countries in the

region. The technologies developed are specially suited to the needs of the developing countries and are of low cost. The neighbouring countries especially Bangladesh and Nepal can seriously consider utilisation of these technologies and make use of the expertise at the most economic terms.

# CHAPTER-II

# INDUSTRIAL POLICY AND INDIAN TELECOM INDUSTRIES

## 1. GROWTH OF TELECOM INDUSTRY IN INDIA

With the policy of self reliance that has been pursued by the Government of India, the majority of telecom equipment has always been produced in India. This has been supplemented from time to time by imported equipments due to technology changes and due to tieing equipment to loans from other countries. But effort has always been made to produce new technologies within the country and to indigenise the production to the maximum extent possible. Till recently the major producers were factories under Public Sector Undertakings controlled by Government as the telecom equipment was reserved for public sector. Hence the biggest manufacturers even today are : Indian Telephone Industries, Bharat Electronics, Hindustan Cables Ltd., Hindustan Teleprinters, Electronic Corporation of India Ltd (ECIL) and the Telecom factories under the Department of Telecommunications. In 1985, the Government delicenced production of telephone instruments and other customer premises' equipments by private entrepreneurs, subsequently all other telecom products were also delicenced. As a result there were as many as 131 units producing equipment worth Rs. 3985 crores (US $ 1.32 billion) in the financial year 1992-93. There are as many as 33 CDOT licencees producing various CDOT products. A brief description of the major producers is given in Annexe 2.1.

## 2. INDUSTRIAL POLICY

The Government of India recognised Telecom Sector as one of the basic infrastructure essential for the economic development of the country and consequently implemented a number of liberalisation measures commencing from 1985. The subscribers premises equipment which was earlier reserved for Public Sector was opened to private manufacturers and this was followed up by a number of other telecom equipment. In July, 1991 under the New Industrial Policy announced by Government of India the production of all types of telecom equipments was delicenced thereby no telecom item was kept reserved for the Public Sector. Automatic approval procedures of foreign collaboration of equity upto 51% with a maximum technical knowhow payment of Rs. 10 million and royalty upto 5% and exports upto 8% were also introduced. Value added services like cellular mobile, radio paging and video tex have also been opened up for private sector participation. However, in such case of foreign collaboration, approval is required to be obtained from Ministry of Industry, Government of India and licence for provision of such services is to be obtained from the Department of Telecommunications.

Some of the highlights of the New Industrial Policy are given below :-

i) <u>Industrial Licence</u>

The issue of the Industrial licence is dispensed with and there is no public sector reservations. Only intimation is to be submited to Ministry of Industry for medium and large scale industrial units for investment above Rs. 7.5 million and in case of small scale units having investment upto Rs. 7.5 million and

registration is to be done with the Directorate of Industries of State Government.

ii) Foreign Investment

If foreign equity is limited to 51% in manufacturing projects the investment is allowed on automatic basis and the application is to be made to Reserve Bank of India. Investment in service sector or in manufacturing with more than 51% equity, approval is required from Foreign Investment Promotion Board (FIPB) and application is to be made to the Ministry of Industry.

iii) Royalty

Royalty upto 5% for domestic sales, and 8% for exports allowed automatically in free foreign exchange. The royalty payment is restricted to 10% and the total payment is to be limited to 8% of the sales in ten years. The royalty payment in case of telecom service requires specific approval.

iv) Capital Goods

All capital goods can be freely imported without permission or licence. However for importing second hand machinery, import licence is required. Import duty under project import is 25% for which certificate will have to be issued by Department of Telecommunications.

v) Excise Duty

The excise duty on rural telecom products and radio transmission equipment is 20% and for telecom cables, it is 25%. For all other telecom products, the excise duty is 20%.

vi) Import of Parts and Components required for manufacture of telecom equipment.

All components except single/double side bare PCBs and populated/ loaded PCBs, can be imported freely. Import of items excepted above can also be imported against a special import license. Concessional customs duty of 50% is levied on components for manufacture of certain specified telecom equipments on the basis of a certificate from the Department of Telecommunications.

vii) Import of Telecom Equipment

The Customs Duty for import of telecom equipment is 80%. Import of all telecom equipments except consumer telecom equipment is freely permitted. The consumer telecom equipment not allowed to be freely imported are - Telephone Instruments, EPABX, Cordless Telephone, Telephone Answering Machine, Transreceiver, Pagers and Cellular Telephones.

## 3. IMPACT OF LIBERALISATION POLICIES

As a result of the liberalisation policy, a number of new production units have been set up in private sector and the total production rose in a year from Rs. 2633 crores to Rs. 3985 crores, which is an increase of about 50%. The liberalisation had attracted additional foreign exchange investment of Rs. 293.6 crores. The exports in telecom products have increased by 82%. The most significant impact being reduction in prices of material inputs as a result of increased competition. Another phenomenon is the increasing tendency of the industries to explore foreign markets as the overall production capacity set up is more than what the telecom network can absorb. Thus the Indian entrepreneur is coming out of the shell of protected markets and is eager to enter the other markets.

4. The number of Indian telecom manufacturing units has been increasing by leaps and bounds and there is tough competition in the industry. The combined total production being more than the market demand for many products the manufacturers are eager to explore neighbouring markets and if necessary form joint ventures including technology transfer. Many of these have developed their own technology to offer. However they lack specific information about the market demand of other countries and also quite cautious about the capabilities of the entrepreneurs of the other countries. Certain of the representaives of the industries who were met by the consultant, were somewhat discouraged by the limited market of Bangladesh and Nepal. However if market studies of neighbouring countries are conducted and results are made known it will attract investments from India. On the other hand all the representatives met are unanimous in extending technical expertise and in supplying SKD and CKD components to start production. This will be the most practical method of starting cooperation between the three countries. UNIDO's help in conducting market surveys, identifying the products, and feasibility studies for setting manufacturing capacities will be a great help.

## CHAPTER III

## QUALITY CONTROL ORGANISATIONS FOR TELECOM PRODUCTS IN INDIA

1. India has been producing electronic and telecom equipments since its Independence in 1947 and has effective quality control organisations which have been evolved over a long period. The Department of Telecom (DOT) has been issuing specifications for all the products introduced in the network and the nodal agency for drawing up the Operational Requirement/Qualitative Requirement (OR/QR) and for issuing specifications, is Telecom Engineering Centre (TEC). To encourage orderly and systematic development of telecom products indigenously, the Department of Telecommunications has established Development Coordination Committees (DCCs) which draw members from Planning, Operation and Maintenance branches, Telecom Engineering Centre (TEC), Quality Assurance Circles, T&D Circle (Technical and Development Circle which conducts acceptance testing of all the telecom systems before they are commissioned) and the manufacturers. While the major industries have set up their own quality control units, the two Departments viz.(i) the Department of Telecoms (DOT) under the Ministry of Communications; and (ii) the Department of Electronics (DOE) under the Ministry of Science and Technology have set up quality control organisations for helping the electronics and telecommunications industries to maintain quality in production. Besides these two departments, the Ministry of Defence and Ministry of Railways also have inspection units for the products purchased by them. A brief description of the two organisations under DOT and DOE are given in subsequent paragraphs.

2. **TELECOM ENGINEERING CENTRE (TEC)**

The TEC with head quarters at New Delhi provides the engineering and technical support to DOT and has four regional Type Approval Centres one each located at New Delhi, Bombay, Calcutta, and Madras. It is responsible for drawing up the OR/QR, issue of specifications, testing and issuing of interface/type/connectivity/technology approval for all equipments that are inducted into the Indian Telecommunication Network. DOT has been conducting field trials of the telecom equipments produced in the country and also validation of systems imported. One of the notable achievements of the TEC was the conduction of validation tests of the state-of-art digital switching systems (ISDN Capability) of large capacities (800,000 BHCA) offered by the six different international manufacturers i.e.

i) EWSD of Siemens
ii) Fetex 150L
iii) System 12 of GPT
iv) AXE 10 of Ericsson
v) 5ESS of AT&T and
vi) OCB 283 of CIT Alcatel

Thus TEC has the unique expertise of testing & validating the new technologies. TEC has a very strong network division which has been conducting computerised network studies for Trunk Network for the 8th Plan of the whole of India. TEC trains personnel for new technologies like videotex and computer aided network planning. TEC has also been issuing specifications for computerised Digital Trunk Manual Exchanges, Audio Conferencing Unit, Morning Alarm,

Reminder Service, Time Announcing Systems etc.

3. **QUALITY ASSURANCE CIRCLE (QA) under DOT**

3.1 There were a number of individual test and inspection units under the Department of Telecom which were engaged in the inspection of products supplied to DOT by different manufacturers. All these units were brought under one umbrella with the name Quality Assurance Circle headed by a Chief General Manager. This was formed in 1979 and was entrusted with the task of assuring quality of a wide range of products and equipments supplied to DOT. Since then this Circle expanded its activities and presently there are as many as fifty units spread through out length of the breadth of India carrying out tests and inspections at the factories. In the year 1991- 92, the cost of stores tested was as high as Rs. 100 crores.

3.2 In addition, this Circle has set up the Component Approval Centre for Telecom (CACT) at Bangalore with a number of laboratories which are :-

i) Measurements Laboratory,
ii) Cable Laboratory
iii) Components Laboratory
iv) Mechanical Laboratory
v) High Voltage Laboratory
vi) Failure Analysis Laboratory

QA Circle has also set up Regional Telecom Testing Laboratories in Delhi, Calcutta, and Bangalore.

These facilities enable the testing of components for their electrical and mechanical characterstics, conducting life tests, analysing failures of the components and for giving feedback to the manufacturers. The Quality Assurance Circle had over the years evolved Quality Approval procedures for the

various categories of telecom products and also participates in the Development Coordination Committee of DOT which identifies the products to be developed indigenously and monitors the various stages of development. The QA Circle has accumulated a wealth of information on :-

i) Different Methods of testing

ii) Quality Management Methods

iii) Issue of Specifications, etc.

A list of such publications is given in Annex 3.1. The QA Circle conducts periodical training classes on quality management, conducts from time to time workshops and seminars on quality aspects.

## 4. DIRECTORATE OF STANDARDISATION TESTING AND QUALITY CONTROL (STQC) :-

4.1 The Directorate of Standardisation, Testing and Quality Control (STQC) was set up under Department of Electronics, Government of India, for providing standardisation and certification support at National and International level as well as testing, calibration, consultancy and related services to Indian Electronic Industry in general. The STQC programme is supported by Government of Germany through its Indo-German Technical Cooperation Project. To achieve the primary goal of improvement of quality of indigenous electronic goods the Directorate of STQC orients its activities towards standardisation of electronic products and harmonisation of existing standards to international standards. It implements National and International certification schemes covering the aspects of performance, safety and EMI/EMC standards.

4.2 The STQC provides a wide spectrum of services like testing of electronic components and systems, nation-wide calibration service, safety certifications

to IEC standards, safety testing as per UL, VDF and IEC standards, EMI/EMC testing as per VDF, CISPRT and FCC standards etc. It also provides product development assistance and also information on components through its computerised data bank called CODIN. It also furnishes technical information services on Standards. It provides assistance for system reliability prediction and assessment. The STQC organises training on various topics related to Quality and Reliability and also training on Electronic Interconnection and packaging techniques.

4.3 The STQC has understanding and linkages with International Certification Organisations like IECQ, GS Mark, FCC, and BSI, UK. The STQC has set up two tier network of 21 laboratories situated through out the length and breadth of the country for carrying out the above activities. Through these laboratories STQC provides the necessary testing support. The STQC is authorised as National Supervising Inspectorate of Implementation of IECQ System for electronic components in India. The qualified components related by approved manufacturers are acceptable in 25 member countries without further testing. The STQC provides testing and development support for obtaining GS Mark CFRG and UL listing through a mutual cooperation arrangement with TUV, FRG and underwriters laboratories (UL) USA. The STQC provides product evaluation leading to FCC certification on EMI/EMC aspects. The STQC has been authorised by World Health Organisation (WHO) for testing cold chain equipment. The STQC through its MOU with BSI, QA, UK is authorised to certify manufacturer under its quality system certification (SQ) ISO9000 Scheme. Such manufacturers are eligible for obtaining the BSI- UK Registration. STQC also provides consultancy for

software quality assurance.

5. From the above it may be seen that the quality control organisations in India have extensive facilities to test and evaluate components, finished products, laboratories to test and calibrate instruments and type approval centres. They provide services covering the whole spectrum of manufacturing like product development, quality control measures, improvement of reliability of products, electronic interconnection and packaging techniques, ISO 9000 certification and training in all related matters. Thus these organisations can extend comprehensive technical expertise in setting up factories, in developing products, implementing quality control schemes etc., which will go a long way in setting up joint ventures in telecom industries in neighbouring countries.

## CHAPTER-IV

## STATUS OF TELECOMMUNICATIONS IN BANGLADESH

1. **LAND**

Bangladesh has an area of 144,000 sq.km. of land. The country is bordered by India on all its three sides except in South where it opens to Bay of Bengal. It also has a small strip of frontier with Burma on the south eastern edge. The land is a deltaic plain with a network of numerous rivers and canals. Bangladesh has a tropical monsoon climate marked by sweltering heat and high humidity for major part of the year, the temperatures varying from 23 to 30 degrees C. The population of Bangladesh is 118.7 million (1991) and a GDP of US$21,921 M (1991). The country is divided into four adminsitrative divisions viz Dhaka, Chittagong, Khulna and Rajshahi. The Divisions are further subdivided to 64 Districts and Districts subdivided into 460 UP Zillas which are rural areas.

2. **TELECOM NETWORK**

The telecommunication sector falls under the jurisdiction of Ministry of Posts and Telecommunications. All the public telecommuniations services were so far provided and managed by Bangladesh Telegraph and Telephone Board (BTTB) which is a state monopoly under the Ministry of P&T. BTTB has under its control two manufacturing units. One is at Dhaka manufacturing electro mechanical EMD switches. The other factory is located at Khulna producing undergrcund cables. Both the factories were set up in collaboration with M/s. Siemens AG of Germany. Bangladesh has about 268,400 lines

(June 1993) and has a very low telephone density of 0.21 main telephone lines per 100 inhabitants (1991). The following table gives an overview of the divisionwise telephone penetration in the country as on March 1992.

| AREA | NO. OF EXCHs. AUTO/ MANUAL | INSTALLED CAPACITY | WORKING CONNECT-IONS | PENDING DEMAND |
|---|---|---|---|---|
| DHAKA | 132 | 140,911 | 128,208 | 78,291 |
| CHITTAGONG | 188 | 56,535 | 48,214 | 24,039 |
| KHULNA | 157 | 29,910 | 25,902 | 8,799 |
| RAJSHAHI | 142 | 22,422 | 19,189 | 33,721 |
| BANGLADESH | 621 | 249,778 | 221,513 | 144,850 |

More than 80% of the exchanges are electromechanical (EMD of Siemens produced in Telephone factory at Dhaka) and about 45% are working in the capital of Dhaka. More than 80% of the automatic numbers have Nation Wide Dialling facility (NWD). Recently 4000 lines of NEAX 61 Digital exchange have been installed in the Dhaka city. The network has still about 33000 lines of manual exchanges. Statistics regarding the telecom services and revenue are given in Annex 4.1. The country has four major broad band MW links. They are i) Dhaka-Chittagong MW Link (Analog), ii) Dhaka Khulna MW link 140 MB/s Digital iii) Dhaka- Sylhet MW link (Analog) and iv) Dhaka-North Eastern MW link (Analog). There is a programme for digitalising the Dhaka Sylhet link by June 1994. The semi districts (UP Zillas) are all planned to be connected with district head quarters with digital UHF 8/34 Mbits links. About 200 such links are already in operation. All the District headquarters are connected to Nation Wide

Dialling facility (NWD) through four digital NEAX 61 trunk exchanges located at each Divisional headquarters. There are two satellite stations in the country one Standard "A" (30 M dish) with analog system and another with standard 'B' (13 m dish) with SCPC. Recently one 2.04 MBT digital link has been commissioned with U.K. The total international channels working in the country through these two stations are 272 voice, 10 nonvoice, 29 SCPC and one 2.0 A MBt. with 105 ccts.

There are three fully digital SPC Telex exchanges with total capacity of 8460 working in Dhaka. The total number of telex subscribers is around 2500. Besides there are two more small telex exchanges outside Dhaka.

## 3. PROBLEMS OF THE LOCAL CABLE AND TRANSMISSION NETWORK

3.1 The local cable network consits of a mixture of L.S. and PVC primary and secondary cables. All the PVC cables are manufactured within the country . The majority of the primary cables are directly buried on earth and a programme of laying primary cables through ducts has been started. No such programme has been envisaged for secondary cables out of which a considerable portion is overhead. Various types of joints have been used in these cables due to the fact these were procured mostly under tied loans from different sources at different times. This has resulted in poor maintenance and high fault rate. There is no pressurisation of the network with the result, in case of damage, water enters and quickly spreads increasing the damage of the cables. The BTTB is seriously considering the

proposal to introduce jelly filled cables in future.

3.2 The various Microwave systems were procured and commissioned against tied loans and this has resulted in having as many as 8 different makes. Such a variety of systems poses a serious problem in the maintenance towards organising spare parts, resources, training manpower and paucity of test equipments. The programmes of digitalisation has yet added another dimension to the problem as the long haul MW systems are from 2 different sources and the short haul links are from 3 different sources. The proper maintenance centre for repair of faulty cards for digital systems is yet to be developed. Availability of spare parts in time and procurement of these from the manufacturers against hard currency (which is in shortage) are main difficulties in providing proper maintenance.

4. **EXPANSION PROGRAMME**

Bangladesh Telegraph and Telephone Board (BTTB) has fixed a target to enhance country's telephones to 800,000 lines capacity by the year 2000. The existing telephones in the country (as on June 1993) is 268,400 lines. To meet the target of 800,000 telephones, another 531,600 ( say 532,000) lines are to be installed. The action programme for meeting this additional requirement is summarised below:-

| | | | |
|---|---|---|---|
| I. | EXISTING | 2,68,400 LINES | |
| II. | ONGOING WORKS<br>NAME OF THE PROJECTS | LINES TO BE INSTALLATED | TIME FRAME |
| a) | For Dhaka Under R/R Programme | 18,500 | 1993-94 |
| b) | 60,000 Line Project under OECF Loan for Greater Dhaka (A.D.P.- Annual Development Plan) | 60,000 | 1993-96 |
| c) | Chittagong Metropolitan city digital telephone project under French Credit (A.D.P.) | 30,000 | 1993-95 |
| d) | EMD Exchanges under Revenue Budget (Balance work of 20,400 lines by TSS) | 14,000 | 1993-95 |
| e) | Cyclone Rehabilitation Project (A.D.P.) | 1,100 | 1993-95 |
| f) | Self Financing (Govt. Bond) | 130,000 | 1993-96 |
| | | 253,600 | |

III. FUTURE PROGRAMME

| | | | |
|---|---|---|---|
| a) | Installation 1,40,000 telephone lines (Replacement 40,000 + net increase 100,000 (Project under process funds not yet lined up). | 100,000 | |
| b. | Installation of telephone exchange under ADP (not yetlined up). | 100,000 | 1999-2000 |
| | Total of (a)+(b) | 200,000 | |

IV. INSTALLATION BY PRIVATE OPERATORS.

| | | | |
|---|---|---|---|
| a) | Expected installation of telephone in Thana by private parties | 80,000 | 1993-2000 |
| | Grand total | 822,000 | |

The source for funds for the future programme under III above is not identified. Govt. is thinking of alternatives like Build Operate and Transfer or Self Financing etc.

5. **DIGITALISATION :-**

The Government of Bangladesh has taken a pragmatic decision to gradually change over to digital switching technology. The transition period for this change over with local manufacture of digital switches is estimated as 3-4 years. Limited tenders from Germany, France and Belgium have since been called and the tenders are under evaluation and it is expected to be finalised shortly.

6. To sum up, the digitalisation of the network has just started and the rural telecommunications have to be developed extensively. The privatisation process has just started. As the economy is opening up there is ample scope of for telecom industries in producing customer end equipment, and products for rural telecom.

## CHAPTER-V

## TELECOM INDUSTRIES AND PRIVATISATION POLICY OF BANGLADESH

1. **TELECOM INDUSTRY**

1.1 There are two major producers of telecom equipment and cables both are under BTTB. The Telephone Shilpa Sangstha (TSS) set up at Dhaka in 1967 with collaboration of M/s. Siemens AG Germany is producing the electromechanical switch of EMD type with an annual capacity of 10000 LN of switching equipment and 50,000 telephone sets in single shift. The Govt. has approved a Balancing, Modernising, Replacement and Expansion programme (BMRE) of 300 Million Taka, under which tenders have been called and the bids are under evaluation. The factory has also plans to produce 5000 lines OKI EPABX in the near future. A detailed report is given in Annex 5.1.

1.2 The second factory viz Bangladesh Cable Shilpa (BCS) Khulna established with the collaboration of M/s. Siemens AG Germany in 1968 has been producing PVC quad cables of different sizes and types and also other associated items like PVC cables for house wiring, aerial cables, etc. This factory has a capacity of 4,00,000 CKM per annum. However there are not enough orders due to various factors mentioned in detail in Annex 5.1. In brief the Bangladesh Govt. decided to introduce jelly filled cables in future which is produced only in a limited quantity in this factory. For changing over to production of Jelly filled cable this factory will have to install machinery costing nearly US$7.9 M as mentioned in detial in the Annex 5.1. referred above. Apart from the above two factories there

are a few factories producing post materials, PVC house wiring and switch board cables etc. of limited capacities which do not merit consideration. In effect the whole effort so far in producing telecom equipment and materials is made by government in its two factories, the machinery of which have been utilised for more than 20 years. Consequently, the technologies used are also as old as the machinery. For a country which looks forward to its own telecom industries these two factories are grossly inadequate. A concerted effort should be made to upgrade these two factories, induct new machineries and technologies. While a significant step has been taken in the case of TSS a similar step needs to be taken for BCS also.

1.3 Bangladesh has a potential market for a number of telecom products which do not require capital intensive industries. In fact in India a number of small scale and medium scale industries are producing items like telephones sets, small EPABXs, C-DOT rural exchanges, key telephones, Digital UHF systems, Jelly filled underground cables, PVC house wiring cables, swtichboard cables, small size power plants for telephone exchanges etc.

## 2. PRIVATISATION POLICY

2.1 The Government of Bangladesh has thrown open the Telecommunication sector to the private industries since the last quarter of 1992 and has announced a number of incentives, tax rebates and facilities for foreign investors. The private companies can set up and operate all telecom services including the basic telephone network. Ministry of communication has already awarded the

work of providing rural telecom services for 200 Up zillas covering half of the rural area to one of the private companies viz. Bangladesh Rural Telecom Authority (BRTA). This company has so far installed five exchanges. The scheme is yet to pick up speed.

2.2 Under the Fourth Five Year Plan BTTB has programmed to add 522,000 lines to meet the target of 800,000 by year 2000. The Government is considering alternatives like leasing of exchanges and privatisation of the core sector. The Government has already taken a decision to permit private operators to provide value added services like Cellular Telephones and Paging.

3. **GENERAL INCENTIVES PROVIDED FOR INVESTORS BOTH FOREIGN AND LOCAL.**

3.1 The Government of Bangladesh as a part of liberalisation policy is making all out efforts to encourage investment by foreign investors. General incentives at present are:

i) Tax Holiday: Tax holiday for five, seven, nine and twelve years is allowed for industries set up in the developed, less developed and least developed and special economic zones respectively subject to the relevant rules and procedures set up by the National Board of Revenue.

ii) Concessionary duty on imported capital machinery:-
Import duty at the rate of 10% is payable on capital machinery and spares imported for initial installation or for BMR/BMRE of

existing industries. After installation when commercial production starts part of the import duty paid will be refunded ranging from 2.5% to 7.5.% depending on whether the industry is located in developed or other areas already mentioned.

iii) Accelerated Depreciation:- Acccelerated depreciation in lieu of TAX Holiday is allowed at the rate of 80% of actual cost of machinery and plant from the year the unit starts commercial production and 20 % for the following year, if the industry is located in the Developed area. For other areas the rate of depreciation is 100%.

iv) Other Incentives:- A number of other incentives like tariff rationalisation, special incentives to non resident Bangladeshees, exemption of tax on interest on foregin loans, exemption of tax on royalty, technical knowhow and technical assistance fees, liberal investment allowance for tax assessment, etc. are extended . Details of incentives for foreign investment in Bangladesh are given in Annexe 5.2.

4. **SCOPE FOR JOINT VENTURES IN TELECOM SECTOR:-**

4.1 After conducting a brief survey of the telecom industries and discussions with telecom authorities, Board of Investment, Chamber of Commerce and representatives of the industry and visit to TSS Dhaka and BCS Khulna, the consultant has arrived at the following conclusions.

4.2 The telecom industry is in its nascent state and needs to be nurtured and encouraged. There is a lot of hesitancy on the part of industrialists to enter the telecom market mainly because it was a reserved sector until recently and not much scope existed. Recent supply of digital exchanges, digital microwave systems and satellite systems were all tied to specific loans from different countries. With the present policy of privatisation and liberalisation of industrial policy there is enough scope for the production of telecom equipments. However, the main digital exchanges, cellular phones and paging etc. are capital intensive areas and hence do not attract local entrepreneurs. But areas like manufacture of underground cables, small digital exchanges, 10 channel/30 channel UHF systems, Automatic Number identification for EMD exchanges which will continue in the network for at least another five years, Push button telephones, PABXs, power plants for small exchanges, microwave towers ( light weight as well as heavy duty) masts for Multi-Access Radio Relay systems, switch board cables, pvc cables for house wiring, coiled cords for telephone sets etc. can be produced in Bangladesh and there is enough interest shown by the entrepreneures. The technologies suitable for the Bangladesh environment are available in India and can be introduced in a most cost effective manner. Already ample scope exists for export of these items to neighbouring countries. The Bangladesh Rural Telecom Authority (BRTA) a private company is holding dialogue with M/s. United Telecommunications of India for production of C-DoT rural exchanges in Bangladesh and these are in advanced stages. More joint ventures are likely to come up once the second tender for

rural telecommunications for the balance 191 Up Zillas is decided. The telecom industry will pick up provided enough information regarding products, the market in Bangladesh and the neighbouring countries is collected alongwith a report about technologies available. UNIDO can help in preparing feasibility studies, market survey and project proposals on specific products and conduct workshop/seminar specially for Telecom Industry.

4.3 The BTTB had entrusted the job of issuing telephone bills by computer to a private company. Apart from this presently no other area of Telecom operation is computerised. The work of identifying the software and hardware for computerisation has been entrusted to the Bangladesh University of Engineering and Technology (BUET) and they are expected to submit their report shortly. After this BTTB proposes to call for tenders. The software for the various aspects of telecom adminstration like Fault Repair Service, Resource Allocation for new connection and shifts, local cable network management, telephone revenue acccounting, works accounting, materials management, MIS etc. have widely been adapted in Indian Telecom network and India has quite a number of established software firms who have developed their own software. Thus, there is ample opportunity for cooperation between Bangladesh firms and Indian software firms. Another area is Automatic Number Identificaton (ANI) for electromechanical exchanges (EMD exchanges) which are expected to be in the network for next five years. India had a similar problem and this has been solved by developing a few vendors in this field who had

manufactured the equipment indigenously and successfully implemented them in the electromechanical exchanges. Hence the expertise of these firms can be utilised by forming joint ventures for this particular product.

4.4 With the liberalisation of industrial policy and with private participation in operating the basic services there is likely to be a large number of telecom products that will be inducted in the network. Minsitry of Posts and Telecommunication is seriously concerned with the quality of the products that will be introduced and is considering formation of a regulatory mechanism for certifying the product supported by a Type Approval Centre (TAC). The successful implementation of the proposal will call for forming a Quality Management Group on the part of the Ministry. The Quality Management Group should lay down procedures to be adapted in the issue of specifications, testing of the telecom products and issuing certificates. Specific recommendations are given in Annex 5.3 for setting up a Quality Management Group and Type Approval Centre in Bangladesh. Clear distinction has to be made between one time import by individuals or operating firms and indigenously produced products. In order to develop quality consciousness among the new entrepreneurs who may establish production facilities special efforts like vendor appraisals and vendor developments are to be taken care of. As mentioned in detail in Chapter III, there are two well established Quality Control Organisations viz. Quality Assurance of DOT and Directorate of STQC of DOE in India. The expertise of both these organisations (DOTQA and STQC) will be extremely

useful for Bangladesh in establishing the new industries in the Telecommunications and Electronic fields.

4.5 Infrastructure and technical manpower available in the Telephone Shilpa Sangstha (TSS) Dhaka may be utilised in setting up a test and calibration centre which can also repair measuring instruments used in BTTB. The type and number of standards that may be required have been identified and they are given in Table 5.1.2.

It is recommended that UNIDO may consider helping Bangladesh in setting up such a centre.

4.6 **CONCLUSIONS:-**

There is enough scope for manufacture of selected telecom products with technologies which are suitable to the needs of Bangladesh and which do not call for high capital investment. Such products manufactured can also be exported to other neighbouring countries. Already a few firms are considering joint ventures with Indian partners. This process can be speeded up if the following steps are taken.

i) Conduct market surveys for specified products in Bangladesh and neighbouring countries and prepare specific typical project proposals.

ii) Conduct seminars/workshops in Bangladesh on investment in telecom industry to enlighten the investors in both countries.

iii) Provide technical assistance for identification of diversification of

products in TSS and BCS and recommend specific investment programme for the above two factories.

iv) Arrange technical assistance from India for helping Ministry of P&T Bangladesh in setting up Quality Management Group and Type Approval Centre.

v) Arrange technical assistance from India for helping BTTB in setting up a Test and Calibration Centre.

## CHAPTER-VI

## STATUS OF TELECOMMUNICATIONS IN NEPAL

1. The Kingdom of Nepal has an area of 147, 181 Sq.Km. and is bordered by China in the north and by India on all other sides and is thus a land locked mass having a rectangular shape. The land extends to about 885 Km east-west and 200 Km approximately in north south direction. The land can be divided into three geographical zones, the high Himalayas, the mid Himalayas with long terrain slopes descending to fertile valleys of Kathmandu and flat sub tropical region of Terai. The population is 18.46 million, 90% of which is distributed in rural areas. The GDP of Nepal is 2826 M. US $ with a rate of growth of 4%.

2. The development of telecommunications in Nepal had been very slow in fiftees and it picked up when the Department of Telecommunications was established in the year 1959. Ten years later this Department was converted into Nepal Telecommunications Board on the advice of World Bank. The Nepal Telecommunications Corporation (NTC),the present body,was constituted in 1975 under the Communications Corporation Act 1972. The NTC is fully owned by Government and is responsible for the providing operation and maintenance of all telecom services in Nepal.

3. The first automatic exchange in Nepal was commissioned in Kathmandu in 1962 and this was followed by other automatic exchanges in sixtees. In seventies, the trunk network connecting the various cities by carrier and microwave systems was taken up. The eighties saw major

technological changes as Digital Trunk Exchanges and Digital Transmission Systems were introduced. The network at present consists of about 78,000 lines of installed capacity ( 79% of digital) with about 64,000 subscribers. 60% of the telephones are concentrated in the Capital. Barring a few manual exchanges and two Cross bar exchanges all the other exchanges are digital (system 12 and E 10 B). The telephone density is 4 per 1000 inhabitants. Important statistics regarding Nepal telecom services is given in Annex 6.1.

4. Out of a total of 75 districts, 55 districts have access to modern telecommunication facilities. About 147 UHF telephones are provided for connecting long distance subscribers and public call offices. Mutliaccess radio systems and UHF systems are being introduced in the network. NTC has linked most of the urban area of Nepal by the long distance broad band and narrow band microwave links, the total installed channels being 6627 (May 93). 80% of these are digital and 6.5% serve rural areas. The long distance circuits installed is about 6618. The nationwide trunk dialling was introduced in 1986 and subscriber trunk dialling facilities is available to 100 destinations. One gateway switching centre located at Kathmandu links Nepal to outside world and provides International Trunk Dialling to 63 countries with 250 international telephone circuits in operation. Majority of the international traffic is routed through satellite connection to Intelsat. Terrestrial links are available to India and Bangladesh. The majority of the network being digital both in transmission and switching the telecom services are reliable

and of high quality.

5. NTC aims to increase the telephone density from 4 telephones per 1000 person to 1 per 100 persons by year 2000 which will take the total number of telephones to 200,000. As mentioned earlier the majority of the telephones are concentrated in the Capital and the Kathmandu valley and the other areas are remote and inaccessible. The NTC has just started a project of connecting 675 Ilakas ( subdistrict level centres) each to be provided with about 5 to 6 connections. About 300 will be covered by 1995 and another 200 by 1997. During the 8th Five year plan (1992-97) about 70,000 digital lines will be added out of which 65,000 will be in Kathmandu valley and balance outside. A new gateway switching centre is proposed in the Kathmandu valley. 90 Route KM of optical fibre is proposed with a total channel capacity of 29,280 ccts. Provisions of a packet switch and expansion of earth station are also on the anvil. A digital MW link between Kathmandu and Nepalganj in the northwest is proposed to be commissioned before 1995.

6. Steps to computerise the various aspects of Telecom Management have already been taken and significant progress has been made in the areas of maintenance control of faults, telephone billing etc. and a programme has been chalked out to integrate the various systems and also to develop an MIS system. NTC is also engaged in developing programmes for computerising the cable network. Assistance from FINNIDA is being given in this regard and most of the programmes are developed in house.

7. The NTC has set up a Test and Development Centre (TDC) as a result of an ITU project and has developed quality management procedures. The laboratories have facilities for testing certain telecom products of external plant. NTC has also got two repair centres for repair of most of the digital switching printed circuits. In the area of training NTC possess adequate facilities for training the officers and staff and further programme of augmentation of these facilities is under consideration.

8. On the whole, the telecom network in Nepal consists of reliable digital switching centres and transmission links in the main routes complemented by 30/60 ch. digital links and multiaccess radio phones in the rural network. The performance of the network can be rated as very good. The progress in support services like computerisation and training of staff is also adequate. But the future needs of the network, due to paucity of funds will require participation of private enterprise. The NTC is ready with the infrastructure for ensuring quality assurance of the products to be inducted into the network and thus is well poised for meeting the challenge of privatisation of the network.

## CHAPTER VII

## INDUSTRIAL POLICY AND STATUS OF TELECOM INDUSTRY IN NEPAL

1. Nepal has a per capita income of US $ 170 and manufacturing sector constitute about 10% of the GDP of US $ 2826M. The rate of growth of GDP is about 4%. The economy is primarily agriculture based, about 55.% of GDP being due to agricultural and fishery and forestry products. The manufacturing activities are concentrated mainly in light industries. The largest number of industrial units are in grain milling, vegetables and animal oils, textiles and garments, carpets, wood products, brick and tiles. Large industries in Public and Private sectors in cement, bricks and tiles, cigarettes, leather, sugar and textiles, jute, paper and pharmaceuticals, rubber, tyres and tubes and vegetables ghee have been set up recently. However the telecom industry is very small and is limited to assembly of telephone instruments, production of insulated PVC cables and few other hardware.

2. The New Industrial Policy of 1992 announced by the Government of Nepal aims to create an environment where the private sector will play a principal role in the industrialisation of the country. The public sector industries will be privatised and no private sector industries will be nationalised. The new Industrial Policy aims to liberalise and simplify procedures and provide single window service for establishment of industries and also to attract foreign investment emphasizing the transfer of advanced technology. The new Industrial policy accords priority to

communications industries. The foreign investment and technology (1981) as amended in 1992 lays down the law governing foreign investment and the applicable rules and regulations. For attracting foreign investment and for promoting industrial growth the Government has offered a number of incentives and facilities within a liberal and open policy, the important being

i) income tax exemption for five years from the date of commencement of production to manufacturing industries

(ii) no income tax levied on the proceeds of gains through export,

iii) Industries established in the remote, undeveloped and under developed districts specified enjoy a tax benefit varying for 50% to 10% and an excise duty rebate varying from 2.5% to 10%.

iv) Reimbursement of the customs duty, excise duty and the sales tax levied on raw materials and auxiliary raw materials of export oriented industries.

v) Deduction in tax rate on each income tax slab by 5 per centage points for industries.

vi) Entitlement to deduct one third of the fixed assets investment as depreciation in addition to the normal depreciation allowance given under income tax law.

vii) Deduction of 10% gross profit for expenses conected with technology or product development and skill enhancement.

viii) No premium customs duties, excise sales tax and local tax to be imposed on raw materials to be used by industries in the export processing line.

ix) Priority will be given for allotment of govt. land to industries and land in industrial districts.

x) The Nepal government has already concluded an agreement with government of India for avoiding double taxation on income of foreign investors. Similar agreements will be entered into with other governments also.

Nepal can boast of a number of other factors conducive to the setting up of industries which merit consideration. The labour in Nepal is quite cheap and dependable. The country has equitable climate in major portion of habitable land and has abundant hydro-electric resource still untapped. Water is available in plenty. The country has fairly long length of road exceeding 6000 KM one third of which is black topped. Even though the country is land locked it has access to the sea port of Calcutta, India and has clearly defined transit formalities with the Indian customs authorities. The Nepal government has already established 11 industrial districts spread through out the country with good infrastructural facilities for medium and large

scale industries. There is also an Export Processing Zone in close proximity to Tribhuvan International Airport in Kathmandu having special facilities catering to export oriented industries.

3. The incentives and facilities mentioned proved to be substanitial and attracted much interest in the Investment Forum 1992 conducted by UNIDO in Kathmandu during Nov/Dec.92. Detailed preparations extending over 2 years were done during which as many 102 project profiles were prepared and wide publicity to all participants in target countries were circulated.

The Investment Forum 92 was well attended by over 400 participants and as a result of the Forum, 128 letters of intent were signed between local and foreign businessmen. However an examinations of the material revealed that out of the 102 project profiles only one was relating to Telecommunications that too on hardware and this did not evoke much response.

4. During the visit of the consultant in August 1993 (much later than the Investment Forum of Nov/Dec.92) a number of discussions were held with the representatives of UNIDO, Ministry of Industries, NTC, FNCCI and a few of the leading industrialists who evinced great interest in manufacture of telecom products. The representatives of the business expressed the opinion that the market in Nepal is very limited. Thier estimate had a basis on the fact that NTC in the past had made very little purchases from the local market. Most of the projects of NTC were tied to aid programmes and hence the total

requirement be it high tech or low tech were supplied by the aid giving countries. Even for the World Bank funded projects preference was not given to products of local or neighbouring countries due to the uncertain quality of the products available. This scenario is fast changing and recently orders have been placed on Indian firms for supply of PVC ducts and MW towers. The Government of Nepal is seriously considering privatising even the basic services due to the paucity of funds. A World Bank project is in progress for studying the alternatives. The Ministry of Information and Communications has already permitted the provision of customer premises equipment by customers themselves or by private parties. The Govt. has also decided to permit private operators for value added services. Hence there is a definite trend towards privatisation of telecom services which can throw open more prospects for manufacture of certain telecom products especially in customer premises equipment and associated items like PVC cables and post materials. Secondly the majority of the population still reside in the rural areas which have only 10% of the services. The Government is committed to provide telephone services and public call offices. All these will call for low cost technologies suitable for the country. Such technologies are available in India and the recent seminars and workshops conducted by UNIDO (DEC. 91 in Banglaore, India, Sept.92 New Delhi India ) have helped convincing the NTC authorities about the suitability of rural technologies and quality control facilities available in India. However, it is to be mentioned that even if the total privatisation is accepted the local market is admittedly limited

as only 100,000 lines are expected to be added upto year 2000. Hence items produced in Nepal should be targetted to markets of neighbouring countries also. The items of telecom equipments mentioned in para 4.2 of Chapter V in the context of Bangladesh can very well be produced in Nepal also through joint ventures between the firms of Nepal and India.

5. To revert back to the discussions held with the representatives of industry in Nepal, it was found that while Nepal Investment Forum generated enough interest in general very little information was made available regarding telecom products, the technologies and the markets. The industrialists felt really handicapped due to lack of such information and they expressed their eagerness to get such information for considering the setting up of joint ventures. Details of visits are given in Annexe 2.1. During the visit of consultant to UNIDO, Kathmandu, it was found the project for follow up of Investment Forum 92 is also finished and the activities had come to stand still. It is essential that the activities are continued on a long term basis if tangible results are to be achieved. It is worthwhile for UNIDO to consider posting an officer to look after the interests of telecom industry on a continuous basis. Having done such good work in other areas UNIDO is eminently suited to organise projects for i) collection of information for identifying detailed list of products and technologies ii) conducting feasibility studies and preparing project profiles for investment and iii) disseminate such information through workshops/seminars specially devoted to Telecom. It is recommended that UNIDO

should consider the above suggestion and take necessary steps.

6. To conclude, the telecom industry is pratically non existent as on date and there is enough scope for small and medium scale industries in this field. But this will require collection and dissemination of information regarding products, technologies available, viability of the projects and market forecasts. UNIDO should consider extending help in this area.

## CONCLUSIONS AND RECOMMENDATION

CONCLUSIONS :-

1. The Telecom Network in India is expanding at a rapid rate and is poised for even higher rate of growth. A number of alternatives like leasing of exchanges, privatisation of the portions of the network for providing basic telephone services are under considerations. The telecom administration has a wealth of talent experienced in designing and validation of new digital systems, quality approval procedures, training etc. and is eminently suited for extending cooperation to neighbouring countries by way of deputation of experts. The telecom industry consists of giant public sector units and a number of private enterprises ready to explore new markets. Many of these enterprises are ready to offer their own technologies and expertise in setting up and operating new factories. While the Public Sector enterprises generally favour offering technical help, some of the private enterpreneurs are ready to form joint ventures. Both Public Sector and private sector enterprises would like to get definite information about the products and their markets in the neighbouring countries and would prefer to start production in a phased manner. However, it is a fact that the market in India is expanding and may become all absorbing in near future and under such circumstances, the Indian enterpreneurs may require strong compulsions or lucrative business opportunities for entering joint ventures in the neighbouring countries.

2. Bangladesh telecom network consists of electro-mechanical switches, LS and PVC cables and

unsystematic cable joints with digitalisation in its initial stages. BTTB has plans to add more than double the present capacity to the network. Privatisation of the rural network had already started. The BTTB is also considering the different alternatives for resource mobilisation to expand the network and services. However BTTB lacks proper Quality Management procedures and type approval centre to ensure and control quality of the products that will be introduced in the network. The two giant factories, i.e. TSS and BCS need to diversify their products. There is a need to set up a test and calibration centre to take care of the instruments BTTB has acquired. There is a need for development of software for Telecom administrations like Fault Repair Service, Telephone Billing etc. BTTB would be requiring technical assistance in this regard. The Bangladesh Telecom Industries are in their nascent state and lack specific information regarding the telecom products that can be manufactured in a small scale, the technologies available and the target markets.

3. Nepal Telecom Network is in much better shape compared to that of BTTB as the network has fairly large amount of digital switches and digital transmission links connecting rural and urban centres. The NTC has already set up its Test and Development Centre and is ready for testing the differnt products before introduction into the network. It has started the process of computerisation and develops all programmes in house. It expects to double the network by the year 2000 by resorting to differnt methods of resource mobilisation including privatisation. The country has necessary infrastructural facilities for setting up medium scale and large scale industries. However, there is no telecom industry worth mentioning. The

entrepreneurs in Nepal also require complete detailed information like their Bangladesh counterparts about Telecom products, technologies available, market assessments and project profiles for setting up industries.

RECOMMENDATIONS :-

1. In order to promote cooperation between industries in Bangladesh, Nepal and India, the respective Governments with UNIDO's help should undertake studies to identify the telecom products, that can be produced by small and medium scale industries in these countries, identify the technologies, conduct market surveys in the neighbouring countries and prepare project profiles. A list of products is indicated in para 4.2 of Chapter V.

2. The respective Governments and UNIDO should organise at frequent intervals workshops/seminars in Nepal and Bangladesh for disseminating information to the entrepreneurs of these countries regarding the results of the studies.

3. UNIDO should institute an Investment Promotion Service preferably located at New Delhi which can continuously monitor and pursue cooperation programmes and the setting up of joint ventures at various stages.

4. UNIDO should consider posting at least one representative exclusively for pursuing matters regarding telecom industry in the UNIDO offices at Dhaka, Kathmandu, and New Delhi.

5. UNIDO should consider extending technical and financial assistance to establish quality management procedures for ensuring the quality of products introduced in the network and for establishing type

approval centre in Bangladesh.

6. BTTB with the help of UNIDO should undertake a study to assess the financial and technical requirements for taking up the production of jelly filled cables in BCS, Khulna, Dhaka.

7. UNIDO should consider extending technical and financial help to BTTB in setting up a Test and Calibration Centre for Calibration and repairs of instruments of BTTB.

ANNEX 0.1

**JOB DESCRIPTION**

Post Title International Telecom Industry Consultant

Duration 1 m/m

Date Required Nepal (1 week), Bangladesh (1 week) and India ( 2 weeks)

Purpose of Project

To develop closer cooperation between India and the countries of the region in the transfer of technology for the telecom industry.

Duties

Following the results of discussions on bilateral cooperation and preliminary working agreements reached during the Workshop for Asia and Pacific Region Representatives from the Telecom Industry held in New Delhi in September, 1992, the incumbent will visit telecom firms in India, Nepal and Bangladesh that were parties to those working agreements. More specifically those firms included :

a) In India
   i) Indian Telephone Industries
   ii) Eltec Systems
   iii) United Telecoms
   iv) BPL Systems and Projects
   v) Shyam Communications
   vi) Hindustan Teleprinter
   vii) Industrial and Engineering
   viii) Mekaster Telecom
b) In Nepal
   i) Nepal Telecom Corporation
c) In Bangladesh
   i) Ministry of Posts & Telecommunications

The incumbent will assist the parties to the working agreements in reaching contractual cooperation

agreements based on memoranda of understanding and/or letters of intent. Revisions to the working agreements may be made in accordance to the current needs of the cooperating partners. Wherever needs for UNIDO technical assistance and/or investment promotion are identified, the incumbent shall prepare project proposals using the UNIDO formats given in Annex I (for technical assistance) and Annex II (for investment projects).

The incumbent shall submit a report to UNIDO containing the results of the cooperation agreements, proposals for UNIDO technical assistance (using Annex I) and investment promotion (using Annex II) as well as recommendations for future bilateral cooperation in the field of telecom industry. All written material provided to UNIDO should be backed up by a Wordperfect diskette.

Qualifications

In depth knowledge of telecom industry, equipment and marketing as well as experience with joint venture agreements.

Language English.

ANNEX 0.2

## BIBLIOGRAPHY


1. Annual Report 1992-93, Department of Electronics, Government of India.

2. A Guide to Organisations seeking approval, SID-01/Issue 1. Directorate of Standardisation Testing and Quality Control (STQC), Department of Electronics, Government of India.

3. Annual Report 1992-93, Department of Telecommunications, Government of India.

4. SQ Scheme for Quality System Certification in Electronic Sector, Directorate of STQC, New Delhi.

5. Electronics Regional Testing Laboratory (North) issued by the Directorate of STQC, New Delhi.

6. UNIDO Workshop for Regional Cooperation in Telecommunication Industry in South Asia and Pacific countries, A compandeum of possible illustrative projects, TCIL, New Delhi.

7. Workshop for Asia and Pacific Region Representatives from the Telecommunications Industry - IPCT. 172 (SPEC) dated 3.12.1992 issued by UNIDO.

8. QM 101. Quality Manual on Equipment Procurement and Repairs issued by ITU, Kathmandu.

9. Industrial Policy, 1992, and Foreign Investment and One Window Policy, 1992 issued by Nepal Industrial Development Corporation, Nepal.

10. Annual Report, 1991-92, Nepal Telecommunications Corporation, Nepal.

11. Eighth Plan 1992-97, National Planning Commission, Government of Nepal, Nepal.

12. Foreign Investment in Bangladesh issued by Board of Investment, Prime Minister's office Government of Bangladesh.

13. Technology Profile of Nepal, issued by Deptt. of Scientific and Industrial Research, Ministry of Science and Technology, Government of India, Jan., 1993.

14. Nepal Investment Forum, Final Report, DP/NEP/ 40/002 Jan., 1993, UNIDO, Kathmandu.

15. Incorporating a manufacturing Company in Bangladesh, Board of Investment, Prime Minister's office, Government of Bangladesh, Dec., 1992.

16. Brief Introduction of FBCCI, Member Organisations and Bangladesh Economic Indicators, issued by FBCCI, Bangladesh.

17. Nepal - Foreign Investment Opportunities issued by the Ministry of Industry, Foreign Investment Promotions Divisions, Nepal.

18. Calibration facilities, National Physical Laboratory, New Delhi.

ANNEX 1.1

# INDIA
## FACTS AND FIGURES

| | | |
|---|---|---|
| Land area (Sq.km.) | : | 3,287,590 |
| Local Currency | : | Rupee |
| Capital | : | New Delhi |
| Telecom Authority | : | Ministry of Communications |
| Telecom Operators | : | Department of Telecommunications;Videsh Sanchar Nigam Ltd. |

| | Year Beginning 4.1 | 1991 | |
|---|---|---|---|
| 1. | **DEMOGRAPHY AND ECONOMY** | | |
| a. | Population | 849,638,000 | |
| b. | Gross Domestic Product (GDP) (M US $) | 268,544 | |
| c. | GDP Per Capita (US $) | 315 | |
| d. | Gross Fixed Capital Formation (GFCF) (M US$) | 56,345 | |
| e. | Annual Average Exchange Rate ( Rupee per 1 US $) | 22.742 | |
| f. | Consumer Price Index (1985=100) | 171 | |
| 2. | **TELEPHONE NETWORK** | | |
| a. | Number of main telephone lines in operation | 5,809,929 | |
| b. | Main telephone lines per 100 inhabitants | 0.68 | |
| c. | Capacity of local exchange | 6,783,936 | |
| d. | % capacity used | 86 | |
| e. | % of main lines connected to digital exchanges | 30 | |
| f. | Number of public pay phones | 109,622 | |
| g. | Public Pay phones per 1000 inhabitants | 0.13 | |
| h. | Waiting list for main telephone lines | 2,289,769 | |
| 3. | **OTHER SERVICES** | | |
| a. | Number of Telex Subscribers | 48,179 | |
| b. | Number of Facsimile Stations | 20,000 | (1990) |
| c. | Number of mobile telephone subscribers | - | |
| d. | Number of radio paging subscribers | - | |
| e. | Number of subscribers to public data networks | 1,100 | |

| | | |
|---|---|---|
| **4. STAFF** | | |
| a. Total fulltime staff employed in telecommunication services | 345,392 | |
| b. Main telephone lines per employee | 17 | |
| **5. REVENUE AND INVESTMENT (M US$)** | | |
| a. Revenue from telecommunications | 2,328.7 | |
| b. As $ of GDP | 0.9 | |
| c. Annual investment in Telecom. | 1,583.8 | (1990) |
| d. as % of GFCF | 2.3 | |

**ANNEX 2.1**

## DETAILS OF COMPANY VISITS

### 1. BHARAT ELECTRONICS LTD., BANGALORE, INDIA

The company based in Bangalore, Karnataka was started in 1954. The company has NINE manufacturing units located at Bangalore (Karnataka); Madras (Tamilnadu), Hyderabad and Machilipatnam (Andhra Pradesh); Pune and Talaja (Maharashtra); Ghaziabad, Kotdwara (Uttar Pradesh) and Panchkula (Haryana). The estimated assets of the company is Rs,4,870 million. The total staff employed is 18,850 and of which 800 persons are engaged in the Research, Design and Development activities. The turn over of the company is nearly Rs. 8 billion. The products of the company are mostly of indigenous design amounting to 75%.

The company is a multi-product one producing equipment for both Defence and non-defence use. The range of electronic products are very much varied and typical items are listed below.

- HF/UHF Communication equipment for Defence.
- VHF/UHF/Microwave communication equipment for defence.
- Switching equipment for Defence such as AES/TIDEX/Unit level switch board.
- Message transmission and encryption equipment.
- Telecommunication equipment covering:
  - Microwave 2 MB, 140 Mb.
  - UHF multichannel Radio Relays.
  - HF multichannel transmission.
  - PCM multiplexing equipment.
  - Rural Automatic Exchanges 40/128 ports.
  - Main automatic exchanges 512 ports.
  - Antennae - HF/VHF/UHF/Microwave.
- Ground electronics and onboard electronics for

space applications.

- Sound broadcast equipment.
- Television Broadcast equipment.
- Studio equipment.
- Radar equipment.
- Various components such as
  - Optical and opto electric products.
  - Semiconductor devices,.
  - Electron tubes.
  - Passive vaccuum devices.
  - Display devices.
  - Crystal devices.
  - Magnesium manganese dioxide and lithium sulphur dioxide batteries etc.

During the discussions with GM marketing, he expressed the opinion that the company is ready to extend the technical expertise for setting up factories, supply CKD and SKD units for starting production. He also informed that they were ready to offer transfer of technology for the products developed by them.

2. **BPL INDIA LTD., BANGALORE, INDIA**

The company was started in 1963 originally for manufacture of Electrical Measuring and test instruments . By its own indigenous R&D efforts and by means of collaboration with Sanyo Japan,the company has diversified into various fields and is at present a multi-product company. The BPL Group has the following subsidiaries and these factories are located in various places.

i) BPL Ltd., Bangalore (Karnataka) and Palghat (Kerala).

ii) BPL Systems and Projects Ltd., Palghat (Kerala).

iii) BPL Sanyo Ltd, Bangalore (Karnataka).

iv) Electronic Research Ltd., Bangalore (Karnataka).

v) BPL Sanyo Technologies Ltd., Bangalore and Palghat.

vi) BPL Sanyo Utilities and appliances Ltd., Noida (Uttar Pradesh) and Bangalore.

vii) BPL Electronics Ltd., Bangalore.

The BPL Group has a total staff strength of 5,000 out of which 250 personnel are engaged in the R&D activities. Each company of the group has in-house R&D recognised by the Government of India.

The total turn over of the BPL group is Rs.8.5 Billion and is expected to reach Rs.10 Billion in 1994.

The products of the company are:-

- IBM PC compatible computers.
- Power line carrier communication equipment
- Digital electronic PABXs.
- Push Button electronic telephone instruments, plan instruments, Key telephones and feature phones.
- Medical electronics products.
- Electronic components such as relays, professional grade switches, panel meters, deflection meters.
- Test and measuring instruments such as Osilloscopes, signal generators, Million megohm meters, multimeters, insulation testers etc.
- Consumer electronics such as TVs, audios and videos.
- House hold appliances such as microwave ovens, washing machines, vacuum cleaners etc.
- Refrigirators.
- Office automation such as stencil scanners, plain paper copiers, electronic type writers cum word processors
- Private communication networks.

The company was interested in supplying their products

and will consider joint ventures provided there is enough scope.

3. **SHYAM TELECOMMUNICATIONS LTD., NEW DELHI**

M/s. Shyam Telecommunications Ltd. is a private sector company situated in Haryana, India and was established in 1974. Initially the company was manufacturing Antenna electronics and later diversified and expanded into the communication systems. The company has Five factories three in Naraina, New Delhi and two in Gurgaon, Haryana state.

The company has a total staff strength of 1100. All the products of the company are of indigenous design from in-house R&d in which 60 persons are engaged. The estimated turn over of the company by the end March 94 is Rs.900 Million.

The product range comprises of

- EPABXs in configurations from 104 to 1264 ports.
- Single channel VHF/UHF MultiAccess Rural Radio Telephone System (MARR).
- 2/15 VHF/UHF MARR telephone system.
- 4/48 VHF/UHF MARR telephone system.
- 10 Channel UHF digital Radio System.
- 30 Channel Microwave Radio System.
- Antennae electronics.

All these equipments which are completely indigenous have been developed after extensive R&D and have undergone rigours field trials. The R&D wing is recognised by the Government of India. Most of the equipments are type approved by the Department of Telecommunications.

The company is keen to start joint ventures and are

interested in exploring neighbouring markets. They are also willing to consider exporting through these joint ventures to markets which are not entered by Indian companies.

4. **UNITED TELECOMMUNICATIONS LTD.**

The company is part of M/s. Priyaraj Group of Companies based in Bangalore Karnataka. The company, United Telecom is occupying a floor space of 45,000 sq.ft. and has a planned capacity of 100,000 lines of C-DOT exchanges has plans to double the capacity. It employs 95 persons. It takes PCBs, and cabinets from the other units of the group or market and assembles the PCBs integrates the equipment and tests. This company has developed its own computer based testing facilities. From a small beginning a decade ago the Priyarak Group is now a Rs.500 million conglomerate with its activities spanning areas like engineering, electronics, telecommunications and consumer durables. The major emphasis is on telecommunications. The Group comprises of SEVEN Companies Priyaraj Electronics (P) Ltd., United Telecom Ltd., Laxmi Electronics, Raja Technics (P) Ltd., and Swan Vacuum Systems Ltd. all located in Bangalore Karnataka. The total staff strength is 500 out of which 50 persons are engaged in the inhouse R&D activities. The turnover of the Group is Rs.500 million.

The products of the group are:-

- Digital Electronic Private Branch Exchanges (EPABX) in varous configurations upto 256 ports.
- Digital Rural Automatic Exchanges (RAX) of 128 and 256 ports.
- Digital Swtiching System (DSS) with a Base Module of 512 terminations expandable upto 16000 Terminations. Using concentration Modules the system can go upto 40,000 lines.

- Mini integrated local cum trunk lines (MILT) upto 64 lines capacity.
- Digital Electronic Private Automatic Exchange (EPAX) for office use and for connecting with power line carrier (PLCC).

- Single Channel VHF system.
- 2/15 Shared Radio System.
- 10 Channel Digital UHF System (600 MHz).
- Line concentrators.
- Electronic Push Button Telephones in Decadic, DTMF and TONE/PULSE Switchable mode.
- Electronic Push Button Telephones Boss Secretary type in Decadic DTMF and Tone/Pulse Switchable mode.
- Electronic Push Button Telephons in Decadic, DTMF and Tone/Pulse Switchable mode with Flash Button, STD, ISD and local call barring facility.
- Line Jack Units with Gas Discharge Tube protection.
- Electronic Key boards and key board concentrators for replacing the old morse code for automatising the telegraphic network.
- Various other products such as printed circuit boards and assemblies, motor stampings for die cast stator and rotors, plastic injection moulding, tool room products and stainless steel vacuum flasks.

The company's management is quite dynamic and is already making vigorous efforts to form joint ventures with BRTA, Dhaka and these talks are in fairly advanced stages.

5. **HINDUSTAN TELEPRINTERS LTD., MADRAS**

The public sector company based in Madras, Tamilnadu was established in 1960 to manufacture page type and tape type electromechanical teleprinters. The

manufacturing unit is located at Madras, Tamilnadu. The estimated assets as on date is around Rs.200 million. It has a staff strength of 2300. It has an inhouse R&D facility. The turn over is around Rs.400 million.

The products are:-

- Electronic teleprinters.
- Rural messaging terminal for transmission of telegrames
- Formatted terminal for transmission of telegrames.
- FAX machines
- Modems- stand alone and rack versions 2400/9600 Bps and base band.
- Line drivers and pads.
- Time division multiplexers.
- Audio conference unit.
- Charge indicators
- Main distribution frames and protection apparatus
- C-DOT RAXs 128 P/256 ports
- C-DOT MAXs 500/1400 ports
- Power plants
- 10 Channel digital UHF
- Antennae, Cable and accessories.

The company is willing to consider supply of their products and also extending technical help. Their products for transmission of telegrammes has a vast potential in Nepal.

6. **INDIAN TELEPHONE INDUSTRIES LTD.,BANGALORE**

The company was set up in 1948 as free India's first public sector undertaking and has contributed substantially to the progress of telecommuncations. From a single unit manufacturing tlephones and the strowger type switching equipments, it has grown as a

multi-unit organisation having units in different parts of the country and making a wide spectrum of telecommunication equipments. The various manufacturing units are located at Bangalore complex with a number of divisions such as Switching, Transmission, Telephones, Defence, Microelectronics, etc. and Electronic City unit in Bangalore (Karnataka), Palghat (Kerala); Naini Rae Bareilly and Mankapur in Uttar Pradesh and Srinagar in Jammu and Kashmir.

It has a total staff strength of 32,000 out of which 800 personnel are enaged in R&D activities. A well established R&D
organisation has been developed over the four decades. The turn over exceeds Rs.10 billion.

The products which are quite numerous covering the entire range of telecommunications are:

- Electro mechanical switching equipments of strowger and crossbar exchanges analogue and digital exchanges, PABXs, Rural exchanges and Main Automatic exchanges. The systems cover in-house designs, indigenous design of C-DOT technology and imported technologies.
- All range of products in the filed of transmission both analogue and digital covering carrier, coaxial, microwave and Radio sytems.
- Ground based satellite equipment and terminals.
- Telecommunication equipment for Defence, Railways etc.
- Microelectronics.
- Components such as Hybrids, ASIC etc.

The company is prepared to extend technical help in setting up factories, training and in supplying SKD/CKD components for production.

7. **TELECOMMUNICATIONS CONSULTANTS INDIA LTD. (TCIL)**

Telecommunications Consultants India Ltd (TCIL) was established as a public sector enterprise by the Government of India in 1978. The objectives are to provide technical and economic services in all fields of telecommunications worldwide and especially to the developing countries and also to provide consultancy services to bulk users of telecom facilities in India.

The company is located in New Delhi and has its offices in various cities in India and eleven countries viz. Yemen Arab Republic, Kuwait, Jordan, Iraq, UAE, Nigeria, Saudi Arabia, Benin, Botswana, Mozambique and Zimbabwe. TCIL has operated/operating in more than 30 countries. The total staff strength is 1600. The projects undertaken in India are for Oil India Ltd, Indian Railways, State Bank of India and Indian Airlines. These are apart from a number of PABXs installed and maintained for Defence and various government departments and organisations. A joint venture TCIL BellSouth Ltd. (TBL) has been established for software development.

The turn over is Rs.140 million. The spectrum of services cover planning techno-economic feasibility studies, design of systems, preparation of equipment specifications, procurement, installation and commissioning, operation and maintenance of all telecom systems, training and manpower development, managerial support and transfer of technology. These services are being rendered in the following areas of telecommunications.

- Local telephone networks of all sizes.
- Transmission systems of all types of media viz coaxial, Radio, Microwave, Optical fibre and satellite communication.
- Software for Telecom Administration such as

Directory Enquiry, fault repair service, cable records, installation management, subscriber billing, network planning, and network quality testing.

- Computer systems in aspects such as computer configuration and selection, system software development, application software development, computer centre management, data base management etc.
- Data communications and networks.
- Various new technologies and services such as Cellular mobile, paging systems, ISDN, public videotex, teletex, electronic mail and supervisory control and data acquisition systems.

The company is ready to offer consultancy services in setting up factories, selection of vendors, training of staff and arrange transfer of technologies. The company can also offer extensive services in software for Telecom Administration.

8. **TAMILNADU TELECOM LTD., ARKONAM, TAMILNADU, INDIA**

Tamilnadu Telecommunications Ltd. is a joint venture of Telecom Consultants India Ltd. with Tamilnadu Industrial Development Corporation, Government of Tamilnadu, India set up with the objective of producing jelly filled cable and other accessories. The company started in 1989 with a project cost of Rs.286.5 million. The commercial production started in March 92. The planned capacity is 600,000 CKM (Conductor Kilometer) and it reached production of 280,000 CKM in 1992-93 with a turnover of Rs.300 Million. It produces jelly filled cables of sizes varying from 20 pair to 400 pairs and has programme to produce cable upto 2000 pairs. The factory complex occupies an area of 17 acres and has a staff of about 160. The company has just started production and is

yet to utilise its full capacity.

9. **HINDUSTAN CABLES LTD., RUPNARAINPUR, WEST BENGAL, INDIA**

Hindustan Cables is a Public Sector Undertaking of Government of India in 1952 with the object of producing the coaxial cables in India. Subsequently, other units for production of paper insulated dry core, jelly filled cables at Hyderabad, India were started. The latest addition is an optical fibre unit at Naini Allahabad started in 1988. Presently the company has turnover of Rs.5000 million and produces a range of products as mentioned below:-

1. Optical Fibre - slotted core and loose tube.
2. Optical Fibre accessories.
3. Optical fibre systems.
4. Paper core twin and quad cables.
5. Aluminium sheathed cables.
6. Coaxial cables.
7. PVC insulated switch board cables & wires
8. PCM cables.
9. Fire retardent low smoke cables.
10. Aerial cables.
11. Radio frequency cables
12. Polythene insulated jelly filled cables (solid/foam/foamskin)
13. Copper coated steel wires.

This company has its own R&D units and has developed a number of testers like cable fault locator, halide leak detector, digital crosstalk, attentuation tester etc.

The company is ready to extend help in preparing project profiles for setting up factories, take up the job of setting up factories on turnkey basis and giving training.

10. **NEPAL TRANSFORMER COMPANY LTD., NEPAL**

The company has a turnover of Nepalese Rupees 20 Million and produces small transformers and switchgears. It also produces small motors and produces motor casings. The company is keen to have transfer of technology for uninterrupted power supply, modems and line jack units and assemblies of solar panels for lighting. The company also wanted technical and financial assistance in setting up telecom factories.

11. **KHETAN GROUP OF INDUSTRIES, NEPAL**

This is a group of industries producing liquour and Textiles and other industries. The company is interested more in participating in the sevice sectors like Mobile telephones and Radio paging. The copany is interested in proejct profiles and market assessment for telecom products.

12. **DUGAR GROUP NEPAL**

This group has the agency for the sale of NISSAN automobiles in Nepal and they have factories for edible oils and industrial oil. The turnover of the group is Nepalese Rupees 1000 Million.

The company is interested in providing Radio paging and cellular phone service and is looking for partners. They are also interested in providing underground cable and modems provided reliable market forecasts and technology transfer is available. They are ready to consider joint venture proposals.

13. **KEDIA GROUP OF INDUSTRIES, NEPAL**

This group has factories producing sugar, fans, textiles and furniture. It has a turnover of more than Rs.1000 million (Nepalese Rupees) This group is interested in running services and dealership in

computers. According to one of the partners of the group, they would like to have complete information regarding telecom products and their markets. They are ready for any joint venture in telecom area.

14. **SWADESHI CABLES, NEPAL**

This group produces drop wire, switch board cable, jumper wire and indoor cables. The group has a trunover of Rs.100 M (Nepalese Rupees). They observe that NTC, Nepal is not purchasing their products either because all equipments are supplied by the aid giving countries or they are not qualified for bidding. The company feels there is enough scope for manufacture of aerial cables and copper coated steel wire and is looking for know-how and partners.

15. **YETI & CO., NEPAL**

This group of companies is selling charge controllers, inverters, solar pumping stations and MITEL EPABXs. The turnover is roughly 2 M US $. The company is interested in producing EPABXs and is negotiating with an Indian company for joint ventures.

16. **BANGLADESH RURAL TELECOM**

This is a part of a group of companies called Gulf Bangladesh company which is basically a trading company and also produces MITEL EPABXs. The BRTA has been awarded the contract for providing telecom services to 200 UP zillas (rural areas) in Bangladesh and has already commissioned five exchanges. These exchanges are yet to be connected to the network due to reported reluctance of staff of BTTB. The company is keen to have joint venture for production of C-DOT exchanges and is holding discussion with United Telecom., India.

17. **VISIT TO UNIDO OFFICES IN DELHI, DHAKA AND KATHMANDU**

The UNIDO Kathmandu could give valuable information regarding Nepal Investment Forum and also helped in guiding the consultant regarding persons to be met and rendered great help in fixing appointments with Ministry of Industries, NTC and FNCCI Nepal even though the officers available were currently engaged in projects other than telecommunications. In the other two offices practically no information could be got as none was looking after telecommunication industry.

**ANNEX 2.2**

## LIST OF OFFICERS MET IN INDIA

1. Mr. V.Krishnan, General Manager (Commercial), Indian Telephone Industries, 45/1 Magrath Road,Bangalore.

2. Mr. Laxminarayana, DGM, Marketing, I.T.I., Bangalore.

3. Mrs. Laxmi G.Menon, Chairman & Managing Director, Hindustan Teleprinter Ltd, GST Road, Guindy,Madras-600015.

4. Mr. S.S.Shekhawat, GM, Hindustan Teleprinters Ltd.,Madras.

5. Dr. R.M.Rao,Director, United Telecom Ltd., Bangalore & President, Telecom Equipment Manufacturers Association, India.

6. Mr. Laxmanan, Director, United Telecom Ltd.,Bangalore

7. Mr.Anil Prakash, GM, Shyam Electronic (P) Ltd, New Delhi

8. Mr. T.R.Dua, GM,Mekaster Telecom Pvt.Ltd., 908 Ansal Bhawan, 16 Kasturba Gandhi Marg, New Delhi - 110001.

9. Brig. R.C.Dhingra, Resident General Manager, BPL Systems and Projects Ltd., 701-703 Devika Tower, 6 Nehru Place,
New Delhi-110 019.

10. Mr.D.K.Ghosh, GM, Modi Telecommunications,Nehru Place, New Delhi, Secretary General, Telecom Equipment Manufacturers Association, India.

11. Col. S.Shankar, General Manager, Bharat Electronics Ltd. Bangalore.

12. Mr.J.S.Raju, Director General, Directorate of Standardisation Testing & Quality Control (STQC) DOE, New Delhi.

13. Dr.A.K.Dutta, Director Electronics Regional Testing Laboratory, New Delhi.

14. Dr.Rajagopal, Director, National Physical Laboratory, New Delhi.

15. Mr. S.Rama Rao, General Manager, Component Approval Centre for Telecommuncations (CACT), Bangalore.

16. Mr. C.V.Rajan, M.D., Tamilnadu Telecommunications Ltd. Arkonam, Tamilnadu, India.

17. Mr. Swaminathan, TCIL BellSouth Ltd., New Delhi.

18. Mr. Chander, GM Marketing,Hindustan Cables, Calcutta.

TABLE 3.1

LIST OF PUBLICATIONS BY QA CIRCLE, DOT, INDIA

**LINE AND WIRE MATERIALS - EXTERNAL PLANT**

| | | | |
|---|---|---|---|
| 01. | IM-101 | Inspection Manual on Lines and wires | Sept-85 |
| 02. | IM-103 | Inspection Manual on Telecom Products | Jul-88 |
| 03. | IM-104 | IM on 50V/5A & 12A APower Plant | |
| 04. | QIB-012 | Metal Oxide Varistors as protection for telephone installations in lightning prone areas. | Sep-88 |
| 05. | QM-314 | Draft Quality Manual on Minimum Production insfrastructure facilities for Line and Wire Materials. | Mar-89 |
| 06. | QSR-007 | PVC Drop wire | Dec.-83 |
| 07. | QSR-010 | External Plant | Mar.-85 |

**TRANSMISSION OUTDOOR**

| | | | |
|---|---|---|---|
| 08. | QM-312 | Quality Plan on Microwave Antennae | Sep.-88 |

**UNDERGROUND CABLES AND CABLE MATERIALS**

| | | | |
|---|---|---|---|
| 09. | MS-004 | Manual of Standards-Underground Telecom Cables | Nov-82 |
| 10. | QIB-002 | Quality Assurance in Underground Cable Procurement | Jun-84 |
| 11. | QM-303 | Underground PIJF Cables | Mar-87 |
| 12. | QM-307 | Draft Quality Plan on Krone Type C.T.Boxes | May-87 |
| 13. | QM-311 | Quality Plan for D.P.Box 10 pairs and 20 pairs using Krone drop wire module | Jul-88 |
| 14. | QM-313 | Quality Manual on Polythene Insulated Unfilled Aerial Cables | Sep-88 |
| 15. | QSR-004 | Underground cables | Jun-82 |
| 16. | QSR-009 | Jelly Filled Cables in Telecom Network | Sep-84 |

**BATTERY AND POWER PLANTS**

| | | | |
|---|---|---|---|
| 17. | IM-102 | Approved Test Schedule for Power | Under |

| | | Plant | Issue |
|---|---|---|---|
| 18. | QM-305 | Power Plant Manufacturer's Infra-structure requirements | Jul-87 |
| 19. | QM-306 | Quality Manual on Secondary Cells | Sep-88 |
| | **ELECTRO-MECHANICAL SWITCHING SYSTEMS** | | |
| 20. | MS-001 | Manual of Standards-Strowger Equipment | Mar-82 |
| 21. | MS-002 | Manual of Standards -Crossbar Equipment | Nov-82 |
| 22. | QM-308 | Strowger Equipments | Sept-87 |
| 23. | QSR-002 | Strowger Equipments | Apr-82 |
| 24. | QSR-003 | Crossbar Equipments | Apr-82 |
| 25. | QSR-005 | Post Office Meters | Aug-82 |
| 26. | QSR-006 | Visual Indicator Lamps | Nov-83 |
| 27. | QSR-011 | Quality Status Report on Crossbar Equipments | Sep-88 |
| 28. | QSR-013 | Quality Status Report on Strowger Equipments | Sep-88 |
| 29. | QSR-015 | QSR on ICP Equipments | Jan-91 |
| | **TELEPRINTERS** | | |
| 30. | QM-316 | QM on Electronic Teleprinters (HTL )make | |
| | **ELECTRONIC SWITCHING SYSTEMS** | | |
| 31. | QM-201 | Control in the Factory for Switching system E-10B-General Procedures | Jul-85 |
| 32. | QM-203 | Control in the Factory for Electronic Equipments - Classification of Defects. | Aug-85 |
| 33. | QM-315 | Acceptance and Test Plan for C-DOT 128 P RAXs | Mar-89 |
| 34. | QM-317 | QM on G.D.Tubes (for Bulk Acceptance & Surveillance Type Tests. | |

| | | | |
|---|---|---|---|
| 35. | QM-319 | QM for Acceptance C-DOT SBM 512 P RAX | |
| 36. | QSR-016 | QSR on C-DORT RAX PSU | Feb-91 |
| | **TELEPHONE INSTRUMENTS & ATTACHMENTS TO TELEPHONES** | | |
| 37. | MS-003 | Manual of Standards-Telephone Instruments. | Nov-82 |
| 38. | QIB-005 | Procedure for evaluation and licencing of attachments to telephones | Jan-86 |
| 39. | QM-304 | 677 Telephone and its sub-assemblies. | Aug-86 |
| 40. | QM-309 | Electronic Push Button Telephones | Mar-88 |
| 41. | QSR-001 | Telephone Instruments | Apr-82 |
| 42. | QSR-014 | Quality Status Report on 677 | Sept-88 |
| 43. | QM-209 | Gold plated PCBs used in EPBTs | |
| | **TRANSMISSION EQUIPMENTS** | | |
| 44. | QIB-004 | Information Bulletin on Consultants Report on PCM productionisation | Sep-85 |
| 45. | QIB-009 | Information circular for the guidance of manufactures of High Technology Telecom Equipment for supply to DOT | Mar-88 |
| 46. | QM-301 | Transmission Equipments-General documentation | Aug-85 |
| 47. | QM-302 | 30 Channel PCM-2MB | Oct-87 |
| 48. | QM-310 | Low Noise Amplifier for Satellite Earth Stations. | Jun-88 |
| 49. | QSR-008 | A case study of capacitors used in Transmission Equipments. | Jan-84 |
| 50. | QSR-012 | Quality Status Report on Transmission Equipments | Sept-88 |
| 51. | QM-321 | Single Cnl. UHF systems. | |
| 52. | QM-322 | 2/15 Shared Radio Systems. | |

| | | | |
|---|---|---|---|
| 53. | QSR-017 | QSR on 120 Chl.Digital UHF of M/s. BEL, Bangalore. | |
| 54. | Supple-ment | Supplement to QSR-017 -120 Chl. Digital UHF of M/s. BEL, Bangalore | |
| | **WORKMANSHIP STANDARDS** | | |
| 55. | QIB-013 | Information Bulletin on Guide-lines for Electrstatic Discharge protection | Sept-88 |
| 56. | QM-202 | Pictorial guidelines for visual assessment of quality of Printed Board Assemblies (PBA) and Discrete Terminal Assemblies(DTA) | Mar-88 |
| 57. | QM-204 | Guidelines for Workmanship Standards for repair and modification of printed wiring board assemblies. | Jul-88 |
| 58. | QM-205 | Guidelines for Standard of Work-manship for Printed Boards. | May-87 |
| 59. | QM-206 | Guidelines for Standard of Workmanship for printed Board Assemblies. | May-87 |
| 60. | QM-207 | Guidelines for Soft Solders and Fluxes for Telecommunication Equipments. | Aug-87 |
| 61. | QM-208 | Guidelines for quality requirements for Solderless Wrapped Connections | Under Issue |
| | **GENERAL DOCUMENTATION** | | |
| 62. | | Information Bulletin on QA in Telecom Stores procurement | Aug-84 |
| 63. | QIB-001 | Quality Assurance in Equipments | Jan-84 |
| 64. | QIB-003 | Information Bulletin, Component Source Approval & Failure Analysis | Mar-85 |
| 65. | QIB-006 | Information Bulletin on QA in new products | Jan-86 |
| 66. | QIB-011 | Climatological Conditions en-countered by Telecom Equipments in India. | Sep-88 |
| 67. | QM-101 | Policies, objectives and System Outline | Apr-84 |

| | | | |
|---|---|---|---|
| 68. | QM-102 | Q.C.System requirements in Telecom Procurement | Apr-84 |
| 69. | QM-103 | Prototype Evaluation & Approval of Equipments & Finished products | Apr-84 |
| 70. | QM-104 | Source Approval for components | Mar-85 |
| 71. | QM-105 | Control on Relaxations to specifications in Telecom Equipments procurement. | Oct-87 |
| 72. | QM-106 | Collection, Analysis and Utilisation of Feedback data from field units. | Nov-87 |
| 73. | QM-107 | Test facilities in QA Test Centres. | Jan-87 |
| 74. | QM-108 | Supplier's Calibration System Requirements | Sep-87 |
| 75. | QM-109 | Guide to the preparation of Quality Manuals and Quality Plans | Dec-87 |
| 76. | QM-110 | Supplier's Quality Control System Requirements (for Approved Firm scheme) | Feb-88 |
| 77. | QM-111 | Supplier's Inspection System Requirements (for Approved Inspection Scheme) | Mar-88 |
| 78. | QM-112 | Guidelines to Quality Reporting by Telecom Quality Assurance Units | Mar 88 |
| 79. | QM-113 | Component Approval Centre for Telecommunications (CACT)- Quality Manual | Aug-88 |
| 80. | QM-114 | Telecom Testing Laboratory (TTL) -Quality Manual | Aug-88 |
| 81. | QM-115 | Reliability Methods & Predictions | |
| 82. | QM-318 | QM on Material Handling | |
| 83. | QM-320 | Training Documentation for E-10B testing<br>Course Directory on Human Resources 1989-90. | |
| 84. | QM-333 | Specification for environmental testing of electronic equipments for transmission and switching use. | |

ANNEX 4.1

# BANGLADESH
# FACTS AND FIGURES

| | | |
|---|---|---|
| Land area (Sq.km.) | : | 143998 |
| Local Currency | : | Taka |
| Capital | : | Dhaka |
| Telecom Authority | : | Ministry of Post and Telecommunications |
| Telecom Operators | : | Bangladesh Telegraph and Telephone Board. |

| Year Ending 30.6 | | 1991 |
|---|---|---|
| 1. | **DEMOGRAPHY AND ECONOMY** | |
| a. | Population | 118,745,000 |
| b. | Gross Domestic Product (GDP) (M US $) | 21,921 |
| c. | GDP Per Capita (US $) | 180 |
| d. | Gross Fixed Capital Formation (GFCF) (M US$) | 2,571 |
| e. | Annual Average Exchange Rate (Taka per 1 US $) | 36.596 |
| f. | Consumer Price Index (1985=100) | 170 |
| 2. | **TELEPHONE NETWORK** | |
| a. | Number of main telephone lines in operation | 249,778 |
| b. | Main telephone lines per 100 inhabitants | 0.21 |
| c. | Capacity of local exchange | 250,249 |
| d. | % capacity used | 100 |
| e. | % of main lines connected to digital exchanges | 10 |
| f. | Number of public pay phones | 462 |
| g. | Public Pay phones per 1000 inhabitants | 0.004 |
| h. | Waiting list for main telephone lines | 144,882 |
| 3. | **OTHER SERVICES** | |
| a. | Number of Telex Subscribers | 2,581 |
| b. | Number of Facsimile Stations | ... |
| c. | Number of mobile telephone subscribers | 250 |
| d. | Number of radio paging subscribers | 394 |
| e. | Number of subscribers to public data networks | ... |

| | | |
|---|---|---|
| 4. | **STAFF** | |
| | a. Total fulltime staff employed in telecommunication services | 19,282 |
| | b. Main telephone lines per employe | 13 |
| 5. | **REVENUE AND INVESTMENT (M US$)** | |
| | a. Revenue from telecommunications | 141.9 |
| | b. As % of GDP | 0.6 |
| | c. Annual investment in Telecom. | 34.0 |
| | d. as % of GFCF | 1.3 |

**ANNEX 5.1**

## GOVERNMENT TELECOM FACTORIES OF BANGLADESH

### 1. TELEPHONE SHILPA SANGSTHA LTD. (TSS), TONGI, DHAKA, BANGLADESH

1.1 This factory was established in 1967 by the Government of Pakistan (before the liberation of Bangladesh) as a joint venture with M/s. Siemens AG. West Germany for the production of EMD Switches and telephone instruments under the name "Telephone Industries Corporation". At a later date by a fresh agreement between the People's Republic of Bangladesh and Siemens AG the name was changed to Telephone Shilpa Sangstha Ltd. The company was started with an authorised capital of TK 120 million (1US $ = 41TK) and a paid up capital of TK 868 million. 92% of equity is held by the Bangladesh Govt. and the balance by M/s. Siemens AG. The Board of Directors consists of seven out of which two are nominated by M/s. Siemens and the rest are from the Govt of Bangladesh. The factory has an area of 82,000 sq.mt and a built up area of 12,800 sq.m. This factory has a staff of about 900 out of which 150 are officers.

1.2 This factory started production under the licence of Siemens in Sept.1970 and has a capacity of 16000 Lines of switching equipment and 50,000 telephone sets per annum in single shift. It is producing still the rotary electro-mechanical switch of EMD make and rotary dial telephone sets. However, it has recently started producing Push Button telephones which form 10% of the production. In addition the TSS also produces a number of other items viz., call

meters, test boards, enquiry and complaint boards, Trunk boards, Rural Automatic Exchanges (Electromechanical), PABXs (2+10, 5+25 lines) and line plants like DPs, pillars and MDF.

1.3 A programme for Balancing, Modernising, Replacement and Expansion (BMRE) for TK 300 million has been approved by Planning Commission, Govt. of Bangladesh. Under this programme a tender has been floated for production of 100,000 lines of digital Exchanges with Transfer of Technology. The bids have been received and are presently under evaluation. In addition a decision has been taken for production of 5,000 lines of Digital EPABXs of OKI of sizes varying from 100 lines to 2,000. Besides these two expansion plans no other specific programme has been formulated. With the policy of Digitalisation of the network by the Bangladesh Government in the offing, the factory is at present engaged in catering to the expansion programme of the existing EMD exchanges and also in supplying spares and reconditioning of equipment. As a stop gap arrangement the TSS has taken up installation of the nation wide dialling services and also repair of telephones sets produced by them.

1.4 The factory has got extensive machinery for producing hardware required for the production of EMD exchanges and also a test centre with a number of measuring instruments. The factory also posseses trained technical work force and officers experienced in test and inspection. Thus the factory has got the capability for taking up products which require minimum of new machinery and techniques. Such products could be

rural automatic exchanges, small capacity EPABXs, 3 channel, 6 channel analogue Radio systems, 10 channel Digital UHF systems, Digital multiplexers, modems, multiaccess radio relay systems (MARR) which are produced in large quantities in much smaller factories in India. Another item that could be considered for production is the power plant for the OKI EPABXs. In India there are a number of small scale industries which produce power plants for the OKI EPABXs these do not require much of capital. These products will be required in large quantities for the proposed expansion of rural telecommunication and TSS can be the pioneer in the field.

1.5 A typical factory in India having a floor space of about 1500 sq. m. with a staff about 90 produces about 100,000 lines of C-DOT exchanges. The inputs are printed cards and cabinets and the factory assembles the printed cards, integrates the equipment and tests the final product. It has got tools and test equipment worth about 271,000 US $. Details of the tools and test equipment is given in Table 5.1.1. To start with, the TSS can get the printed cards and assemble and test the equipment as most of the infrastructure is available in the factory. The facilities like printed card assembly which will be part of the digital exchange manufacturing programme can be used for production of printed cards in house at a later stage as and when it is set up.

1.6 The Bangladesh Telegraph and Telephone Board (BTTB) has over a period of time accumulated a number of measuring instruments which are not

being calibrated from time to time. Besides, the instruments which go faulty are not being repaired due to lack of expertise and where withall for rectifying the defective instruments. The TSS has a staff of 60 in their quality control unit trained in tests and measurement and thus has the necessary manpower who can be gainfully employed in calibration and repair of instruments if adequate spares are provided. Even if the spares are not available due to obsolecence or due to any other problem the repairs to the extent possible can be attempted. Thus TSS has the infrastructure and trained manpower for the upkeep of the Test and calibration centre with repair facilities. A list of standards which will meet the calibration needs of the instruments used in installations and the industry is given in Table 5.1.2. However setting up of Test and calibration centre will need a more detailed study with cost estimates for preparing a detailed project. It is recommended that UNIDO should undertake a project for assessing the techno economic requirements of such a test and calibration centre.

2. **BANGLADESH CABLE SHILPA LTD, KHULNA, BANGLADESH (BCS):-**

2.1 Bangladesh cable Shilpa Ltd (BCS) situated in the Shiromani Industrial Area, Khulna, Bangladesh occupies about 25 acres and was established in 1967 by the Pakistan Govt. in collaboration with M/s. Siemens AG of West Germany with the object of producing all kinds of PVC quad type telecommunication cables. The factory which started production 1972 has a rated capacity of 400,000 conductor kilometer (CKM) and is

producing about 300,000 CKM per year. BCS employs about 394 persons.

2.2 The present product range is :-

i) Cellular Polyethelene Insulation, star quad type, unit stranded, laminated sheath telecommunication junction cables upto 1000 pair.

ii) Solid PE insulation starquad type, unit stranding, laminated sheath telecommunication subscriber cables upto 2,000 pair.

iii) Solid PE insulation, starquad type, unit stranding, laminated inner sheath, plain steel tape armouring PE outer sheath up to 400 pair.

iv) Solid PE insulation, star quad type, unit stranding, shield of aluminium tape, messenger wire, PE sheath, light weight aerial cables upto 200 pair.

v) PE or PVC insulated subscriber lines.

vi) PVC insulation, unit stranding, PVC sheath insulation cables upto 100 pair.

vii) PVC insulation, shield of almunium tape, PVC sheath SW board cables upto 30 pair.

viii) PVC insulated jumper wires.

2.3 All the existing machinery was installed around 1968 and many of them are in good condition. With some local modification BCS is now able to produce Jelly filled cables upto 250 pairs. The factory is facing the problem of lack of orders from BTTB which consumes all the u/g cables produced. In the fourth Five Year Plan (1990-1995) BTTB has planned an expansion programme of 300,000 new telephone lines which will require about 200,000 CKM of underground cables of all

types. The annual consumption for maintenance and repair of the existing cable network damaged due to regular severe flood and road cutting by different agencies is about 100,000 CKM per year of secondary cables. Hence the total requirement of 300,000 CKM per annum is well within the capacity of BCS to supply. But the BTTB is planning to go for the jelly filled cables in future. In addition, due to privatisation programme some portion of expansion may be entrusted to private companies who are free to make their own arrangement of the cables. There is quite a justified anxiety on the part of BCS authorities as the private bidders may not patronise BCS due to its high cost compared to that of international market. Under the circumstances the production programme of BCS is very much curtailed.

2.4 A suggestion was given by the Ministry of Posts & Telecommunication to study the feasibility of producing jelly filled cable in BCS. This was examined by going through the details of machinery and by discussion with the officers in charge of production. The majority of the machinery was installed between 1967 to 1971 and the list of the main equipment is given in Table 5.1.3. The condition of the machinery is quite satisfactory except for the one of the heavy wire drawing machines brought from T&T workshop Tejgaon. However, barring the wire drawing machines all the other machinery are not suitable for the production of jelly filled cable. Even the presently used wire drawing machine needs to be augmented by increasing the number of reduction stages from the other unutilised machine so that the wire drawing can be done in

a single run from 5.20 mm to about 2.5 mm necessary for the next stage. Complete new modern high speed machinery like tandem insulating machines are required to be installed for the production of jelly filled cables. It is found that there is enough free floor space available for erecting new lines. The list of machinery required and their approximate cost is given in Table 5.1.4. It may be seen that cost of new machinery is about US $ 7.9 million. The existing machinery available may be used for manufacturing the present quad cable to the extent required for replacement of existing cable network till such time the machinery is in good repair.

2.5 In addition to the above, the BCS can also diversify to manufacture following products :-

i) Electric Cables (Domestic)
ii) Bare Copper Conductor for earthing.
iii) Coiled cords for telephone sets.
iv) Radio Frequency Cables
v) PCM cables.

2.6 Before finalising the diversification proposal the Ministry of Communication should take policy decision regarding

i) Introduction of jelly filled cables and the programme of change over in the present network.
ii) Identifying the quantum of cables that will be allocated to BCS for supply and
iii) Production programme of the BCS in the short term and long term perspectives.

2.7 Meanwhile BTTB should conduct detailed techno economic study for production of jelly filled cables and diversification of the products. UNIDO may help BTTB in conducting such a study and preparing a feasibility report.

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TABLE 5.1.1

**TOOLS AND TEST EQUIPMENT REQUIRED FOR A TYPICAL FACTORY FOR MANUFACTURE OF 100,000 LINES OF CDOT EXCHANGE EQUIPMENT IN INDIA**

| S.NO | ITEM | QTY | SOURCE | COST US($) |
|---|---|---|---|---|
| 1. | Antistatic Measure | Lot | Indian | 26,667 |
| 2. | Insulation Tester | 02 | Indian | 83 |
| 3. | Lead Forming- IC | 05 | Indian | 17 |
| 4. | Lead Forming-Axl | 06 | Indian | 17 |
| 5. | Lead Forming-Rdl | 01 | Indian | 167 |
| 6. | Soldering Station | 35 | Indian | 60 |
| 7. | De-soldering | 01<br>10 | Indian<br>Indian | 530<br>3 |
| 8. | Smoke Absorber (Part of wave soldering M/c) | 01 | Indian | - |
| 9. | LabellingMachine (Labels procured) | - | Indian | - |
| 10. | MICE 68000 | 01 | Indian | 7900 |
| 11.<br>11.a | Line Parameter Measuring Inst.<br>-do- | 01<br>02 | Indian<br>Indian | 23886<br>50000 |
| 12. | Tele Traffic Gen.(Optional) Load Test Generator | 02 | Indian | 6667 |
| 13. | 2/7 Flat Cable Crimper | 01 | Local | 67 |
| 14. | 2/7Round Cable crimper | 01 | Local | 67 |
| 15. | 2/32Round Cable Crimper (Bench modl) | 01 | Local | 200 |
| 16. | 2/32Round Cable Crimper (Hand held) | 01 | Local | 200 |
| 17. | Multi Purpose Tool | 01 | Local | 100 |
| 18. | PCB Edge Connector Crimper | 01 | Indian | 2000 |
| 19. | Flat Cable Cutter | 02 | Indian | 8 |

| S.NO | ITEM | QTY | SOURCE | COST US($) |
|---|---|---|---|---|
| 20. | Wire wrapping Tool with accs. | 12 | Indian | 424<br>400 |
| 21. | Cable Tie Gun | 03 | Indian | 3000 |
| 22. | 2/32 IDC Crimper | 01 | | 100 |
| 23. | FRC Crimper Tool | 01 | Indian | 2000 |
| 24. | Mate & Lock Crimping Tool | 01 | Indian | 25 |
| 25. | PVC Receptacle crimper | | Indian | Included item 24 |
| 26. | Gang Programmer | 01 | Indian | 25967 |
| 27. | LCR Meter | 05 | Indian | 5,267 |
| 28. | Multimeter | 26 | Indian | 241 |
| 29. | D.C.Microhm meter | 01 | Indian | 252 |
| 30. | IBM PC<br>PC-XT<br>PC-AT | 27 | Indian | 3,267 |
| 31. | Frequency Counter 10 MHz-100 MHz | 01 | Indian | 500 |
| 32. | Solder bath | 02 | Indian | 67 |
| 33. | Magnifying Glass | 05 | Indian | 67 |
| 34. | Operator Tool Kit | 40 | Indian | 17 |
| 35. | High Wattage Iron | 06 | Indian | 7 |
| 36. | Oscilloscope-50 Mz | 16 | Indian | 1500 |
| 37. | Oscilloscope-100 Mz | 14 | Indian | 2333 |
| 38. | Telephones | 50 | Indian | 27 |
| 39. | GPIB Interface | 06 | Indian | 300 |
| 40. | Terminals | 18 | Indian | 533 |
| 41. | Suites Equipment | 02 | Indian | 1167 |
| 42. | UPS-3KVA | 01 | Indian | 3282 |
| 43. | Printer -132 col. | 04 | Indian | 667 |
| 44. | Plotter | 01 | Indian | 6667 |

| S.NO | ITEM | QTY | SOURCE | COST US($) |
|---|---|---|---|---|
| 45. | Digitizer | Set | Indian | Included item 44 |
| 46. | CAD Station | | Indian | 2000 |
| 47. | PCB Carriers | 130 | Indian | 60 |
| 48. | Dedicated LB meter | 02 | Indian | 2733 |
| 49. | Diode Tester | 02 | Local | 167 |
| 50. | Transistor Tester | 02 | Local | 167 |
| 51. | Voltage Reg.Tester | 01 | Local | 167 |
| 52. | Op-Amp Tester | 01 | Local | 167 |
| 53. | Comparator Tester | 01 | Local | 167 |
| 54. | Dual Timer Tester | 01 | Local | 167 |
| 55. | RMS-DC Conv.Tester | 01 | Local | 167 |
| 56. | ADC Tester | 01 | Local | 167 |
| 57. | Relay Driver Tester | 01 | Local | 167 |
| 58. | Seven Segment LED Tester | 01 | Local | 167/- |
| 59. | Delay Line Tester | 01 | Local | 167 |
| 60. | RS232CDriver/Rec.Tester | 01 | Local | 167 |
| 61. | ECL Driver/Recvr.Tester | 01 | Local | 167 |
| 62. | Opto coupler/ Triac Tester | 01 | Local | 167 |
| 63. | Fuses Tester | 01 | Local | 167 |
| 64. | Crystal oscillator & Tester | 01 | Local | 167 |
| 65. | 68000 Tester | 01 | Local | 833 |
| 66. | DRAM Tester | 01 | Local | 667 |
| 67. | IOP Comp.Tester | 01 | Local | 333 |
| 68. | VIA 7 Timer Tester | 01 | Local | 167 |
| 69. | FIFO & Signal Processor Tester | 01 | Local | 167 |
| 70. | Zener Diode Tester | 01 | Local | 167 |
| 71. | Mechanical Gauges for Inspection | Lot | Imported | 333 |
| 72. | BPUCT | 01 | Local | 2000 |

| S.NO | ITEM | QTY | SOURCE | COST US($) |
|---|---|---|---|---|
| 73. | TSWCT | 01 | Local | 2000 |
| 74. | MSWCT | 01 | Local | 2000 |
| 75. | SCUCT | 01 | Local | 2000 |
| 76 | TICCT | 01 | Local | 2000 |
| 77 | AFBCT | 01 | Local | 2000 |
| 78. | TTCCT | 01 | Local | 2000 |
| 79. | SWICT | 01 | Local | 2000 |
| 80. | TUCCT | 01 | Local | 2000 |
| 81. | DTC/DTSCT | 01 | Local | 2000 |
| 82. | IOPCT | 01 | Local | 2000 |
| 83. | ADPCT | 01 | Local | 2000 |
| 84. | PSUCT | 01 | Local | 2000 |
| 85. | CCBCT | 01 | Local | 2000 |
| 86. | TU TESTER | 01 | | 2000 |
| 87. | MUSCATT | 01 | | 2000 |
| 88. | BM Tester | 01 | Local | 3333 |
| 89. | IOP Tester | 01 | Local | 4333 |
| 90. | BM Soak Tester (Generator and Battery back up) | 01 | Local | 16667 |
| 91. | IOP Soak Tester (Generator and battery back up) | 01 | Local | 30000 |
| 92. | Assembly Fixtures | Lot | Indian | 333 |
| | TOTAL | | | 271,104 |
| | | | | |

Note: The Printed Cards and Cabinets are not produced inhouse. These are procured from outside.

**TABLE-5.1.2**

**LIST OF EQUIPMENT/STANDARDS FOR TEST AND CALIBRATION CENTRE**

A. TESTER CENTRE.

| | PRODUCT | TYPEICAL SPEC. | TYPICAL SET UP |
|---|---|---|---|
| 1. | Components (Passive)<br><br>Resistors, Capacitors, Inductors, Transformers, Chokes, Potentiometers, Electromechanical Devices and Relays etc. | R: 0.02 micro ohm to 100 M ohm and secondary parametrs upto 1 Ghz freq.<br><br>L:1 micro H to 100 KH<br><br>C: 10E-5 pF to 1F | Video Bridge<br>Impredence Analysers<br>LCR Meters<br>Q-meter<br>Resistance Bridge<br>Cap. Bridge<br>Ind. Bridge<br>Res.Noise Tester |
| 2. | Components (Active,Discrete) | | |
| | Transistors<br>Diodes<br>Others | Various DC parameters power upto 100W/200A in pulse mode.<br><br>Rise/Fall time characteristics down to 6 nSec. | Programmable curve Tracer with high current Option<br><br>Programmable Pulse Generator<br><br>Waveform process -ing Oscilloscope |
| 3. | Components (Integrated Ccts) | Static parameters covering TTL,ECL, CMOS, Memories & processors, Telecom circuits, Codecs | Digital IC Test System<br>PC Based IC Teser<br>IC Handler<br>Universal EPROM programmer |
| 4. | Subsystems | | |
| | a) Filters & Amplifiers etc. | Frequency 100Hz to 1.5 GHz<br>10 Hz resolution | Spectrum Analyser<br>Emulator<br>Logic Pulser<br>Current Tracer |
| | b) TIC/SN Cards | Emulation of various micro-processors | |

| | | |
|---|---|---|
| c) Transreceivers & RF Systems | Input/output parameters<br>Attenuation 120dB upto 1 GHz(0.4 to 1040 MHz)<br><br>AM,FM,PM functions (55 KHz to 1360 MHz) | Shielded Enclosure<br>Counter<br>Power meter<br>Distortion Analyser<br>Signal generator<br>Mod.Analyser<br>Attenuator<br>Distortion Analyser |
| d) Telephones | Speech & signal parameters | Telephone tester with accessories for tranducer tests |

B. CALIBRATION CENTRE

| | PARAMETER | ACCURACY | TYPICAL SET UP |
|---|---|---|---|
| 1. | D.C. voltage & current | +/-0.5PPM 2.1111110v DC | Potentiometer |
| | | 1 micro V to 1100 V<br>200 micro A to 20 A, 0.03% | DC calibration sys.<br>Meter Calibrator<br>Electronic standard DC power supply |
| | | +/-2ppm/year for 1.00018v at 20 deg. C | |
| | | Power supply DC upto 1000A. | |
| 2. | A.C. Voltage & current | 100 micro V to 1100 V<br>+/- 0.01% to +/-1% | AC Calibration System |
| | | 10 micro A to 20A<br>+/- 0.07% | |
| 3. | Time/Frequency | 1X10E-11/month stability<br>Freq. 0.1,1,5, & 10 MHz | Rubidium Frequency Standard<br>Frequency counter<br>Synthesized Signal generator<br>RF Millivoltmeter |
| | | Frequency count 50 micro Hz to 1 GHz upto 11 digit display | |
| | | Signal generation 1 to 2600 Mhz (-136 to +10dBm) | |

| | | | |
|---|---|---|---|
| | | 10KHz to 2 GHz 1%, -50dBm to 73 dBm | |
| 4. | R.F.Power | +/-0.5% upto 44 dBm 100 KHz to 4.2 GHz. | Power meter |
| 5. | Modulation | +/-1%FSD for AM & FM | Modulation meter |
| 6. | Attenuation | +/-0.02% to +/-0.3% 0 to 140 dB, upto 1 GHz | Programmable Attenuator |
| 7. | Inductance | +/-0.1%, 100 micro H to 10 H | Inductance Standards |
| 8. | Capacitance | +/-5ppm,10pF to 1000 pF<br>+/-0.05%, 0.001 micro F to 1 micro F | Capacitance Standard |
| 9. | Resistance | +/-0.001% to +/-0.02%, 0.001 ohm to 1 M ohm<br>+/-1% upto 1T ohm<br>1 ppm to 0.1% upto 11 G ohm | Resistance Standards |
| 10. | Temperature | +/-0.75 deg C,-80 to +250 deg C | Quartz Thermometer |
| 11. | Oscilloscope | +/-0.25%, 200 micr V to 100 V p-p,250 Khz to 250 MHz | Oscilloscope Calibrator |
| 12. | Computer aid for calibration | | Instrument Controller 16 bit processor & calibration software |

TABLE 5.1.3

**LIST OF MACHINERY AND EQUIPMENT**
**BANGLADESH CABLE SHILPA LIMITED, KHULNA, BANGLADESH**

| SNO. | NAME OF THE MACHINES | QTY. | ORIGIN |
|---|---|---|---|
| | **1. WIRE DRAWING SECTIONS:-** | | |
| 1.1 | Heavy Drawing | 2 | Herborn, W.Germany |
| 1.2 | Medium Drawing | 2 | -do- |
| 1.3 | Fine Drawing | 1 | -do- |
| 1.4 | Tinning | 1 | West Germany |
| | **2. WIRE INSULATING SECTION:-** | | |
| 2.1 | 60- Extruder 20/D | 2 | Troester, West Germany' |
| 2.2 | BM 60-Extruder 20/D | 2 | Maillerfer, Switzerland |
| | **3. TWISTING AND UNIT STRANDING SECTION:-** | | |
| 3.1 | Vertical Type Quadding | 2 | VSB, West Germany |
| 3.2 | Horizontal Type Quadding | 3 | Stolberger, West Germany |
| 3.3 | Basic Unit Twisting | 2 | West Germany |
| 3.4 | S-Z Basic Unit Twisting | 1 | Maillefer Switzerland |
| 3.5 | Big Unit and Core Strading | 1 | Kraft West Germany |
| | **4. CORE FILLING, FOILING AND ARMOURING SECTION** | | |
| 4.1 | Petrojelly filling & foiling | 1 | West Germany |
| 4.2 | Steel Tape Armouring-cum Foiling Machine | 1 | Stolberger, West Germany |

## 5. FINAL JACKETING/SHEATHING SECTION

| | | | |
|---|---|---|---|
| 5.1 | 90-Extruder 20/D | 1 | Troester, West Germany |
| 5.2 | 150-Extruder 20/D | 1 | -do- |

## 6. AUXILIARY MACHINERIES

| | | | |
|---|---|---|---|
| 6.1 | Aluminium Tape and Paper Foil Slitting | 1 | England |
| 6.2 | Checking stand for Quad and Pair | 1 | West Germany |
| 6.3 | Checking stand for Quad and pair-2 | 1 | -do- |
| 6.4 | Small Repairing Stand. | 1 | -do- |
| 6.5 | Big Repairing Stand. | 1 | -do- |
| 6.6 | Coiling machine | 1 | -do- |

## 7. DRUM SHOP

| | | | |
|---|---|---|---|
| 7.1 | Band Saw | 1 | West Germany |
| 7.2 | Table Saw | 1 | -do- |
| 7.3 | Cross Cutting | 1 | -do- |
| 7.4 | Drilling | 1 | -do- |
| 7.5 | Drilling-2 | 1 | -do- |
| 7.6 | Plainer | 1 | -do- |

TABLE 5.1.4

**LIST OF NEW MACHINERY TO BE ADDED FOR MANUFACTURE OF JELLY FILLED CABLES IN BCS**

| S.NO. | NAME OF THE MACHINERY | APPROX. COST (US$) (AS IN 1992) |
|---|---|---|
| 1. | TANDEM LINE-WIRE DRAWING | 340,000 |
| 2. | TANDEM LINE-INSULATON | 2,457,151 |
| 3. | LIGHT DUTY REWINDING MACHINE | 180,610 |
| 4. | TWINNING MACHINE | 867,969 |
| 5. | DRUM TWISTER | 2,393,845 |
| 6. | HEAVY DUTY REWINDING MACH. | 106,720 |
| 7. | MATERIAL HANDLING SYSTEM | 140,824 |
| 8. | MECHANICAL SERVICE | 273,909 |
| 9. | ELECTRICAL SERVICES | 587,516 |
| 10. | TESTING EQUIPMENTS | 675,412 |
| | TOTAL US $ | 7,888,956 |
| | | |

NOTE: ITEMS 1,6,7,8 AND 9 ARE AVAILABLE IN INDIA.

ANNEX 5.2

## INCENTIVES FOR FOREIGN INVESTMENT IN BANGLADESH

(Source :Publication titled "Foreign investment in Bangladesh" published in December, 1992 by the Board of Investment Prime Minister's office, Dhaka, Bangladesh)

The following is an extract from the policy document and presents in brief the salient points and highlights on important aspects.

### GENERAL

Bangladesh offers opportunities for foreign private investment in all areas of its industrial sector, except for reserved sectors such as Defence, Security printing, minting, forests, and transportation areas. Telecommunications fall under the FREE sector.

### ESTABLISHMENT OF AN INDUSTRIAL UNIT

No approval/permission is required for establishing an industry in the free sectors with own source of financing. Approvals are necessary if local investments are involved or when credit exceeds certain values (Rate of interest is more than LIBOR + 4%; Down payment is more than 10% and repayment period is less than 7 years). There is no limitation in respect of foreign equity holdings.

An industrial unit has to be registered with the Board of Investment (BOI), which provides pre- investment counselling, post investment services and monitoring.

### INVESTMENT GUARANTEE

Legal protection is ensured to foreign investment in Bangladesh against nationalisation and expropriation. Repatriation of capital and dividend is also guaranteed. Intellectual property rights are also protected.

**REPATRIATION FACILITIES**

These include

- Repatriation of capital including capital gains

- Remittance of 50% of the salary of foreign nationals and saving from earnings, retirement benefits etc.

- Remittance of Royalty and technical fees (beyond 6% per annum needs BOI approval)

**FISCAL AND OTHER INCENTIVES**

- Tax holiday of 5 years to 12 years depending on the area.

- Import duty @ 10% on capital machinery and spares. Part of this duty ranging from 2.5% to 7.5% (depending on the area and other aspects) will be refunded after the installation.

Establishment of industrial units in the under- developed areas has many other incentives such as exemption of tax on interest on foreign loans, royalty, know-how and technical assistance fee, liberal investment allowance for tax assessment, Tariff protection upto 4 years, income tax exemption to foreign technicians for 3 years, import of second hand/reconditioned machinery having 10 years of life, repatriable dividends treated as new investments if reinvested, and companies (Joint venture or 100% foreign owned) can remain private irrespective of the amount of capital.

**ADDITIONAL INCENTIVES GIVEN TO EXPORT ORIENTED AND EXPORT LINKAGE INDUSTRIES.**

- Highest priority accorded
- Loan upto 90% value of L/C from Commercial Banks
- Special bonded Warehouse against back-to- back L/C or national import duty and VAT payment facilities.
- Duty draw back simplified
- 30% to 100% tax exemption depending on the export performance. Exempted from local taxes
- Importation of raw materials under banned list.

**EXCHANGE CONTROL RELAXATIONS**

Many controls are relaxed to facilitate foreign investment, to encourage exports and to further improve the investment climate. Full details are available in the above publication.

**STOCK EXCHANGE**

The stock exchange market provides services of purchase and sale of shares etc.

**PRIVATISATION**

Large sacale privatisation programme is undertaken by the Government and further diseinvestment programmes of public enterprises are at hand.

**OTHER FACILITIES**

The investors are provided many facilties by various organisations established by the Government such as - BEPZA (Bangladesh Export Processing Zones Authority), BSCIC (Bangladesh Small and Cottage Industries Corporation) and BOI (Board of Investment).

**INVESTMENT OPPORTUNITIES**

Telecommunications is one of the many areas having potential and comparative advantage of investment in Bangladesh.

A congenial economic and potential atmosphere has been established for foreign investment with necessary legal protection, administrative reorganisation, simplification of procedures and attractive incentive packages. Low cost production may be expected.

ANNEX 5.3

## RECOMMENDATIONS FOR ESTABLISHING A QUALITY MANAGEMENT GROUP AND TYPE APPROVAL CENTRE IN BANGLADESH

1. **BACKGROUND:-**

The recently declared industrial policy of Government of Bangladesh has deleted Telecommunications from the sectors reserved for Public investment thereby permitting private sector to provide all telecommunication services including the operation and maintenance of basic network and also for manufacturing all telecom products. The Ministry of Telecommunications has already permitted provision of Customer Premises Equipment (CPE) by the subscribers themselves or by private companies. A contract for provision of telecom facilities in 200 Up zillas covering about half the country has been awarded to a private firm by name Bangladesh Rural Telecom Authority which is free to procure, install and operate its own telecom equipment. In addition, with the liberalisation of the industrial policy, a number of private companies are interested to set up their own facilities for producing telecom products. Hence there is an urgent need to regulate the quality of the products being introduced in the network and to ensure that they meet the required standards of international quality. To enable the Ministry of Communications in performing the task a Quality Management Group should be organised and this group should have facilities to conduct necessary tests before issuing type approval certificates for products manufactured within the country. Towards this objective, it is recommended that a

Type Approval Centre with minimal Conformance test capability is set up in Bangladesh. The following paragraphs give a broad outline of functions of the Quality Management Group and requirements for Type Approval Centre.

2. **QUALITY MANAGEMENT GROUP:-**

2.1 The Quality Management Group should be set up as an important help to Certifying Authority. It is desirable to have a large number of sources supplying high quality products at competitive cost. It is essential that these products before being inducted into the network are evaluated to assure satisfactory performance functionally and over the entire life of the product/equipment. For this purpose, the Quality Management Group plays an important part by undertaking the product inspection and test by actively working with manufacturers and their various wings such as design, productionisation, quality control and inspection departments.

2.2 Objectives and Functions of Quality Management Group:

i) Preparation and issue of specifications.

ii) Continuously monitoring the quality of equipments being procured by BTTB.

iii) Inspection and Test of products (conformance testing) with the help of Type Approval Centre.

iv) Production surveillance, and interaction with quality units of the supplying factories

v) Vendor Development for products.

vi) Improvement and updating of technical specifications.

2.3 **TYPE APPROVAL CENTRE** (TAC):-

The type approval centre shall be responsible for carrying out the tests prescribed by the QMG to be taken on the equipments offered to them for tests. The majority of the equipments being customer end equipments the TAC may have separate laboratories for different items like Telephone materials, Gas Discharge Tubes, Fuses, Batteries, material testing (for PVC cables and dropwires etc.) and measurement lab for measuring dB loss etc. A list of instruments required is given in Table 5.3.1. This table also gives the details of environmental chambers for reliability of components and subs assemblies. In case the entire equipment is to be tested for reliability bigger environmental chambers to create the conditions stipulated in the specifications are required.

Initially the test centre may be used for tests on the customer end equipment like telephone instruments, outdoor plant especially hardware like poles, wires, switch board cables, small power plants. This facility may be gradually extended to cover the other products that may be manufactured. The ultimate objective of the centre should be to aid vendor development in these areas.

3. Setting up a Quality Management Group and Type Approval Centre calls for expertise which may not be available within the country. UNIDO can help by way of providing technical assistance in this regard.

TABLE 5.3.1

**TEST EQUIPMENTS RECOMMENDED FOR TYPE APPROVAL CENTRE, BANGLADESH**

| S.NO. | NAME OF THE TEST EQUIPMENT | APPROX. COST (US $) |
|---|---|---|
| 1. | **TELEPHONE TERMINALS** | |
| 1.1 | Microprocessor base telephone test instruments. (microtronics Canadian make) | 47,600 |
| 1.2 | Keypad Life Tester | 790 |
| 1.3 | Hook switch -life test | 480 |
| 1.4 | Coiled Cord- life test | 480 |
| 1.5 | Line termination jack | 160 |
| 1.6 | Ringer | 160 |
| 1.7 | Tinsel Cord | 500 |
| 2. | **GAS DISCHARGE TUBES** | |
| 2.1 | DC spark over voltage test | 635 |
| 2.2 | Impusle spark over voltage test | 1,000 |
| 2.3 | AC discharge current test | 635 |
| 2.4 | Impulse discharge current test 8/20 micro seconds | 15,900 |
| 2.5 | Impulse discharge current test 10/700 micro seconds | 1,590 |
| 2.6 | Insulation resitors | 635 |
| 2.7 | Residual voltage test | 635 |
| 2.8 | High voltage probes (2 nos) (Tektronics make USA) | 6,350 |
| 2.9 | AVO meter | 254 |
| 2.10 | Digital multimeter | 64 |
| 2.11 | Digital capacitance meter | 10,000 |
| 2.12 | Varistor Tester | 320 |
| 3. | **FUSES** | |

| S.NO. | NAME OF THE TEST EQUIPMENT | APPROX. COST (US $) |
|---|---|---|
| 3.1 | 1/22 Micro secs life test | 320 |
| 3.2 | Blowing current test jig | 320 |
| 3.3 | Pulse test | 320 |
| **4.** | **BATTERY LAB** | |
| 4.1 | Charge/discharge equipment | 10,000 |
| 4.2 | Hot water bath | 635 |
| 4.3 | Drop ball tester | 320 |
| 4.4 | Digital conductivity meter | 320 |
| 4.5 | Test jig for separator | 320 |
| 4.6 | Plastic yield tester | 300 |
| 4.7 | Digital Conductivity meter | 300 |
| 4.8 | Jig to measure predominent pore size of separtors | 30 |
| 4.9 | Digital multimeter | 35 |
| **5.** | **CABLE LABORATORY** | |
| 5.1 | Air compressor | 400 |
| 5.2 | Solder bath test set | 300 |
| 5.3 | Compression device for out through test | 900 |
| 5.4 | Universal bridge | 600 |
| 5.5 | Hot water bath | 160 |
| 5.6 | Earth Tester | 500 |
| 5.7 | Kelvin bridge | 1,800 |
| 5.8 | Hot deformation test apparatus | 128 |
| 5.9 | Melting point apparatus | 100 |
| 5.10 | Digital PH meter | 790 |
| 5.11 | Million Meg ohm meter | 1,500 |
| 5.12 | Hot air oven | 540 |
| 5.13 | Break down & Insulation tester | 700 |
| 5.14 | Single Pan balance | 600 |
| 5.15 | Wheat stonebridge | 200 |
| 5.16 | Optional QC printer | 700 |

| S.NO. | NAME OF THE TEST EQUIPMENT | APPROX. COST (US $) |
|---|---|---|
| 5.17 | Electronic Digital Calipers | 320 |
| 5.18 | Digital capacitance unbalance | 15,900 |
| 5.19 | Universal bridge | 250 |
| 6. | **MATERIAL TESTING LABORATORY** | |
| 6.1 | Tensile testing machine | 3,000 |
| 6.2 | Torsion Testing machine | 1,500 |
| 6.3 | Automatic Universal penetrometer | 700 |
| 6.4 | Abration test equipment | 700 |
| 6.5 | Drop point apparatus | 300 |
| 6.6 | Tensile testing machine (high range) | 1,500 |
| 6.7 | Solderability test | 300 |
| 7. | **RELIABILITY LABORATORY** | |
| 7.1 | Hot cold humidity chamber-programmable (large capacity) | 63,500 |
| 7.2 | Hot cold humidity chamber-programmable (small capacity) | 31,700 |
| 8. | **FAILURE ANALYSIS** | |
| 8.1 | Metallographic microscope | 31,700 |
| 8.2 | Zoom microscope | 15,900 |
| 8.3 | Decapping tools of various types | 2,000 |
| 8.4 | Life test jig for relays | 15,900 |

9. MEASUREMENT LAB:-

| S.NO. | NAME OF THE INSTRUMENTS | COST (US $) |
|---|---|---|
| 9.1 | SSI/MSI/DC Parameteric functional and Dynamic parameteric test system. CODE: 9207 | 98,670 |
| 9.2 | LSI/MSI/ Functional, Static, Dynamic Test System Code no.9240 | 131,890 |
| 9.3 | Programming Station for 9240 | 12,303 |
| 9.4 | Discrete Semiconductor Tester | 157,204 |
| 9.5 | Frequency Meter type no 2710/1<br>Logic Analyser type AL 7600 | 7,345 |
| 9.6 | Oscilliscope type no. 5218 | 6,649 |
| 9.7 | Thermostream Equipment | 6,350 |
| 9.8 | Current Source 103 A | 1,460 |
| 9.9 | Pico Ammeter type 614 | 1,428 |
| 9.10 | Micro ohm Meter type MV300A/CS/1010A | 1,682 |
| 9.11 | Selective Level Meter<br>Level Generator PSS 116<br>Display Unit SG-4 | 21,746 |
| 9.12 | VBE Tester (Thermal Resistance) type no. 7804-KTTester | 7,528 |
| 9.13 | LCR Meter (100 KHz) | 4,920 |
| 9.14 | LCR Meter (100 MHz) 4275-A | 3,841 |
| 9.15 | Digital High Capacitance meter 4282-A | 2,127 |
| 9.16 | Pulse Generator (programmable) 2161-A | 9,841 |
| 9.17 | Q-Meter 4342-A | 2,350 |
| 9.18 | High Voltage source PR 12P | 2,380 |
| 9.19 | Noise Meter NM 1500 | 4,190 |
| 9.20 | Current Source 103-A<br>Current Source 103-A | 1,460<br>1,460 |

| S.NO. | NAME OF THE INSTRUMENTS | COST (US $) |
|---|---|---|
| 9.21 | Insulation Tester C1-500C | 4,571 |
| 9.22 | Solartron 7065 | 492 |
| 9.23 | TOTAL | 789,883 |

NOTE: ALL ITEMS FOR SECTIONS 1 TO 9 ARE INDIAN PRODUCTS.

ANNEX 5.4

## LIST OF OFFICERS MET IN BANGLADESH

1. Mr. Fazlur Rahman - Chairman (T&T Board)
2. Mr. M.H.Choudhury - Member M&O (T&T Board)
3. Mr. Manwar Ali - Director M&O (T&T Board)
4. Mr. Md. Fazlur Rahman - Director (Int) (T&T Board)
5. Mr. S.D.Khan - Chief Planning, Ministry of Posts and Telecommunications, Dhaka
6. Mr. N.H.Choudury - Dir. Computer and Data Network, BTTB, Dhaka.
7. Mr. Waddood - Director BTTB and MD, BCS, Khulna.
8. Dr. Hannak, Programme Officer (UNIDO, Dhaka).
9. Dr. Syeed Yusuf Farooq - Member (Executive Counsel) Board of Investment (Dhaka)
10. Mr. A.R.Saber - M.D. Telephone Shilpa Sangstha Ltd. Tongi, Dhaka
11. Mr. Nizamuddin Ahmed Choudhury - DGM, TSS, Dhaka.
12. Mr. Md.Afzal Hossain Mollah, Manager, Testing BCS, Khulna
13. Mr. Atiar Rahman, Manager Production, BCS, Khulna.
14. Mr. A.K. Rashiduzzaman, Manager Maintenance BCS, Khulna
15. Mr. Shamsher Rahman, Manager, (Admn) BCS, Khulna
16. Mr. Alhaj Md. Monjurul Islam, Manager (F&A) BCS, Khulna
17. Mr. S.K.Biswas, Dy. Manager, (P&S) BCS, Khulna.
18. Mr. Nurun Nabi, M.D.Bangladesh Rural Telecom Authority, Dhaka

ANNEX 6.1

# NEPAL
## FACTS AND FIGURES

| | | |
|---|---|---|
| Land area (Sq.km.) | : | 140797 |
| Local Currency | : | Rupee |
| Capital | : | Kathmandu |
| Telecom Authority | : | Ministry of Communications |
| Telecom Operators | : | Nepal Telecommunications Corporation (NTC) |

| | Year Ending 15.7 | 1991 |
|---|---|---|
| 1. | **DEMOGRAPHY AND ECONOMY** | |
| a. | Population | 19,605,000 |
| b. | Gross Domestic Product (GDP) (M US $) | 2,826 |
| c. | GDP Per Capita (US $) | 140 |
| d. | Gross Fixed Capital Formation (GFCF) (M US$) | 571 |
| e. | Annual Average Exchange Rate (Nepal Rupee per 1 US $) | 37.255 |
| f. | Consumer Price Index (1985=100) | 196 |
| 2. | **TELEPHONE NETWORK** | |
| a. | Number of main telephone lines in operation | 65,298 |
| b. | Main telephone lines per 100 inhabitants | 0.33 |
| c. | Capacity of local exchange | 78,460 |
| d. | % capacity used | 83 |
| e. | % of main lines connected to digital exchanges | 83 |
| f. | Number of public pay phones | 266 |
| g. | Public Pay phones per 1000 inhabitants | 0.01 |
| h. | Waiting list for main telephone lines | 90,031 |
| 3. | **OTHER SERVICES** | |
| a. | Number of Telex Subscribers | 613 |
| b. | Number of Facsimile Stations | 300 |
| c. | Number of mobile telephone subscribers | - |
| d. | Number of radio paging subscribers | - |
| e. | Number of subscribers to public data networks | ... |

| | | |
|---|---|---|
| 4. | **STAFF** | |
| | a. Total fulltime staff employed in telecommunication services | 3,546 |
| | b. Main telephone lines per employe | 18 |
| 5. | **REVENUE AND INVESTMENT (M US$)** | |
| | a. Revenue from telecommunications | 25.0 |
| | b. As $ of GDP | 0.9 |
| | c. Annual investment in Telecom. | 3.1 |
| | d. as % of GFCF | 0.54 |

ANNEX 7.1

## LIST OF OFFICERS MET IN NEPAL

1. MR. B.K.L. JOSHI, SENIOR PGORAMME OFFICER, UNIDO, KATHMANDU

2. MISS ANJANI BHATTARAI, PROGRAMME OFFICER, UNIDO, KATHMANDU

3. DR. S.K. HAJELA, AREA REPRESENTATIVE, ITU, KATHMANDU

4. MR. BORA, GENERAL MANAGER, NEPAL TELECOM. CORPORATION KATHMANDU

5. MR. CHET PRASAD BHATTARAI, DGM PLANNING, NTC, KATHMANDU

6. MR. HALDAR DIRECTOR TRANSMISSION, NTC, KATHMANDU

7. MR. RAJENDRA BAJRACHARYA, MANAGER (MATERIALS MANAGEMENT), NTC, NEPAL

8. MR. CHITRAKAR, MANAGER TELECOM TESTING CENTRE, NTC, KATHMANDU

9. MR. BIMAL PRASAD KOIRALA, JT. SECRETARY, MINISTRY OF INDUSTRIES, KATHMANDU

10. MR. CHIRANJIBI SHARMA, UNDER SECRETARY, MINISTRY OF INDUSTRIES, KATHMANDU

11. MR. H.R. GANSHYAM, FIRST SECRETARY, EMBASSY OF INDIA, KATHMANDU

12. MR. BADRI P.OJHA, DY. SECRETARY GENERAL, FEDERATION OF NEPALESE CHAMBER OF COMMERCE AND INDUSTRIES, KATHMANDU

13. MR. V.K. SHAH, VICE PRESIDENT, FEDERATION OF NEPALESE CHAMBERS OF COMMERCE AND INDUSTRIES, KATHMANDU. SIRAC SOFTWARE PVT. LTD.

14. MR.JB.SHRESTHA MD NEPAL TRANSFORMER (P) LTD, KATHMANDU

15. MR. VIJAY DUGAR, DIRECTOR, DUGAR BROTHERS, KATHMANDU

16. MR. MOHAN GOPAL KHETAN, HON.VICE PRESIDENT FNCCI, KHETAN INDUSTRIES, KATHMANDU.

17. MR. MANOJ KEDIA, DIRECTOR, NEPAL TRANSFORMER COMPANY LTD, KATHMANDU

18. MR. NEERAJ K. SURANA, SWADESH CABLE INDUSTRIES, KATHMANDU

19. MR. YUG R. TAMRAKER, DIRECTOR YETI & CO.PVT. LTD. KATHMANDU

20. MR. ANAND PREMI, GENERAL MANAGER, SWADESH CABLES KATHMANDU